MUNICIPAL DEVELOPMENT STANDARDS

March 2022

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1 Introduction to Standards

1.1 FOREWARD

This document, “Town of Millet - Municipal Development Standards”, has been prepared to guide the designer and development industry in the design of municipal improvements and systems that will meet the requirements and ultimate approval of the Town of Millet.

These Standards encourage good engineering and construction practices. Any deviation from these Standards requires a formal request complete with justification to the Town of Millet for approval prior to implementation.

This manual will be updated on an as-required basis and shall be a useful tool for all persons interested in developing within the Town of Millet. Persons in receipt of and using the Municipal Development Standards are required to ensure they have the latest revisions. Current revisions of the document are available on the Town’s website (www.millet.ca) or from the Millet Civic Centre located at 4528 51 St Millet, AB T0C 1Z0

1.2 SCOPE

1.2.1 Municipal Development Standards

These Standards and Procedures apply to the preparation, submission and approval of engineered plans for all proposed developments. Municipal servicing of rural or urban residential, commercial and industrial developments will require the following minimum plans for review and approval:

- Water distribution systems, fire protection systems and lot service connections;
- Sanitary sewage systems and lot service connections;
- Storm collection systems, lot grading and lot service connections;
- Facilities including storm water management facilities;
- Roadways, sidewalks, curb and gutter and lane improvements;
- Shallow (franchised) utilities (i.e. gas, power, lighting, telephone and cable television);
- Landscaping requirements including hard and soft elements and walkway systems.

1.2.2 Re-Development

The Standards outlined in section *1.2.1 Municipal Development Standards* also apply to the re-development of residential and industrial/commercial lands.

1.3 DEFINITIONS

In this manual the following words shall have the meaning hereinafter assigned to them:

- "Applicant" shall be synonymous with Developer.
- “Approved for Construction” shall be the ultimate acceptance by the Town of drawings and documents as submitted by the Developer, confirming that they have been reviewed and found to be in conformance with the municipal development standards. This approval does not relieve the Developer or Consulting Engineer of their responsibilities to ensure that all work proposed and completed continues to be in conformance
- “Construction Completion Certificate (CCC)” shall mean a certificate issued by the Consulting Engineer and executed by the Town confirming that the work is complete and operational; all deficiencies have been resolved to the satisfaction of the Town and the warranty period for the work has commenced. See Construction Completion Certificate in the Municipal Development Standards, Appendix B.
- "Developer’s Consultant or Consulting Engineer" shall mean the professional engineer retained by the Developer to be responsible for the design, layout and supervision of construction, recording as-built information, certifying the installation is in accordance with the current standards, submitting design drawings and design specifications, and performing these duties in connection with the provision of municipal services as set out in this document.
- "Contractor" shall mean any person, persons or corporation who shall enter into a contract to undertake installation of municipal services on behalf of either the Developer or the Town.
- "Developer" shall mean any person, persons or corporation which has applied to enter into a development agreement 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.
- “Development Agreement” shall mean a contract between the Developer and the Town detailing the responsibilities of both the Developer and the Town in relation to a particular development.
- “Development Authority” shall mean the Chief Administrative Officer of the Town of Millet and/or his appointee.
- “Easement” shall mean an easement, interest or right held by the Town of Millet for the purpose of providing utilities, access or drainage.
- "Engineer” shall mean an individual appointed by the Town that represents the Town in any engineering or related functions, also called the “Town’s Engineer”.
- “Environmental Reserve (ER)” shall mean land owned by the Town to be preserved in its natural state. Environmental Reserve includes swamps, gullies, ravines, natural drainage courses, flood plains, steep slopes and shorelines as defined in Section 664(1) of the Municipal Government Act of Alberta, as amended.

- “Final Acceptance Certificate (FAC)” shall mean a certificate issued by the Consulting Engineer and executed by the Town, confirming that the work is complete and acceptable to the Town, that all deficiencies and maintenance work has been resolved to the satisfaction of the Town, and that the warranty period for the work has expired. See Final Acceptance Certificate in the Municipal Development Standards, Appendix B.
- "Landscape Consultant" shall mean the Landscape Architect or qualified landscape designer that is retained by the Developer to be responsible for the design, layout and supervision of installation of landscape and related work; recording as-built information; certifying that the material and installation is in accordance with the standards, design drawings and design specifications; and performing those duties in connection with the provision of municipal services as set out in these Municipal Development Standards.
- “Local Improvements” to be provided by the Developer shall include but are not limited to: deep utilities, shallow utilities, franchise utilities, roadways, lanes, street lighting and landscaping, also called “Municipal Improvements”.
- “Maintenance” shall be Developer’s sole responsibility for any and all repairs, rework and replacements of any improvements which, in the opinion of the Town, is necessary to address during the warranty period.
- “Municipal Reserve (MR)” shall mean land owned by the Town for the development of parks and school grounds pursuant to Section 666 and Section 667(1) of the Municipal Government Act of Alberta, as amended.
- “Open Space” or “Public Open Space” shall mean any parcel of land or body of water which is set aside and reserved for public use including Municipal and Environmental Reserves.
- “Outline Plan” shall mean a plan providing a more specific planning framework and servicing strategy for an area included in an Area Structure Plan and conforms to the general principals and concepts established in the Area Structure Plan.
- “Public Utility Lot (PUL)” shall mean land designated for a public utility.
- "Rural" shall generally mean an area within the Town limits with “rural services”.
- “Rural services” shall generally mean an area with either a private individually owned water supply system and sewage collection system or public trickle fill water supply system and low pressure sewage collection system.
- "Town" shall refer to the Town of Millet.
- "Urban" shall generally mean an area within the Town limits with “urban services”.
- “Urban services” shall include Town owned sanitary collection system and water distribution system installed to the property in an urban development.

- "Warranty Period" shall mean a minimum two (2) year period of time commencing with the execution of a Construction Completion Certificate and ending with the execution of a Final Acceptance Certificate. The warranty period duration will be coordinated to correspond with the development agreement.

1.4 REFERENCE MATERIALS

Throughout the Standards, reference will be made to other standards and regulations. These include, but are not limited to:

- Occupational Health and Safety Rules and Regulations;
- Transportation Association of Canada, Geometric Design Guide for Canadian Roads (including supplements);
- Alberta Infrastructure, Highway Geometric Design Standard;
- Transportation Association of Canada (TAC);
- Manual of Uniform Traffic Control Devices for Canada (MUTCD);
- Alberta Environment and Parks: Standards & Guidelines for Municipal Waterworks, Wastewater Systems, and Stormwater Management Guidelines;
- Canadian Standards Association (CSA);
- American Society for Testing and Materials (ASTM);
- American Water Works Association (AWWA).

1.5 FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY ACT

The Freedom of Information and Protection of Privacy Act is in effect for the Town of Millet and it gives any person a right of access to the records in our custody or control, subject to limited and specific exceptions. All documents and information, including correspondence, agreements, plans and specifications that are written, photographed, recorded or stored in any manner by the Town of Millet may be subject to the access and privacy provisions of the Act.

While the Town will endeavour to use Sections 16 through 29 of the Freedom of Information and Protection of Privacy Act, as amended, to protect the confidentiality of the information identified by the Developer or his agents 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 Town's custody and control.

2 Procedures for Development

2.1 GENERAL

In addition to these Municipal Development Standards, the Town of Millet has a number of documents that Developers and/or their agents should be fully aware of in advance of undertaking the design of a specific subdivision or project. These documents include:

- Municipal Development Plan – 2015
- Land Use Bylaw – 2018

Together the Town's "Municipal Development Plan – 2015" and the "Land Use Bylaw – 2018" serve to guide future growth and development and put forward a list of permitted and discretionary uses for each land use district which may coincide with specific design parameters.

The Town encourages Developers to initiate early preliminary meetings with Town administration to discuss various land development concepts, proposals and alternative options.

2.2 SUBMISSION AND APPROVAL

2.2.1 Area Structure Plans, Outline Plans and Supporting Documents

The Developer shall prepare and submit for review and approval an Area Structure Plan (ASP) of the road network, site servicing layouts and landscape improvements for developments completed within new subdivisions. For submission to the Development Authority the ASP will include or be accompanied with Outline Plans showing detailed calculations and layout supporting the means by which the development will be serviced including all proposed right-of-way's, easements, and utility lots.

Conceptual 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.

2.2.2 Detailed Engineering Drawings and Specifications and Landscape Plans

Upon acceptance of the ASP and Outline Plans, the Developer shall submit for approval to the Development Authority two (2) sets of full size design drawings and specifications, sanitary sewer, storm drainage and water distribution network diagrams and geotechnical report(s) sealed by a Consulting Engineer registered in the Province of Alberta. All full size drawing and specification submissions need to be accompanied by an electronic duplicate of the same document in PDF format.

The review by the Town is for the sole purpose of ascertaining conformance to the current Municipal Development Standards, Land Use Bylaw and all other Municipal Plans, Master Plans, Standards and Guidelines. Approval to construct does not relieve the Developer of his responsibility for errors or omissions or meeting all requirements of the Municipal Development Standards and other Federal and Provincial Acts and Regulations.

Engineering drawings, diagrams and reports must be sealed by a Professional Engineer registered in the Province of Alberta. Landscape plans are to be submitted with the Engineering Drawings and be signed by the Landscape Consultant, who is a member in good standing of the Alberta Association of Landscape Architects.

Other information required prior to construction:

- Fully endorsed development agreement;
- Geotechnical Investigation;
- Design calculations shall be provided for, but not limited to, the Water Distribution System, Sanitary Collection System, and Stormwater Management;
- A copy of any required approvals from Alberta Environment;
- Tender documents and construction specifications;
- Traffic Impact Analysis if applicable;
- Construction drawings and specifications.

2.2.3 Approval by the Development Authority

The Development Authority shall inform the Developer, within twenty (20) working days after receipt of the detailed design submission, whether or not the Developer's submission has been approved for construction. Should the Development Authority not approve a part of the Developer's plans or proposals, they will be returned to the Developer for revision to the satisfaction of the Town. The twenty (20) working day approval period will begin again on the receipt of any re-submission.

Subsequent design submissions requiring changes to the previous submission shall consist of the following:

- Two (2) complete sets of drawings supplemented with an electronic duplicate in PDF format;
- All submissions subsequent to the first submission shall have highlighted with yellow any changes made by the design engineer which are in addition to "Red Line" revisions to accommodate the changes required by the Town of Millet.

2.2.4 Development Agreement

Developments within the Town of Millet that include new (greenfield) subdivision developments, and/or municipal improvements require a Development Agreement. The Town of Millet will prepare

a detailed draft Development Agreement for review with the Developer. Once the elements of the draft agreement are finalized, a final agreement will be prepared for signature.

The Development Agreement will detail the duties and responsibilities of both the developer and the Town of Millet in respect to the development. Generally, the Developer will be responsible to either construct, or provide funds to the Town of Millet for the construction of municipal improvements that will be required for the development.

2.2.5 Design Revisions after Approval

Whenever it is necessary to make changes to the design drawings after they have been approved, two (2) prints of each original drawing affected shall be submitted with the proposed changes shown in red with an electronic duplicate in PDF format, accompanied by a letter outlining the reasons for the required changes. The Engineer will inform the Developer within ten (10) working days after receipt if the proposed changes meet the approval of the Town. One (1) copy of the requested change will be signed and returned, accompanied by a letter authorizing the changes to be made on the original approved detailed design drawings. No changes are to be made to any original approved drawings without following this procedure.

2.2.6 Municipal Development Standards Deviation Process

The Developer shall identify and provide justification for any deviations from the Municipal Development Standards along with their submission.

The Town of Millet has the ultimate authority to reject and proposed deviations from the current Municipal Development Standards.

A deviation from the Municipal Development Standards will not be considered by the Town without the submission of detailed documentation demonstrating the justification for the deviation and the added benefit to the Town.

2.2.7 Approval by the Alberta Environment

The Developer shall be responsible to obtain Alberta Environment approvals. A copy of all correspondence, and the approval, shall be included in the submissions package to the Town. For the proposed development, Alberta Environment approval is a condition of the development agreement. Obtaining any approvals in no way removes the responsibility of the Developer to comply with the Municipal Development Standards to obtain the Town's approval to construct.

2.2.8 Mailing Address and Canada Post - Community Mailboxes

Mailing addresses for new developments will be determined by the Development Authority with collaboration from the Developer. The Developer is responsible to coordinate community mailbox locations with Canada Post. Proposed locations of community mailboxes are to be shown on all development plans. The Development Authority has final approving authority of all community mailbox locations.

2.2.9 Approval by Other Agencies

The Developer shall submit documentary evidence to the Development Authority that permission has been received from appropriate authorities and utility companies to address pipelines, railways, highways or other facilities. All agreements and approval are to be in place prior to approval to construct.

2.2.10 Acts, By-Laws and Standards

Any reference to Acts, By-Laws and Standards shall be to the most recent edition of each applicable document.

2.2.11 Required Drawings

2.2.11.1 Cover Page

The cover sheet shall include the following project information:

- Project Name & Reference Number if applicable;
- Description of the location of the project and/or legal description of lands involved in the project;
- Site location (key plan) showing the extents of the development and any offsite improvements;
- Developer's Consultant's logo (if available);
- Developer's name/logo (if pertinent);
- The year of construction.

2.2.11.2 Legend Page

The Legend page shall contain all symbols with definitions used in the project and an index of all drawings contained in the set.

2.2.11.3 Site Plan

This drawing shall include, but not limited to, the following existing and proposed information:

- Property lines;
- Street names, lot and block numbers;
- All easements and right of ways;
- Water, sanitary, storm information (pipes, valves, hydrants, catch basins, manholes, etc.,);
- Curb lines, sidewalks, trails;
- Limits of contract;
- Drawing number references to plan/profile and plan details sheets;
- Community mailboxes;
- Shallow utilities;
- Overhead utilities;
- Surface drainage.

2.2.11.4 Storm Water Management Plan

A Storm Water Management plan shall at minimum consist of the following:

- Include the site and surrounding area (400 m minimum outside of the development) showing roads and major features (1:2500 scale). A small location plan of the watershed is also to be included;
- Topographic contours of the existing ground (0.5 m intervals), with source and date;
- Major flood routing (1 in 100 year event);
- Stormwater management facility details, if applicable;
- Area, in hectares, of the development and the total area of the drainage basin;
- Directional arrows of the flow within the site and on surrounding and impacted areas;
- Sub-catchment boundaries, coefficients and areas;
- Pipe system including size, grade and minor and major flows (a table may be utilized).

2.2.11.5 Water-Sanitary-Storm Plan/Profiles

The plan/profile drawings shall show all the detailed information as to the underground utilities to be installed. Scales to be used are: 1:500 horizontal and 1:50 vertical.

The top half of a Plan/Profile sheet shall show the plan view, and shall show all the property lines (proposed, existing), legal description of all properties, the location of catch basins, underground utilities such as sanitary sewer, storm sewer, water, telephone, television, power, cable, manholes, valves, hydrants, curb cocks, inspection chambers, etc.

The following shall also be shown:

- Dimensions from all mains to property line to two (2) decimal places;
- Label all mains with the following: *###mm Material Wtr/San/Stm* (ex. 200mm PVC Wtr);

- Manhole numbers;
- Service/lateral diameter and material as well as inverts at the end of pipe;
- Existing franchise utilities with type and size (if applicable).

The bottom half of a Plan/Profile sheet shall show the profile view and show the following:

- Surface profiles of both the existing and design/proposed;
- Label all mains length, size, material, type, and grade of each main (ex. *###m-###mm PVC Wtr/San/Stm @ #.##%)*;
- Show the invert and top of pipe (crown) of all mains;
- Invert elevations at the inlet and outlet side of all manholes;
- Manholes are to be labelled with their respective number as well as the rim elevation;
- Franchise utilities with type, elevation, and size (if applicable);
- Bedding type, backfill, and surface restoration;
- Grades are to be to two (2) decimal places, while all invert, top of pipe, and rim elevations are to be to three (3) decimals;

2.2.11.6 Surface Works and Lot Grading Drawings

The surface works and lot grading sheet shall show all detailed information as to the road design and area grading. This sheet(s) shall be drawn at a scale of 1:500 and shall include the following:

- Property line, (proposed and existing);
- Legal dimensions of all properties;
- Legal description of all properties (Lot: ## / Blk: ## /Pln: ######);
- Property design lot elevations (two (2) decimals);
- Proposed garage elevations;
- Lot grade arrow and percent of slope;
- Hydrants, valves, manholes, catch basins, service shutoff valves and inspection chamber;
- Sidewalk (separate sidewalk shall show both sides of the walk while a monolithic walk will only show the back of walk);
- Face of curb (gutter) line with design/as-built elevations at grade changes, end of curb/back of curb, catch basins (three (3) decimals);
- Edge of pavement line;
- Gutter grade percent (two (2) decimals) with flow direction arrow;
- Area of pavement to be constructed or as-built shall be hatched;
- All manholes shall show their number and rim elevation (design/as-built);
- Centerline elevations at critical locations (grade change, vertical curves, etc.).

2.2.11.7 Street Sign, Pavement Markings, Traffic Control Devices

A separate plan shall be prepared in all cases for road surface works. This plan(s) shall detail all eradications, alterations, additions and new regulatory and advisory signage and line painting. The design shall conform to Manual of Uniform Traffic Control Devices guidelines. The following information shall be shown:

- Dimensions, lengths and color of proposed lane or curb markings, medians and crosswalks;
- Lane widths, median radii and taper ratios;
- Dimensioned location and type of new or relocated signs.

2.2.11.8 Landscaping

The landscaping sheet(s) shall show all detailed information as to the landscaping of the development. This shall show what is to be constructed as well as what is to be removed. This sheet(s) shall be drawn at a scale of 1:500 and shall include the following as a minimum:

- Fencing;
- Seeded/sod areas;
- Tree/shrub locations and types;
- Flower beds;
- Trails;
- Playground Equipment;
- Park/trail signage and lighting;
- Bollards.

2.2.11.9 Details

The Detail Drawing(s) shall show all specifications for construction which are not covered or specifically detailed in the Town of Millet Design Standards. Where there is a Standard Detail, it is expected to refer to the Standard Drawing Number. It is not necessary to include or provide work(s) for which there is a Standard Drawing.

2.2.12 Requirements for Geotechnical Reports

It is the responsibility of the Developer to have a Geotechnical Report completed by a Professional Geotechnical Engineer registered in the Province of Alberta and submit the report to the Development Authority for review. The Geotechnical Report shall include information about:

- Suitability of the soil for the type of development proposed;
- Physical properties of soil;
- Mechanical properties of soil;
- Design parameters (including water tables, sulfates and frost zone);
- Foundations, road structure and pavement design and any special construction requirements.
- Location of all bore holes and bore hole logs showing original ground elevation at the test hole and recorded water levels.

2.2.13 Reference Standards

All references to specifications, standards or methods of technical associations refer to the latest adopted revision, including all amendments, in effect on the date of submission of bids, except where a date or issue is specifically noted.

2.3 GENERAL CONSTRUCTION REQUIREMENTS

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 meet the following general requirements.

2.3.1 Occupational Health and Safety

The Developer, Contractor, Consulting Engineer and Landscape Consultant shall comply with the provisions of the Occupational Health and Safety Act in Alberta. All subcontractors at the worksite shall also comply with the requirements of this Act. The Contractor shall be the general representative and agent to the Developer for the purposes of ensuring compliance with safety regulations for both itself and any subcontractors. The Contractor shall bring to the attention of subcontractors the provisions of the Occupational Health and Safety Act.

2.3.2 Project Supervision

The Consulting Engineer shall be responsible for the layout, field surveys, inspection, approval of materials and the supervision of all improvement installations which are the responsibility of the Developer. The Consulting Engineer or his authorized representative shall be on-site at all times during the installation of services to certify that all improvements are in conformance with the approved plans and specifications.

In addition to supervision carried out by the Consulting Engineer, the Town may periodically inspect the work and assist in coordinating the subdivision works with any related Municipal works. The Town will bring the use of any unacceptable materials or practices to the attention of the Consultant. If remedial action is not taken to the satisfaction of the Town, a Stop Work Order (See 2.3.11) will be issued and all work will cease. The unacceptable work will be corrected and/or replaced.

2.3.2.1 Coordination of Survey Layout and Materials Testing

The Consulting Engineer will coordinate with the Contractor survey layout and materials testing as required. Minimum 24hr notice for survey layout or material testing services must be provided by the Contractor. Inadequate notice (less than 24hrs) to schedule these services will result in potential delays that will be the responsibility of the Contractor and their staging plan.

2.3.3 Right-of-Way Documents

Where easement or right-of-way documents are deemed necessary, they shall be prepared by a registered Land Surveyor at the Developer's expense. Easements or right-of-ways shall be of sufficient size to allow access for maintenance purposes. All easements and right-of-ways shall be registered in the Town of Millet's name.

2.3.4 Construction Approval

Upon receipt and approvals of certified drawings and specifications, the Developer on the satisfactory execution of Development Agreement and payment of security deposit may proceed to install the municipal improvements.

A copy of all approved drawings and specifications shall be maintained at the construction site during the installation of services.

2.3.5 Construction Commencement Notice

The Developer shall give the Engineer at least two (2) weeks notice prior to commencing construction to allow for time to arrange for inspection staff.

2.3.6 Stockpile Locations

The location and composition of all stockpiles on Town of Millet property shall be approved by the Town. All agreements with private landowners must be provided in writing and approved by the Town.

2.3.7 Barricades, Guards and Safety Provisions

The Developer is responsible to protect persons from injury and to avoid property damage. The Developer shall place and maintain adequate barricades, construction signs, warning lights and guards during the progress of the construction work and until it is safe for traffic or pedestrian use. Whenever required, flag people shall be provided to prevent accidents.

2.3.8 Erosion and Sedimentation Control

The Developer shall have erosion and sedimentation control measures in place to prevent erosion and the transport of sediment from the development. The Developer shall comply with the 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 and adverse effects on the environment.

2.3.9 Traffic and Utilities Controls

Approvals
Prior to any work being done within the Municipal right-of-way, the Developer must obtain approvals from the Town of Millet at least five (5) working days prior to work commencing.

A Traffic Accommodation Strategy (TAS) showing proposed temporary construction signage layout, identified work area, and pedestrian accommodation (if required) must be submitted to the Town for review.

Traffic Disruption
Excavations for pipe laying operations shall be conducted to cause minimal interruption to traffic. The Developer shall provide and maintain safe and suitable temporary bridges at street and driveway crossings where traffic must cross open trenches. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes or other utility controls shall be unobstructed and accessible during the construction period.

Utility Disruption
Adequate provision must be made for the flow of sewers, drains and water courses encountered during construction. No valve, switch or other control on the existing utility system shall be operated for any purpose by the Developer. If utility disruption is unavoidable, the Town must have a written request for a temporary shutdown stating timelines for shutdown and a contingency plan for unforeseen problems. A minimum of five (5) days notice shall be required. A response will be given within 24 hours to leave enough time to give affected residents and businesses a written notice a minimum of 72 hours before shutdown. All costs incurred by the Town will be the responsibility of the Developer.

Adjacent Property Owner Notification
All property owners affected by such operations shall be notified by the Developer in consultation with the Engineer 72 hours before the service interruption and advised of the probable time when service will be restored.

Detours
Prior to any road closure, the Developer must submit a detour plan to the Development Authority for approval. The Developer shall be responsible for supplying, placing and maintaining detour signage for the duration of construction. Garbage pickup must be coordinated with the Town and facilitated with impacted residents. Emergency access must be maintained at all times.

Signage
The Developer must, at his expense, provide, erect, and maintain all signs, barricades, flares, flagpersons, etc.

2.3.10 Boundary Controls

A boundary valve is to be placed at the tie-in to the existing water distribution system as approved by the Town. All boundary valves are to be operated by the Town of Millet Public Works personnel.

2.3.11 Stop Work Order

The Town may issue a "Stop Work Order" to the Contractor due to non-conformance. Examples of non-conformance includes:

- Unsafe practices;
- Imminent danger;
- Lack of traffic control;
- Failure to submit required testing certification;
- Construction not in accordance with approved drawings and specifications;
- Non-compliance with the development requirements;
- Damage to existing facilities.

Should a "Stop Work Order" be issued, the Developer shall immediately cease operation, rectify the non-conformance, and obtain the Town of Millet's approval prior to proceeding.

2.4 RECORD DRAWINGS AND OTHER DOCUMENTS

The Developer shall submit record drawings and other related information giving detailed measurements of the actual municipal services constructed to the Development Authority. The submission of this data for record purposes is a condition of the execution of a Construction Completion Certificate by the Town. If applicable, Record Drawings can be completed in two stages.

2.4.1 Underground Construction

On completion of the sanitary sewer, storm sewer, the water distribution system, and lot servicing, the Developer shall submit to the Development Authority two (2) sets of as-built drawings, an electronic copy (pdf format) and video-inspection tests.

The Consulting Engineer shall certify that all work had been completed in accordance with the plans and specifications, the Municipal Development Standards and that all work and deficiencies have been completed. A written request must be submitted to the Town of Millet for Chlorination of water distribution system.

Together with the above, the Developer shall submit the lot service records, compaction test results, successful pressure, leakage, and chlorination tests and an accurate as-constructed bill of materials for the Town's inventory database.

Upon satisfactory acceptance of this data, the Developer may request a construction completion inspection for underground improvements.

2.4.2 Surface Construction

After satisfactory completion of surface improvements and as a condition of the execution of Construction Completion Certificate for surface improvements, the Developer shall submit the following information to the Development Authority:

- Certification by the Consulting Engineer that all work has been completed in accordance with the plans and specifications, the Municipal Development Standards, and that all work and deficiencies have been completed;
- Two (2) sets of black line prints and an electronic copy of as-constructed drawings sealed by a professional engineer registered in the Province of Alberta. At this stage, the drawing shall be stamped "Record Drawings";
- All previously unsubmitted certificates concerning materials inspection and testing, mix designs, deflection tests, concrete strength tests, and compaction tests, as required by this document and by the Town of Millet;
- Operation and Maintenance Manuals, spare parts, and lubricants;
- Completed tender document as tendered by the successful contractor and a copy of the Final Progress Payment Certificate;
- An accurate as-built bill of materials for the Town's inventory database.

Upon satisfactory acceptance of this data, the Developer may request a construction completion inspection for surface improvements.

2.4.3 Seasonal Conditions

Should seasonal conditions not permit the inspection, execution of the Construction Completion Certificate by the Town will be delayed until appropriate conditions exist and/or conditional acceptance may be granted based on the Consulting Engineer's Certification.

2.4.4 Additional Information

Record drawings shall be of the same format as the original construction drawings with all changes noted and the following information added:

- Design data is erased on original and replaced with record data;
- All hydrants, valves, curb stops, manholes and catch basins are to be dimensioned in two (2) directions.

2.4.5 As-built Survey

Included with the project as-built submittal drawing shall be a coordinate file (PNEZD-comma delimited) containing as-built (as-constructed) locations and elevations of all surface structures.

This coordinate file shall be referenced to the Town's coordinate system and include ties to at least two (2) survey control monuments or approved alternate. Horizontal accuracy for this survey shall be less than or equal to 0.050 m and vertically of less than or equal to 0.025 m. The following shows what information shall be included in the survey:

- Manholes;
- Valves;
- Pipe Fittings (Elbow, Cross, Tee, Plug, etc.) At a minimum all plugs shall be captured;
- Clean out;
- Catch basin;
- Inlet / Outlet Structures;
- Service shutoff valve (CC);
- Hydrant;
- Hydrant Valve;
- Face of Curb, Front and/or Back of walk, Centerline. These shall be surveyed at grade change points and at least every 20 m along the feature;
- Lot corners.
- Street Furniture

2.4.6 Service/Lateral As-built Sheets

All services/laterals shall be surveyed and recorded. The survey will consist of recording the invert of the sanitary and/or storm service at up to three (3) locations (main, property line and the end of pipe). This survey information can be included with the above noted file(s).

2.4.7 Dimensions

All dimensions, elevations and inverts shown shall reflect the as-built conditions of the construction and references to "Proposed" shall be removed. As-built drawings shall be to scale in accordance with the as-built dimensions shown.

2.4.8 As-built Drawings

All as-built drawings shall also include the following information:

- The location and elevation of all existing utilities and services encountered in the construction operation;
- The location and invert elevation at the end of all service connections.

2.5 CONSTRUCTION COMPLETION CERTIFICATE (CCC)

Upon satisfactory completion of the project, a satisfactory construction completion inspection, and after all the deficiencies have been corrected and submissions received, the Town shall execute the Construction Completion Certificate submitted by the Developer and Consulting Engineer, notifying:

- Acceptance of the portion of work by the Town;
- Commencement date of warranty.

A copy of the Construction Completion Certificate is included in Appendix B.

If provided for in the Development Agreement, separate Construction Completion Inspections and commencement of warranty periods shall be required for the following:

- Underground utilities;
- Surface works;
- Landscaping.

2.6 WARRANTY PERIOD

The Developer shall be responsible for any defect, fault, or deficiency in the completed work during a minimum twenty-four (24) month warranty period and shall remedy it at his own expense.

The Developer shall be responsible for any and all third party damages up until the issuance of the Final Acceptance Certificate.

Upon commencement of the warranty period, the Town will assume responsibility for regular summer and winter maintenance on paved streets within the occupied subdivision and garbage pickup. The Developer shall remain responsible for all other maintenance and repair items including third party damages, maintenance of street signs, flushing of sewer lines, thawing and flushing of watermains and landscape maintenance.

2.7 FINAL ACCEPTANCE CERTIFICATE (FAC)

Prior to the expiration of the warranty period, the Developer shall submit a written request for a final inspection, and within fifteen (15) working days of receipt of such request, the Town will carry out an inspection. Final Acceptance shall include underground services and surface work and facilities, where applicable, and upon correction of all deficiencies, shall be issued under one combined Final Acceptance Certificate. Landscape improvements will be approved under a separate Final Acceptance Certificate. A copy of the certificate is included in Appendix B. The warranty period shall remain in effect until the Final Acceptance Certificate is accepted by the Town.

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

2.8 BUILDING PERMITS

Submissions for Building Permits are made to The Inspections Group Inc. of Edmonton, Alberta for any construction project within the Town of Millet. Their contact information is as follows:

The Inspections Group Inc.
12010 – 111 Avenue NW
Edmonton, AB T5G 0E6
Ph: 1-780-454-5048
Ph (Toll-Free): 1-866-554-5048

2.9 CONSTRUCTION COMPLETION CERTIFICATES AND FINAL ACCEPTANCE CERTIFICATE INSPECTIONS

Five (5) working days prior to any construction completion inspection or final acceptance inspection, the Developers Consultant shall prepare a Pre-Inspection Checklist that certifies the readiness for inspection.

The Engineering/Landscape Consultant shall take the lead role in the inspections. The Town will observe the inspection and only provide comments whenever necessary. The Engineering/Landscape Consultant is responsible to confirm that the project has been constructed in general conformance to the Contract Drawings and Specifications.

3 Roadway Systems

3.1 GENERAL

This guideline covers the general design and construction of roads, lanes, curbs, gutters, sidewalks, boulevards, and accessories to be built or re-built in the Town of Millet. Drawings relating to roadway design and construction are provided in the Municipal Development Standard Drawings.

3.2 TRAFFIC & TRANSPORTATION

These requirements and standards are the minimum basis for roadway and walkway facilities. Changes in the design values may be considered, provided that the changes are justified and added benefits are provided by the Developer to the Town's satisfaction.

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

- Roadway Geometrics - Road right-of-way, road width, lane width, storage turnbay 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.

3.3 ROAD CLASSIFICATION AND GEOMETRIC STANDARDS

The classification and designation of roads and walks shall be undertaken during the subdivision design stage, commencing with the Outline Plan, in order that roads and walks, utility, and right-of-way requirements can be coordinated, established and approved in the design stages of subdivision development.

3.3.1 General

- Roads are classified in a functional hierarchy. The road classifications are local, collector, and arterial;
- The design standards for roads shall be in accordance with the geometric design standards outlined in the latest edition of the "Geometric Design Guide for Canadian Roads" by the Transportation Association of Canada;
- Typical cross-sections are provided in Municipal Development Standard Drawings.

3.3.2 Arterial Road

Arterial roads generally serve as line-haul facilities carrying traffic between activity centres - connecting with collectors, other arterials, and freeways, but not local streets. On-street parking is not normally permitted on this type of facility in the Town of Millet.

3.3.3 Collector Road

A Collector road is to provide local access to frontage developments, collect traffic from several local streets or from an industrial area and channel it towards the arterial system. A collector street can connect with local streets, other collectors or with arterial roadways; however, their location should minimize the potential use as a short-cut between arterial roadways. Parallel and angle parking may be allowed on these streets.

3.3.4 Local Road

A Local road is intended solely to provide access to individual properties. This street should only be permitted to connect with similar type facilities or with collector streets. All sites should provide sufficient on-site parking to meet demands and service no industrial bus routes. School buses may be permitted.

3.4 PAVEMENT STRUCTURES

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

Pending the results of the geotechnical investigation, additional pavement structure strengths and/or materials testing may be required in areas with poor subgrade materials. This would include areas with heavy industrial applications. Where road use is mixed (i.e. commercial and residential) the pavement structure shall meet the higher load criteria.

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

Good roadway industry construction practices and techniques shall be employed.

In no case shall the total pavement thickness be less than 100 mm on a local road and 120 mm on a collector road. The pavement shall be placed in two (2) separate lifts. The fist lift shall be designed to withstand the expected loads due to construction activity in the first two (2) years and must be placed prior to Construction Completion Certificate being issued by the Town. The second lift being placed after a two (2) year period and prior to Final Acceptance Certificate being issued by the Town.

3.5 ROAD CONSTRUCTION REQUIREMENTS

3.5.1 General

Roadway construction must be in accordance with the planning documents within the Town and must follow the roadway design approved by the Town.

The work shall be completed in an efficient manner with approved equipment and capable personnel. During the evaluation of contractor proposals, the Town will assess the personnel assigned to the Project. Should a personnel change be required, the contractor must notify the Town with details of the reason for the change and details on the replacement personnel including, but not limited to, their up-to-date resume. The Town reserves the right to deny the change in personnel if the replacement personnel are not adequately capable.

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

3.5.2 Temporary Roads and Access

Plans for temporary roads, access, and detours shall be approved by the Town. All weather type construction will be required and the Developer is responsible for all maintenance of temporary roads, access, and detours.

All signing, channelization, detours, closures, etc. shall be in accordance with the most recent copy of the Manual of Uniform Traffic Control Devices (MUTCD) as published by the Transportation Association of Canada.

3.5.3 Dust Control, Street Cleaning and Snow Removal

The Developer shall be solely responsible for dust control and debris and mud removal from sidewalks, curb, gutter, and boulevards within the subdivision or project limits for the duration of the Warranty Period. The Developer/Contractor shall also be solely responsible for ensuring silt and debris cannot enter into catch basins within the new development and directly adjacent to the new development.

The Town shall be responsible for snow removal and street cleaning once the Construction Completion Certificate has been executed.

3.5.4 Maintenance of Existing Facilities

The Developer is responsible to ensure that existing infrastructure, such as sewer mains, watermains, roadways, and landscaped areas, are not disturbed or become inoperable as a result

of actions by the Developer, his agents or Contractors. Existing services shall not be exposed to loadings beyond their design capacities. Existing services shall continuously be maintained and cleaned by the Developer where his actions are cause for additional maintenance. The existence and location of underground utilities indicated on the plans that have been determined from the Town's records are not guaranteed.

3.5.5 Staged Construction

Staged construction shall meet the approval of the Town. The Developer is responsible for all maintenance of partially completed works which have been opened for use. All partially completed works shall be properly restored prior to commencing with the next stage of construction. The Developer is required to place a temporary turnaround on dead end streets to accommodate garbage trucks and school buses.

3.6 MATERIALS

3.6.1 General

Materials used in roadway construction shall be from sources approved by the Town of Millet. Manufactured goods shall meet the standard manufacturer's specifications and the approved roadway specifications. Under no circumstances shall defective, rejected or substandard materials be used in the construction of roadways.

3.6.2 Excavation and Embankment

In general, the following design standards should be followed for excavation and embankment required to facilitate roadway preparation:

- Embankment materials require approval by the Town. Material unsuitable for roadbuilding purposes shall either be removed from site entirely or utilized onsite for non roadbuilding purposes as directed by the Town.

- Materials used in roadway embankment shall not contain organic matter, frozen lumps, weeds, sod, roots, logs, stumps or any other objectionable matter.

- Embankment material shall be compacted to a minimum 97%. The upper 300mm shall be compacted in 150mm layers to a minimum 100% of Standard Proctor Density at optimum moisture.

- Stripped topsoil stockpiles shall avoid contamination from suitable roadway excavation stockpiling.

- Contractor shall notify Town when material below natural ground level under embankment requires to be excavated.

3.6.3 Subgrade and Fill materials and Granular Road Base

Subgrades under the roadway structure shall be constructed of suitable soils, free from organic and frost susceptible materials. Subgrade preparation shall typically include scarification to a depth of 300mm, condition of the soil, and replacement of the material compacted to 100% Standard Proctor Density (at optimum moisture content).

Granular Road Base placement without subgrade proof roll or approval to proceed shall be removed by the Contractor at their own cost.

Granular Road Base Materials shall be conditioned and installed in suitable lifts (minimum 150mm depth) to meet compaction requirements to 100% Standard Proctor Density. Granular road base material sieve and proctor shall be submitted to Town for review before use.

3.6.3.1 Proof Roll

All roadway subgrade must be proof-rolled and witnessed by the Town or appointed representative prior to granular road base placement. If proof roll determines subgrade deficiencies, the Contractor is responsible for repairs at their own cost. Any placement of granular road base material prior to approval of subgrade proof roll shall be removed entirely by the Contractor at their own cost.

3.6.4 Concrete

Concrete for roadways, including sidewalks, walkways and structures, shall be to a C-2 exposure classification (CSA-A23.1), have a minimum compressive strength of 30 MPa in 28 days (20 MPa in 7 days), be Type HS (unless specified differently) 5% to 8% air content, have a nominal maximum size course aggregate of 14.0-20.0 mm, a maximum water/cement ratio of 0.45, and use a curing compound. Contractor shall submit concrete mix design to Town for review before use.

Fall mix (October 1 to October 15) shall contain replacement of minimum cement content with fly ash and Type HS cement cannot be used.

Type HS sulphate resistant cement shall not be used after October 15. Contractor shall utilize cold weather concrete mix that will attain a minimum compressive strength of 27 MPa in 7 days and shall be provided with cold weather protection to CSA A23:1:19 / CSA A23:2:19.

Cold weather protection must be adequate to maintain concrete surface temperatures at a minimum 10 C for a period of 7 days following placement. Concrete shall be protected from freezing for a minimum of 4 days after placement or for the time necessary to achieve 75% of the specified 28 day compressive strength, whichever is greater.

3.6.5 Asphalt

Asphalt surface shall not be laid prior to the base course meeting the required testing. See Section 9.2. Contractor shall submit asphalt mix design to Town before use.

Asphalt materials, mixing, spreading and rolling shall conform to good paving practice. Refer to the latest edition of the Asphalt Institute Manual Series No. 22 (MS-22), Construction of Hot Mix Asphalt Pavements, for guidance in good practices of handling materials and hot mix production.

No paving shall occur when rain or snow is imminent or when surface to be paved is wet, icy or snow covered, or frozen to at any point within 150mm of the surface.

Mixes shall conform to the following:

- Asphalt Concrete Base (ACB): base course lift for arterials, industrial/commercial roadways and collector roadways.
- Asphalt Concrete Residential (ACR): paving alleys, local roadways and trails
- Asphalt Concrete Overlay (ACO): top lift paving arterials, industrial/commercial roadways and collector roadways

A tack coat shall be applied to all horizontal and vertical surfaces prior to paving. Tack coat shall be SS-1 liquid asphalt grade 50% concentration. The required densities shall be as follows in Table 3.2:

Table 3.2

Minimum Density	***Type of Paving***
98%	New paving and all stages in staged paving except 2nd stage residential mat 40 mm thick or less.
96%	Second stage residential mat 40 mm thick or less
97%	Lane paving.
97%	Rehabilitation overlay more than 40 mm thick.
96%	Rehabilitation overlay 40 mm thick or less.
96%	Paved walkway and bikeways

3.7 TRAFFIC CONTROL DEVICES, STREET SIGNS, AND PAVEMENT MARKINGS

Traffic control devices, street signs, and pavement markings shall be installed by the Developer and shall be in accordance with the latest edition of the Manual of Uniform Traffic Control Devices for Canada, issued by the Transportation Association of Canada.

Highly reflective engineer grade street name signs and traffic control high density signs shall be mounted on a 4x4 pressure treated post to the satisfaction of the Town. Street sign blades are to be extruded aluminum street blades, blue in colour, 150mm x 400mm. Mounting hardware is to be bracket #ID-30B 6" as supplied by Alberta Traffic Supply. Stop signs are to be a minimum size of 600mm x 600mm. Diamond grade reflective signs are required for all signage.

Pavement markings, including lane markings, stop lines and pedestrian crossings, shall be provided by the Developer at his own expense. Pavement marking shall be painted on the top lift of asphalt. Pavement markings shall be inlaid thermoplastic on all arterial classified roadways within the Town.

3.8 ROADWAY ILLUMINATION

The Developer shall provide plans for street lights in accordance with IES – Illumination Engineering Society.

Street lights shall be provided for each internal park area that does not abut onto a lighted street. A street light shall be located at the point where each walkway opens out onto the park area. Street lights shall be placed at locations not interfering with proposed driveways and water and sewer services and in general shall be located in line with the extension of common property lines between two lots.

The location and density of the street lights shall be in accordance with the Transportation Association of Canadas "Guide for the Design of Roadway Lighting".

3.9 SWALES

In general, the following design standards should be followed for swales required to facilitate drainage

3.9.1 Grass Swales

- Minimum 2.0 m of right of way;
- 150mm depth, with 4:1 maximum side slopes;
- Minimum Slope of 1.50%.

3.9.2 Concrete Swales

- Minimum 500mm Width;

- 75mm depth;
- Minimum Slope of 0.70%

Asphalt swales will not be permitted in new developments.

3.10 LANES

In general, the following design standards should be followed:

- Minimum 6.0 m of right-of-way;
- Where lane traffic is expected to be high, such as for certain commercial developments, a wider surface width and right-of-way may be required, as determined by the Town;
- Road structure shall be as per geotechnical investigation;
- "Dead-end" lanes must be terminated with a means to turn around;
- Maximum length of lane between streets shall not exceed 350 m. Lane layout should not encourage possible short cutting between streets;
- Maximum length of drainage in lanes shall be 350 m cumulative to any one catch basin;
- Maximum lane grade shall be 6.0%;
- Minimum lane grade shall be 1.0%.

3.11 DEAD-END ROADS

In residential subdivisions, all dead-end roads shall be provided with a cul-de-sac or turnaround consistent with the requirements outlined in the Standard Drawings and the Transportation Association of Canada manual. The maximum length of dead end roads that terminate into a cul-de-sac, which service residential lots, shall be 300 m.

3.12 APPROACHES AND DRIVEWAYS (URBAN)

Urban approaches and driveways shall be in accordance with the Transportation Association of Canada Geometric Design Guide for Canadian Roads and as modified herein.

3.12.1 Private Driveways

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. Driveways on corner lots shall be located to provide a minimum of 8.0 m clearance from the lot property line adjacent to the intersection.

3.12.2 Commercial/Industrial Driveways

Intersection spacing shall be at a minimum horizontal distance of 10 m from the edge of driveway to the end of the curb return and must be designed to accommodate the types of vehicles the business/industry will generate.
The maximum driveway width of any commercial/industrial lot shall be 60% of the frontage of lot. Deviation from this standard will require written approval from Infrastructure Services.

3.13 PEDESTRIAN PATHWAYS

3.13.1 Separated Sidewalks

Concrete sidewalks measuring minimum 1.2 m in width will be required in the following instances:

- On both sides of arterial roads where there is no parallel service road with sidewalk (separate walk on one side and multi-purpose 2.5 m Asphalt path on other side);
- On the same side as street lights on Collector roads;
- On the same side as street lights on Local roads;
- Where there is a possibility of a requirement to provide continuity of sidewalk to future development;
- Where linkage is required to maintain continuity of pedestrian network;
- Cul-de-sacs see Standard Drawings.

Refer to Standard Drawings for typical layouts and dimensions.

Curb ramps shall be provided on sidewalks at all roadway intersections and at all pedestrian crossings in accordance with the Standard Drawings.

3.13.2 Monowalk

Concrete sidewalks measuring minimum 1.2 m in width will be required in the following instances:

- On both sides of arterial roads where there is no parallel service road with sidewalk (separate walk on one side and multi-purpose 2.5 m Asphalt path on other side);
- On the same side as street lights on Collector roads;
- On the same side as street lights on Local roads;
- Where there is a possibility of a requirement to provide continuity of sidewalk to future development;
- Where linkage is required to maintain continuity of pedestrian network;
- Cul-de-sacs see Standard Drawings.

Refer to Standard Drawings for typical layouts and dimensions.

Curb ramps shall be provided on sidewalks at all roadway intersections and at all pedestrian crossings in accordance with the Standard Drawings.

3.13.3 Trails

Pedestrian trails shall be minimum 3.0 m wide in accordance with the Standard Drawings.

4 Sanitary Sewerage Systems

4.1 GENERAL

These standards cover the design and construction of sewer mains and accessories to be built or re-built in the Town of Millet. Drawings relating to sanitary sewer system construction, trenching and backfill are provided in the Municipal Development Standard Drawings.

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. These standards may be exceeded if warranted by the design consultant. Good engineering practices and designs must prevail on all projects.

4.1.1 Separation of Storm and Sanitary Systems

All new systems or extensions from existing systems are to be designed on a separated basis. Run off from roofs, lots, streets and other outside areas including yards and parking areas and infiltration water from foundation drains and other sources, is to be excluded from the sanitary sewer system.

4.2 DESIGN FLOW

The sanitary sewer system shall have sufficient capacity to convey the peak dry weather flow, extraneous flows, and sanitary flow from all future contributing areas. This section outlines the methodology and design criteria that applies to the design of the sanitary sewer system.

Sanitary sewage systems shall be designed on whichever of the following is greater:

- The ultimate subdivision design population in the Outline Plan or Land Use Bylaw;
- Equivalent population subject to the peak day demand multiplier.

The equivalent populations are:

- Residential = 42 persons/ha
- Medium Residential = 90 persons/ha
- High Residential = 178 persons/ha
- Commercial/Industrial/Institutional = 48 persons/ha

Residential design populations can be further broken down as follows:

Residential-Low Density

- Single detached dwelling — 12 units/ha @ 3.5 people/unit

Residential-Medium Density

- Semi detached or duplex dwellings — 25 units/ha @ 2.4 people/unit
- Mobile home parks — 17.5 units/ha @ 2.4 people/unit

Residential-High Density

- Apartments — 74 units/ha @ 2.4 people/unit
- Townhouses — 37.5 units/ha @ 2.4 people/unit

The sewer main capacity shall be designed to convey the peak hourly sewage contribution plus infiltration, without the use of holding tanks and based on the following:

4.2.1 Residential/Domestic Contribution

The sewer main capacity shall be designed on the basis of either the subdivision design population, or 42 persons per hectare, whichever is greater, including all future contributing areas.

- Minimum average contribution of 360 litres per capita per day.
- Peak hourly flow for each contributing area calculated at an average flow multiplied by a peaking factor:

$$\text{C Peak Factor} = 1 + \frac{14}{4+P^{1/2}} \quad \text{(Harmon Formula)}$$

Where P = the population in thousands.
The maximum peak factor shall be 3.8.

4.2.2 Commercial/Industrial Contribution

Commercial and Industrial design flows will be based on the gross developed area or the specific application.

- Industrial flows - minimum average contribution of 0.2 litres per second per gross hectare.
- Commercial and Institutional (churches, schools, etc.) flows - minimum average contribution of 0.2 litres per second per gross hectare. Lower contributions may be considered on a per case basis.

- Peak dry weather flow for each contributing area calculated at average flow multiplied by a minimum peaking factor of 3.0. Maximum peak factor shall be 3.8.

4.2.3 Infiltration

- Roof leaders and weeping tiles shall not be connected to the sanitary sewer system. New development of existing areas where roof leaders and weeping tile are connected to the sanitary system, connections must be removed.
- The sanitary sewer and manhole system shall be constructed as water-tight. However, a maximum infiltration rate of 0.28 litres per second per gross hectare is acceptable.
- All new manholes are to be located out of “sags”.

4.3 PIPE FLOW FORMULA

All sanitary sewers shall be sized using the Manning’s equation and an “n” value of 0.013 for all smooth walled pipes of approved material.

Application of a depth variable friction factor at a flow depth of 80% of the sewer diameter results in a flow rate of approximately 86% of the sewer’s full flow capacity. Therefore, the required flow capacity for sizing of the sewer shall be computed using the following relationship:

4.3.1 Gravity Sewers

$$\text{Required full flow sewer capacity} = \frac{\text{estimated total design peak flow rate}}{0.86}$$

$$\text{Using Manning's formula } Q = \frac{AR^{0.667}S^{0.5}}{n}$$

Where Q = Design flow in m^3/s
A = Cross sectional area in m^2
R = Hydraulic radius (area/wetted perimeter) in m
S = Slope of hydraulic grade line (m/m)
n = Roughness coefficient

4.3.2 Sewage Force Mains

Use Hazen-Williams formula:

$Q = CD^{2.63}S^{0.54} \times 278.5$

Where Q = Rate of flow in L/s
D = Internal pipe diameter in m
S = Slope of hydraulic grade line (m/m)
C = Roughness coefficient = 120 for all mains

4.4 VELOCITY

4.4.1 Minimum Velocity

Gravity sewers	V = 0.6 m/s
Forcemains	V = 0.76 m/s

4.4.2 Maximum Velocity

Unless specifically designed the maximum velocities are:

Gravity Sewers	V = 3.00 m/s
Forcemains	V = 1.5 m/s

4.5 MINIMUM PIPE DIAMETER (GRAVITY SEWERS)

- Residential Areas — D = 200 mm
- Commercial/Industrial Areas — D = 250 mm
- Service Connections — D = 100 mm (single family dwelling)

Note: D = internal pipe diameter.

4.6 MINIMUM PIPE GRADE

Table 4.1 lists minimum pipe grades. Steeper grades are desirable.

Table 4.1
Minimum Pipe Grades

Internal Pipe Diameter mm	*All Pipe Types % Grade*
200	0.40*
250	0.28
300	0.22
375	0.15
450	0.12
525	0.10
600	0.10

*The % grade shall be increased to 1% for top ends/dead ends of sanitary systems.

For curved sewers, the minimum grade shall be as follows.

Table 4.2
Minimum Pipe Grades

Internal Pipe Diameter mm	*All Pipe Types % Grade*
200	0.40
250	0.31
300	0.25
375	0.18
450	0.15
525	0.13
600	0.10

4.7 MINIMUM DEPTH OF COVER

Minimum cover to be 3.0 m to invert and shall be of sufficient depth to satisfy the following requirements:

- Permit service connections to basements. Typically the obvert of the sewer should be at least 1.0 m to 1.5 m lower than the proposed basement elevation;
- Prevent freezing;
- Clear other underground utilities;
- Prevent damage from surface loading.

4.8 FROST PROTECTION

If minimum depth of cover for underground sanitary sewer system pipe cannot be achieved, pipe shall be insulated per Standard Drawings detail.

4.9 MANHOLE SPACING

- Manholes shall be provided at the end of each line and at all changes in pipe sizes, grades or alignment;
- The maximum allowable distance between manholes is 120 m for sewers smaller than 600 mm and 150 m for sewers 600 mm and larger;
- For curved sewers, manholes spacing shall be a maximum of 90 m for sewers smaller than 600 mm and 120 m for sewers 600 mm and larger.

4.10 CURVED SEWERS

Maximum joint deflection shall be as recommended by pipe manufacturer. Curved sewers shall be aligned parallel to the road centreline.

4.11 HYDRAULIC LOSSES ACROSS MANHOLES

The following criteria shall be used:

- Generally, for increasing pipe diameters the obvert of the downstream pipe shall match obvert of the upstream pipe;
- Minimum drop in invert levels across manholes:
    - Straight runs – 30mm drop minimum;
    - Deflections up to 45^{o} - 30 mm drop minimum;
    - Deflections 45^{o} to 90^{o} - 60 mm drop minimum;
- Deflection greater than 90^{o} shall be accommodated using two (2) or more manholes;
- A drop pipe shall be installed when the drop between inverts exceeds 1.0 m. The manhole barrel shall be sized to attain a clear main entry access of 1.0 m or greater.

4.12 PIPE LOCATION

- Sanitary sewers shall be installed on the centreline of the roadway;
- Separation of sewer main from watermains, storm sewers, power/telephone/cable:
    - Minimum 3.0 m horizontally unless sewer depth requires increased spacing;
    - Minimum 0.5 m vertical clearance between the bottom of the sewer service pipe and the top of the watermain;

- Minimum 0.3 m vertical separation between the top of the sewer service pipe and the bottom of the watermain.

4.13 SERVICE CONNECTIONS

- Service connections shall be installed:
  - In separate trench if larger than 200 mm;
  - In common trench with water service laterals. For service connection details, see Standard Drawings;

- The minimum size of sanitary sewer service connections to a single family dwelling shall be 100 mm;
- Sanitary sewer service connections for commercial, industrial, multi-family or institutional areas, unless otherwise approved by the Town, shall be 150 mm or greater based on required design flows;
- Each Sanitary sewer service connection shall be designed as a single connection from the main to the property line;
- Sanitary and water sewer service connections shall be extended 4.0 m past the property line;
- All sanitary sewer service connections from the main to property line shall be designed for gravity flow with a minimum grade of 2.0%, and provide a minimum of 2.85 m of cover at property line;
- Sanitary sewer service connection materials shall be polyvinyl chloride (PVC) DR35 building service pipe conforming to CSA specification B182.2, latest revision thereof;
- Sanitary service connections can be made at manholes but must connect to a sewer main within the manhole. Where this is not feasible, sanitary service connections shall be made by the use of in-line tees or saddles;
- Risers shall be employed where the service connection at the main is 4.0 m or deeper;
- Roof leaders and building foundation drains shall not be connected to the sanitary sewer system;
- Grease, oil and sand interceptions or filters shall be provided on private property for all restaurants, garages, petroleum service stations, vehicle and equipment washing establishments as per Bylaw 2002-06/43

4.14 SERVICE CONNECTION RECORDS

The Developer's Consultant shall provide detailed record drawings for all installed service connections with such drawings providing information related to pipe dimension, invert elevations at the property line, location of services relative to property line(s), manholes or watermain valves, and lot number.

4.15 MATERIALS AND SPECIFICATIONS

Pipe materials shall be selected using a rational design method with the following information as a guide:

4.15.1 Gravity Sewers

Table 4.3
Acceptable Pipe Materials for Gravity Sewers

Preferred Materials	***General Size Range (mm)***	***Specification***
Polyvinyl Chloride (PVC) Reinforced Concrete	100 to 900 900 & larger	ASTM D3034, SDR 35 (CSA B182.2) CAN/CSA A257, Class 3 min.

4.15.2 Force Mains

Table 4.4
Acceptable Pipe Materials for Sewer Forcemain

Preferred *Materials*	***General Size Range***	***Specification***
Polyvinyl Chloride (PVC)	150 to 300 400 & larger	AWWA C900, DR-18 or approved AWWA C905, DR-25 or approved
High Density Polyethylene HD PE	75 & larger	AWWA C906, DR-11 or approved

Alternate materials will be evaluated on individual presentations (justification for deviation) by the Developer to the Town.

4.15.3 Manholes

All manholes are to be 1200 mm inside diameter and as per standard drawings.

- Manholes shall be manufactured using sulphate resistant Type HS cement;
- Manhole sections shall be precast reinforced concrete sections conforming to ASTM C478 and CSA A257.4;

- Manhole steps shall be standard safety type, aluminum forged of 6061-76 alloy having a minimum tensile strength of 200 MPa. Spacing to be no more than 400 m on center for the full depth of manhole;
- All joints shall be sealed with rubber gaskets conforming to ASTM C443 and grouted inside and outside with non-shrink grout;
- Manholes shall be fitted with the appropriate cast-iron frame and cover conforming to Class 20 ASTM A48 as shown on the Standard Drawings;
- Pre-benched manhole bases shall be used wherever possible with pre-cored connection holes and water-tight Duraseal or G-Loc joints or approved equal;
- Tee-riser manholes shall conform to CSA 257.2/ASTM C76 (pipe components) and CSA A257.4/ASTM C76 for the manhole riser component;
- Aluminum safety platforms shall be required in all manholes with a depth greater than 5 m. See Standard Drawings.

4.15.4 Bedding Materials

Granular material for bedding of pipes in sound dry soils shall be Class B sand conforming to Table 4.5:

Table 4.5
Acceptable Bedding Material Gradation

Standard Sieve Size (µm)	***% Passing***
10 000	100
5 000	50 – 100
2 000	30 – 90
400	10 – 50
80	0 - 10

In high water table areas with poor soils, course granular or washed rock shall be used.

5 Storm Drainage Systems

5.1 GENERAL

These standards cover the minimum requirements for storm drainage systems. The requirements are to be in accordance with the Town of Millet Drainage System Assessment (2017). For each storm drainage system development shall be designed for proposed land use and ultimate drainage basin and shall be dependent on the type of development, the drainage area, and the length of surface drainage runs. Drawings relating to the storm drainage system construction, trenching and backfilling are provided in the Municipal Development Standard Drawings.

5.2 STORMWATER MANAGEMENT PLAN

Stormwater runoff generated from within the subdivision shall be routed through a stormwater management facility to regulate the rate of outflow to a controlled rate equivalent to 2.5 liters per second, per hectare (2.5 L/s/ha) or better.

Stormwater management facilities shall be designed in accordance with current Alberta Environment Design Standards as published by Alberta Environment.

Prior to submission of any detailed design, a stormwater management plan shall be prepared by the Developer subject to approval by the Town of Millet. The stormwater management plan shall be consistent with the Standards outlined herein, and shall:

- Be in accordance with the Town of Millet Drainage System Assessment;
- Identify the impact of the proposed development on the watershed;
- Identify and quantify the amount of upstream drainage entering onto the proposed development lands, including all points of entry;
- Identify all existing flow channels, drainage patterns or routes and containment areas;
- Identify the point(s) of discharge from the lands, as well as the type and calculated capacity of the receiving drainage facility(s), whether natural, man-made or a combination of both;
- Provide details of required stormwater retention/detention facilities;
- Provide details of water quality enhancement facilities;
- Identify all licensing requirements as may be required by Alberta Environment.

5.3 MINOR SYSTEMS

The Minor System shall consist of pipes, open channels and water courses that convey peak flows of a 5-year return period rainfall event with ponding of water to a depth no greater than 300 mm of depression at drainage inlets.

5.4 MAJOR SYSTEMS

- The Major System shall consist of surface flood paths, roadways, parkways and water courses which are designed to convey flows of a 100-year return frequency. The system shall include culverts crossing roadways;
- Major System Conveyance elements shall be designed to accommodate runoff rates and volumes for a 100-year return period rainfall event such that:

    - The depth of peak flows and ponding in developed area streets, conveyance channels and swales are to be limited so that major system flows will not constitute a significant hazard to the public or result in significant erosion or other property damage;
    - The maximum water surface level of surface flows and ponding in streets is below the lowest anticipated landscape grade or opening at any adjacent buildings, with a freeboard provision generally in the order of 300 mm with a minimum of 150 mm;
    - Depths of flow and ponding are less than 300 mm in roadways and other public rights-of-way;
    - For arterial roadways, the water depth at the crown of the road shall not exceed 150 mm.

5.5 DESIGN FLOWS

Design flows shall be computed using one or more of the following methods:

5.5.1 Rational Formula

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

Where Q = Design flow in m3/s
A = Drainage area in ha
I = Rainfall intensity in mm/hr
C = Runoff coefficient

The rational formula is allowable for the minor system storm sewer main design for watersheds (less than 50 ha) which discharge into detention facilities or other outlets approved by the Town of Millet.

5.5.2 Hydrograph Methods

Computer modelling shall be used for stormwater drainage design for:

- Residential and commercial/industrial development areas greater than 50 hectares in size;
- Any development requiring storage or detention facilities;
- Alternatively, computer modelling may be used for areas smaller than those outlined above;
- Storage or detention facilities shall be sized based on most critical rainfall event, four (4) hour modified Chicago or 24 hour Huff distribution.

Acceptable computer models are the SWMM/XPSWMM or MOUSE models. Other models shall be approved by the Town prior to design.

5.6 COEFFICIENT OF RUNOFF

The coefficients of runoff for return periods shall be taken from Table 5.1:

Table 5.1
Recommended Runoff Coefficients for Storm Drainage Design

	Imperviousness	*Rational Method C*	
Land Use	***%***	***1:5 Year***	***1:100 Year***
Parks/Playgrounds	10	0.25	0.35
Schools/Institutional	40	0.45	0.55
Residential - low density	40	0.45	0.55
Residential - medium density	60	0.60	0.70
Residential - high density (Multi-Family)	70	0.70	0.75
Light Industrial	70	0.70	0.75
Commercial	90	0.85	0.90
Paved Areas	100	0.90	0.95
Grassed Areas	0	0.15	0.30
Agricultural areas	0	0.10	0.30

5.7 RATE OF PRECIPITATION

The most updated rainfall curves available for the area of development should be selected for design purposes.

The 5-year frequency curve shall be used for all minor systems. The 100-year frequency curve shall be used for major systems.

The maximum inlet time shall be ten (10) minutes for residential and commercial land use area and fifteen (15) minutes for industrial land use areas.

5.8 SITE AND LOT GRADING

The following criteria shall be used:

- Each lot shall be graded to drain to the municipal storm drainage system, independently of adjacent lots;
- Areas around buildings shall be graded away from the foundations to prevent flooding. See Standard Drawings for typical grading requirements;
- Lots lower than adjacent roadways are not permissible in urban areas;
- 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;
- Buildings shall be above the Major System hydraulic grade line for a 100-year storm event plus a minimum of 0.6 m freeboard. Note: may not apply to replacement of structures/developments within existing flood plains. In these areas, suitable precautions such as mounting electrical panels above the 1:100 year level shall be taken.
- It is the sole responsibility of the developer to ensure that improvements completed in the proposed area do not negatively impact adjacent land, including private and public property, roadways, and laneways. All impacts to adjacent properties need to be identified and presented to the Town of Millet, and consent must be given by the Town of Millet and the impacted landowners prior to completing any work.

5.9 STORM SERVICES

Storm services shall discharge to a storm sewer system. Storm mains shall be designed to collect storm service flows produced from basement sump pump discharge.

Sump pumps in basements shall have a pressure discharge connection to a storm service riser pipe at the outside of the building foundation and a storm service connection pipe from the riser connection at the house to the property line are required, see Standard Drawings. The pressure discharge connection to the gravity storm service riser pipe shall be provided with a cleanout and an overflow discharge to a concrete splash pad. Installation and maintenance of these on-lot components are the responsibility of the homeowner.

The following criteria shall be used:

- Under no circumstances shall a storm service be discharged to the sanitary system;
- Preferably, the depth of the storm service should match that of the sanitary sewer service at the property line, 2.85 m from invert to proposed finished grade. Otherwise, the minimum depth of the storm service shall be 1.5 m from top of service pipe to finished grade at the property line. If the storm service minimum depth cannot be achieved, a storm servicing plan shall be submitted to the Town for approval;
- Size the storm main to provide the capacity in free flow based on all connected sump pumps operating simultaneously;
- Pipe materials shall be restricted to:

    - PSM type PVC to CSA Standard B182.2 PVC Sewer Pipe and Fittings (PSM Type) with locked-in elastomeric ring gasket and integral bell system joint type with a minimum wall thickness as required for Standard Dimensional Ratio 35.

5.10 ROOF DRAINAGE

- Roof drainage from one-family and two-family dwellings shall be discharged to the ground and dispersed via splash pads at the downspouts. No connections to the storm or sanitary service are permitted;
- Roof drainage from apartment buildings and commercial/industrial areas may discharge to the storm sewer where the new and existing systems are designed to accommodate the direct discharge and only if approved by the Town.

5.11 FLOW CAPACITIES

5.11.1 Storm Sewers and Open Channels

Using Mannings Formula $\underline{Q = AR^{0.667} S^{0.5}}$
n

Where Q = Design flow in m^3/s
A = Cross sectional area in m^2
R = Hydraulic radius (area/wetted perimeter) in m
S = Slope of hydraulic grade line in m/m
n = Roughness coefficient
= 0.013 for all smooth-walled pipe
= 0.024 for corrugated steel pipe (unpaved)
= 0.020 for corrugated steel pipe (invert paved)
= 0.020 for gravel lined channels
= 0.015 for concrete or asphalt lined channels
= 0.05 for natural streams and grassed channels

5.11.2 Culverts

Use the inlet control and outlet control methods referred to in:

- The Handbook of Steel Drainage and Highway Construction Products, by the American Iron and Steel Institute;
- The Handbook of Concrete Culvert Pipe Hydraulics by the Portland Cement Association.

5.12 PIPE LOCATION

- See Standard Drawings for typical location within road right-of-way;
- Storm service connections should be located adjacent to sanitary service connections at property line and shall be as shown on the Standard Drawings;
- Minimum separation of storm sewer from water mains:
    - 3.0 m horizontally;
    - 0.5 m vertically above or below water pipe;
- Minimum separation of storm sewer from sanitary sewer: 3.0 m horizontally.

5.13 MINIMUM DEPTH OF COVER

The minimum depth of cover shall be as follows:

• Storm sewers	minimum 1.8 m to invert for pipes
• Culverts:	minimum 1.0 m to obvert
• Catch basin leads at the catch basin:	minimum 1.4 m to obvert

5.14 MINIMUM PIPE DIAMETER

• Storm Sewers connected to storm services only	200 mm
• Storm Sewers connected to catch basins	300 mm
• Culverts	600 mm
• Catch Basin Leads	250 mm
• Storm Services	100 mm

5.15 FROST PROTECTION

If minimum depth of cover for underground storm sewer system pipe cannot be achieved, pipe shall be insulated per Standard Drawings detail.

5.16 MINIMUM VELOCITY AND GRADE

- All storm sewers shall be designed with mean velocities, of 0.90 m/s, and a maximum velocity of 3.0 m/s, based on Manning's formula, when flowing full. Mean velocities below 0.60 m/s will not be allowed.

- Storm sewers with velocities in excess of 3.0 m/s must be designed appropriately to protect against displacement of sewers by erosion or shock.

The minimum grades are as follows; steeper grades are desirable:

Pipe Size mm	***Minimum Grade, %***
200	0.40 (storm services only)
250	0.28 (storm services only)
300	0.22
375	0.15
450	0.12
525	0.10
600 and Larger	0.10

5.17 CURVED SEWERS

For storm sewers aligned in a curve, the minimum slopes shall be permitted for various sewer sizes are as follows:

- Maximum joint deflection shall be as recommended by the pipe manufacturer;
- Curved sewers shall be aligned parallel to the road centreline.

Pipe Size mm	***Minimum Grade, %***
200	0.40 (storm collector mains only)
250	0.31 (storm collector mains only)
300	0.25
375	0.18
450	0.15
525	0.13
600 and Larger	0.10

5.18 MANHOLES

- The obvert of the downstream pipe shall not be higher than that of the upstream pipe;
- A smooth transition will be provided between the inverts of incoming sewers and the outlet sewers. Extreme changes in elevation at manholes will be avoided;
- Minimum drop in invert levels across manholes to account for energy loss:
    - Straight runs – 10 mm drop minimum;
    - Deflections up to 45^{o} - 30 mm drop minimum;
    - Deflections 45^{o} to 90^{o} - 50 mm drop minimum;

- Deflections greater than 90° shall be accommodated using two (2) or more manholes;
- Where drops greater than 1.0 m cannot be avoided, a specifically designed drop manhole will be required to address the hydraulic requirements of the change of elevation. Considerations include:
    - The pipe shall be of sufficient size so that it does not surcharge;
    - A smooth vertical curve shall be formed between the inlet pipe and the drop shaft with no breaks in grade, projections, or edges;
    - The drop shaft diameter shall be equal to or greater in size than that of the largest inlet pipe. For multiple connections, a larger drop shaft shall be supplied;
    - Air vent to be provided at the crown of the outlet pipe downstream of the drop structure to allow removal of air released at the lower connection. This vent is to be located upstream of the point where full flow in the outlet pipe is anticipated under design flow conditions. The air vent may be connected to the shaft vent system;
    - The cover shall be able to withstand pressures from air discharge and surcharging;
    - The outlet shall provide a hydraulic jump basin to dissipate energy, to convert the flow to sub-critical velocity, and to allow for air release;

- Baffled vertical drop shafts are not permitted due to potential maintenance and access problems. Vortex type drop shafts are preferred. Proposals to use vortex type drop shafts must be supported by the appropriate design calculations and approved by the Town.

5.19 MANHOLE SPACING

Manholes shall be provided at the end of each line and at all changes in pipe sizes, grade and alignment.

The maximum distance between manholes shall be 120 m maximum for sewers 900 mm and smaller, and 150 m for sewers larger than 900 mm.

For curved sewers, manhole spacing shall be 90 m maximum for sewers 1200 mm and smaller, and 120 m for sewers larger than 1200 mm.

5.20 CATCH BASINS

- 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;
- Catch basins shall be provided to intercept surface runoff and shall be spaced a maximum of every 120 m. The maximum distance to first catch basin shall be 120 m;
- Catch basins shall be a minimum of 900 mm diameter, see Standard Drawings;
- All catch basin bodies shall be poured in place or precast concrete sections conforming to the most recent ASTM specifications and constructed so as to provide a 500 mm sump to trap rocks and gravel;
- Catch basin leads shall be installed to provide a minimum depth of cover, from the design finish grade, of 1.4 m to obvert unless otherwise approved. The minimum slope on catch basin leads shall be 2% and a maximum length of 30 m;
- All catch basin leads shall discharge directly into stormwater manholes;
- Catch basin installation shall be upstream of any crosswalk whenever possible;
- Catch basin leads greater than the 20.0 m in length will use 300 mm diameter pipes;
- Catch basin neck section and catch basin frame shall be installed within 50 mm of plumb with catch basin shaft.

Frame & Cover Type	***Curb Type***	***Min. Barrel Size (mm)***	***Allowable Application***
F-36	Straight Face	900	Catch basins only
F-36A	Straight Face	1200	Catch basin manholes only
F-39 Round Top	No Curb	900	For off roadway locations or temporary inlets on roadways
K-7	80 mm rolled face	900	Current preferred inlet for residential areas
DK-7	80 mm rolled face	900	Preferred for residential areas where additional capacity is needed
F-38	No Curb	900	Lanes, swales, gutters and curb ramps
F-51 (no side inlet)	No Curb	900	For situations requiring increased capacity of F36
F-51 (with side inlet)	Straight Face	900	Situations requiring increased capacity over F51

5.21 CULVERTS AND DRAINAGE

The minimum allowable ditch grade shall be 0.5%. Ditch grades in excess of 2.0% shall be protected against erosion through ditch checks dams, silt fences, Enviroberm fences and/or erosion control blankets.

The minimum ditch bottom width shall be 1.5 m, sloping away from the roadway at a minimum of 5.0%.

Culvert size requirements shall be determined through the stormwater drainage analysis however, the minimum size culverts shall be as follows:

- Roadway cross culvert 600 mm
- Residential approach culvert 400 mm
- Industrial approach culvert 600 mm

Culverts shall be of approved material with a minimum wall thickness of 1.6 mm, or as required by the loading criteria. 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.

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 the finished shoulder grade of the roadway to the top of the culvert.

Riprap shall be placed around the inlet and outlet of all culverts. Riprap material shall consist of rock ranging in size from 150 mm to 350 mm with 50% of the rock material being larger than 200 mm. Typical riprap installations are illustrated in the Standard Drawings.

5.22 PIPE, MANHOLE AND BEDDING MATERIALS AND SPECIFICATIONS

5.22.1 Pipe Materials

Pipe shall comply with the specifications in Table 5.2:

Table 5.2
Acceptable Pipe Materials

Material	*Range (mm)*	*Specification*
Reinforced Concrete PVC Open Profile (PVC) Corrugated Steel Culverts	300 and up 200 to 900 mm 400 to 900 mm 400 and up	CAN/CSA A257 Class 3 min. ASTM D3034 Min. Class DR35 CSA-B182.4, 320 kPa pipe stiffness AASHO-M-36 (Storm only)

Pipe shall be jointed with rubber gaskets or gasketed fittings or couplings.

5.22.2 Manholes

- Manholes shall be manufactured using sulphate resistant Type HS cement;
- Manhole sections shall be precast reinforced concrete sections conforming to ASTM C478 and CSA A257.4;
- Manhole steps shall be standard safety type, aluminum forged of 6061-76 alloy having a minimum tensile strength of 200 MPa;
- All joints shall be sealed with rubber gaskets conforming to ASTM C443 and grouted inside and outside with non-shrink grout;
- Manholes shall be fitted with the appropriate cast iron frame and cover conforming to Class 20 ASTM A48 as shown on the Standard Drawings. All castings shall be true to form and dimensions, free from faults, sponginess, cracks, blowholes, or other defects affecting their strength;
- Pre-benched manhole bases shall be used wherever possible with pre-cored connection holes and water tight Duraseal or G-Loc joints or approved equivalent;
- Tee Riser manholes shall conform to CSA 257.2/ASTM C76 (pipe components) and CSA A257.4/ASTM C76 (manhole riser component);
- Aluminum safety platforms shall be required in all manholes with a depth greater than 5.0 m. See Standard Drawings.
- Manhole frame and cover shall be NF-80, F-39 or approved equivalent.

5.22.3 Bedding Material

Bedding material shall be Class B sand bedding in accordance with the Standard Drawings and gradation specified under Item 4.14.4.

5.22.4 Outfall Structures

- For all outfalls, it is required that a hydraulic analysis be completed to ensure that the exit velocities will not damage natural watercourses. Final velocities into a natural drainage course shall not exceed 1.5 m/s;
- Appropriate erosion control measures, including energy dissipaters, are to be provided downstream of the outfall to prevent erosion;
- All sewer outlets 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;
- Outfall structures shall be designed with consideration of aesthetics, as they are generally located within parks, ravines, and on channels. Concrete surface treatment is recommended.

5.23 MAJOR SYSTEMS

Major stormwater management systems must meet with current Alberta Environment Design Standards as published by Alberta Environment. Prior to final submission to the Town of Millet for approval, all stormwater management plans need to be submitted to Alberta Environment and all applicable third party approvals must be received and included in the final submission to the Town of Millet. Refer to the "Application Form and Guide for Registration to Construct and Operate a Municipal Storm Drainage System" as published by the Government of Alberta.

5.24 EROSION AND SEDIMENTATION CONTROL

All storm drainage systems, including storage facilities, 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.

6 Water Distribution Systems

6.1 GENERAL

These standards cover the requirements for water distribution systems. This section also covers the design and construction of watermains and accessories to be built in the Town of Millet. Drawings relating to the construction of water distribution systems, trenching and backfilling are provided in the Municipal Development Standard Drawings.

This section provides the minimum acceptable standard for general construction requirements, construction materials, and construction procedures. These standards may be exceeded wherever appropriate. Good engineering practices and designs must prevail on all projects.

6.2 DESIGN FLOW

- The waterworks system shall be designed in accordance with the Alberta Environment guidelines as part of the overall municipal distribution system. The system shall be capable of delivering the peak day demand plus fire flow, or the peak hour flow - whichever is greater. Velocities at maximum flows shall not exceed 1.5 meter per second;
- The rate of water demand shall be determined by the land use density basis of either the ultimate subdivision design population in the Outline Plan or if population is unknown: 45 persons per hectare, or 3.5 persons per residential unit, whichever is greater. The minimum per capita water demands for the Town are as follows:

    - Average Daily Demand = 360 litres/capita/day (L/c/d)
    - Peak Daily Demand = 2.0 times average daily demand
    - Peak Hour Demand = 3.0 times average daily demand

- Commercial and industrial areas shall be designed on the basis of equivalent population subject to the peak daily demand and peak hourly demand multipliers.

    The equivalent populations are as described in section 4.2 Design Flow for sanitary systems

- Fire flows shall be in accordance with the recommended Standards of the Insurance Bureau of Canada. Typical requirements are:

Land Use	*Flow Rate (L/s)*	*Duration (Hours)*
Residential - Single Family	92	1.5
Residential - Multi-Family	303	2.0
Residential - High Density	303	4.0
Commercial	227	3.0
Industrial	227	3.0
Commercial Business District/Institutional	303	4.0

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.”

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.

6.3 DESIGN COMPUTATIONS

Use the Hazen-Williams formula:

$$Q = CD^{2.63}S^{0.54} \times 278.5$$

Where
Q = Rate of flow in L/s
D = Internal pipe diameter in m
S = Slope of hydraulic grade line in m/m
C = Roughness coefficient 125 for all mains

Minimum pressure at peak demand	= 273 kPa
Minimum pressure with automatic sprinklers	= 350 kPa
Maximum allowable pressure	= 690 kPa
Minimum fire pressure at main	= 140 kPa

Network analysis shall be by the Hardy-Cross method or a suitable computer program.

6.4 MINIMUM MAIN PIPE DIAMETER

- Single Family Residential = 200 mm
- Multi-Family Development = 250 mm
- Industrial/Commercial = 250 mm

Main sizes may be increased as considered necessary by the Infrastructure Services Department to accommodate future development.

Temporary blow off valve may be required, dependent upon construction staging, at the discretion of the Town. See Standard Drawings.

6.5 DEAD ENDS

Except in cul-de-sacs of less than 300 m length, all watermains shall be looped. A Hydrant must be provided at the end of all cul-de-sacs greater than 300 m in length and dead end watermains. Dead end roads terminating in cul-de-sacs shall not be greater than 300 m in length if they are servicing residential lots.

6.6 PIPE LOCATION

Minimum horizontal separation of watermains from sanitary or storm sewers shall be 3.0 m and from power, telephone, or gas services shall be 3.0 m; minimum vertical separation shall be 0.5 m from all sewer mains.

All watermains are to be installed 3.0 m from the centreline of the roadway.

6.7 MINIMUM DEPTH OF COVER

Minimum cover to be 3.0 m below finished grade to obvert and shall be of sufficient depth to:

- Prevent freezing;
- Clear other underground utilities.

6.8 FROST PROTECTION

If minimum depth of cover for underground water distribution system cannot be achieved, pipe shall be insulated per Standard Drawings detail.

6.9 VALVING

In general, valves shall be located as follows:

- In intersections at projected property lines:
    - Three (3) valves at cross intersection;
    - Two (2) valves at tee intersection;
- Not more than two (2) hydrants isolated;
- A maximum of four (4) valves will be closed to isolate any one section;
- A maximum of 30 lots cut off from the water supply in all areas.

6.10 HYDRANT LOCATION

Fire hydrants shall be located at street intersections and spaced as follows:

- In accordance with "Water Supply for Public Fire Protection - A Guide to Recommended Practice" published by Public Fire Protection Survey Services;
- Location to be 2.0 m back from curb, 0.5 m from property line, no closer than 1.0 m to back of walk, and 3.0 m from franchise utilities (pedestals, transformers, street lights, etc);
- No more than 180 m apart in residential areas;
- No more than 100m from a dwelling;
- No more than 90 m apart in a commercial/industrial area.

6.11 SERVICE CONNECTION

See Standard Drawings for service connection installation details.

- Water and sanitary services in a common service trench shall have the following minimum horizontal separation from other services:
    - 50 mm diameter or less = 0.2 m
    - Greater than 50 mm diameter = 2.0 m
    - Separate trenches required for services 100 mm diameter or larger

- Water service connection pipes shall have minimum 2.85 m cover at the property line. Services shall extend 4.0 m past property line, or 2.0 m past the shallow utility easement;
- Locate water service curb stops as per Standard Drawings, outside of hard surface areas (driveways, concrete pads, etc).

6.12 THRUST BLOCKING

Concrete thrust blocking (Type HS Cement) shall be provided at bends, tees, wyes, reducers, plugs, caps, hydrants and valves as per the Standard Details.

6.13 CHAMBER DRAINAGE

Chambers or manholes containing valves, blow-offs, meters or other appurtenances shall not be connected directly to a storm drain or sanitary sewer, nor shall blow-offs or air release valves be connected to any sewer. Such chambers or manholes shall be drained to the surface by gravity where they are not subjected to flooding by surface water or to absorption pits underground where it is above the groundwater table or pumped to a storm or sanitary sewer. They shall be insulated to prevent freezing where necessary and shall also be sealed to prevent groundwater infiltration.

6.14 DISINFECTION AND FLUSHING

All disinfection and flushing of new water mains will be the responsibility of the Developer. Test procedure reports and approved sample results shall be forwarded to the Town of Millet for review. For test procedure requirements see 9.6.2.

6.15 HYDRO STATIC PRESSURE TESTING – SEE SECTION 9.6

6.16 MATERIALS

6.16.1 Pipe

Table 6.1 lists specifications for acceptable pipe materials and approved PVC materials are listed in Section 6.16:

Table 6.1
Acceptable Water Pipe Materials

Material	*General Size Range (mm)*	*Specification*
Polyvinyl Chloride (PVC)	150 to 300 400 to 900	AWWA C900, DR 18 AWWA C905, DR25

6.16.2 Fittings and Hardware

Cast Iron Fittings	-	AWWA C110 1.03 MPa (Class 150) working pressure
PVC Fittings	-	150 to 300 mm CSA B137.2 (Class 150), AWWA C907
	-	400 to 900 mm: CSA 137.3 (Class 150), AWWA C905
Flanged Joints	-	Class 125, ANSI B16.6, B16.5 flat-faced
Bolts and Nuts	-	Stainless Steel, Type 304, wrapped with Denso paste and tape

6.16.3 Cathodic Protection

- Cathodic protection for buried non-steel metallic fittings, valves and hydrants:
    - All buried non-steel metallic fittings and valves shall be cathodically protected with 2.3 kg zinc anodes;
    - All hydrants shall be cathodically protected with 5.5 kg zinc anodes. See Standard Drawings;
    - Zinc anodes shall conform to ASTM B418-73;
- All copper services 50 mm diameter and smaller shall have a 5.5 kg zinc anode attached to the copper service pipe. See Standard Drawings.

6.16.4 Bedding

Bedding material for pipes shall be Class B sand, conforming to the Standard Drawings and the gradation specified under Item 4.14.4.

6.16.5 Trench Section

See Standard Drawings for trenching.

6.16.6 Fire Hydrant

- Approved materials are listed in Section 6.16. Hydrants are to be complete with a breakaway flange and a 300 mm minimum spool piece. See Standard Drawings;
- The minimum hydrant connection size shall be a 150 mm hub end;
- The minimum cover shall be 3.0 m;
- Drain outlets shall be plugged when ground water is encountered during construction;
- Hydrants shall have two (2) 65 mm hose connections and one (1) 100 mm Storz pumper connection as presently used in the community;
- Hydrant will have threads conforming to the Alberta specifications;
- Hydrant main spindles shall turn to the left (counter clockwise) to open;
- A gate valve shall be provided on each connection between a hydrant and main;
- Hydrants shall be enamel painted to CAN/CGSB-1.59. Town of Millet hydrants are to be all yellow in colour;
- All bolts and nuts must be stainless steel, type 304;
- Hydrants shall be cathodically protected. See Standard Drawings;
- Hydrant ground flange shall be 50 mm above design grade.

6.16.7 Gate Valves

- Gate valves shall be in accordance with AWWA C509 and the following supplementary data:
- Gate valves shall have an iron body, bronze mounted, and are to be cathodically protected;
- Valves shall be resilient seat gates with non-rising stem, to open by turning in a counter-clockwise direction;
- Valve ends shall be provided to fit the pipe. Where flanged valves are used, they must be accompanied by flexible couplings;
- The position of the valve in line shall be vertical;
- Stem seals shall be o-ring;
- Valve boxes with operating stem and nut are required on all valves. All valve boxes shall be sliding Norwood Foundry Type A. PVC lower section of valve boxes are acceptable;
- Dresser style 450 mm diameter butterfly valves suitable for buried installation may be considered as an approved alternative, subject to written approval of the General Manager, Engineering Services on main sizes >400 mm;
- All bolts and nuts will be stainless steel, type 304;

- All gate valves larger than 350 mm shall have a bypass built into the body of the valve;
- All valve boxes are to be adjusted such that the top of the valve box is 10-15 mm below the finished design grade at the proposed roadway or flush with any concrete work.
- Valve boxes are to include a 150 mm cast iron or PVC Type 'A' sliding sleeve, complete with operating extension stem to provide for 600mm adjustment flexibility, rock disc and 25mm square steel valve spindle. Cast iron to be asphaltic coated.

6.16.8 Service Connections

- Water Service Pipe:
    - Approved Materials are listed in Section 6.16;
    - Service connections shall be copper pipe, Type K;
    - Couplings shall be Standard Brass, compression type;
    - Unsprinklered dwelling: 19 mm or 25 mm for services less than 30 m in length
      Sprinklered dwelling: 50 mm
      Multi-family/commercial: sized accordingly
- Water Service Fittings:
    - Approved materials are listed in Section 6.16;
    - Curb stop will be copper to copper invert and key stop and drain;
- Service Connection Reports:
    - The Developer's Consultant shall provide detailed record drawings for all installed service connections with such drawings providing pipe diameter, elevation, and location relative to property line(s) and lot number;
- Water service connections in new subdivisions shall be installed from the water main to 4.0 m inside the property line or 2.0 m past the shallow utility easement.

6.17 APPROVED MATERIALS

Polyvinyl Chloride (PVC) Water Pipe			
Manufacturer	***Model/Type***	***Size (mm)***	***Remarks***
Ipex	Blue Brute	100 to 300	AWWA C900, DR18
Ipex	Centurion	450 to 900	AWWA C905, DR25

Fire Hydrants			
Manufacturer	***Model/Type***	***Lead Size***	***Remarks***
Canada Valve Darling	Century	150	AWWA C502

Service Saddles			
Manufacturer	***Model/Type***	***Size (mm)***	***Remarks***
Robar	2616, 2626, 2706	100 to 600	AWWA C800

Main Stops			
Manufacturer	***Model/Type***	***Size (mm)***	***Remarks***
Cambridge Brass	301 Series	20 to 50	AWWA C800
Mueller	B2500 Series	20 to 50	AWWA C800

Water Service Unions			
Manufacturer	***Model/Type***	***size (mm)***	***Remarks***
Cambridge Brass	118 Series	20 to 50	AWWA C800 Compression Ends
Mueller	300 Series	20 to 50	AWWA C800 Compression Ends
Curb Stops – Select Connections to Suit Service Tubing Material			
Manufacturer	***Model/Type***	***size (mm)***	***Remarks***
Cambridge Brass	202 Series	20 to 50	AWWA C800 Compression Ends

Mueller	B-25209 Series	20 to 50	AWWA C800 Compression Ends

Service Pipe			
Manufacturer	***Model/Type***	***Size (mm)***	***Remarks***
Wolverine/Cerro/Halstead	Type K Copper	20 to 50	Third Party Certified to ASTM B88

Service Boxes Including Chairs and Rods			
Manufacturer	***Model/Type***	***Size (mm)***	***Remarks***
Norwood Foundary	Complete Service	20, 25	See Standard Drawings
Norwood Foundary	Complete Service	40, 50	See Standard Drawings

7 Franchised Utilities

7.1 GENERAL

All work necessary for the installation of power, gas, street lighting, telephone, and cable television shall be the responsibility of the Developer and the installation of these utilities will be a condition of development. In addition to the financial responsibilities, the Developer must initiate and coordinate the design, approval, and construction of these services as well as register all easements required in the name of the Town of Millet.

7.2 DESIGN STANDARDS

7.2.1 Location of Utilities

Unless otherwise approved by the Town of Millet, all gas, power, telephone and cable television distribution lines and service connections shall be installed in preferred locations as per the standard cross section details.

For all urban applications, power shall be underground. For isolated rural applications where the installation of buried power may not be practical, above ground power may be acceptable to the Town.

All distribution cables for primary and secondary power, telephone, cable television and street light feeders, may be installed in one common 300 mm wide trench at the required alignment.

Street lights shall be placed at location not interfering with proposed driveways and services and be located in line with the extensions of common property lines between two lots.

The face of the posts, poles, pedestals and transformers shall be at least 1.0 m clear of the face of the curb.

7.2.2 Separation From Other Utilities

The franchised utilities shall be separated from the deeper municipal utilities (i.e. water and sewer) by not less than 3.0 m laterally.

A separation of 1.2 m from other franchised utilities is also required, common (three-party) trench installations excepted.

7.2.3 Compaction of Trenches (refer to Section 11)

All trenches located on municipal property or within municipal easements are to be compacted to the following standards:

- 95% Standard Proctor Density for trenches in boulevards and landscaped areas;
- 97% Standard Proctor Density for base materials in roads;
- Restore to a minimum depth of 200 mm of 100% Marshall Density for Asphaltic Concrete Pavement in roads.

7.2.4 Rights-of-Way, Easements, and Public Utility Lots

The Developer shall provide, to the satisfaction of the utility companies, rights-of-way, easements and public utility lots (PUL's) to accommodate the utility servicing, registered in the name of the Town of Millet.

Easements shall be registered on each lot prior to the sale of any lot in the development area.

8 Landscaping and Fencing

8.1 GENERAL

One of the responsibilities of developing land in the Town of Millet is the landscaping of boulevards, buffer strips, utility lots, walkways, medians, public service land and recreation land.

Landscaping involves site preparation, establishment of a grass cover, planting and the installation of park furnishings.

This division covers all requirements for a complete landscaping package that is to be presented to the Town. Materials procedures and maintenance are also covered.

8.2 LANDSCAPE PLANS

Landscape plans shall show clearly both hard and soft landscape development. All plans shall show clearly both existing and proposed development.

8.2.1 Hard Landscape Drawings

- Site Plans - Layout Plans

  Layout plans shall indicate clearly the exact location of:

  - Buildings;
  - Roads;
  - Concrete and paving stone walks;
  - Asphalt/Gravel Trails;
  - Retaining walls, fencing and screens;
  - Underground services required for completion of the contract;
  - Site furnishings - benches, lighting, etc.;
  - Existing features to be retained;
  - Irrigation systems if applicable.

- Details - Working Drawings

  Detail drawings will be required to explain the working details of the Site Layout Plan. Drawings to include details for paving, benches, lights, fencing, walls, etc.

- Grading Plans

  Grading plans shall include:

  - Existing contours, including spot elevations, boundary conditions, road elevations and drainage outlets for surface water;
  - Proposed contours;
  - Proposed final spot elevations of strategic locations:

    - Corners of paved areas;
    - Top of curbs;
    - Top and bottom of steps, retaining walls and slopes;
    - Ground elevation of all structures;
    - Drastic changes in grade;

  - Direction of proposed surface drainage and drainage districts;
  - Cross sections and profiles where appropriate.

8.2.2 Soft Landscaping

Landscaping plans shall include:

- Location of trees, shrubs and planting beds
- Areas to be seeded, sodded or requiring special treatment
- A list of plant materials giving:

  - Keys to planting plan;
  - Quantity of individual species;
  - Botanical name and common name;
  - Size of material - height and calliper;
  - Method of transport, i.e. balled and burlap, container stock; bare root, etc.;
  - Canadian Plant Hardiness Zone.

8.3 ROUGH GRADING

- Rough grading shall be carried out without damage to the root and branch systems of existing plant material.
- All sites requiring topsoil shall be rough graded within 150 mm of final grade - for topsoil accommodation.
- The maximum allowable slope for all new hills and berms shall be 4:1, unless otherwise approved by the Town of Millet. 3:1 slopes will be acceptable in areas on minimal pedestrian traffic and on drainage side slopes. 3:1 slopes must be approved by the Town.

The Developer shall register a lot grading caveat against all lots within the subdivision prior to Final Acceptance Certificate issuance for surface improvements.

8.4 PLANT MATERIAL

- 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. All plant material shall have straight stems, well and characteristically branched for the species. All plant material shall conform to the Horticultural Standards for nursery stock of the Canadian Nursery Landscape Associates (Canadian Standards for Nursery Stock).
- At the time of inspection and final acceptance, the plant material shall:

    - Be planted and staked;
    - Exhibit two (2) years of healthy growth to the satisfaction of the Town.

8.5 UNIFORM FENCING

- Pressure treated wood fencing shall be constructed adjacent to the following locations:

    - Arterial Roadways;
    - Town owned lands- e.g. Firehall sites;
    - Multifamily sites;
    - Neighborhood Commercial Sites;
    - Institutional Sites and;
    - Other areas as required by the Town of Millet;

    No stain shall be applied on locations identified above;

- Chain link fencing and gates shall be installed where playgrounds, parks and school sites are adjacent to residential properties;
- Gates shall be located approximately at the mid-point of each lot and shall open inwards onto private property;
- Wood rail fencing may be approved by the Town for selected park or walkway areas;

8.6 LANDSCAPE MAINTENANCE

- During 2-year warranty period, Contractor is responsible for landscape maintenance for seeded and sodded areas including watering, mowing, and weeding as required. Seeded and sodded areas shall be mowed minimum twice (2) per year during warranty period. Landscaped areas that fail to germinate due to failure to perform landscape maintenance shall be replaced at the cost of the Contractor.

9 Testing Procedures

9.1 GENERAL

It shall be the responsibility of the Consulting Engineer to ensure that the Contractor properly tests all aspects of each project. A quality control plan shall be provided to the Town of Millet prior to work commencing.

The Developer shall submit all test data performed by the accredited testing company to the Town on an on-going basis and prior to issue of the Construction Completion Certificate.

Failure to receive test results will be considered sufficient cause for not accepting such work.

9.2 MATERIALS TESTING - ROADWAYS

Subgrades, construction materials and construction standards shall be verified with a representative number of standard tests.

The Developer shall forward copies of such test results on an ongoing basis to the Town and prior to issuing the Construction Completion Certificate.

The Developer shall engage a qualified materials testing consultant to take representative samples of all materials to be incorporated in the pavement structure, prepare mix designs for approval by the Town, and to carry out quality control testing during construction.

9.3 MATERIALS TESTING - TRENCH BACKFILL FOR SHALLOW AND DEEP UTILITIES

9.3.1 Trench More than 15 m in Length

A minimum of two (2) density tests per 600 mm of trench depth per 100 m of length. The tests shall be representative of the entire length, width and depth of trench backfill, including around catch basins, manholes, valves and service connections.

9.3.2 Trench Less than 15 m in Length

A minimum of three (3) density tests evenly spaced through depth of trench. For service connection trenches, at least one (1) additional (fourth, or more) density test shall be taken between the back of curb and separate walk over each service connection line within the uppermost 0.5 m as measured from final finished grade.

9.4 TESTING – SANITARY SEWERS

Testing of installed pipes shall depend on the elevation of existing ground water and shall consist of at least one of the following tests:

9.4.1 Video Inspection Test

A televised inspection of the sewer system shall be carried out by the Developer at the end of construction and prior to the Construction Completion Certificate inspection. Any deficiencies found during this test shall be promptly remedied by the Developer at his own expense. A digital copy or USB device shall be submitted with all data in colour format only, and of acceptable clarity, and quality, along with inspection reports and summaries of the visual inspection, shall be supplied to the Town prior to issuing the Construction Completion Certificate.

The report shall also include the location of all service connections together with a statement of opinion as to whether or not the service connections are leaking.

9.4.2 Testing of Force Mains

Force mains shall be tested as described for watermains in 9.6.1.

9.5 TESTING - STORM SEWERS

Testing of installed pipe shall consist of the following:

- Visual checking between manholes to ensure proper alignment and grade of pipe;
- Visual checking for joint leaks where access is possible;
- Visual checking for pipe cracks where access is possible;
- Video inspection of the entire sewer system by the Developer at the end of construction;
- All testing and repair of deficiencies found during the testing shall be rectified by the Developer at his own expense.

All the results of acceptable tests shall be supplied to the Town.

9.6 TESTING - WATERMAINS

9.6.1 Pressure and Leakage Test

- Test completed mains after services are installed, backfill is complete, and at least five (5) days after placing concrete for thrust blocks and in accordance with AWWA Standards.
- Test in sections containing no more than 500 m.
- Fill the system with water and expel air at services and hydrants. Install temporary taps wherever necessary to expel air and plug after completion.
- Apply test pressure by means of a test pump with a measurable volume container.

- The Town of Millet shall witness all pressure tests.

9.6.1.1 Pressure Testing PVC Pipe

- Maintain test pressure for a period of two (2) hours. Test pressure shall be the greater of 1035 kPa (150 psi) or 1.5 times the normal operating pressure.
- For testing PVC sanitary forcemains (Section 9.4.2), the pressure shall be the greater of 690kPa or 2.0 times the normal operating pressure.
- Table 9.2 outlines a leakage allowance chart. This chart forms the basis for testing all watermains.

Table 9.2
Leakage Allowance Time
Leakage Allowance in Litres per 100 Joints Per Hour

Pipe Size	***Test Pressure (kPa)***	
	690	***1035***
150 mm	3.10	3.76
200 mm	4.09	5.02
250 mm	5.14	6.27
300 mm	6.14	7.52
350 mm	7.20	8.78
400 mm	8.18	10.00
450 mm	9.24	11.28
500 mm	10.22	12.56

Above leakage allowances have been calculated from the following formula from the AWWA Manual No. M23 (PVC Pipe – Design and Installation):

$$L = \frac{NDP}{128{,}300}$$

where: L = allowable leakage in L/hr
N = total number of joints
D = pipe diameter in mm
P = square root of the test pressure in kPa.

Leakage allowance for new construction of materials other than PVC shall be in accordance with the applicable AWWA standard.

9.6.1.2 Pressure Testing HDPE Pipe

The test procedure consists of two steps. The initial expansion phase and the test period. In order to accommodate the initial expansion of the main under test, the following shall be done:

- Fill the line with water and pressurize to 1.5 times the Standard Pressure Rating of the main. Test pressure shall be 1035 kPa for DR11 HDPE pipe. All air shall be expelled from the line during filling of the test section.
- Add sufficient make-up water to the main at hourly intervals to return the main to the test pressure. The initial expansion shall be done for a three (3) hour period so the main shall be repressurized three (3) times during this phase.
- After the third repressurization, the test period shall begin. No make-up water shall be added to the main until the end of the test period which shall be one (1) to three (3) hours long. At the end of the three (3) hours, a measured quantity of make-up water shall be added to the main to repressurize it to the test pressure. The amount of make-up water shall not exceed the volume allowance for expansion given below.
- Allowance for expansion under test pressure in litres for each 100 m of pipe at 23°C.

Nominal Pipe Diameter in mm	***1 Hour Test***	***2 hour Test***	***3 Hour Test***
75	1.2	1.9	3.1
100	1.6	3.1	5.0
150	3.7	7.5	11.2
200	6.2	12.5	18.7
250	8.7	16.2	26.2
300	13.7	28.7	42.4
350	17.4	33.7	52.4
400	21.2	41.1	62.3
450	27.4	53.6	81.0
500	33.7	68.6	99.7
550	43.6	87.3	130.9
600	56.1	111.0	165.8

The amount of make-up water shown in the table above should be multiplied by the appropriate correction factor taken from below for the pipe temperature at the time of testing.

Temperature (^oC)	*Correction Factor*
0	0.22
2	0.24
4	0.28
6	0.32
8	0.36
10	0.42
12	0.47
14	0.53
16	0.59
18	0.66
20	0.74
22	0.87
23	1.00
24	1.20

- Under no circumstances should the total time under test exceed eight (8) hours at 1.5 times the pressure rating. If the test is not completed due to leakage, equipment failure or any other reason with this time period, the test section shall be permitted to "relax" for an additional eight (8) hour period prior to starting the next testing sequence.
- Locate and repair defects if leakage is greater than amount specified. Repeat test until leakage is within specified allowance for the test section.

9.6.2 Flushing and Disinfection

- Flushing and Disinfection is the responsibility of the Developer;
- Boundary valves are only to be operated by Town of Millet personnel;
- The method of disinfection shall conform to AWAA Standard C651-05- Disinfecting Water Mains;
- Chlorine products must be NSF/ANSI 61 certified products for potable water use.

10 Abandoning Existing Infrastructure

10.1 MANHOLES

For manhole abandonment, plug all pipes with non-shrink grout, remove and dispose of manhole to 1.0 m below ground and fill with fillcrete.

10.2 CATCH BASINS

For abandonment of catch basins follow procedure for abandonment of manholes.

10.3 ABANDONED SERVICE CONNECTIONS

Abandoning existing service connections will be completed at property line. The water service CC is to be closed and the rod cut off 1.2m below finished grade. Sanitary services are to be disconnected at property line and cased in concrete. Documentation must be provided to the Town of Millet referencing existing property pins, sidewalks, underground infrastructure, and other street furniture to properly locate the abandoned service.

Appendix 'A' – Standard Drawings

ROADWAYS

3-01 24.0m Arterial ROW
3-02 20.0m Collector ROW no Frontage
3-03 20.0m Collector ROW with Frontage
3-04 Asphalt Trail
3-05 Lane or Commercial Crossing
3-06 Industrial/Commercial Curb & Gutter Crossing
3-07 Residential Crossing
3-08 Typical Monolithic Lane or Driveway Crossing
3-09 Ramp Locations
3-10 Types of Ramps
3-11 Pinned Concrete Curb
3-12 150mm STD. Curb and 250mm Gutter
3-13 150mm STD. Curb and 500mm Gutter
3-14 400mm Rolled Curb and 250mm Gutter
3-15 1200mm/1500mm/1800mm Monolithic Sidewalk
3-16 1200mm/1500mm/1800mm Rolled Monolithic Sidewalk
3-17 1200mm/1500mm/1800mm Separated Sidewalk
3-18 500mm/1000mm Concrete Drainage Swale
3-19 Asphalt Speed Bump

SANITARY SEWER

4-01 Sanitary Riser

STORM SEWER

5-01 Storm Catch Basin Assembly C/ W 500mm Sump
5-02A Strom Catch Basin Neck (1 of 2)
5-02B Storm Catch Basin Neck (2 of 2)
5-03 Catch Basin Manhole
5-04 Manhole
5-05 Interior Drop Manhole Detail
5-06 Manhole Safety Platform
5-07 Preached Manhole
5-08 T-Riser Manhole
5-09 Catch Basin Frame & Grate Insolation (150 Curb & 250 Gutter)
5-10 Typical Dry Pond Detail
5-11 Typical Dry Pond Detail

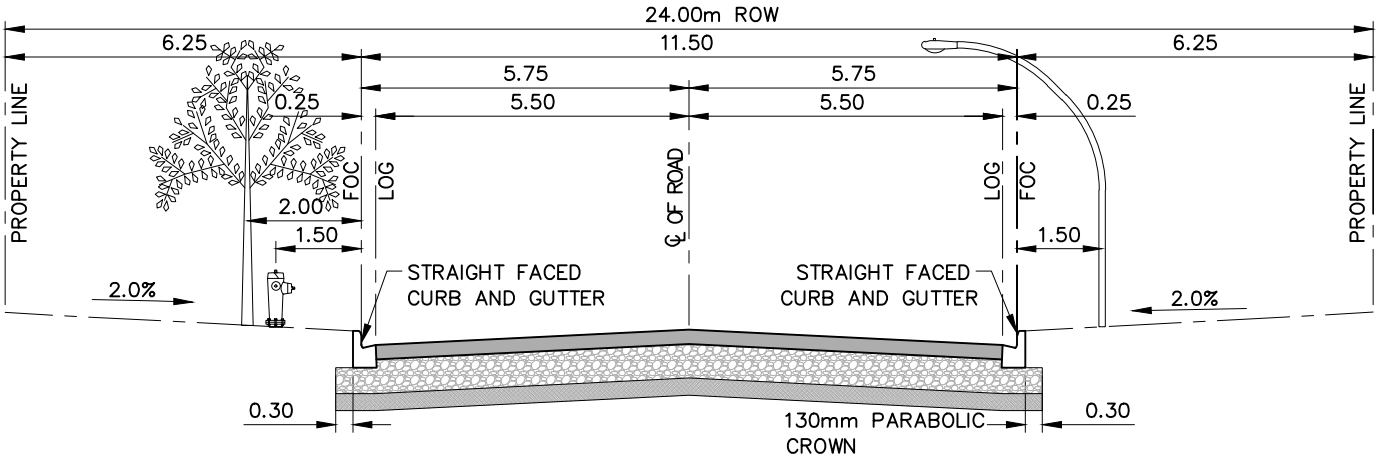
5-12 Typical Construction Wetland Detail
5-13 Constructed/Engineered Wetland Zones
5-14 Typical Oil Grit Interceptor
5-15 Sump Pump/Surface Discharge

WATERMAINS

6-01 Off-line Hydrant Detail
6-02 Off-line Hydrant Detail
6-03 Typical Anode Installation at Valved Iron Fitting & Hydrants
6-04 Main Valve Casing Detail
6-05 Water Service Riser Detail
6-06 Thrust Block Details

TRENCH AND BACKFILL

9-01 Trench Detail
9-02 Pipe Bedding Details
9-03 Water, Storm and Sanitary Insulation Requirements



24.0m ARTERIAL ROW

MINIMUM ROAD STRUCTURE
125mm ASPHALT CONCRETE
300mm–20mm CRUSHED GRAVEL
300mm COMPACTED SUBGRADE OR
CEMENT STABILIZED CLAY SUBGRADE

NOTES:
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE SPECIFIED.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

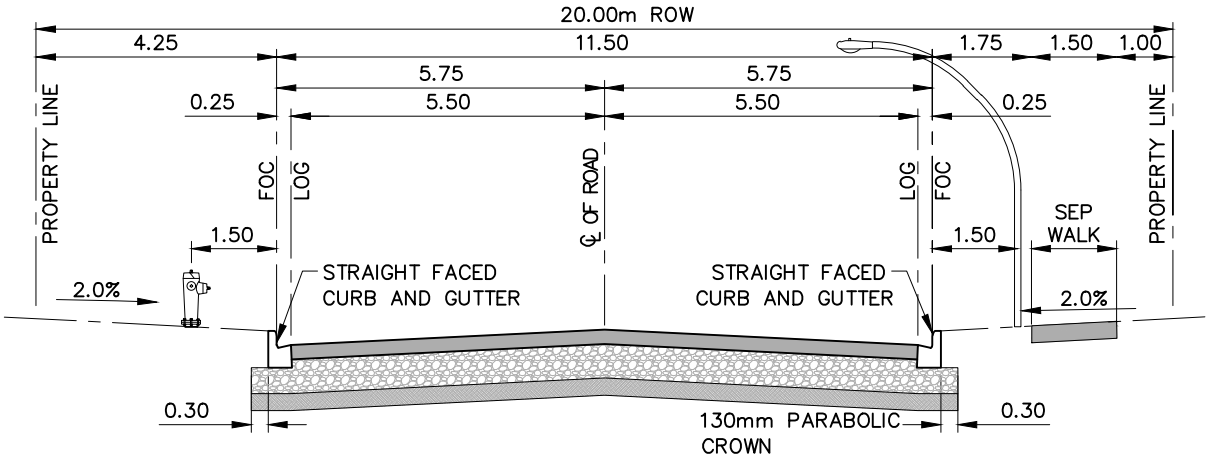
REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

24.0m ARTERIAL ROW

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
3-01



20.0m COLLECTOR ROW NO FRONTAGE

MINIMUM ROAD STRUCTURE
125mm ASPHALT CONCRETE
300mm–20mm CRUSHED GRAVEL
300mm COMPACTED SUBGRADE OR
CEMENT STABILIZED CLAY SUBGRADE

NOTES:
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE SPECIFIED.

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20.0m COLLECTOR ROW
NO FRONTAGE

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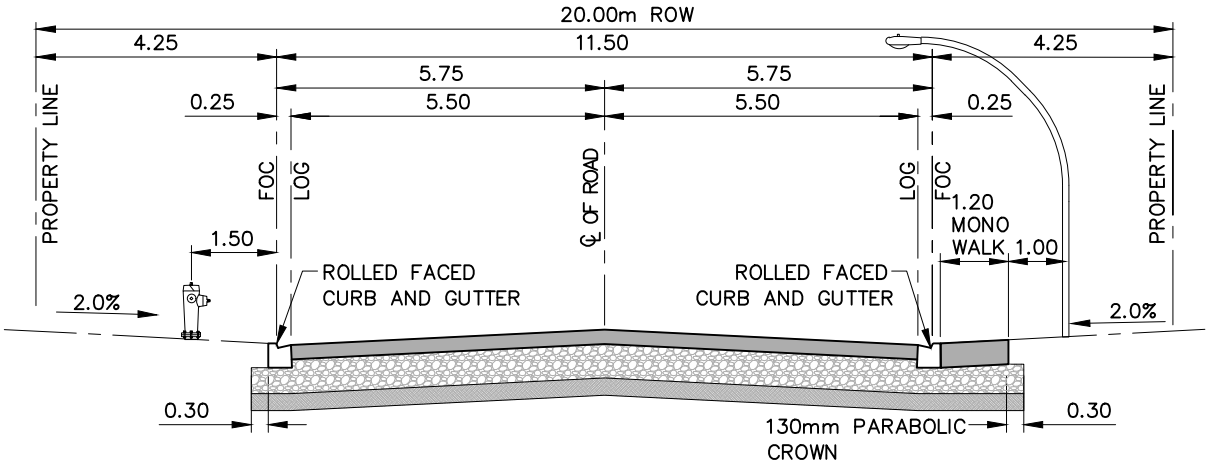
T0C 1Z0

STD. DWG NO.
3-02



20.0m COLLECTOR ROW WITH FRONTAGE

MINIMUM ROAD STRUCTURE
125mm ASPHALT CONCRETE
300mm–20mm CRUSHED GRAVEL
300mm COMPACTED SUBGRADE OR
CEMENT STABILIZED CLAY SUBGRADE

NOTES:
1. ALL DIMENSIONS IN METRES UNLESS OTHERWISE SPECIFIED.

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20.0m COLLECTOR ROW WITH FRONTAGE

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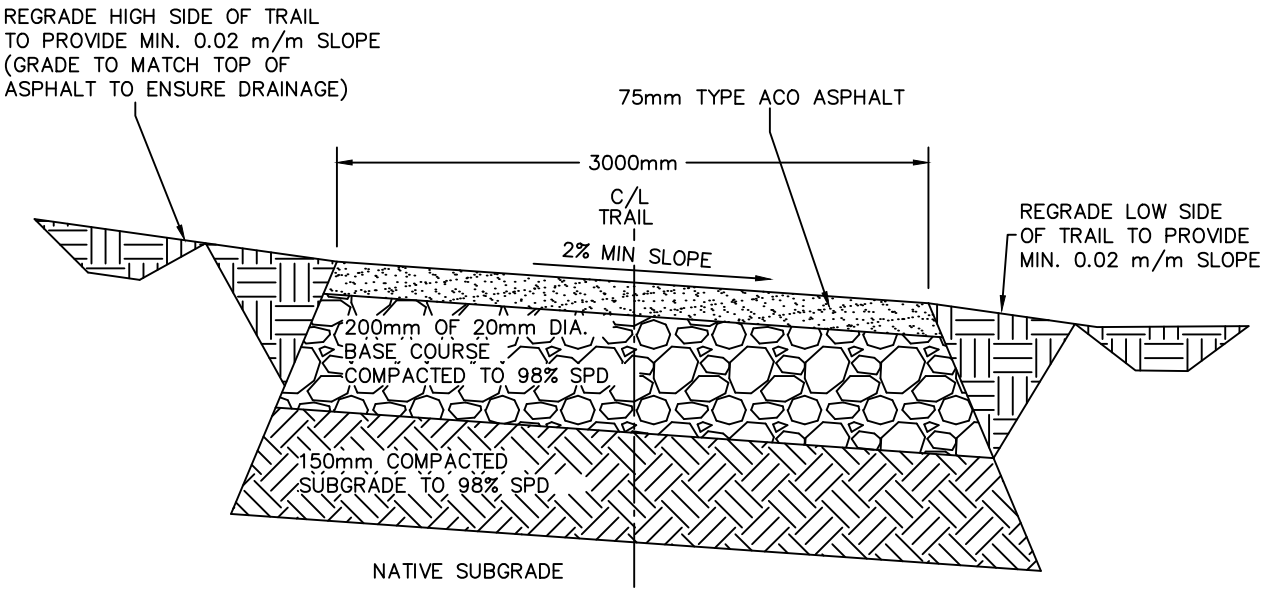
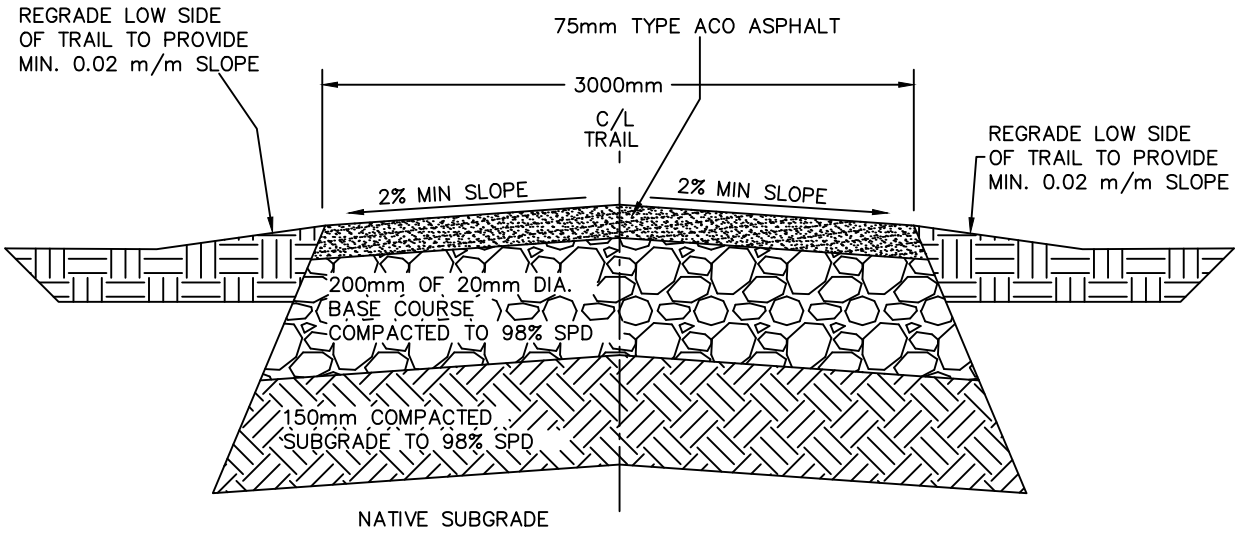
STD. DWG NO.
3-03



TYPICAL TRAIL SECTION – CROSSFALL

NTS



TYPICAL TRAIL SECTION – CROWN

NTS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. MAKE ALL JOINTS WITH EXISTING VEGETATION SMOOTH AND CONTINUOUS, WHERE NECESSARY TRIM BACK ROOTS AND CLEAR DEBRIS
3. FOR 3.0m SHARED–PATH WIDTH, A 100mm SOLID YELLOW CENTER LINE IS REQUIRED AT THE DISCRETION OF THE TOWN.

ALTERNATE STRUCTURE:

- 75mm ACO ASPHALT
- 300mm 20mm GRAVEL ON WOVEN GEOTEXTILE FABRIC EXTENDED UP EDGES OF GRAVEL ON NATIVE GROUND.
- ASSUMES NO SIGNIFICANT WORK TO THE NATIVE SUBGRADE, DUE TO UNFORESEEN CONDITIONS OR MINIMUM UTILITY COVER.

PROFESSIONAL ENGINEER
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Date	Details	Drawn
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ASPHALT TRAIL

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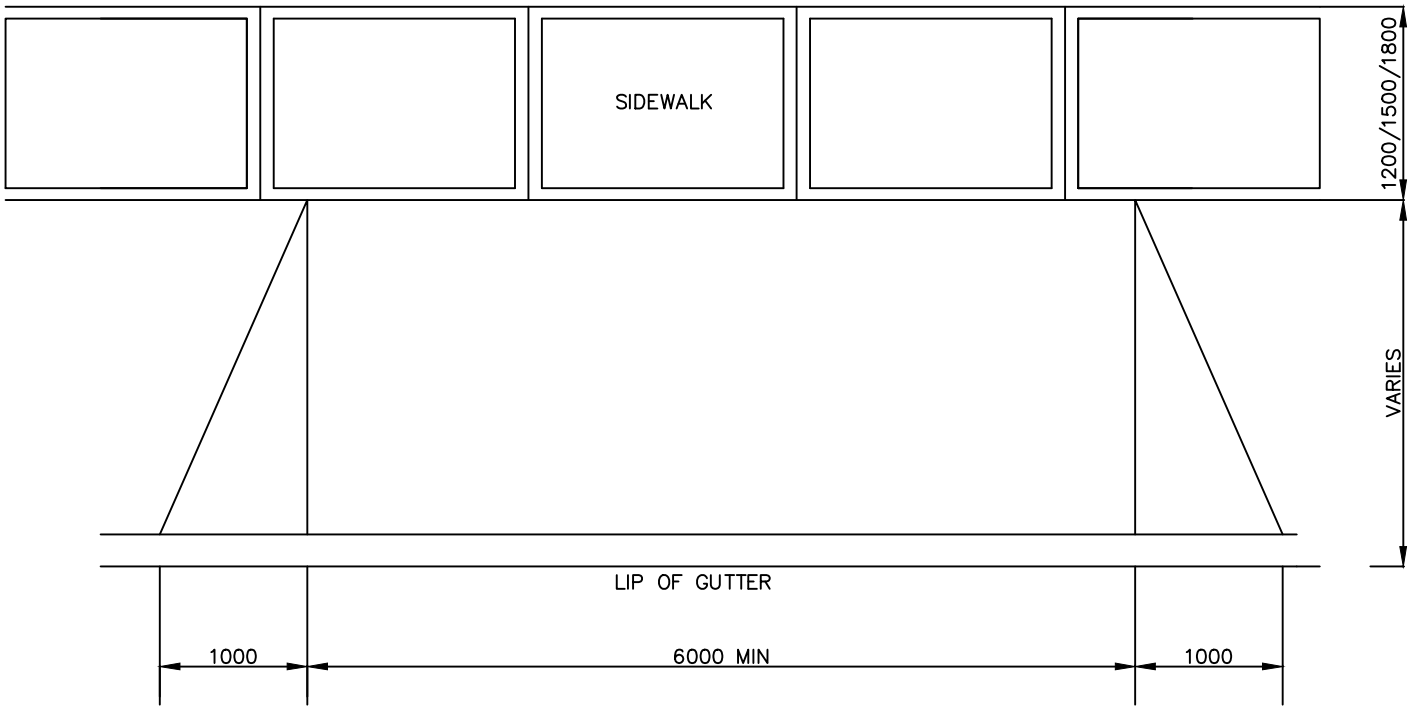
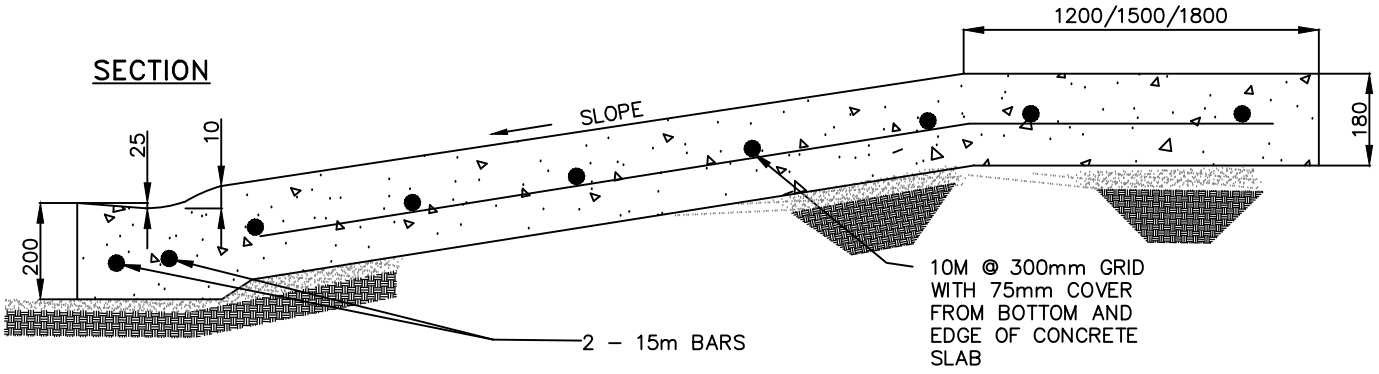
T0C 1Z0

STD. DWG NO.
3-04





NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE SHALL BE CLASS C, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% and <8.0% AIR ENTRAINMENT.
3. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
4. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
5. CROSSING DEPTH IS VARIABLE AND DEPENDANT ON BOULEVARD WIDTH.

PROFESSIONAL ENGINEER ALBERTA
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8 Feb 2022
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REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

LANE OR COMMERCIAL CROSSING

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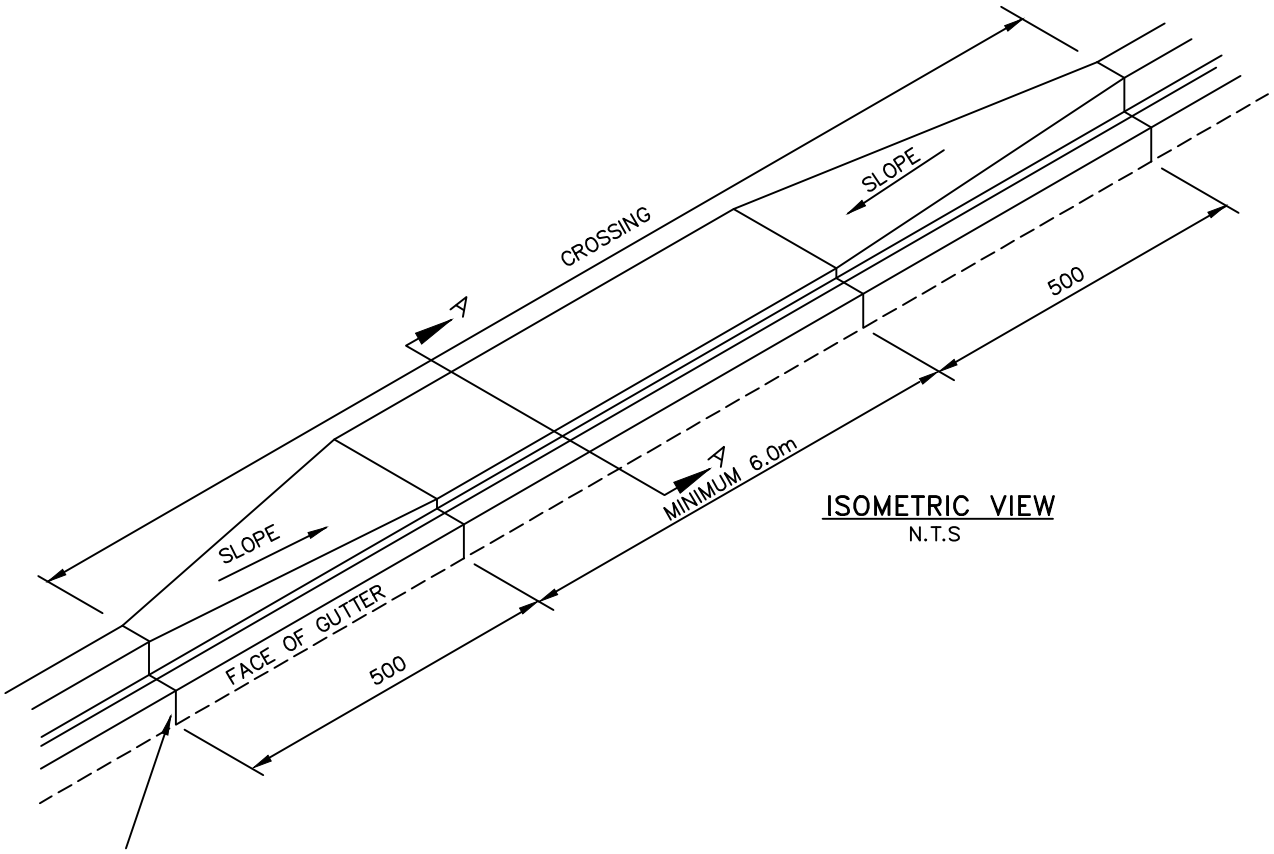
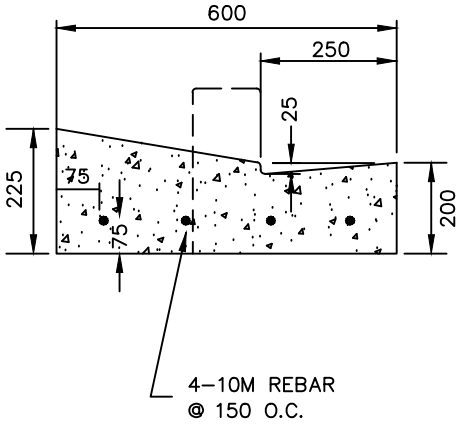
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
3-05



ISOMETRIC VIEW
N.T.S



SECTION A – A

NOTES:

1. CONCRETE SHALL BE CLASS C, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% and <8.0% AIR ENTRAINMENT.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
2. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
3. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

INDUSTRIAL / COMMERCIAL CURB & GUTTER CROSSING

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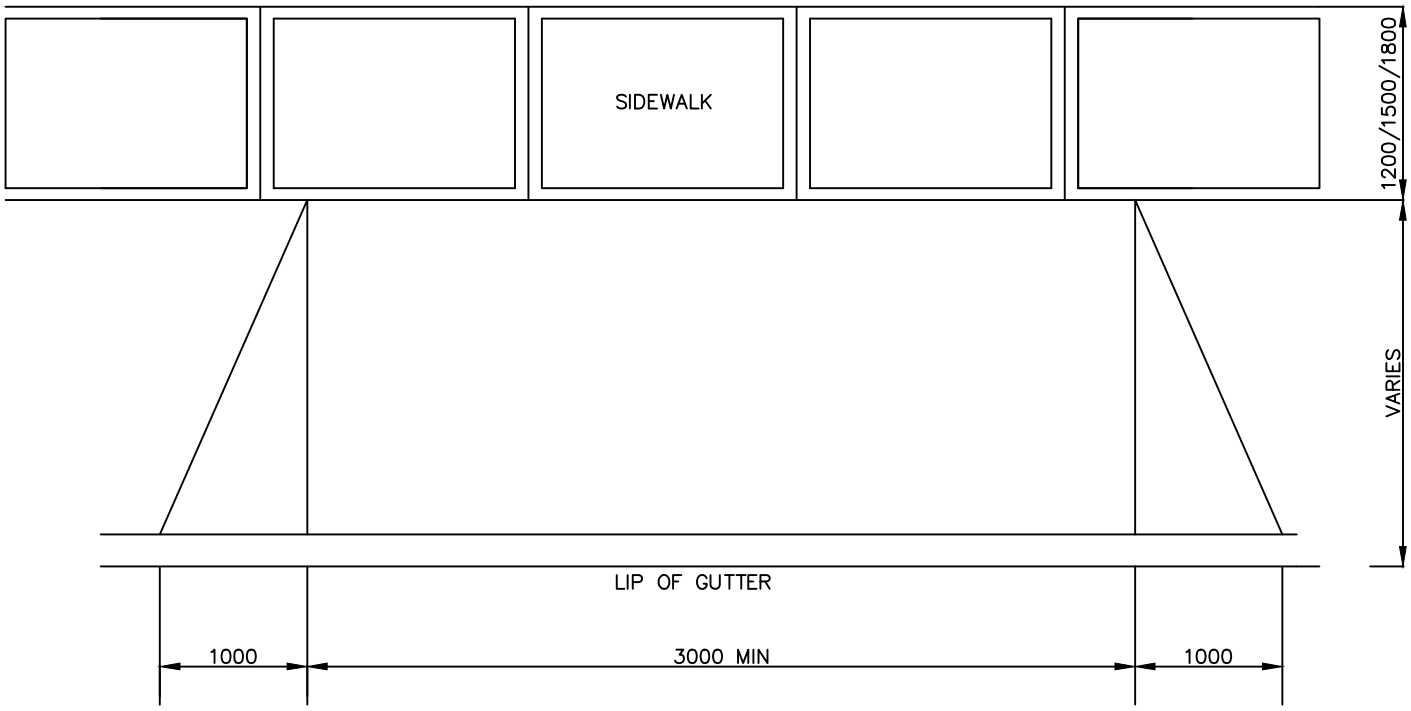
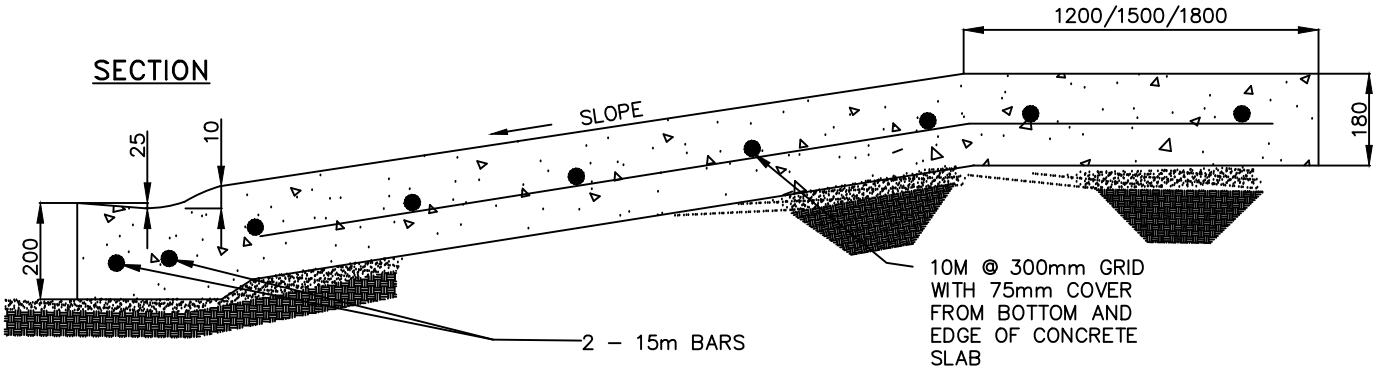
T0C 1Z0

STD. DWG NO.
3-06





NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE SHALL BE CLASS C, 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% and <8.0% AIR ENTRAINMENT.
3. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
4. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
5. CROSSING DEPTH IS VARIABLE AND DEPENDANT ON BOULEVARD WIDTH.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
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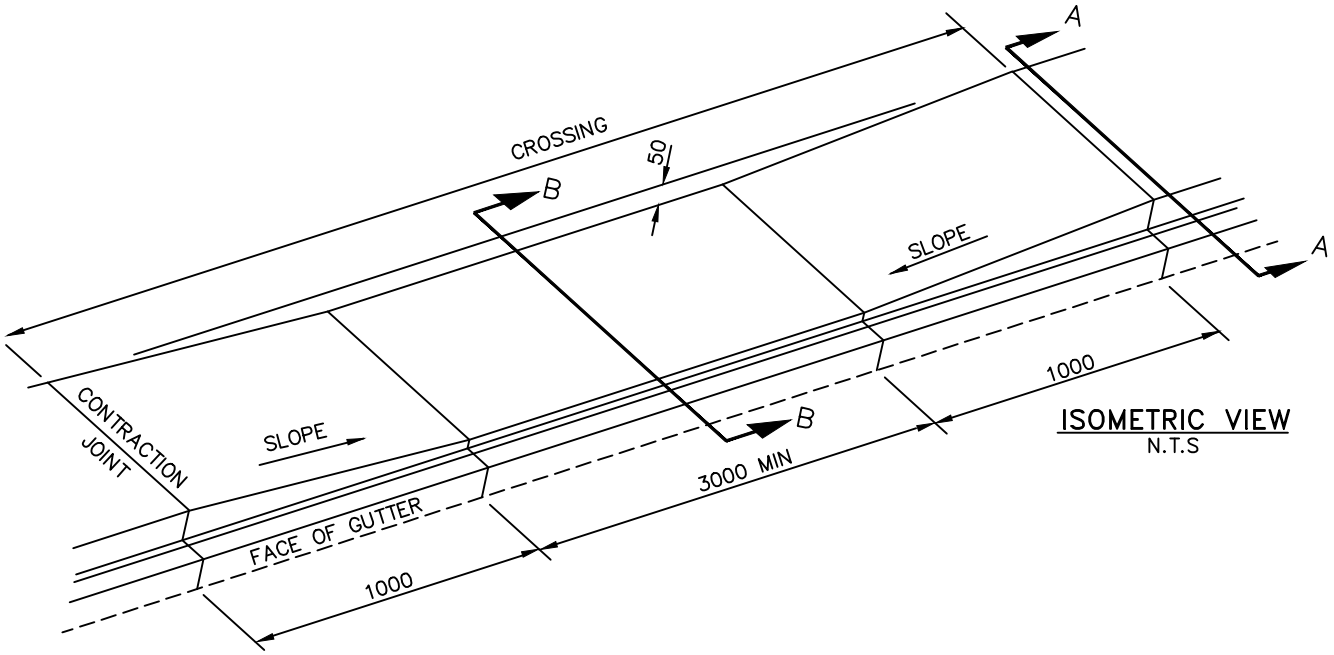
REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

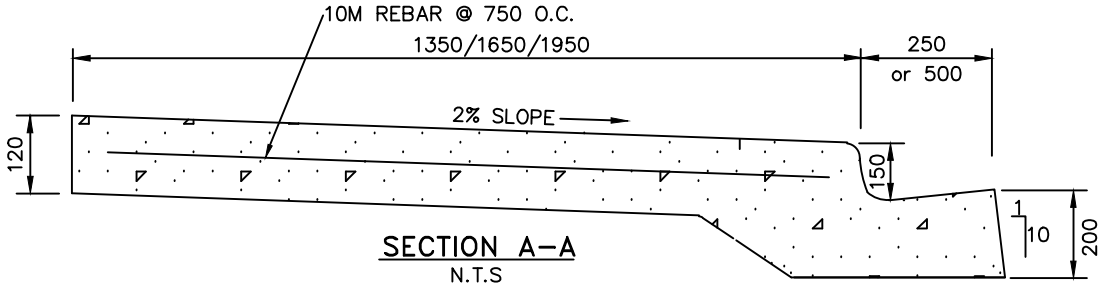
RESIDENTIAL CROSSING

Millet
Proud to be
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

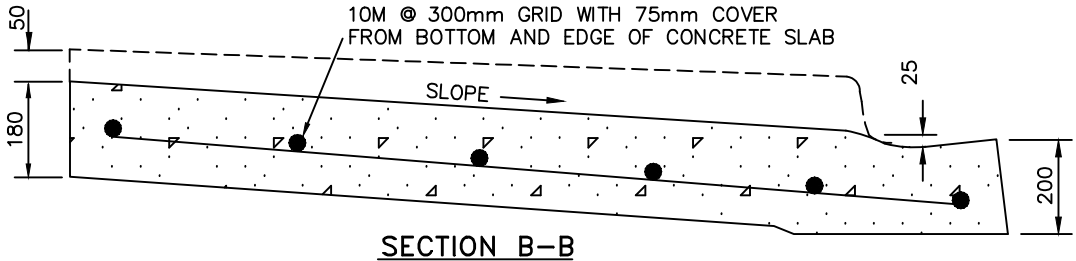
STD. DWG NO.
3-07



ISOMETRIC VIEW
N.T.S



SECTION A–A
N.T.S



SECTION B–B
N.T.S

NOTES:

1. CONCRETE SHALL BE CLASS C 30 MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0% AIR ENTRAINMENT.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. DROP BACK OF CROSSING 50mm FOR WIDTH OF CROSSING
4. MIN. DEPTH OF CROSSING TO BE 1.4m IF PLACED WITHOUT SIDEWALK
5. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
6. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER
ANDREW D. HEATH
ID 90650
ALBERTA
8 Feb 2022
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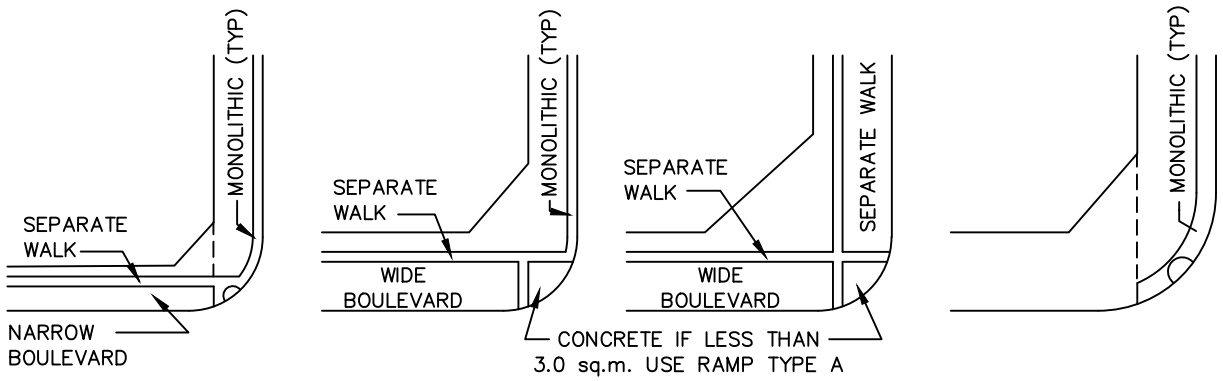
REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

TYPICAL MONOLITHIC LANE OR DRIVEWAY CROSSING

Millet
Proud to be

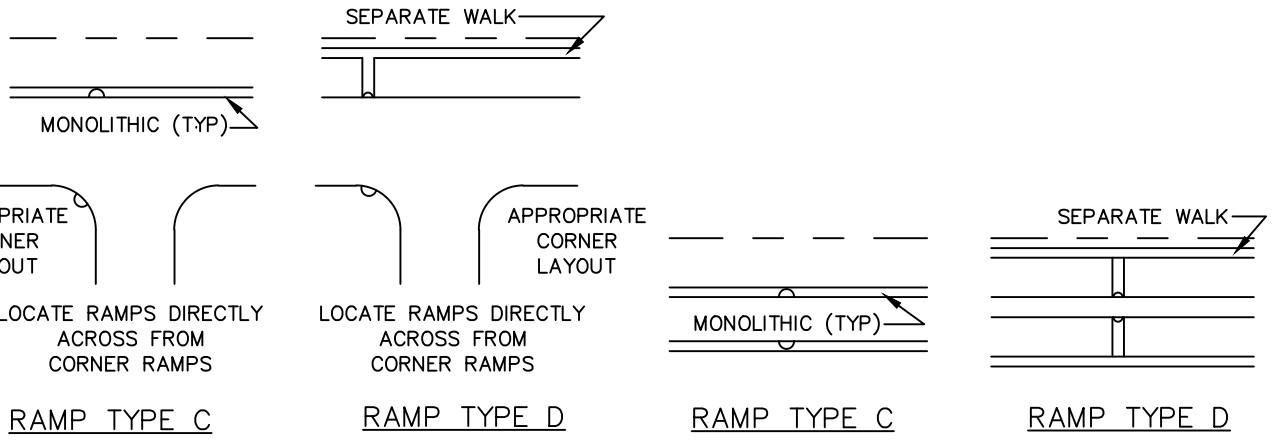
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
3-08



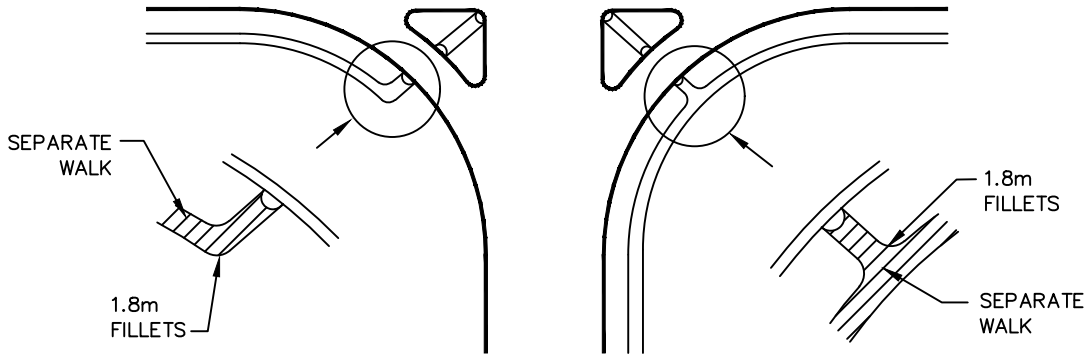
RAMP TYPE A | RAMP TYPE B | RAMP TYPE B | RAMP TYPE A

CORNER LAYOUT



RAMP TYPE C | RAMP TYPE D | RAMP TYPE C | RAMP TYPE D

TANGENT LAYOUT



RAMP TYPE D

INTERSECTION LAYOUT

PROFESSIONAL ENGINEER ANDREW D. HEATH ID 90650 ALBERTA
8 Feb 2022
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REVISIONS		
Date	Details	Drawn
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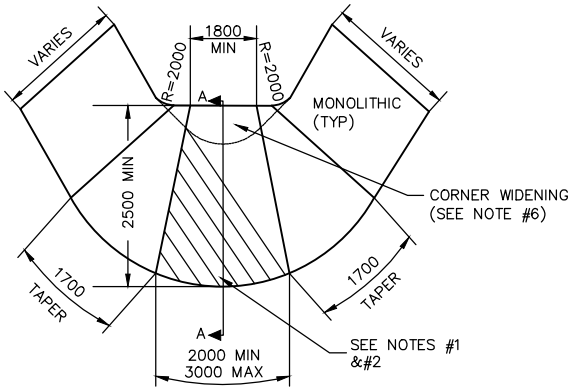
RAMP LOCATIONS

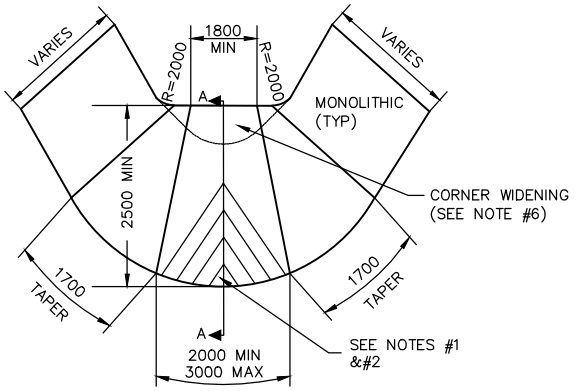
Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

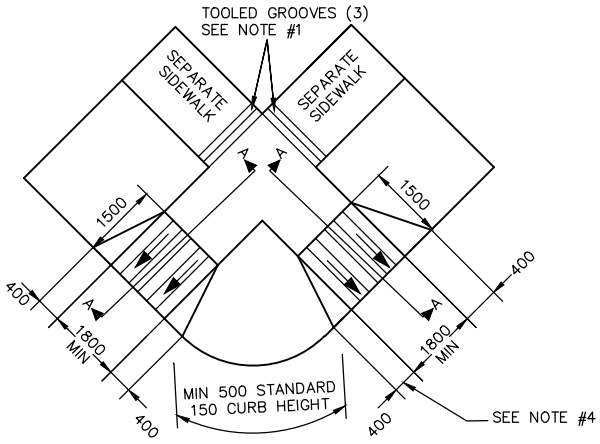
STD. DWG NO.
3-09



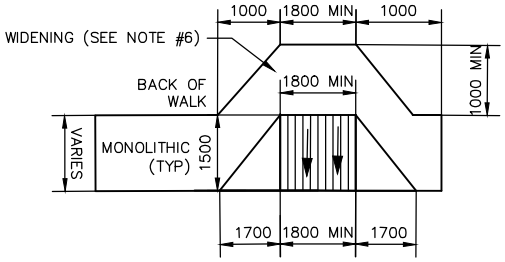
TYPE A1 (ONE DIRECTION)



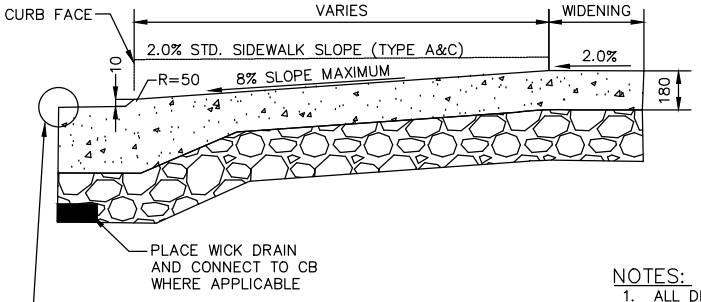
TYPE A2 (TWO DIRECTION)



TYPE B

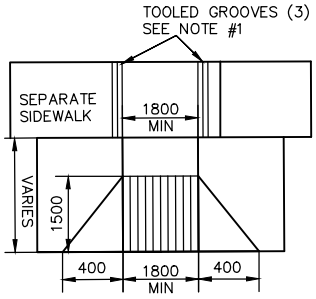


TYPE C



A) MATCH ASPHALT SURFACE TO GUTTER LIP WITHIN 3mm.
B) IF ASPHALT TOPLIFT IS DEFERRED, PLACE ASPHALT RAMP FOR THE WIDTH OF CURB RAMP, AND EXTENDING MINIMUM 1.0m INTO ROAD.

TYPICAL CROSS SECTION A–A



TYPE D

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0% AIR ENTRAINMENT.
3. TOOLED GROOVES 5mm WIDE x 10mm DEEP, BROOM FINISH. GROOVE SPACING 150mm O.C. ADJACENT TO CURB.
4. GROOVES TO BE IN DIRECTION OF TRAVEL.
5. WHEN REQUIRED, TRANSITION FROM STRAIGHT FACE OF CURB TO ROLLED FACE OF CURB AT CURB RAMP.
6. CURBS AND RAMPS TO BE POURED MONOLITHICALLY.
7. WIDTH OF RAMP MUST EQUAL WIDTH OF WALK (MIN. 1.5m, MAX 3.0m) EXCEPT "TYPE A."
8. PROVIDE 1.0m WIDENING (AT 2.0% X–FALL) FROM BACK OF CURB RAMP (TYPES A&C) WHERE ROAD RIGHT OF WAY ALLOWS.
9. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
10. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER
ANDREW D. HEATH
ID 90650
ALBERTA
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REVISIONS		
Date	Details	Drawn
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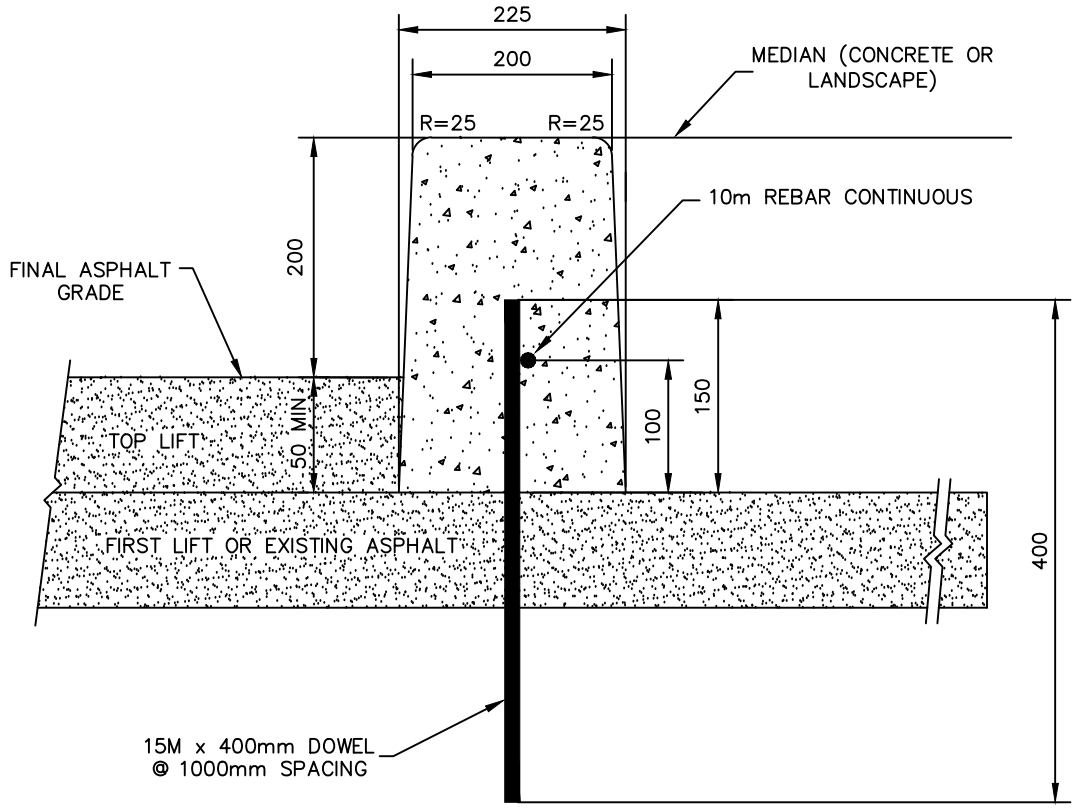
TYPES OF RAMPS

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
3-10



NOTES:

1. CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0% AIR ENTRAINMENT.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. 200mm CURB HEIGHT ABOVE FINAL PAVEMENT ELEVATION

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ANDREW D. HEATH
ID 90650
8 Feb 2022
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REVISIONS		
Date	Details	Drawn
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PINNED CONCRETE CURB

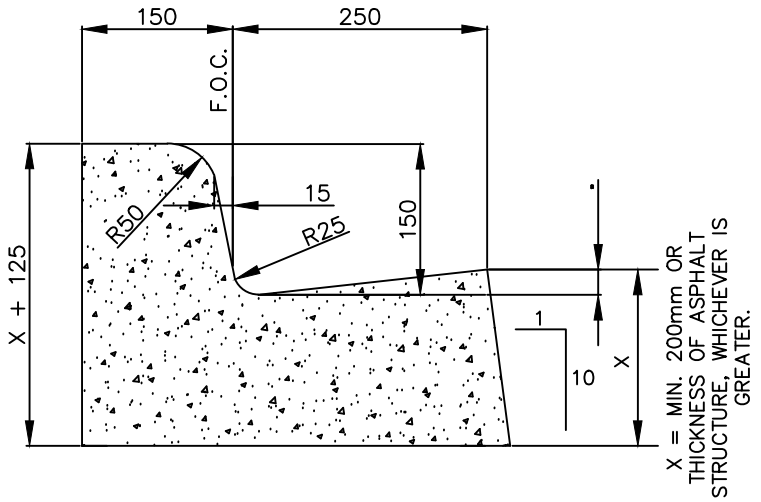
Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

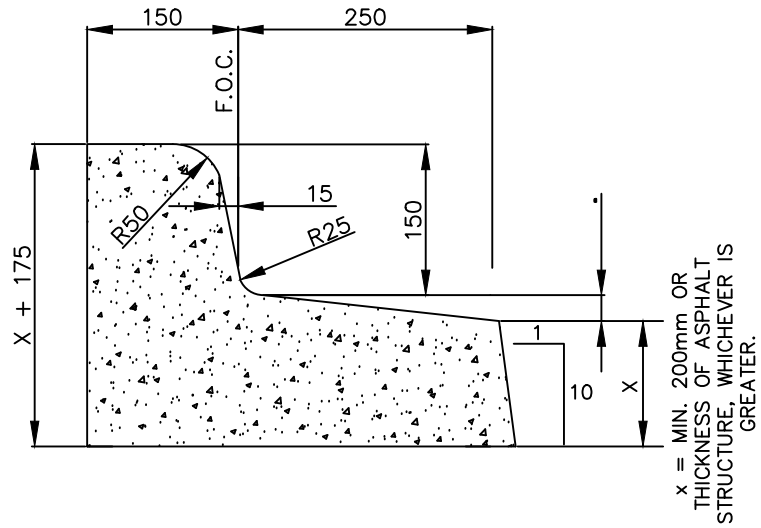
Scale: N.T.S.

STD. DWG NO.
3-11

STANDARD GUTTER



REVERSE GUTTER



NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0% AIR ENTRAINMENT.
3. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
4. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER ALBERTA
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REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

150mm STD. CURB AND 250mm GUTTER

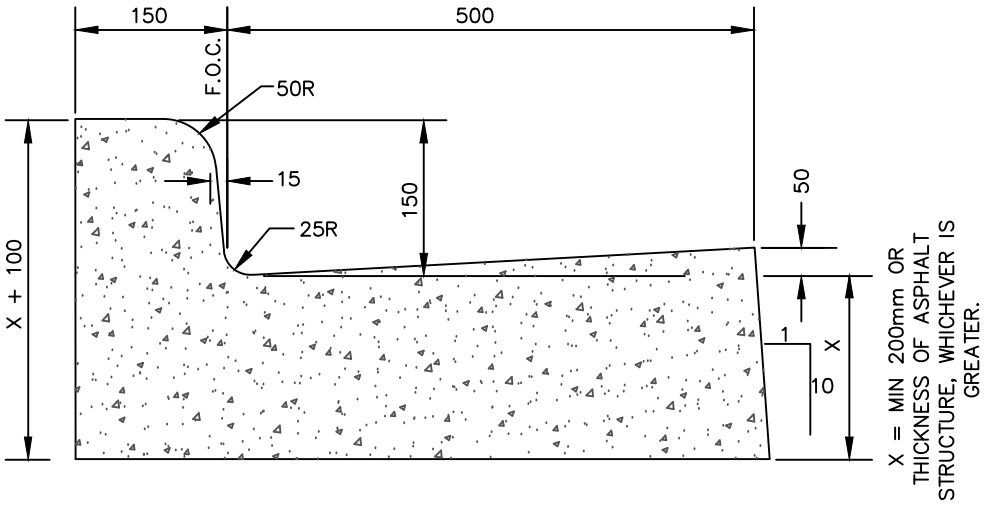
Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

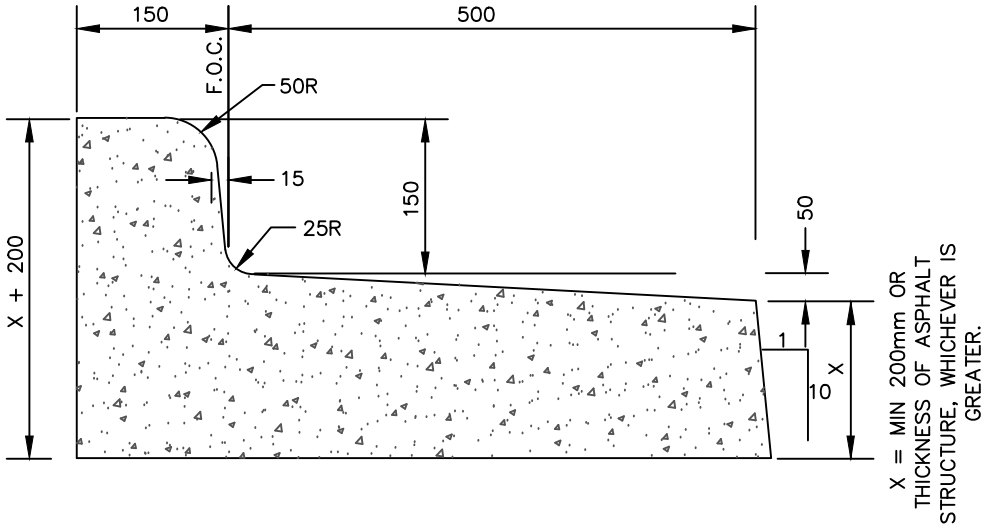
STD. DWG NO.
3-12

Scale: N.T.S.

STANDARD GUTTER



REVERSE GUTTER



NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0% AIR ENTRAINMENT.
3. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
4. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

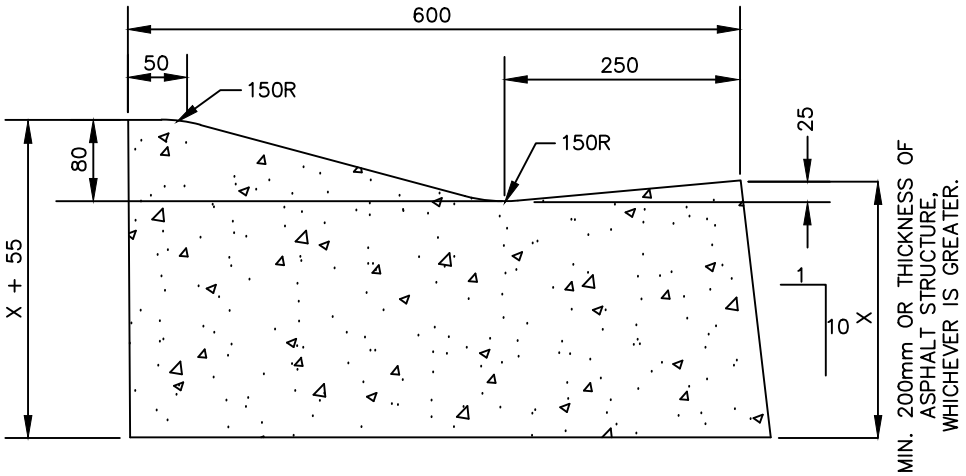
150mm STD. CURB AND 500mm GUTTER

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
3-13

Scale: N.T.S.



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0%AIR ENTRAINMENT.
3. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
4. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

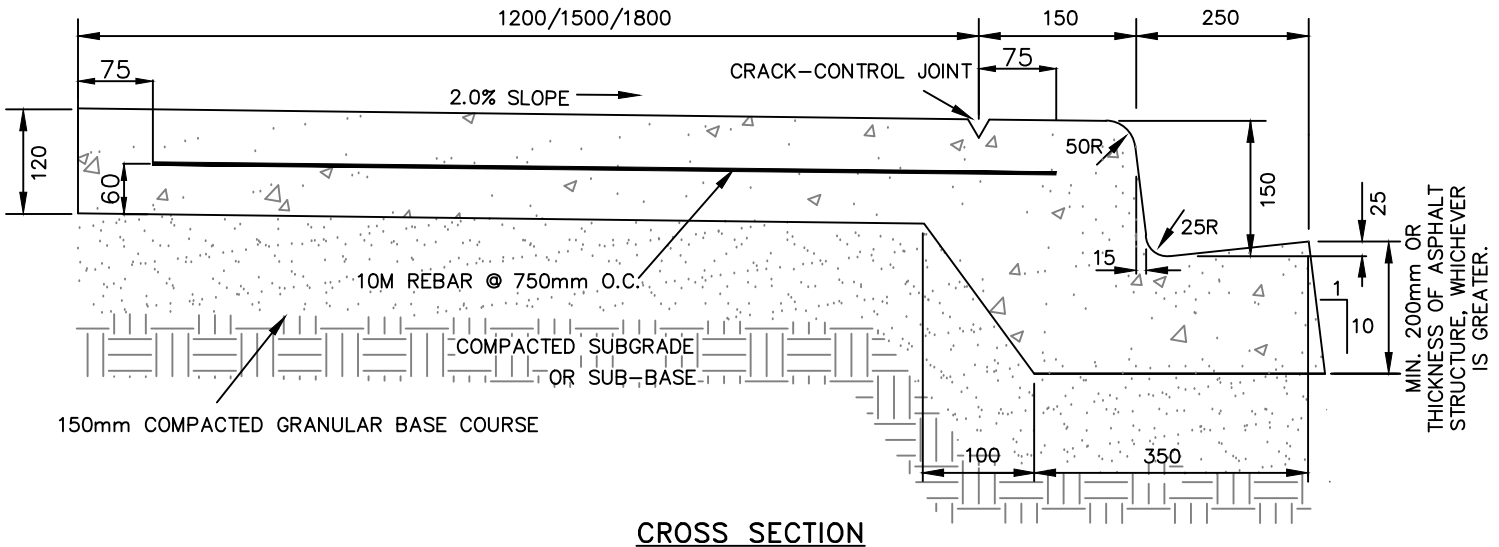
400mm ROLLED CURB AND 250mm GUTTER

Millet
Proud to be

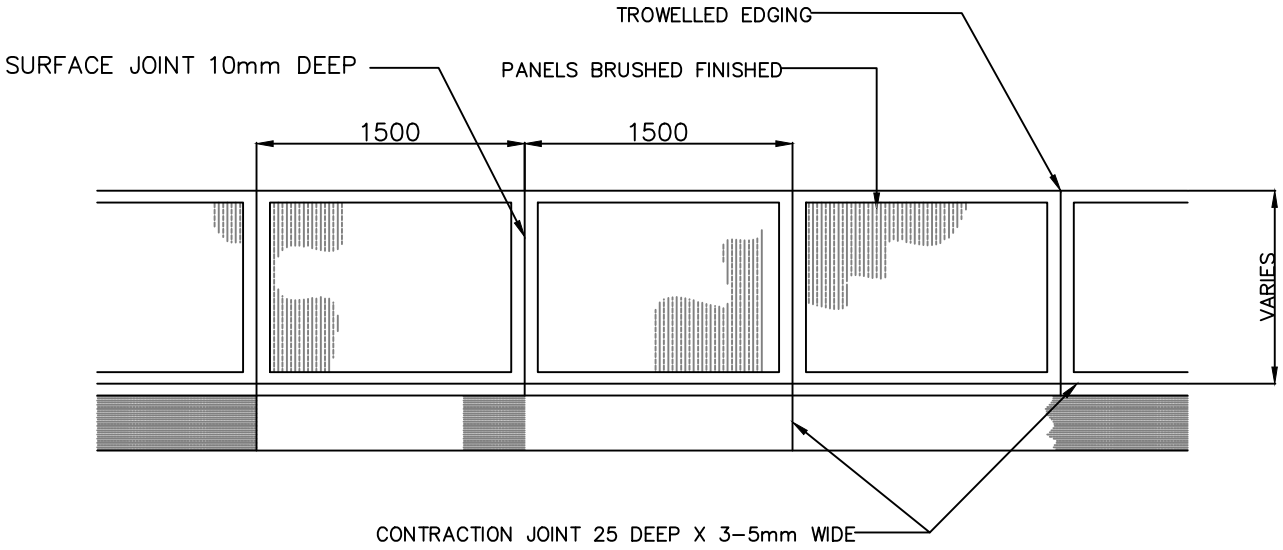
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
3-14

Scale: N.T.S.



CROSS SECTION



PLAN VIEW

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0% AIR ENTRAINMENT.
3. CONTRACTION JOINTS SHALL BE 50mm DEEP IN CURB AND GUTTER AND 25mm DEEP IN SIDEWALKS.
4. MAXIMUM SPACING BETWEEN CRACK-CONTROL JOINTS SHALL BE 3.0m.
5. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
6. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
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REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

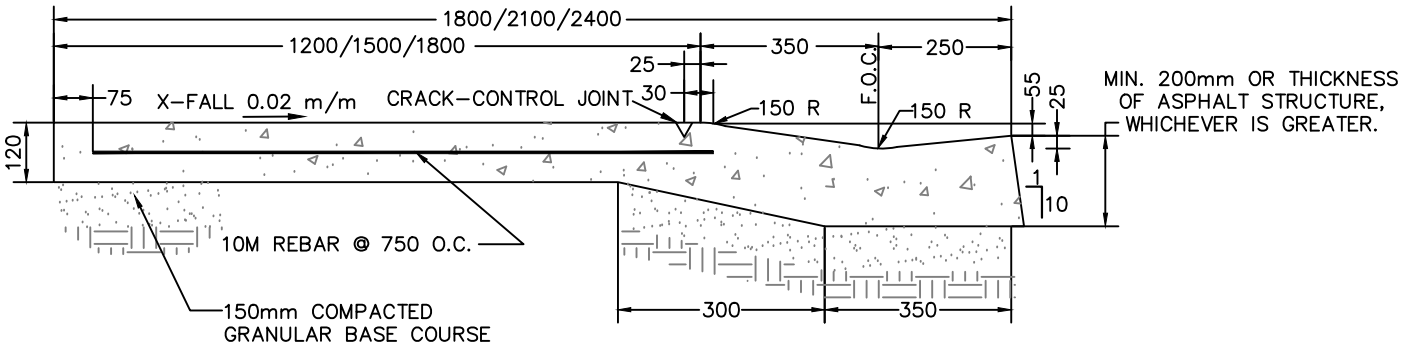
1200mm/1500mm/1800mm MONOLITHIC SIDEWALK

Millet
Proud to be

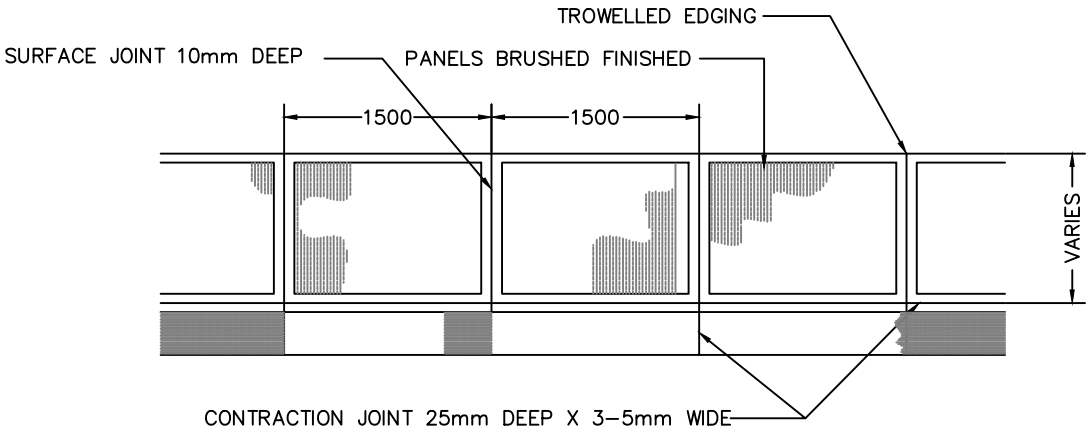
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
3-15



CROSS SECTION



PLAN VIEW

NOTES:

1.) CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AIR ENTRAINMENT AND <8.0% AIR ENTRAINMENT.
2.) CONTRACTION JOINTS SHALL BE 50mm DEEP IN CURB AND GUTTER AND 25mm DEEP IN SIDEWALKS.
3.) MAXIMUM SPACING BETWEEN CRACK-CONTROL JOINTS SHALL BE 3.0m.
4.) GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 1000% STANDARD PROCTOR DENSITY (SPD).
5.) ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

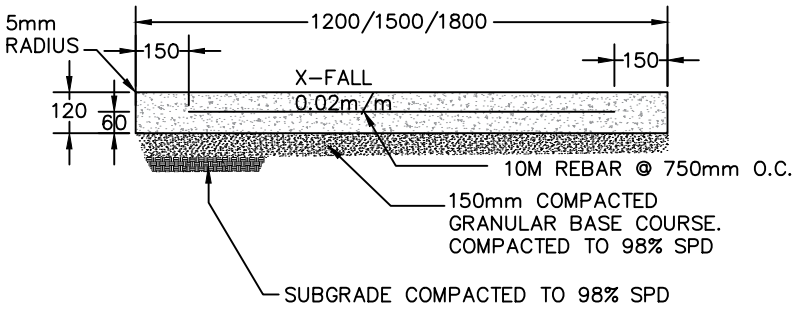
1200mm/1500mm/1800mm ROLLED MONOLITHIC SIDEWALK

Millet
Proud to be

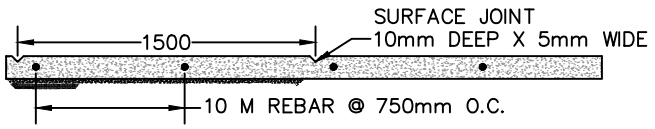
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

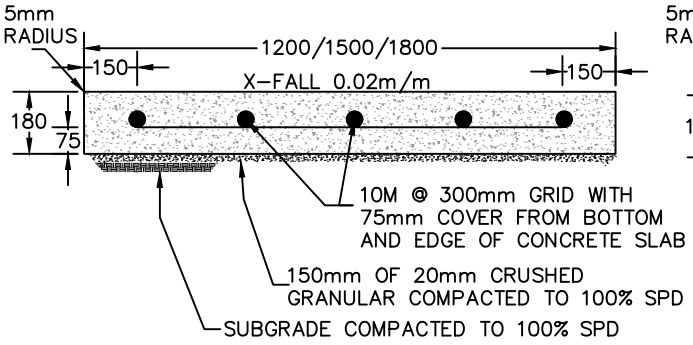
STD. DWG NO.
3-16



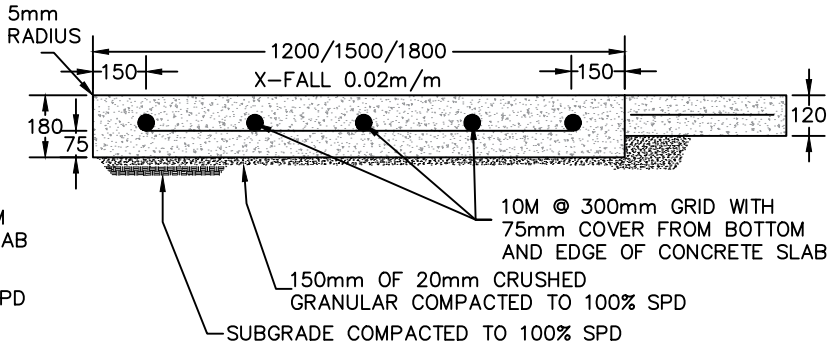
STANDARD SIDEWALK



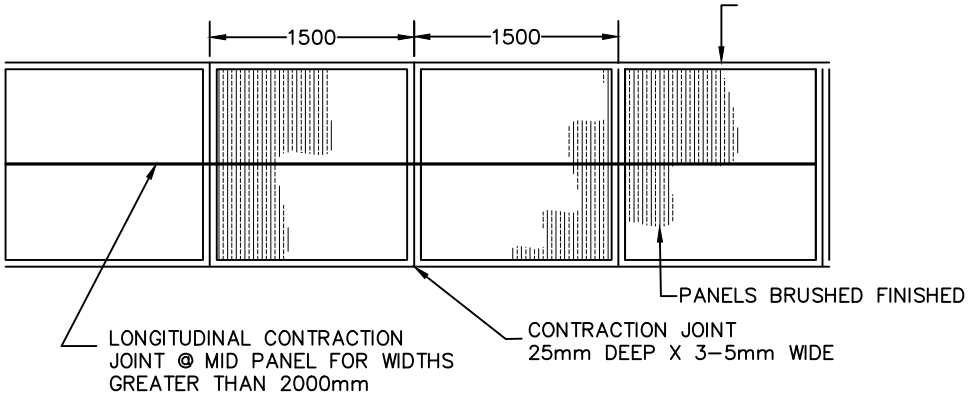
PROFILE SECTION



DRIVEWAY SECTION



TRANSITION



TOP VIEW

NOTES:

1.)CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH 5.5% AND 8.0% AIR ENTRAINMENT.
2.)CONTRACTION JOINTS SHALL BE 50mm DEEP IN CURB AND GUTTER AND 25mm DEEP IN SIDEWALK.
3.) MAXIMUM SPACING BETWEEN CRACK–CONTROL JOINTS SHALL BE 3.0m.
4.) SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
5.) GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD)
6.) ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

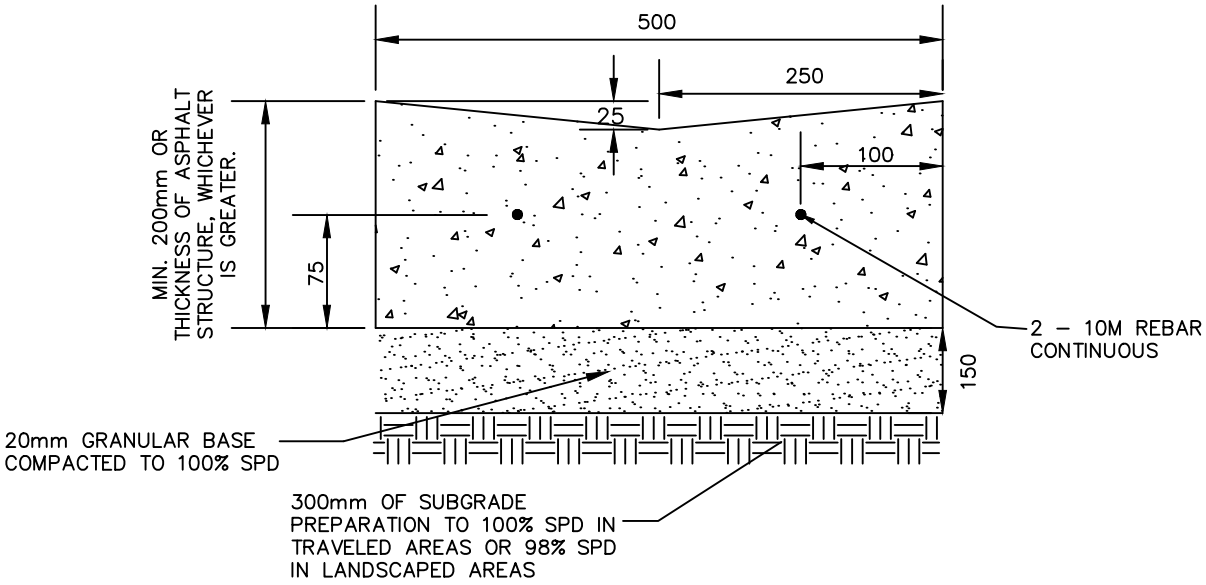
1200mm/1500mm/1800mm SEPARATE SIDEWALK

Millet
Proud to be

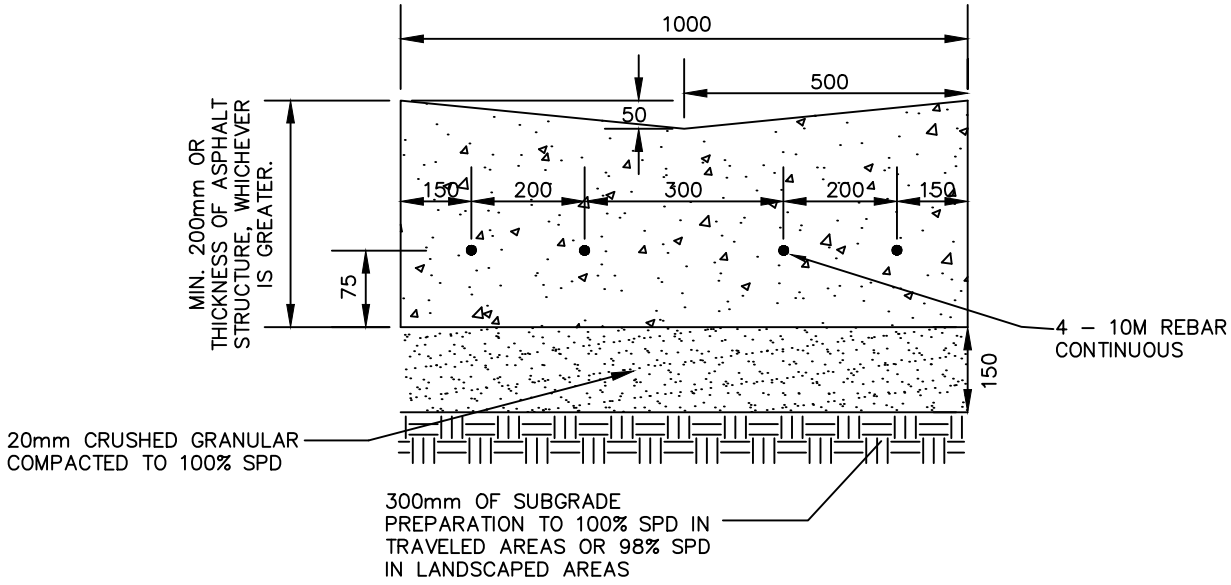
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
3-17



500mm CONCRETE SWALE



1000mm CONCRETE SWALE

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. CONCRETE SHALL BE CLASS C, 30MPa COMPRESSIVE STRENGTH AT 28 DAYS WITH >5.5% AND <8.0% AIR ENTRAINMENT.
3. SUBGRADE TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).
4. GRANULAR BASE SHALL BE MINIMUM 150mm THICKNESS COMPACTED TO 100% STANDARD PROCTOR DENSITY (SPD).

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

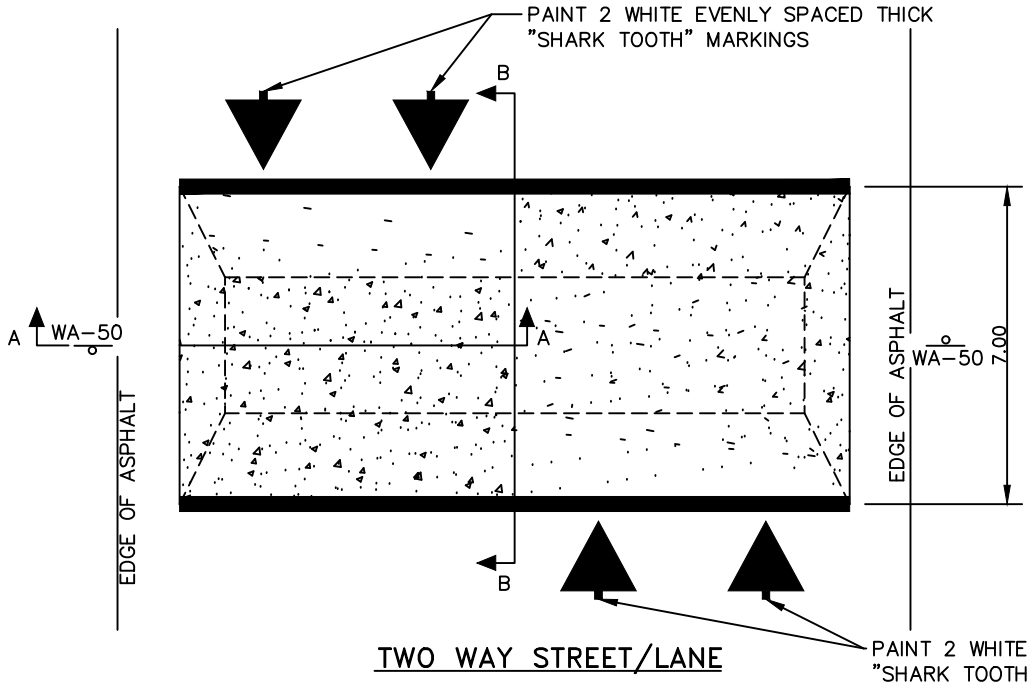
500mm/1000mm CONCRETE DRAINAGE SWALE

Millet
Proud to be

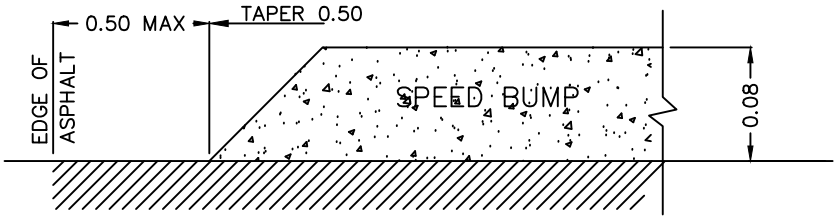
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
3-18

Scale: N.T.S.



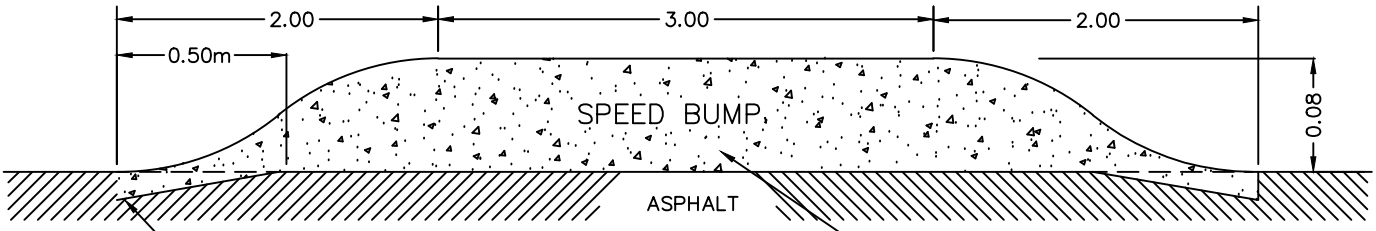
TWO WAY STREET/LANE



SECTION A – A

WA-50

450mm X 450mm
SPEED BUMP



SECTION B – B

SINUSOIDAL SPEED BUMP DEVELOPMENT:

DISTANCE (M)	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000
FINISHED HEIGHT (mm)	0	1	3	7	12	18	26	32	40	48	55	62	68	73	77	79	80

NOTES:

1. PAINT 1.0m WIDE WHITE LINE ACROSS BOTH FACES OF BUMP.
2. PAINT 0.6m WIDE CHEVRON PATTERN ON ENTIRE TOP SURFACE.

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ANDREW D. HEATH
ID 90650
8 Feb 2022
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Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

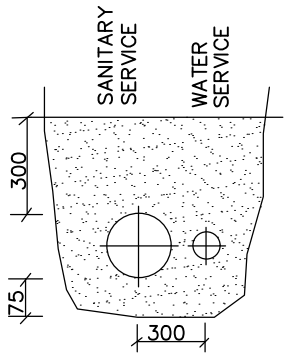
ASPHALT SPEED BUMP

Millet
Proud to be

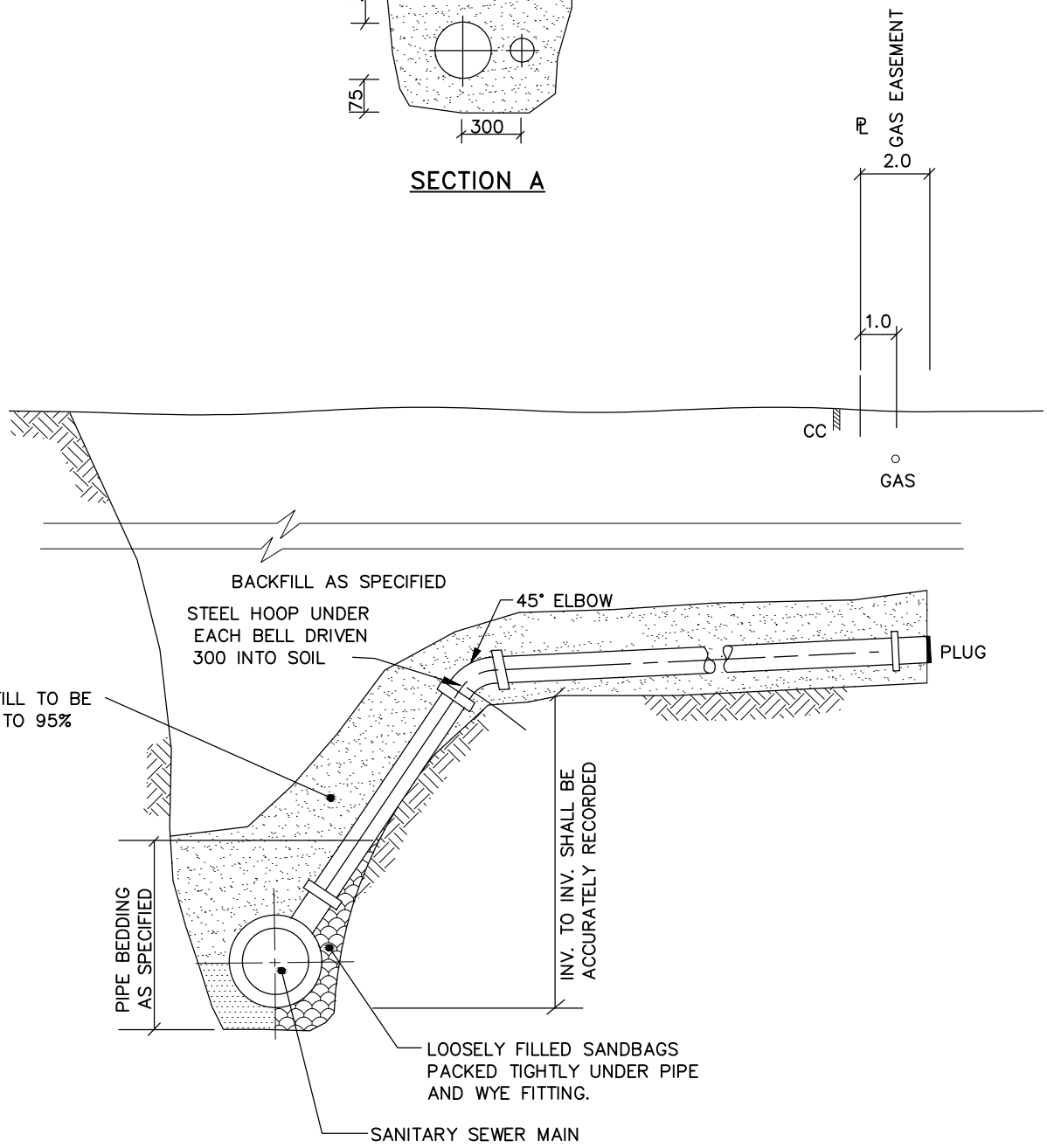
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
3-19



SECTION A



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ANDREW D. HEATH
ID 90650
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REVISIONS		
Date	Details	Drawn
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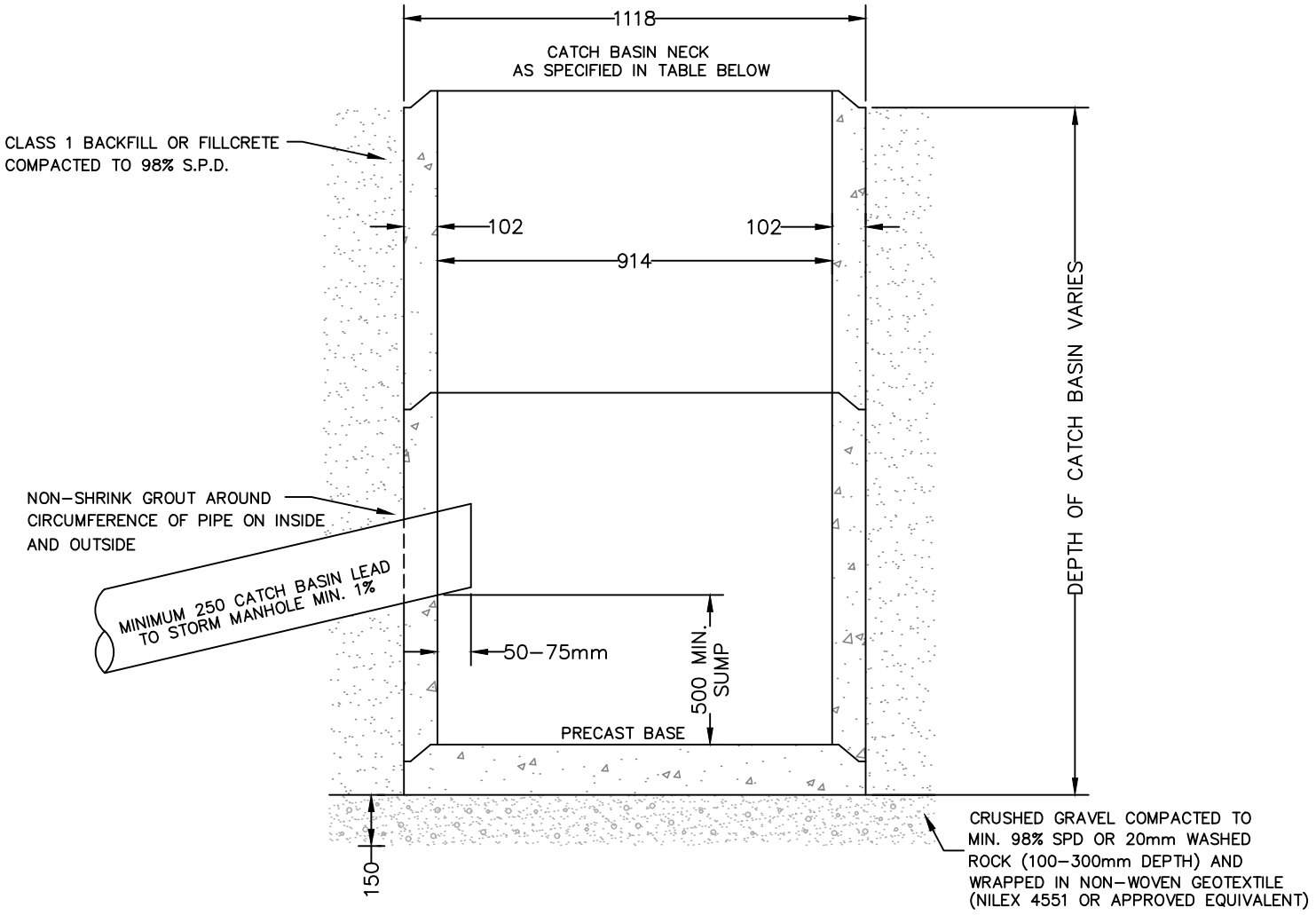
SANITARY RISER

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
4-01



FRAME AND COVER TYPE	CURB TYPE	TOP (UNDER FRAME AND GRATE)	SLAB TOP SIZE (ON TOP OF BARREL)
K-7	ROLLED FACE	K7 TOP	900mm W/ 635mm OPENING
F-38	NONE	NONE	900mm W/ 635mm OPENING
F-36	STRAIGHT FACE	T-TOP	900mm W/ 635mm OPENING

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN MILLIMETRES
2. REFER TO 'STORM CATCH BASIN NECK DETAILS' STANDARD DRAWING
3. REFER TO 'CATCH BASIN TYPICAL INSTALLATION' STANDARD DRAWING
4. ALL JOINTS TO BE FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE
5. WICK DRAINS TO EXTEND 100mm – 150mm INTO CATCH BASIN.
6. ALL PRECAST COMPONENTS MUST MEET A.S.T.M. C478 STANDARDS.

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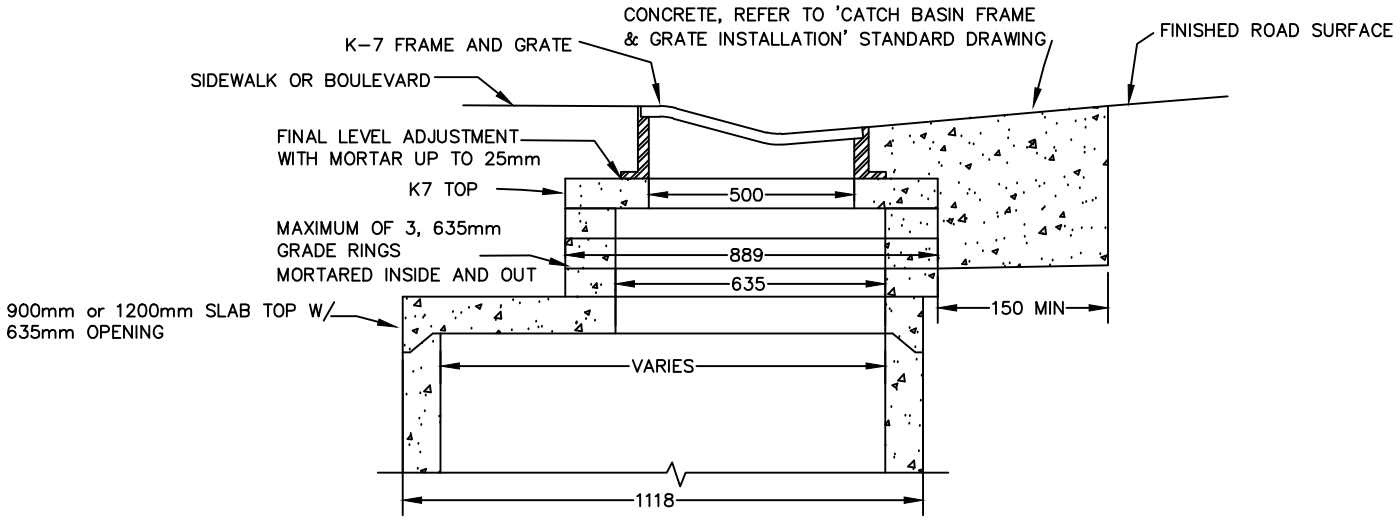
STORM CATCH BASIN ASSEMBLY C/W 500mm SUMP

Millet
Proud to be

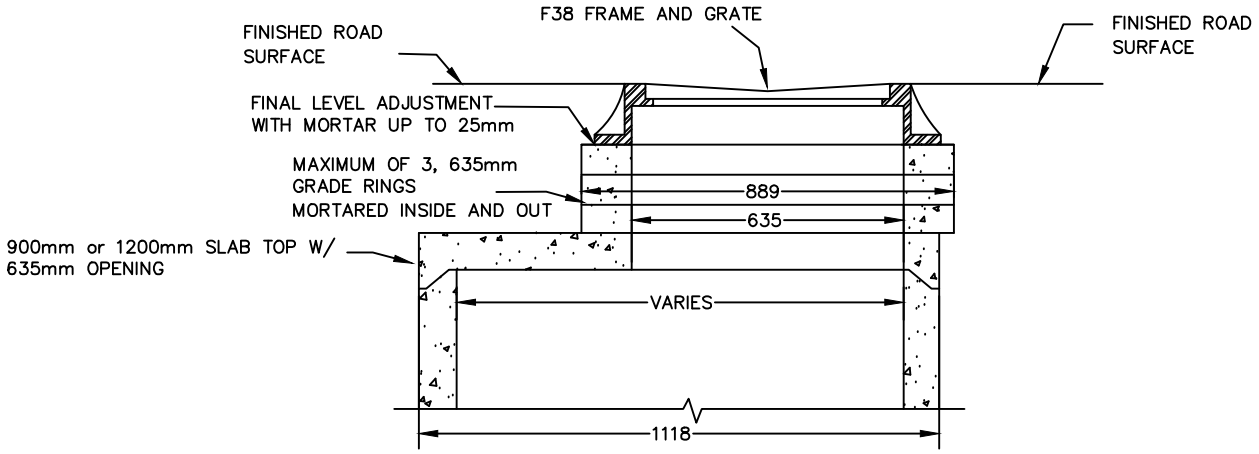
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
5-01

Scale: N.T.S.



K – 7 FRAME AND GRATE



F38 FRAME AND GRATE

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

STORM CATCH BASIN NECK (1 OF 2)

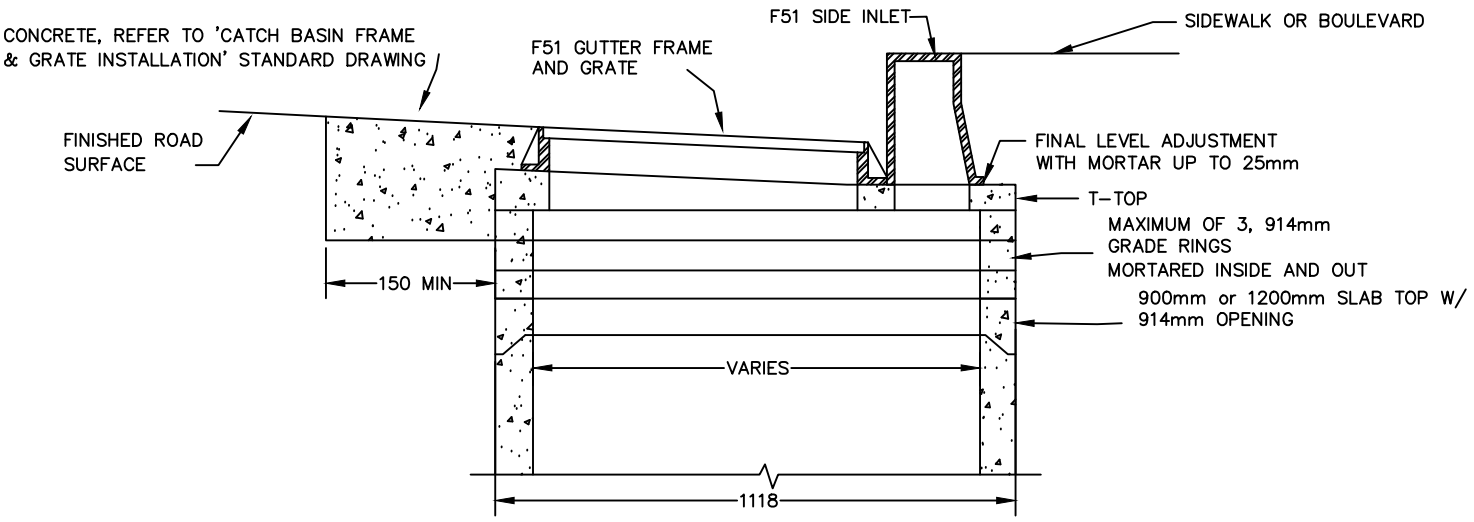
Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
5-02A

Scale: N.T.S.

Approved Sealed



F51 FRAME AND GRATE

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN MILLIMETRES
2. ALL FRAMES AND GRATES TO BE DIPPED
3. RUB-R-NEC EACH JOINT
4. ALL JOINTS TO BE FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. GRADE RINGS TO BE PLUMB TO THE BARREL AND NOT BE STAGGERED.
6. ALL GRADE RINGS SHALL BE PRECAST CONCRETE

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ID 90650
8 Feb 2022
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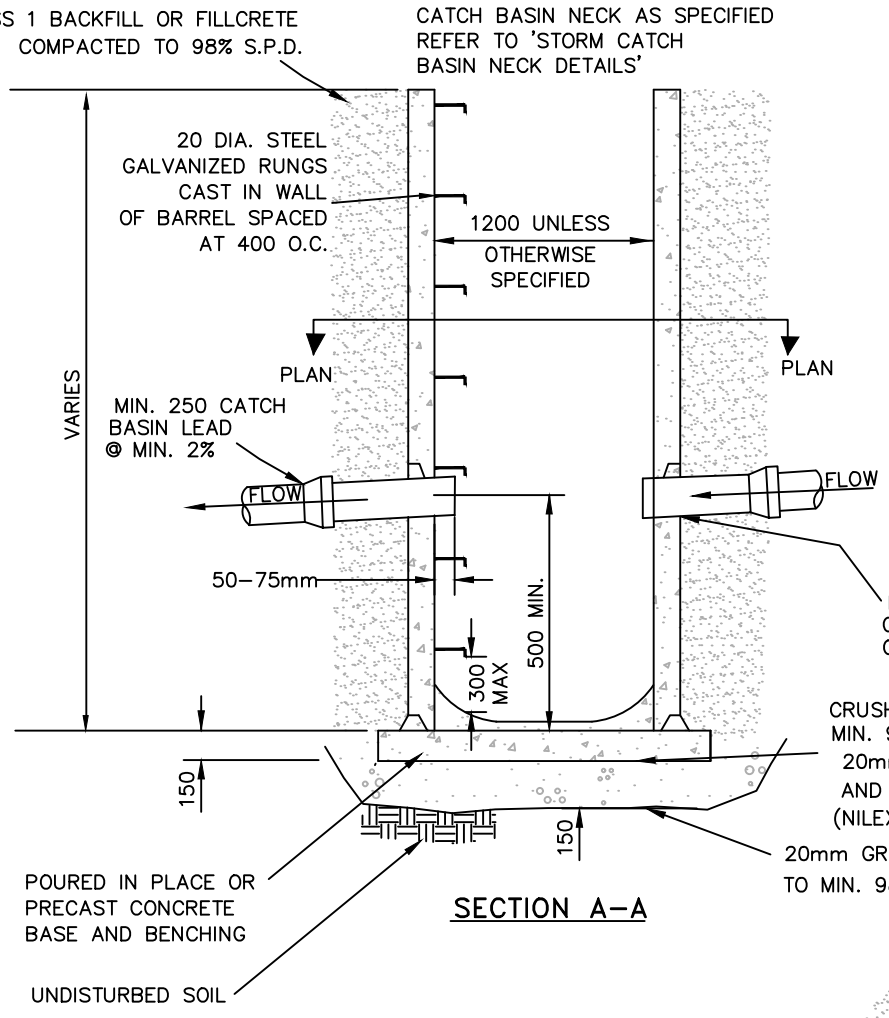
STORM CATCH BASIN NECK (2 OF 2)

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

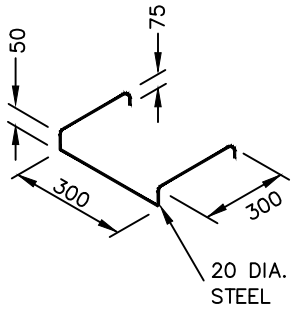
STD. DWG NO.
5-02B

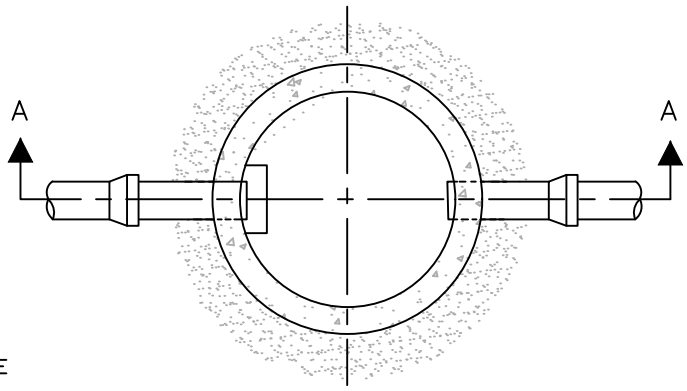
Scale: N.T.S.



SECTION A–A

SAFETY TYPE MANHOLE RUNG
(GALVANIZED AFTER FABRICATION)





PLAN

NOTES:

1. ALL PRECAST MANHOLES MUST CONFORM TO A.S.T.M. C478.
2. POURED IN PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH 30 MPa.
3. POURED IN PLACE CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
4. ALL DIMENSIONS ARE IN MILLIMETRES.
5. MAX. DISTANCE FROM RIM TO TOP RUNG IS 800mm.
6. ALL JOINTS TO BE FINISHED WITH NON–SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
7. RUB–R–NEC EACH JOINT.
8. BACKFILL MANHOLE WITH CLASS 1 BACKFILL OR FILLCRETE COMPACTED TO 98% S.P.D.
9. WICK DRAINS TO EXTEND 100mm – 150mm INTO CATCH BASIN.
10. GRADE RINGS MUST BE PLUMB AND NOT STAGGERED.

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ANDREW D. HEATH
ID 90650
8 Feb 2022
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REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

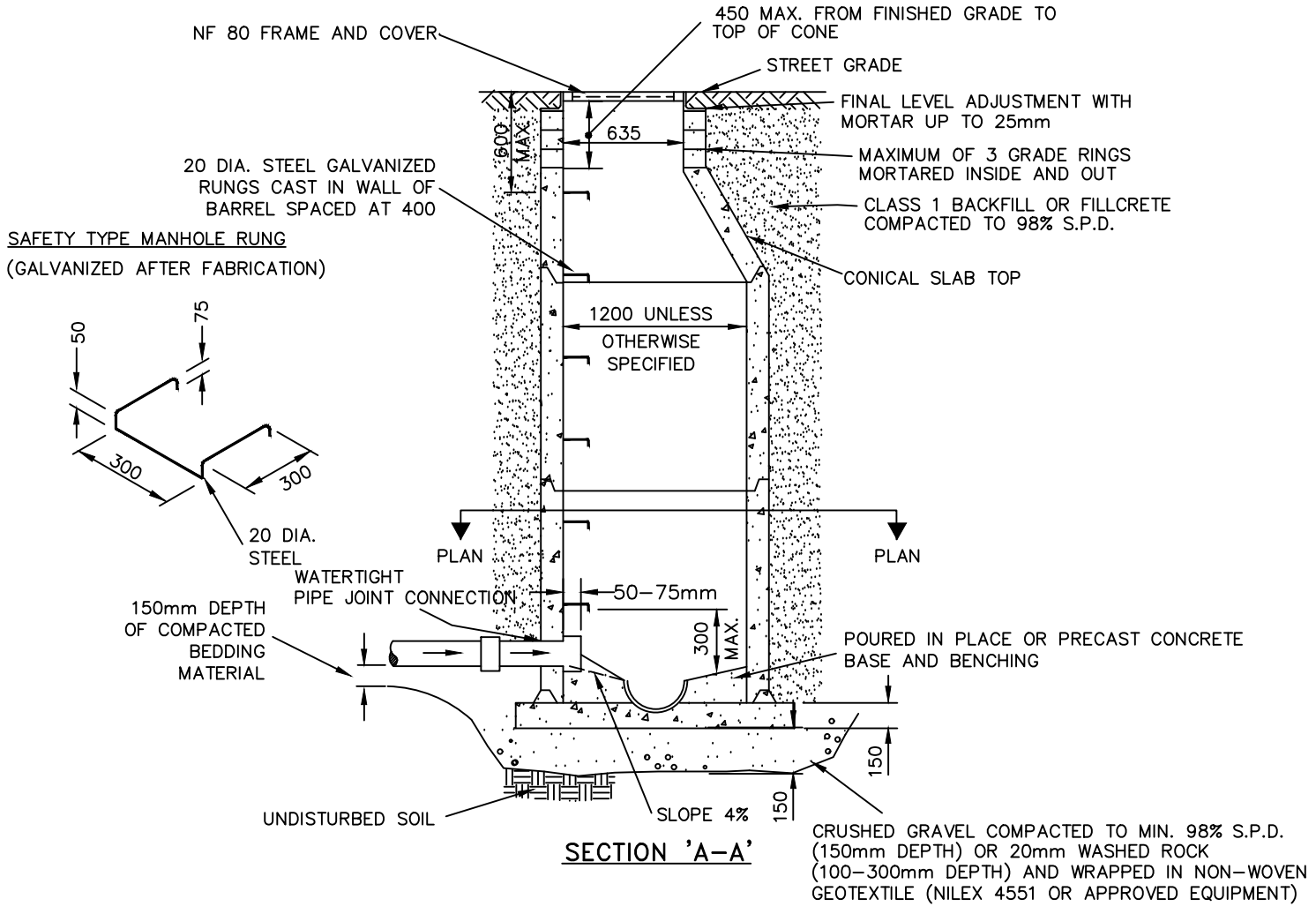
CATCH BASIN MANHOLE

Millet
Proud to be

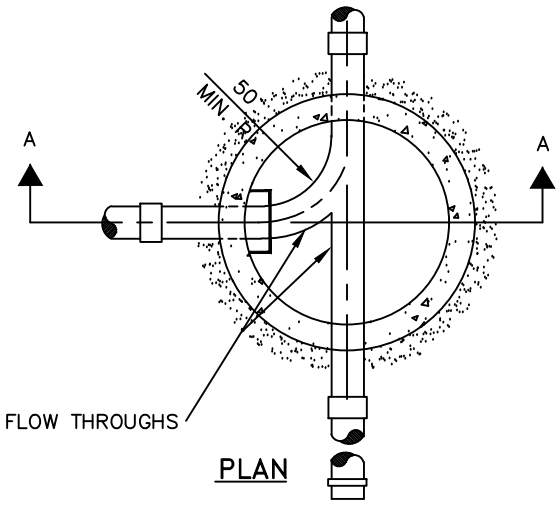
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
5-03



SECTION 'A–A'



PLAN

NOTES:

1. ALL PRECAST MANHOLES MUST CONFORM TO A.S.T.M SPECIFICATION C478.
2. POURED IN PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH 30 MPa.
3. POURED IN PLACE CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
4. ALL JOINTS TO BE FINISHED WITH NON–SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. ALL DIMENSIONS GIVEN IN MILLIMETRES.
7. MAX. DIST FROM RIM TO TOP RUNG IS 600mm.
8. BACKFILL MANHOLE WITH CLASS 1 BACKFILL OR FILLCRETE COMPACTED TO 98% S.P.D.
9. FLAT SLAB TOP CAN BE USED IN PLACE OF CONICAL SLAB TOP IN CASES THAT THE MANHOLE IS LESS THAN 1.8m DEEP.
10. FRAME AND COVER TO BE DIPPED.
11. RUB–R–NEC EACH JOINT.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

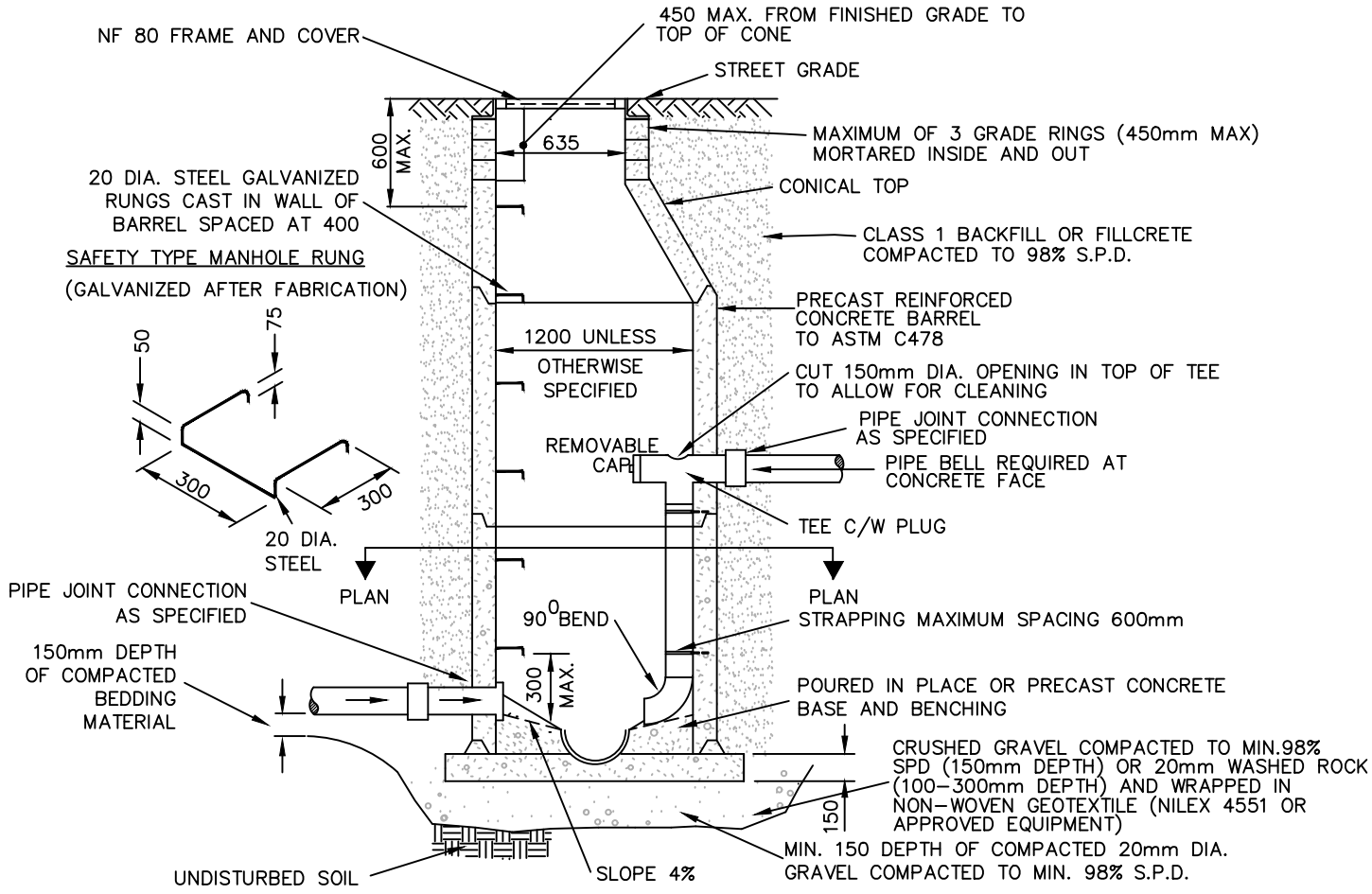
MANHOLE

Millet
Proud to be

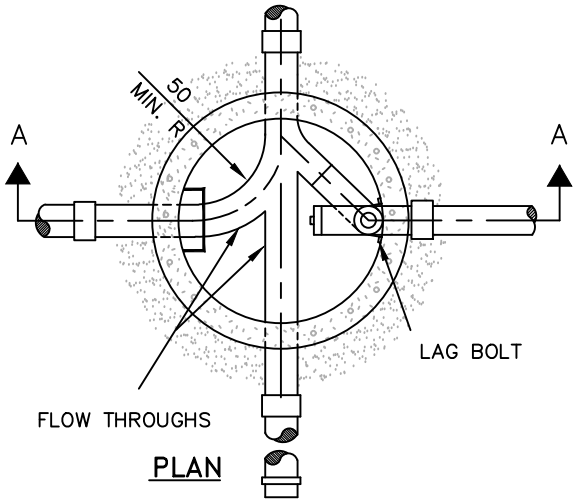
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
5-04



SECTION 'A–A'



PLAN

NOTES:

1. ALL PRECAST MANHOLES MUST CONFORM TO A.S.T.M. SPECIFICATION C478.
2. POURED IN PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH 30 MPa.
3. POURED IN PLACE CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
4. ALL JOINTS TO BE FINISHED WITH NON–SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. ALL DIMENSIONS GIVEN IN MILLIMETRES.
7. MAX. DIST FROM RIM TO TOP RUNG IS 800mm.
8. BACKFILL MANHOLE WITH CLASS 1 BACKFILL OR FILLCRETE COMPACTED TO 98% S.P.D.
9. LAG BOLTS AND STRAPPING ARE TO BE INSTALLED IMMEDIATELY BELOW THE TEE AND A CONTINUAL 1.0m VERTICAL SPACING TO THE BASE.
10. DIAMETER SIZE AND TYPE OF VERTICAL PIPE TO MATCH INLET PIPE.
11. FLAT SLAB TOP CAN BE USED IN PLACE OF CONICAL SLAB TOP IN CASES WHERE THE MANHOLE IS LESS THAN 1.8m DEEP.
12. FRAME AND COVER TO BE DIPPED.
13. RUB–R–NEC EACH JOINT.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
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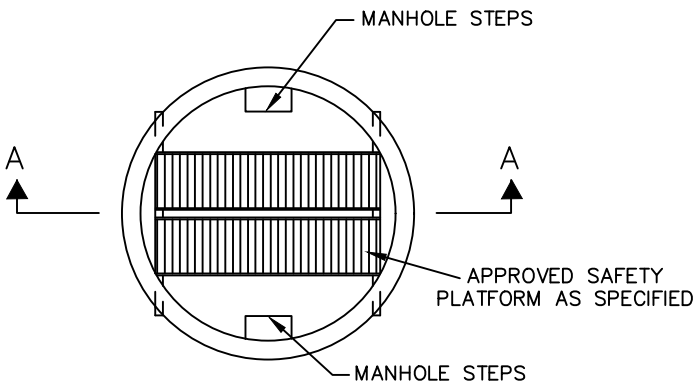
INTERIOR DROP MANHOLE DETAIL

Millet
Proud to be

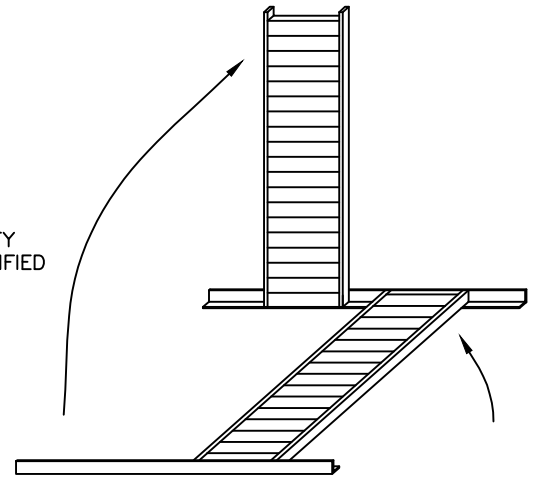
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
S-05

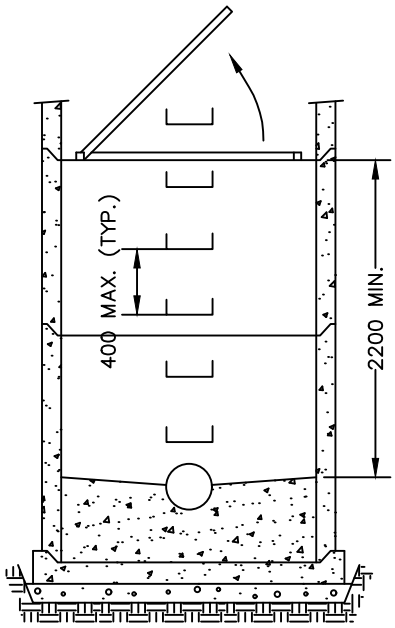
Scale: N.T.S.



PLAN VIEW



ISOMETRIC VIEW



SECTION 'A–A'

NOTES:

1. TO BE INSTALLED ON MANHOLES GREATER THAN 5.0m DEEP.
2. MAXIMUM SPACING BETWEEN PLATFORMS TO BE 5.0m.
3. ALUMINUM GRATES TO BE MSU MISSISSAUGA OR APPROVED EQUAL.
4. TO BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

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ID 90650
8 Feb 2022
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2022/02/01	DRAWING CREATION	J.ZILINSKI

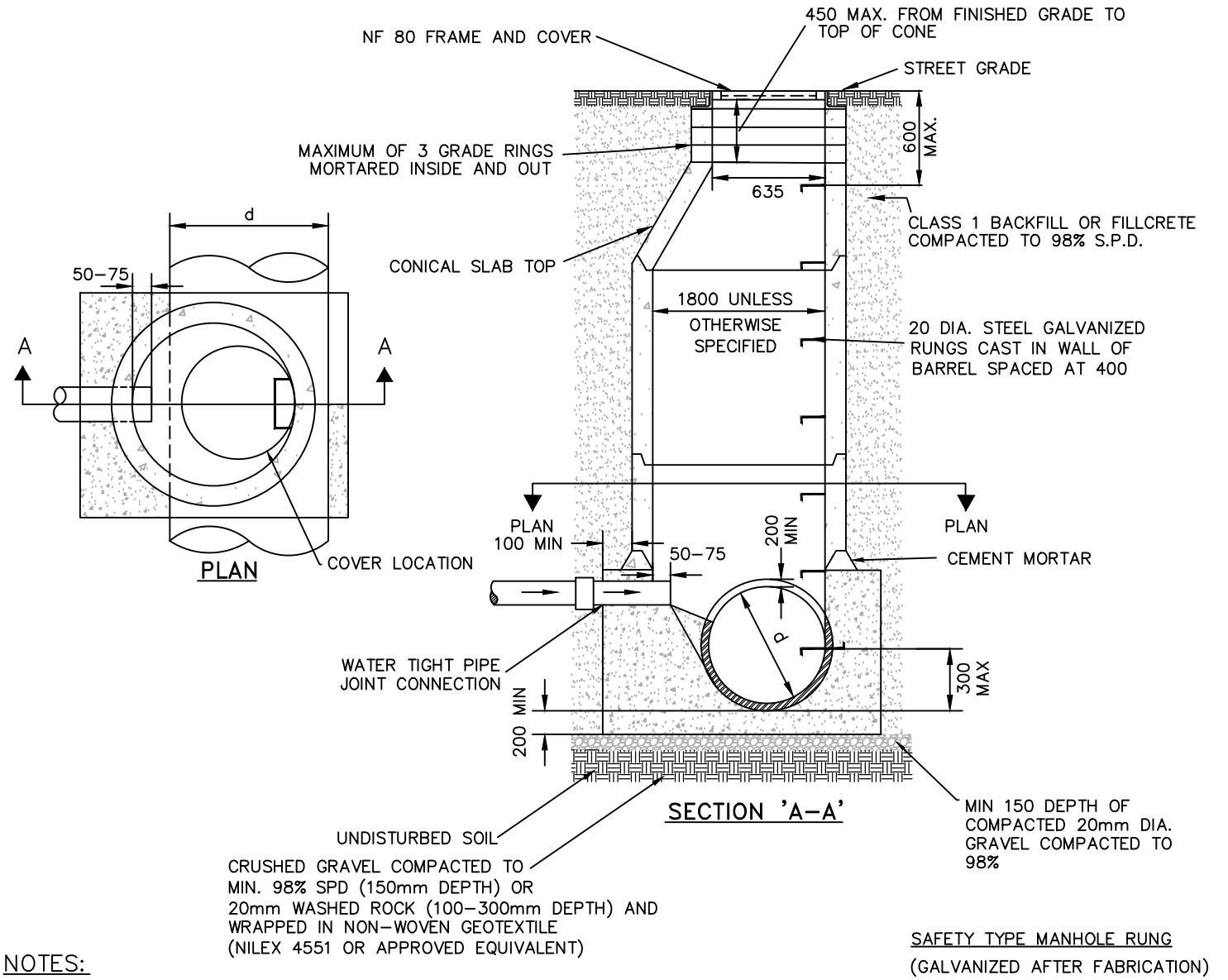
MANHOLE SAFETY PLATFORM

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
5-06

Scale: N.T.S.

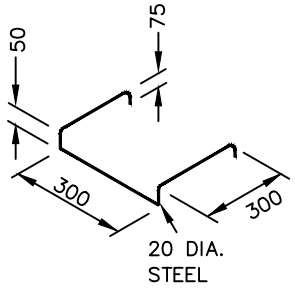


NOTES:

1. PIPE DIAMETER FOR PERCHED MANHOLE SHALL BE D=600mm TO 1050mm.
2. SAFETY STEPS TO BE SPACED AT 400 MAX.
3. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
4. ALL PRECAST MANHOLES MUST CONFORM TO A.S.T.M SPECIFICATION C478.
5. POURED IN PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH 30 MPa.
6. POURED IN PLACE CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
7. ALL JOINTS TO BE FINISHED WITH NON–SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
8. ALL DIMENSIONS GIVEN IN MILLIMETRES.
9. MAX. DIST FROM RIM TO TOP RUNG IS 600mm.
10. BACKFILL MANHOLE WITH CLASS 1 BACKFILL OR FILLCRETE COMPACTED TO 98% S.P.D.
11. FLAT SLAB TOP CAN BE USED IN PLACE OF CONICAL SLAB TOP IN CASES WHERE THE MANHOLE IS LESS THAN 1.8m DEEP.
12. FRAME AND COVER TO BE DIPPED.
13. RUB–R–NEC EACH JOINT.
14. MATCH PIPE CROWN ELEVATIONS.
15. GRADE RINGS MUST BE PLUMB TO THE BARREL AND NOT STAGGERED.

SAFETY TYPE MANHOLE RUNG

(GALVANIZED AFTER FABRICATION)



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ANDREW D. HEATH
ID 90650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

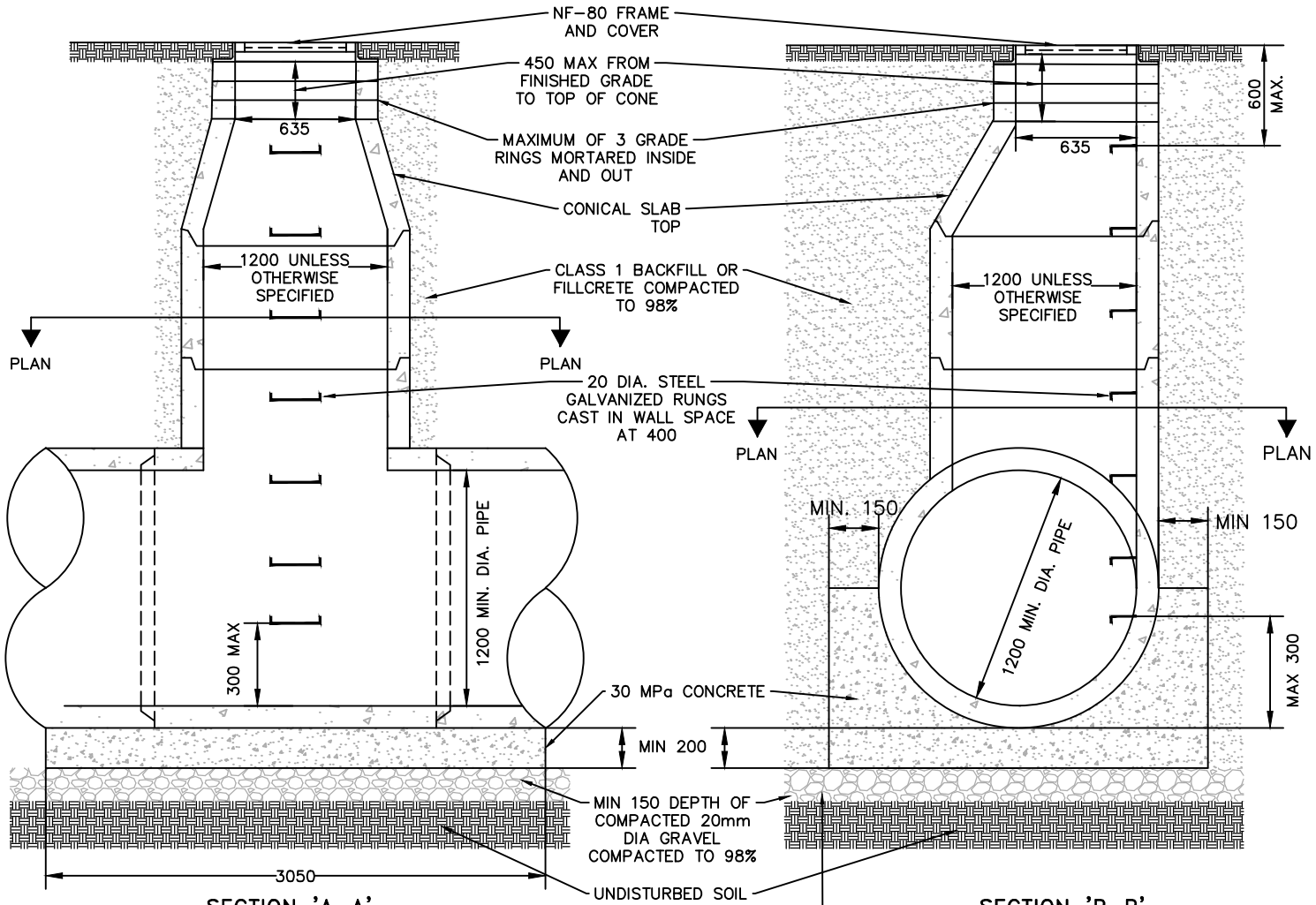
PERCHED MANHOLE

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
5-07



NOTES:

1. ALL DIMENSIONS GIVEN IN MILLIMETRES.
2. THIS TYPE OF MANHOLE IS TO BE BUILT ONLY ON MAINS OF 1200mm DIAMETER OR LARGER AND WHERE THERE IS NO CHANGE IN DIRECTION OF FLOW.
3. ALL PRECAST MANHOLES MUST CONFORM TO A.S.T.M. SPECIFICATION C478.
4. SAFETY STEPS TO BE SPACED AT 400 MAX.
5. MAX. DIST FROM RIM TO TOP RUNG IS 600mm.
6. FLAT SLAB TOP CAN BE USED IN PLACE OF CONICAL SLAB TOP IN CASES WHERE THE MANHOLE IS LESS THAN 1.8m DEEP.
7. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
8. BACKFILL MANHOLE WITH CLASS 1 BACKFILL OR FILLCRETE COMPACTED TO 98% S.P.D.
9. ALL JOINTS TO BE FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
10. RUB-R-NEC EACH JOINT.
11. POURED IN PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH.
12. POURED IN PLACE CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
13. FRAME AND COVER TO BE DIPPED.

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ID 90650
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T-RISER MANHOLE

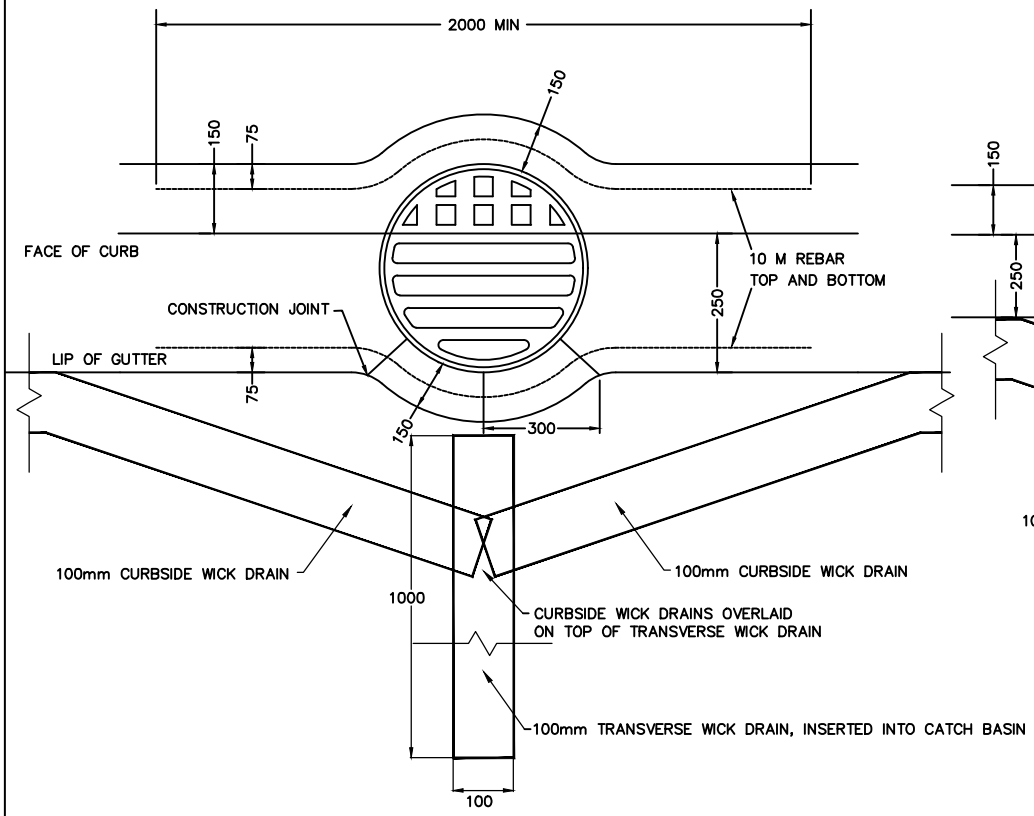
Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

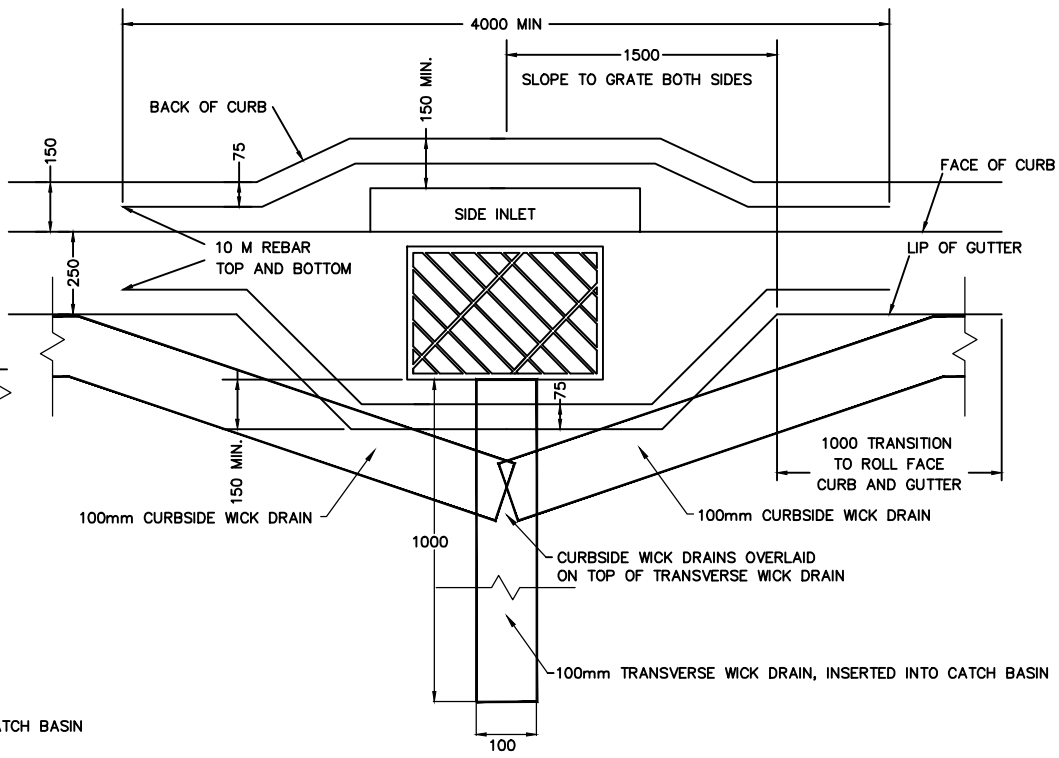
Scale: N.T.S.

STD. DWG NO.
S-08

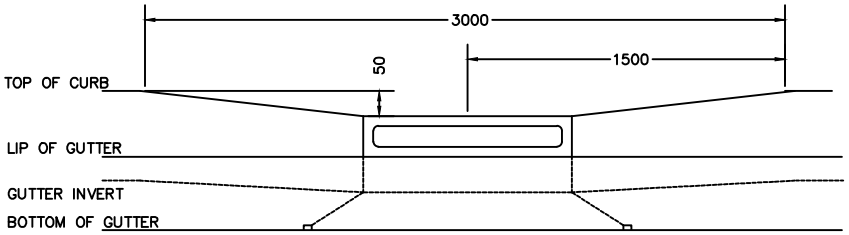
F-36 TOP VIEW



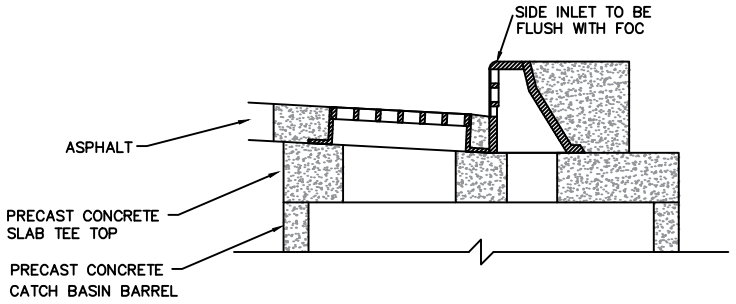
F-51 TOP VIEW



TYPICAL CATCH BASIN FRONT VIEW



F-51 SIDE VIEW



NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

PROFESSIONAL ENGINEER
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ID 30650
ALBERTA
8 Feb 2022
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REVISIONS		
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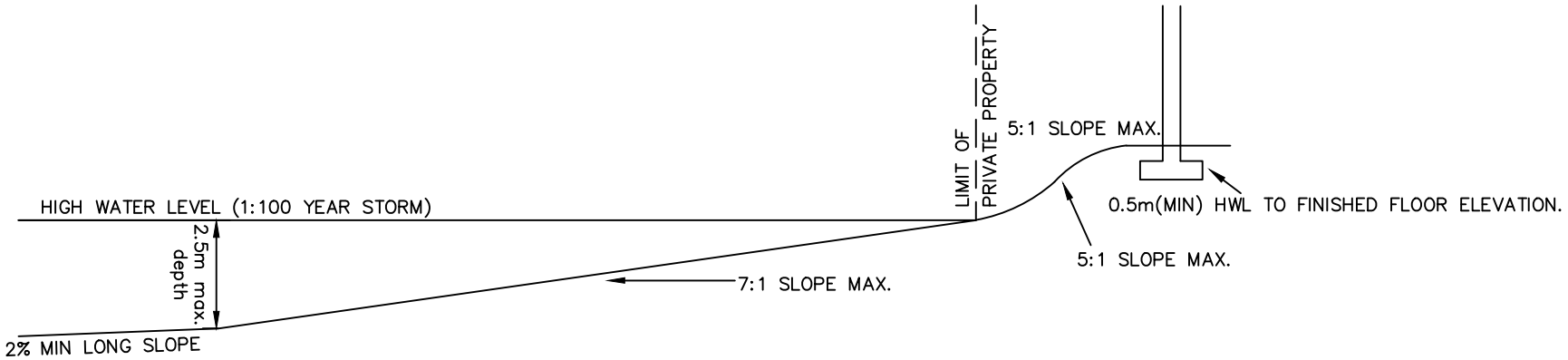
CATCH BASIN FRAME & GRATE INSTALLATION (150 CURB & 250 GUTTER)

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
5-09



NOTES:

1. MAXIMUM ACTIVE STORAGE DEPTH OF THE POND SHALL BE 1.5m.
2. INLET AND OUTLET SHALL BE LOCATED AS FAR FROM EACH OTHER AS POSSIBLE.
3. MINIMUM LANDSCAPING REQUIRES TREES, SHRUBS AND NATIVE GRASS SEED MIX THAT IS DROUGHT TOLERANT AND CAPABLE OF WITHSTANDING WET CONDITIONS.

PROFESSIONAL ENGINEER ANDREW D. HEATH ID 30650 ALBERTA
8 Feb 2022
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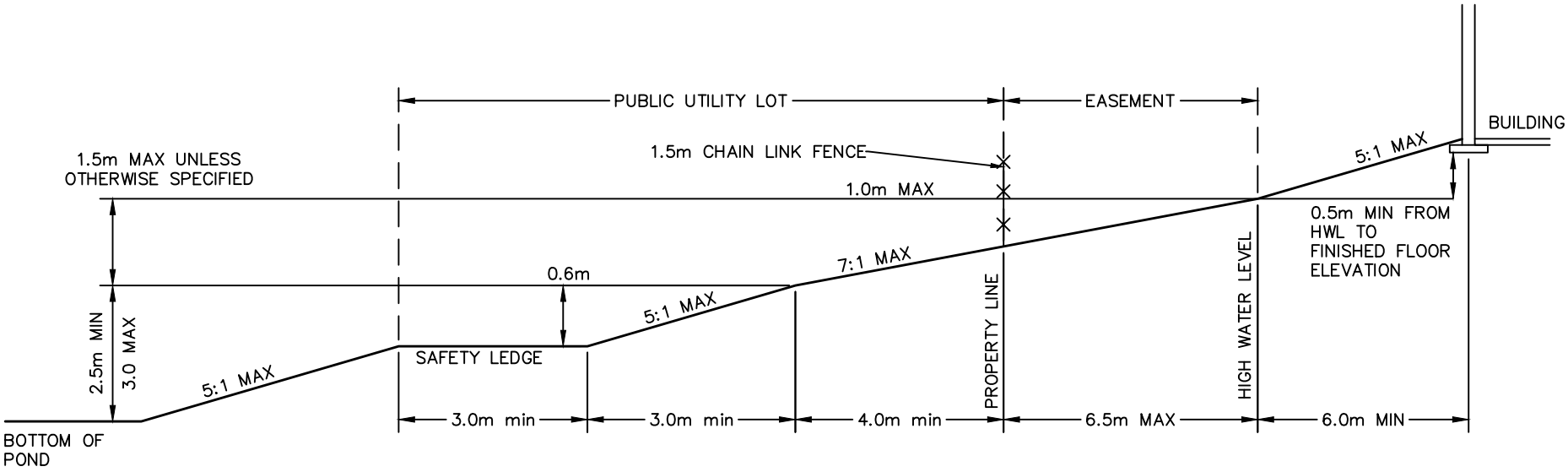
TYPICAL DRY POND DETAIL

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
5-10



NOTES:

1. INLET AND OUTLET SHALL BE LOCATED AS FAR FROM EACH OTHER AS POSSIBLE.
2. MINIMUM SURFACE AREA OF THE POND AT NORMAL WATER LEVEL SHALL BE 2ha.
3. MINIMUM WIDTH OF THE WATER SURFACE AT NORMAL WATER LEVEL SHALL 25m

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ANDREW D. HEATH
ID 90650
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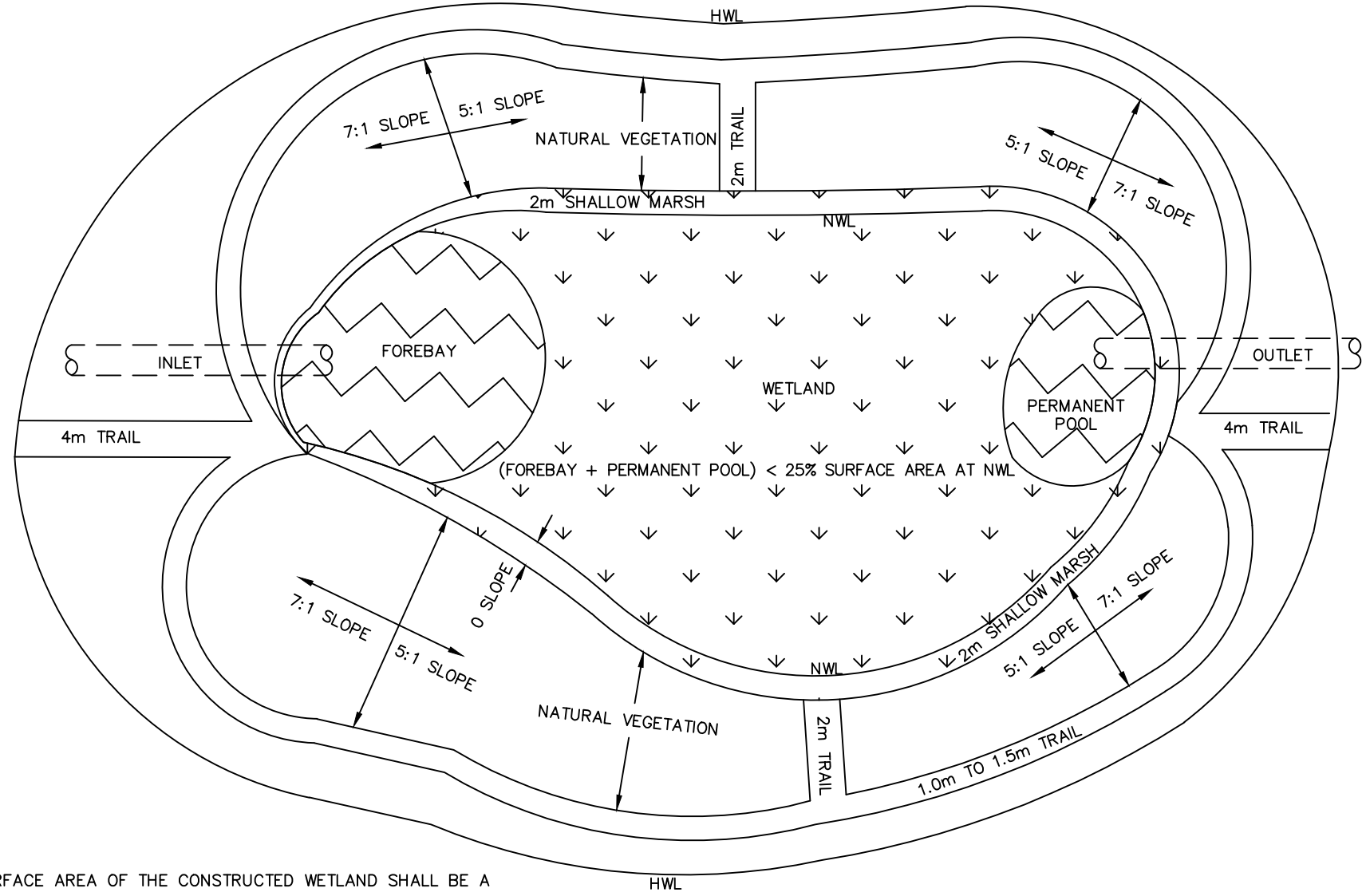
TYPICAL DRY POND DETAIL

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
5-11



NOTES:

1. THE SURFACE AREA OF THE CONSTRUCTED WETLAND SHALL BE A MINIMUM OF ONE HECTARE AT THE NWL.
2. THE MINIMUM LENGTH OF THE WETLAND SHALL BE 3 TIMES THE WIDTH.
3. INLET AND OUTLET SHALL BE LOCATED AS FAR FROM EACH OTHER AS POSSIBLE.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEATH
ID 90650
8 Feb 2022
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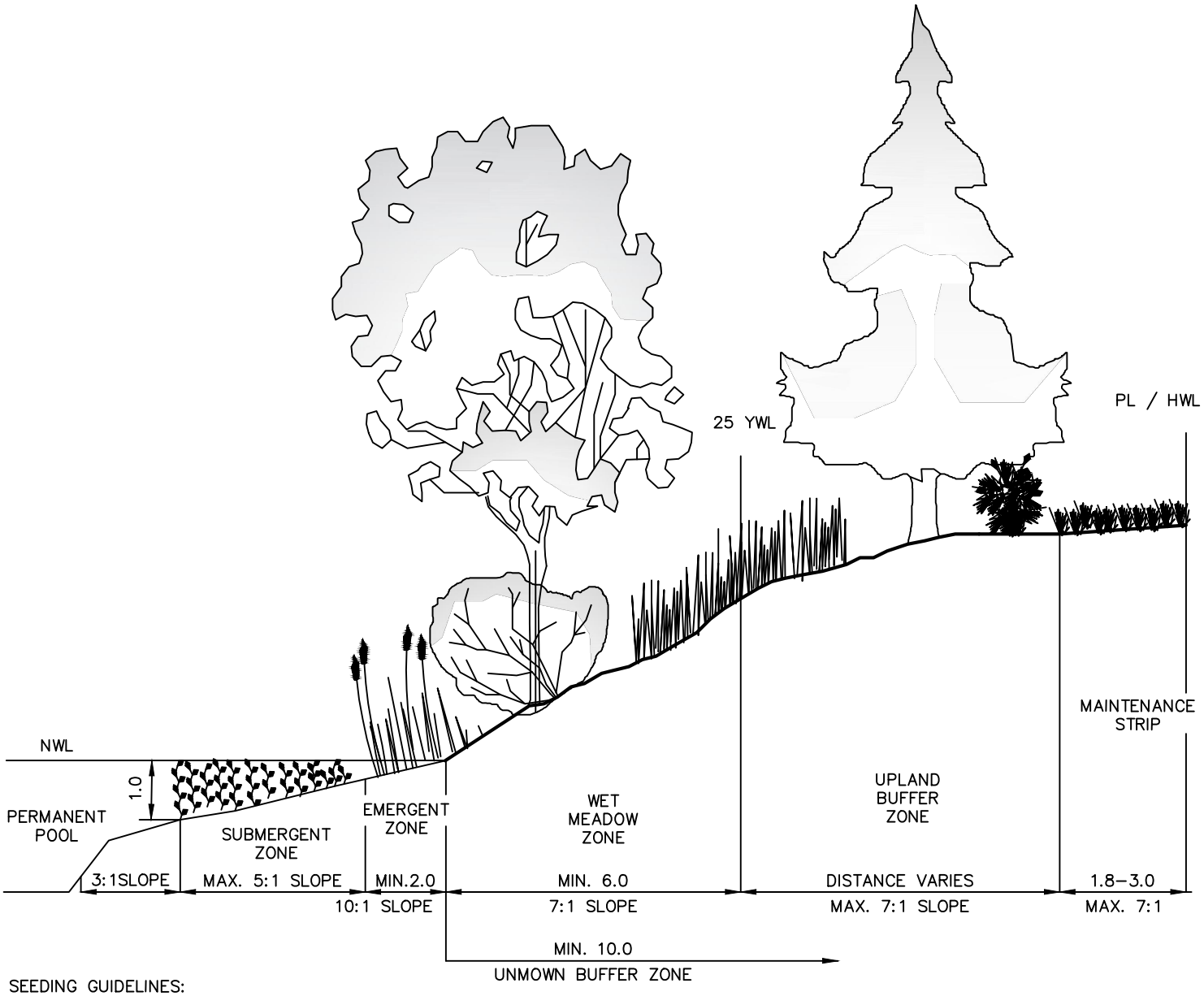
TYPICAL CONSTRUCTION WETLAND DETAIL

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
5-12

Scale: N.T.S.



SEEDING GUIDELINES:

NWL TO 5 YWL: WET MEADOW SEED MIX.
5YWL TO 25 YWL: NATURALIZATION SEED MIX.
25 YWL AND HIGHER ELEVATIONS: NATURALIZATION, GENERAL PARK SEED MIX OR SOD ARE ACCEPTABLE ALTERNATIVES.

*BE ADVISED THAT SEED MIX PLACEMENT MAY VARY DEPENDING ON EACH CONSTRUCTED/ENGINEERED WETLAND DESIGN.

NOTES:

1. TRAILS TO BE INSTALLED ABOVE THE 25 YWL. SEE DRAWING 61401 FOR DETAILS.
2. SHREDDED WOOD MULCH SHALL NOT BE INSTALLED BELOW THE 25 YWL, EXCLUDING MULCHED AREAS WITHIN INDIVIDUAL TREE WELLS.
3. LIVE SOILS AND PLANT MATERIAL REMOVED FROM EXISTING WETLANDS TO BE UTILIZED WHENEVER AVAILABLE.
4. SUBMERGENT ZONE CAN VARY IN WIDTH AND INCLUDE ZERO SLOPE AREAS AND TERRACES.
5. A MINIMUM 1.0m MAINTENANCE STRIP COMPLETED WITH SOD OR GENERAL PARK SEED MIX IS REQUIRED ALONG BOTH SIDES OF ASPHALT TRAILS.
6. A 1.8m–3.0m MAINTENANCE STRIP COMPLETED WITH SOD OR GENERAL PARK SEED MIX IS REQUIRED ALONG FENCE LINES. EXACT WIDTH AND SURFACE TREATMENT AS PER CONSTRUCTION DRAWINGS.
7. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

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CONSTRUCTED / ENGINEERED WETLAND ZONES

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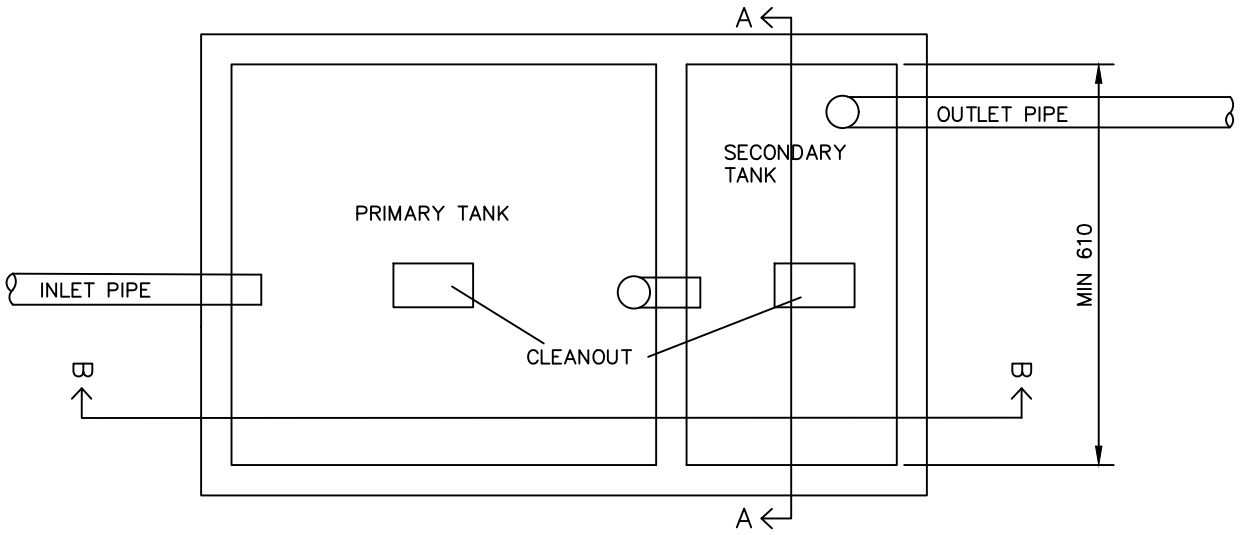
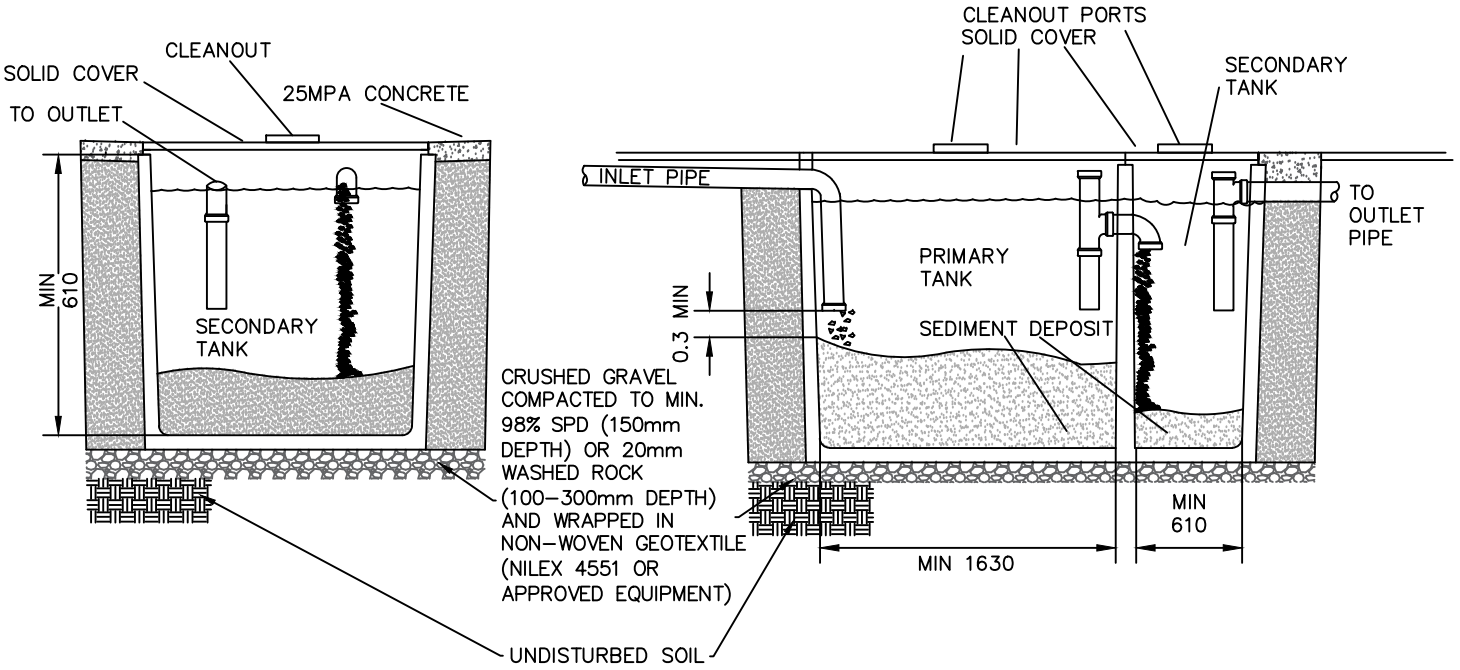
T0C 1Z0

STD. DWG NO.
5-13

Scale: N.T.S.



PLAN VIEW



SECTION A–A

SECTION B–B

NOTES:

1. ALL DIMENSIONS GIVEN IN MILLIMETRES.
2. BACKFILL WITH CLASS 1 BACKFILL OR FILLCRETE COMPACTED TO 98% S.P.D.
3. ALL JOINTS TO BE FINISHED WITH NON–SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
4. POURED IN PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH 30 MPa.
5. POURED IN PLACE CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
6. CONFIRM SIZING REQUIREMENTS WITH THE TOWN OF MILLET.

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TYPICAL OIL GRIT INTERCEPTOR

Millet
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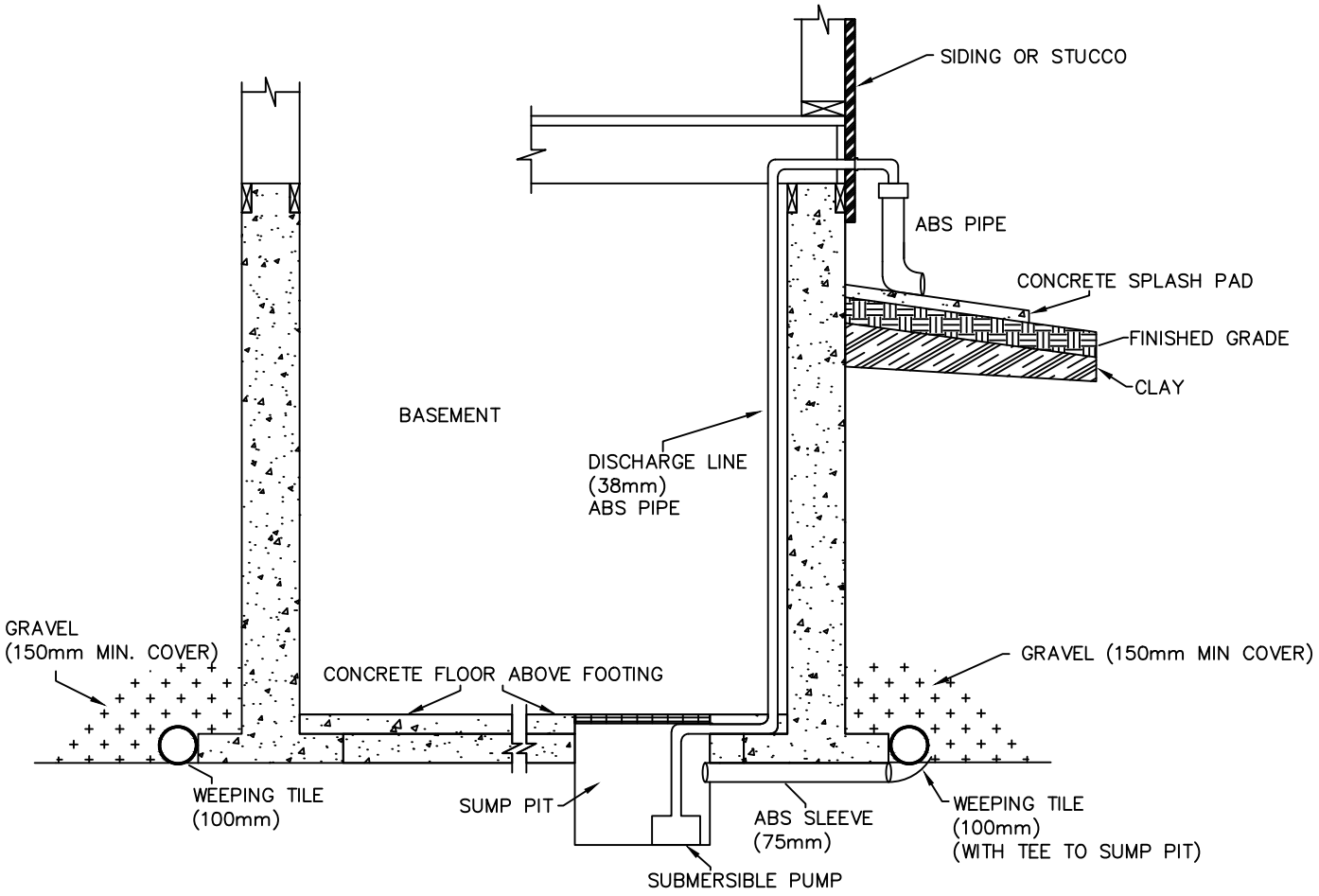
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
5-14

Scale: N.T.S.



NOTES:

1. SUMP PUMP DETAIL IS A CONCEPTUAL SKETCH FOR "INFORMATION ONLY". BUILDING OWNER SHALL BE RESPONSIBLE FOR SUMP PUMP INSTALLATION TO CURRENT BUILDING CODE STANDARDS.

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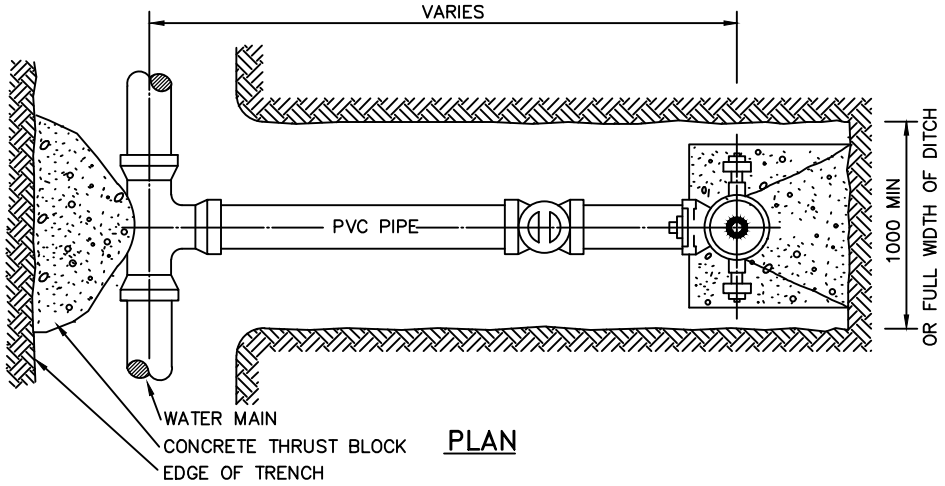
SUMP PUMP / SURFACE DISCHARGE

Millet
Proud to be

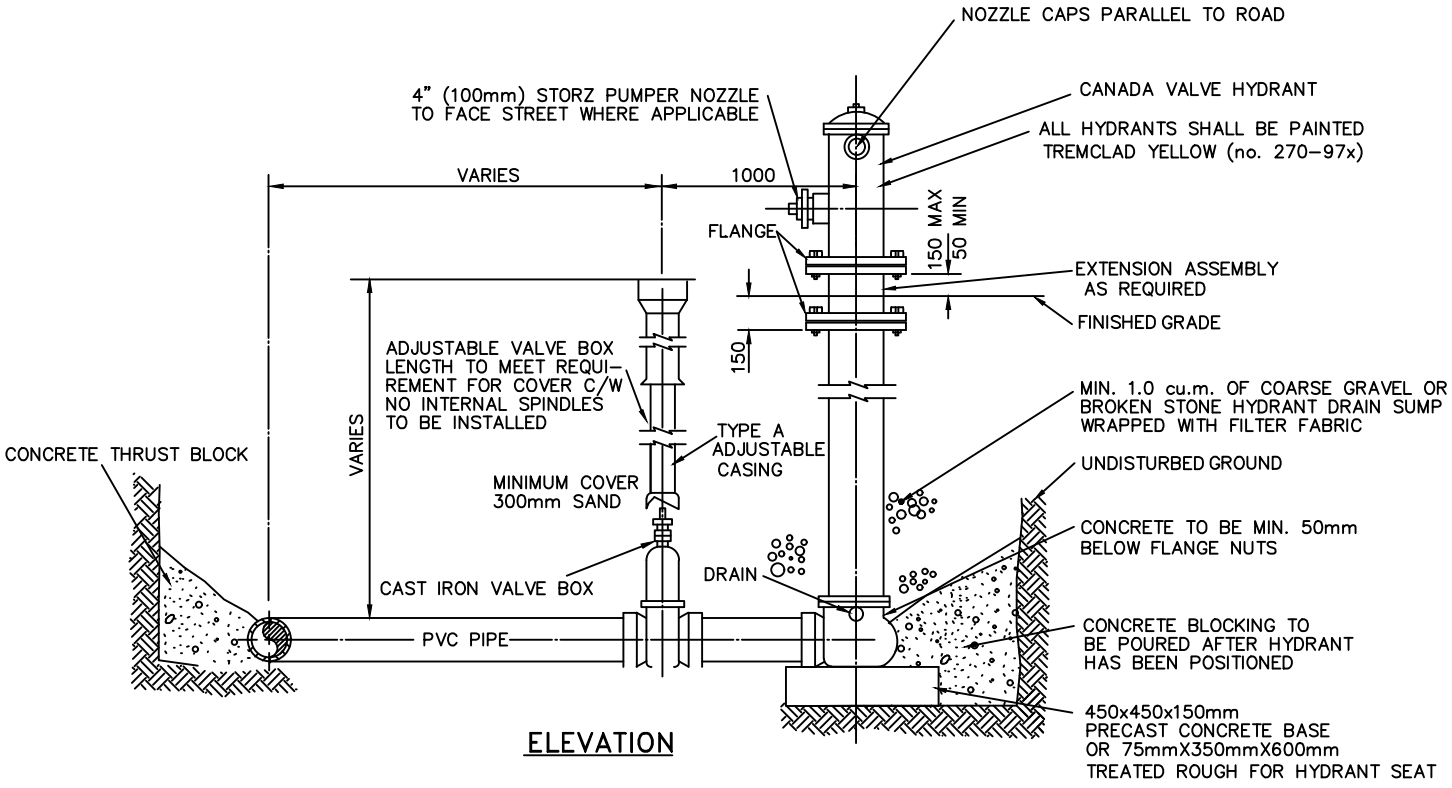
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
5-15

Scale: N.T.S.



PLAN



ELEVATION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL FITTINGS TO BE WRAPPED IN POLY PRIOR TO POURING CONCRETE.
3. CONCRETE TO BE 30 MPa @ 28 DAYS.
4. CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
5. CONCRETE TO BE CURED FOR MINIMUM OF 8 HOURS BEFORE BACKFILLING UNLESS OTHERWISE APPROVED BY CITY.
6. HYDRANTS SHALL BE COMPRESSION TYPE CONFORMING TO AWWA C502 COMPLETE WITH UNPLUGGED DRAINS, STAINLESS STEEL BOLTS AND ASPHALTIC COATED BURIED HYDRANT COMPONENTS.
7. PROVIDE CATHODIC PROTECTION AS SHOWN ON STD. DWG. 'TYPICAL ANODE INSTALLATION AT VALVES IRON FITTINGS & HYDRANTS'
8. WHERE HYDRANT VALVE FALLS IN SEPARATE OR MONOLITHIC SIDEWALK, VALVE WILL BE MOVED TO STREETSIDE OF GUTTER.
9. BACKFILL AS PER TOWN STANDARDS.

PROFESSIONAL ENGINEER ALBERTA
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OFF-LINE HYDRANT DETAIL

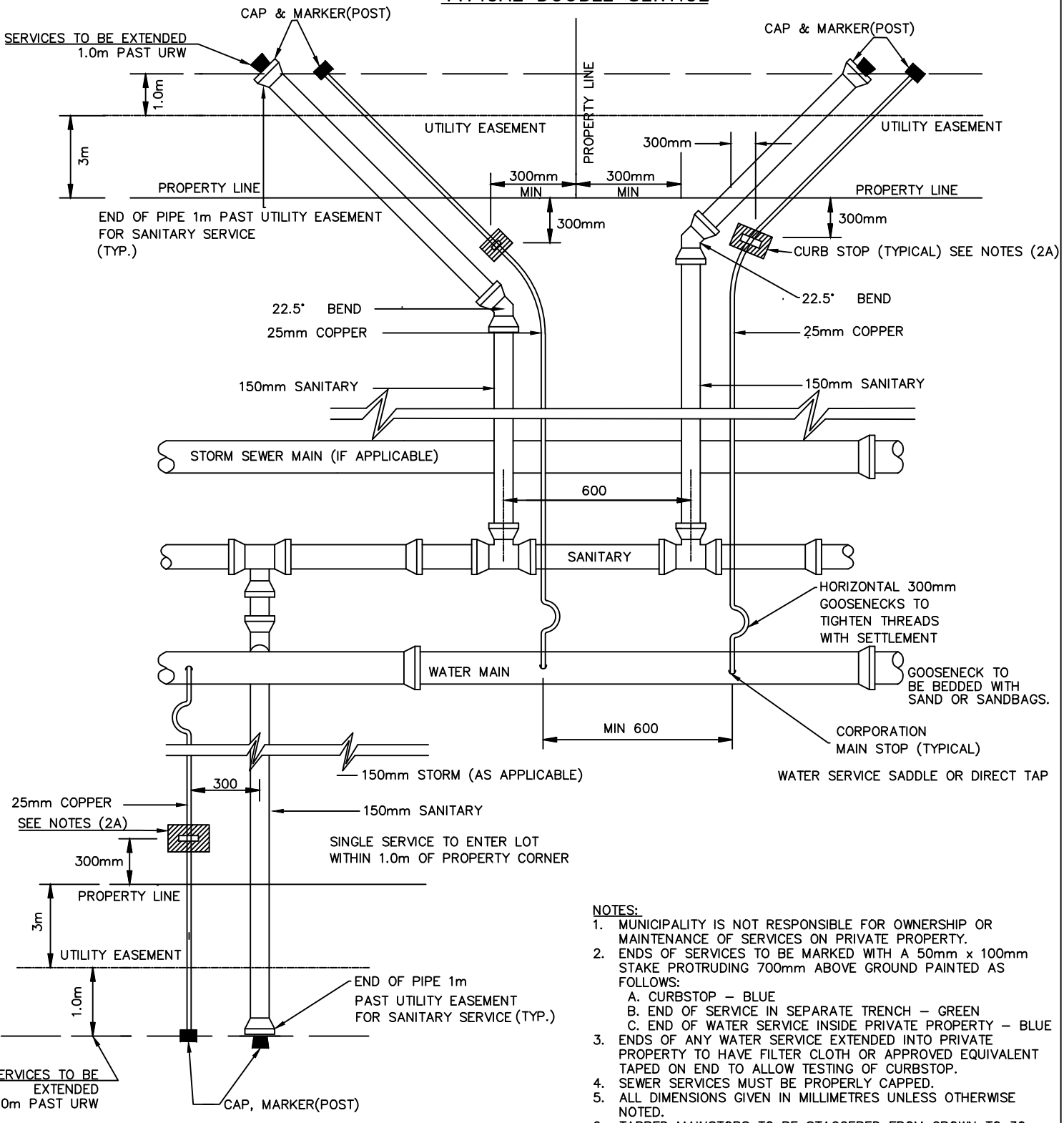
Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
6-01

Scale: N.T.S.

TYPICAL DOUBLE SERVICE



TYPICAL SINGLE SERVICE

NOTES:

1. MUNICIPALITY IS NOT RESPONSIBLE FOR OWNERSHIP OR MAINTENANCE OF SERVICES ON PRIVATE PROPERTY.
2. ENDS OF SERVICES TO BE MARKED WITH A 50mm x 100mm STAKE PROTRUDING 700mm ABOVE GROUND PAINTED AS FOLLOWS:
   A. CURBSTOP – BLUE
   B. END OF SERVICE IN SEPARATE TRENCH – GREEN
   C. END OF WATER SERVICE INSIDE PRIVATE PROPERTY – BLUE
3. ENDS OF ANY WATER SERVICE EXTENDED INTO PRIVATE PROPERTY TO HAVE FILTER CLOTH OR APPROVED EQUIVALENT TAPED ON END TO ALLOW TESTING OF CURBSTOP.
4. SEWER SERVICES MUST BE PROPERLY CAPPED.
5. ALL DIMENSIONS GIVEN IN MILLIMETRES UNLESS OTHERWISE NOTED.
6. TAPPED MAINSTOPS TO BE STAGGERED FROM CROWN TO 30 DEGREES OF PIPE WITH 1–3 THREADS SHOWINGS.

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OFF-LINE HYDRANT DETAIL

Millet
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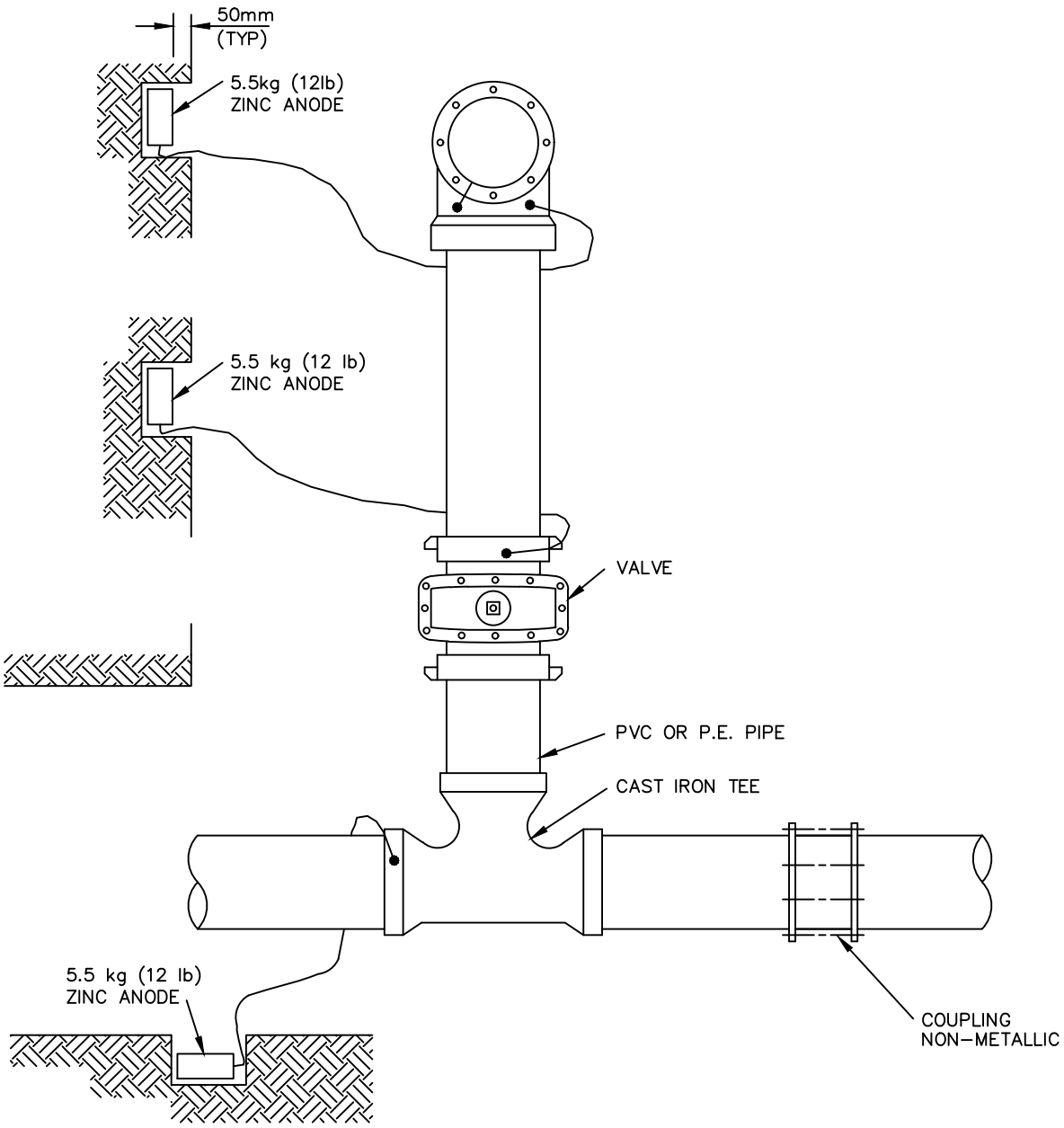
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
6-02

Scale: N.T.S.



NOTES:

1. MIN DISTANCE FROM ANODE TO PIPE IS 150mm.
2. INSTALL ANODE AT APPROX. PIPE DEPTH IN NATIVE SOIL.
3. ALL ZINC ANODES ON FITTINGS AND VALVES ARE 5.5 kg (12 lb).
4. ALL ZINC ANODES ON HYDRANTS ARE 5.5 kg (12lb).
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 300mm CLEAR OF THRUST BLOCK.
7. WET THE ANODE WITH WATER PRIOR TO BACKFILL TO ACTIVATE IT.

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TYPICAL ANODE INSTALLATION AT VALVES IRON FITTING & HYDRANTS

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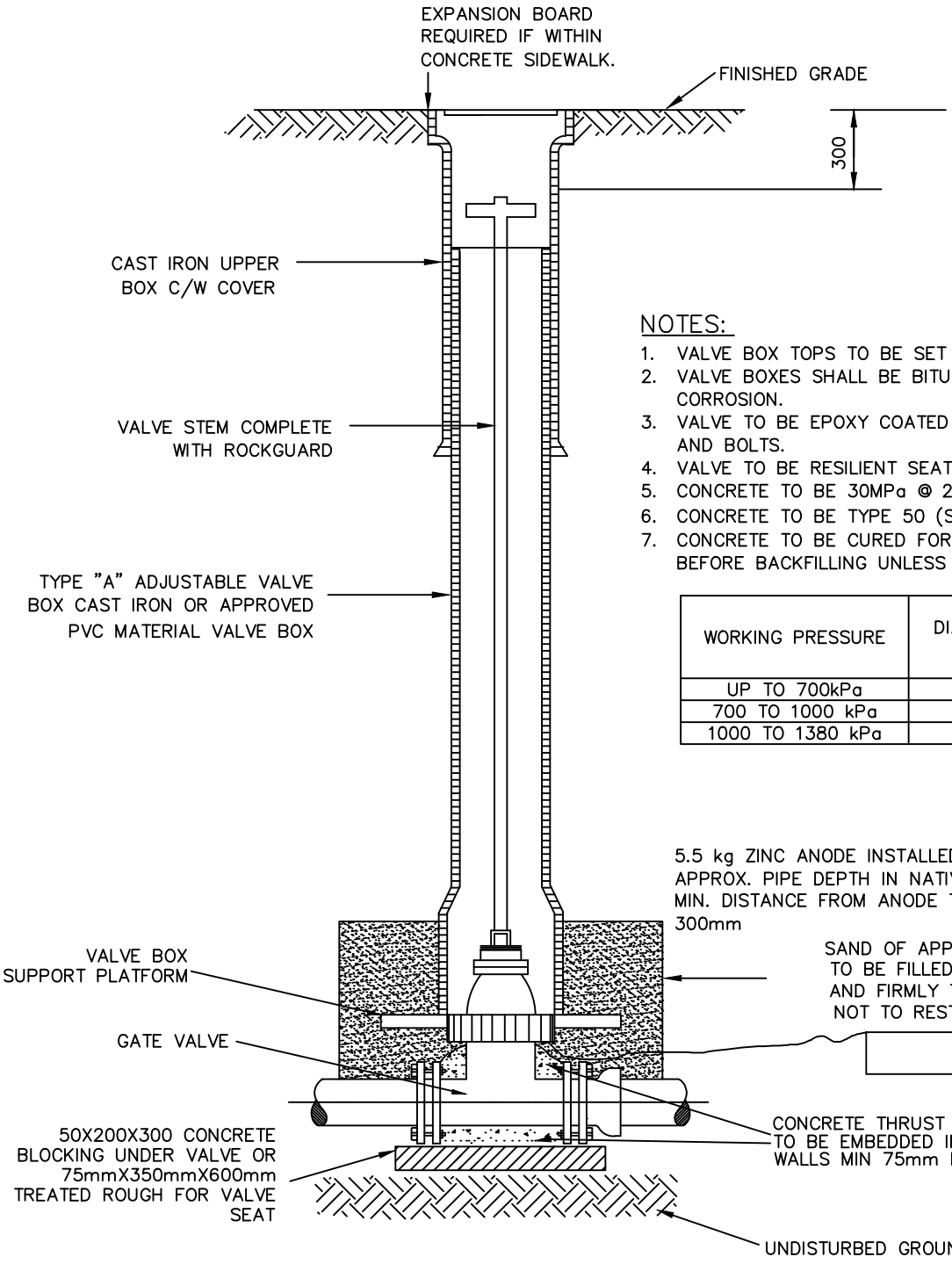
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
6-03

Scale: N.T.S.



NOTES:

1. VALVE BOX TOPS TO BE SET FLUSH WITH SURFACES.
2. VALVE BOXES SHALL BE BITUMINOUS COATED TO PREVENT CORROSION.
3. VALVE TO BE EPOXY COATED WITH STAINLESS STEEL NUTS AND BOLTS.
4. VALVE TO BE RESILIENT SEATED WEDGE TYPE.
5. CONCRETE TO BE 30MPa @ 28 DAYS.
6. CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
7. CONCRETE TO BE CURED FOR A MINIMUM OF 8 HOURS BEFORE BACKFILLING UNLESS OTHERWISE APPROVED BYTOWN.

WORKING PRESSURE	DIAMETERS REQUIRING RESTRAINT
UP TO 700kPa	300mm & UP
700 TO 1000 kPa	200mm & UP
1000 TO 1380 kPa	ALL SIZES

VALVE BOX SUPPORT PLATFORM NOTES:

- VALVE BOX SUPPORT PLATFORM CONSISTS OF 2-3 LAYERS OF RECYCLED PLASTIC TIMBERS OR TREATED LUMBER (2X4" OR 2X6" OR 2X8" OR SIMILAR).
- PLATFORM SHALL BE TAILORED TO VALVE TYPE AND HELD TOGETHER BY NAILS OR SCREWS.
- PLACE PLATFORM ON TAMPED SAND AT LEVEL WITH THE FLANGE ON THE VALVE.

(NOTE IF RECYCLED PLASTIC TIMBERS ARE NOT READILY AVAILABLE, THEN PRESSURE TREATED TIMBERS MAY BE USED AD AN ALTERNATE MATERIAL).

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MAIN VALVE CASING DETAIL

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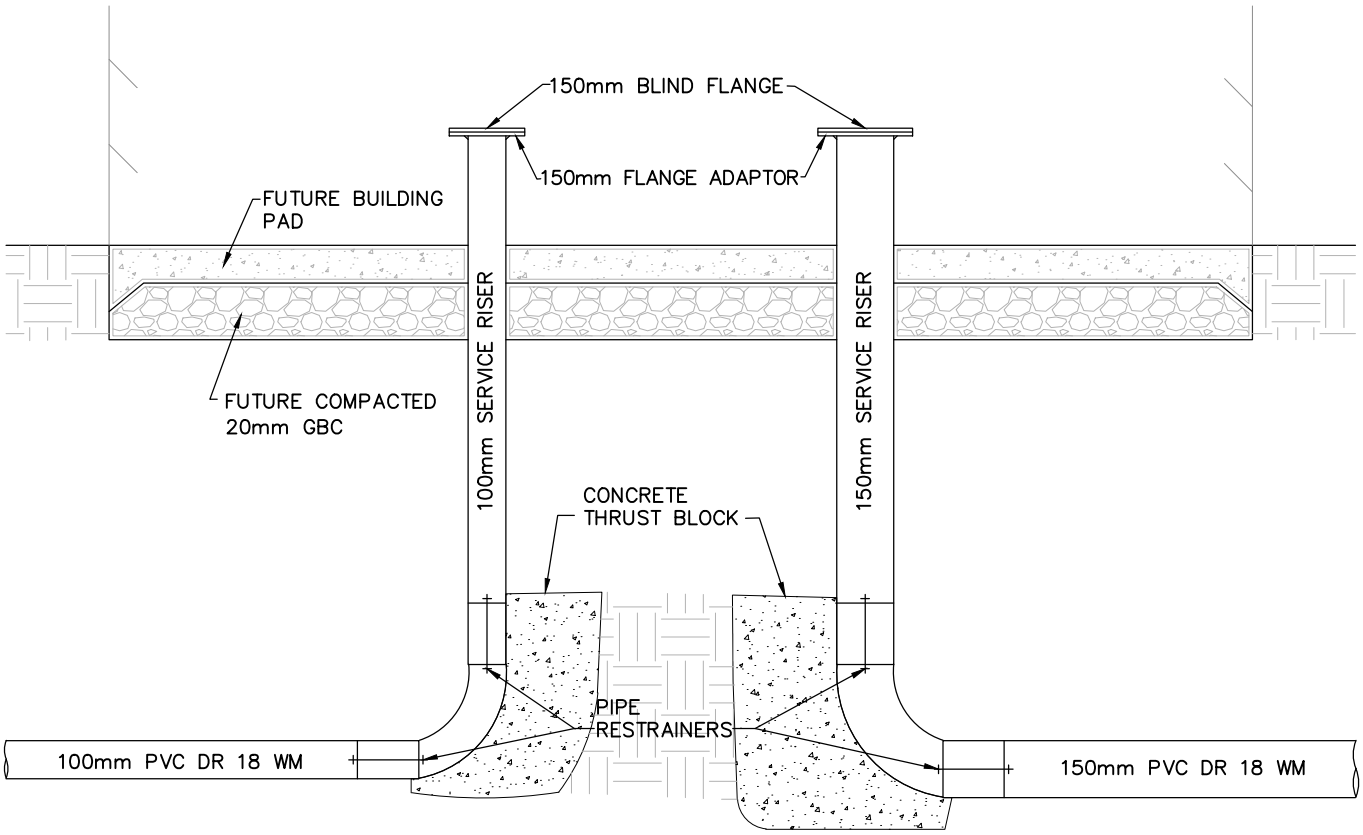
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
6-04

Scale: N.T.S.



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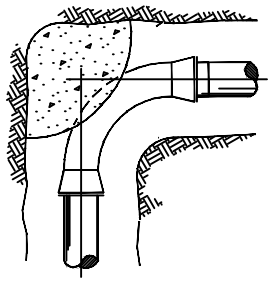
WATER SERVICE RISER DETAIL

Millet
Proud to be

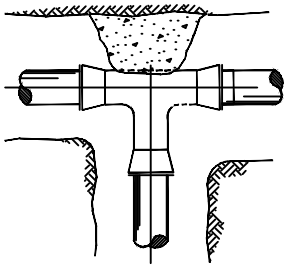
4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
6-05

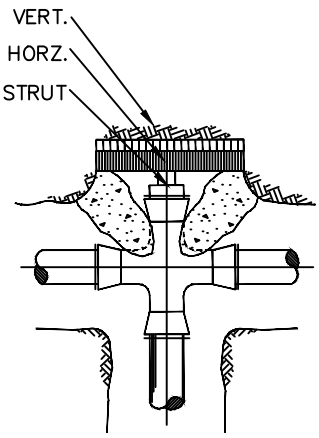
Scale: N.T.S.



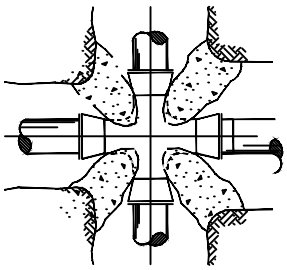
HORIZONTAL
90° BEND



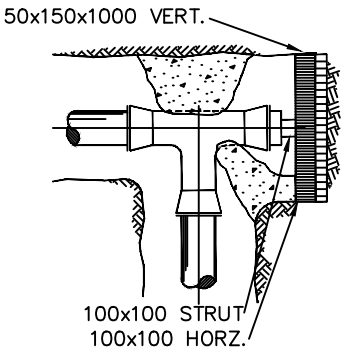
TEE



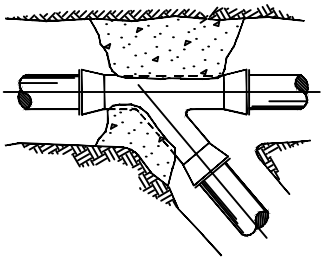
CROSS WITH PLUG



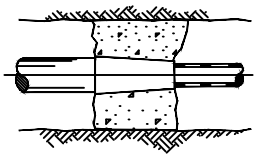
CROSS



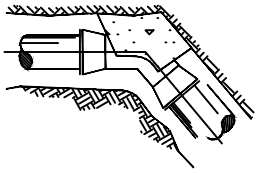
TEE WITH PLUG



WYE



REDUCER



HORIZONTAL
BENDS

THRUST AREAS CALCULATED FOR 1035 KPa, TOTAL PRESSURE 1490 MPa BEARING

	TEE	BRANCH AND CROSS				11.25° & 22.5° BENDS					45° BENDS					90° BENDS				
DIA.	350	300	250	200	150	350	300	250	200	150	350	300	250	200	150	350	300	250	200	150
A	1200	950	750	525	375	375	305	230	200	150	750	560	450	375	305					
B	75	75	75	75	75	150	150	125	100	75	150	150	125	100	75	550	525	350	300	200
C																600	450	400	350	300
AREA m^2	1.39	1.02	0.75	0.46	0.28	0.56	0.42	0.28	0.19	0.14	1.11	0.79	0.56	0.37	0.23	2.04	1.49	1.02	0.69	0.37

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN MILLIMETRES.
2. ALL WOOD PRODUCTS TO BE TREATED.
3. ALL FITTINGS TO BE WRAPPED IN POLY PRIOR TO POURING CONCRETE.
4. ALL CONCRETE TO BE MIN. 30MPa @ 28 DAYS.
5. ALL CONCRETE TO BE TYPE 50 (SULPHATE RESISTANT).
6. ALL CONCRETE TO BE CURED FOR A MINIMUM OF 8 HOURS BEFORE BACKFILLING UNLESS OTHERWISE APPROVED BY TOWN.
7. BEFORE PRESSURE TESTING 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.
8. CONCRETE TO BE CLEAR OF BELLS AND PIPE.
9. MIN 75mm OF CONCRETE REQUIRED UNDER ALL FITTINGS.
10. BEARING SURFACE MUST BE ON UNDISTURBED SOIL.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEAT
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THRUST BLOCK DETAILS

Millet
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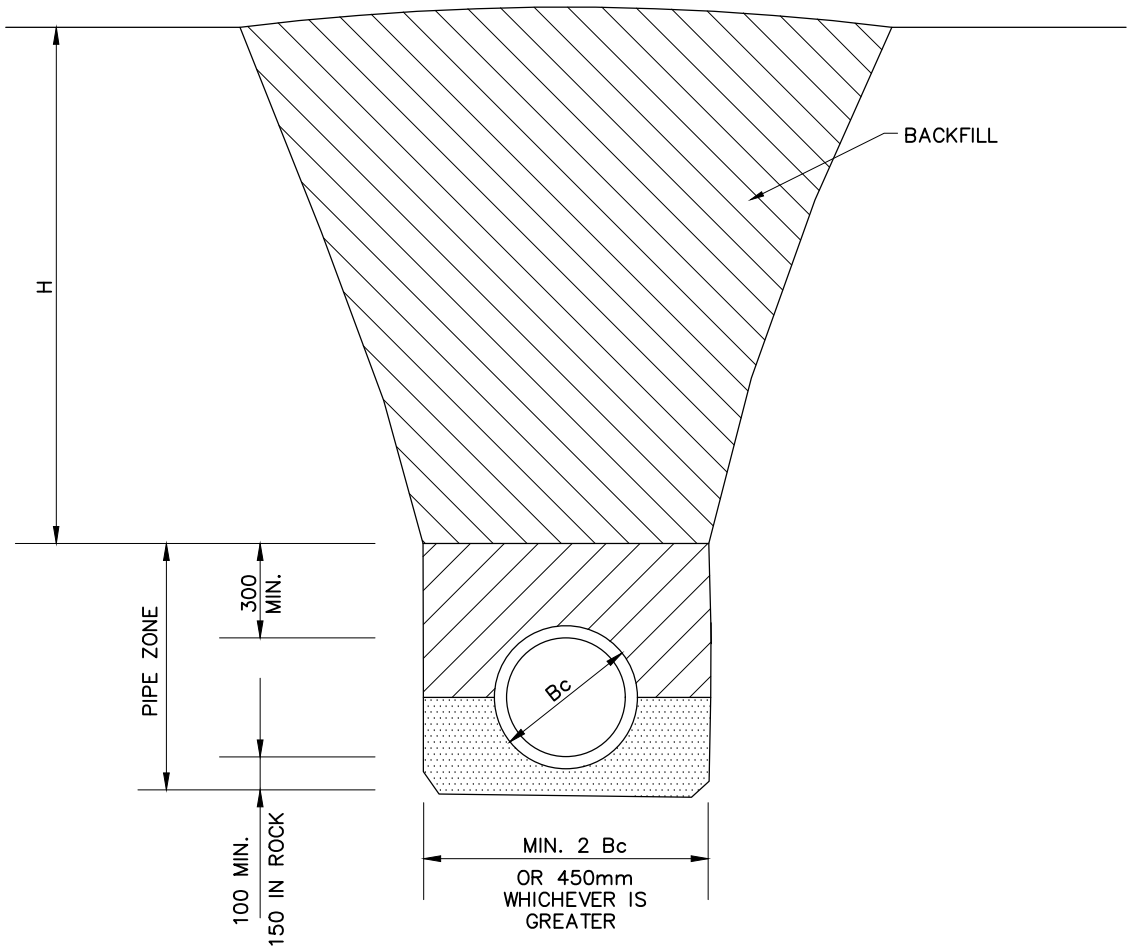
MILLET, ALBERTA
T0C 1Z0

STD. DWG NO.
6-06

Scale: N.T.S.



NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. WHEN CUT BACK SLOPES ARE TO BE USED IN LIEU OF CAGES AND SHORING, THESE SLOPES ARE TO MEET REQUIREMENTS OF LOCAL CODES.
3. SEE SPECIFICATIONS FOR MINIMUM COVER ABOVE PIPE.
4. MIN. PIPE ZONE WIDTH IS SPECIFIED TO ALLOW PROPER PIPE ZONE COMPACTION.
5. Bc = OUTSIDE PIPE DIAMETER.
6. FOR UNCOMPACTED BACKFILL, CROWN TRENCH BY 0.1 x H.

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TRENCH DETAIL

Millet
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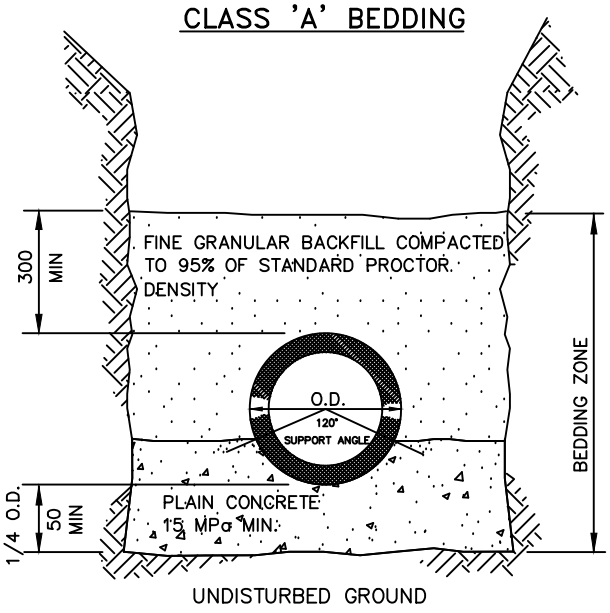
MILLET, ALBERTA
T0C 1Z0

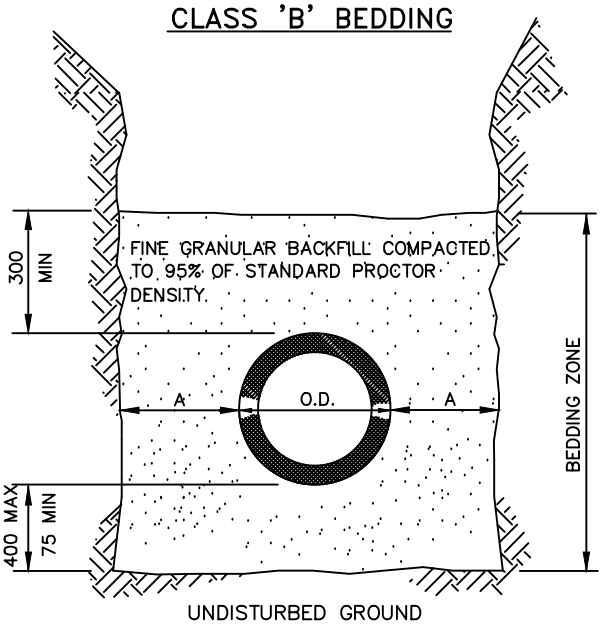
STD. DWG NO.
9-01

Scale: N.T.S.

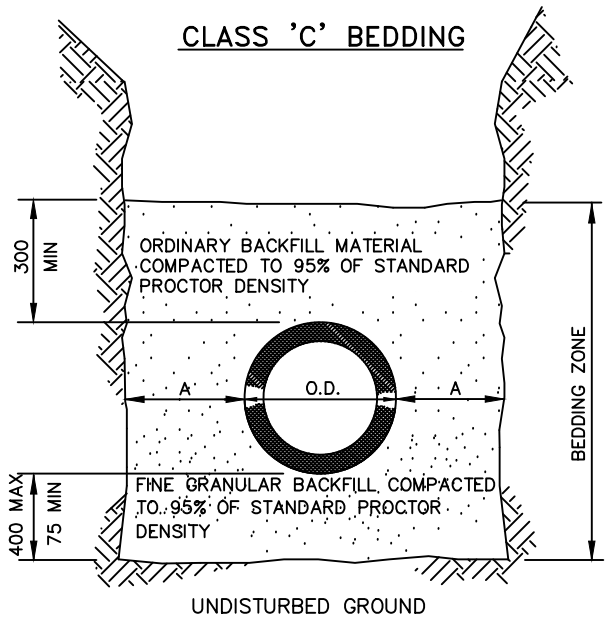
CLASS 'A' BEDDING



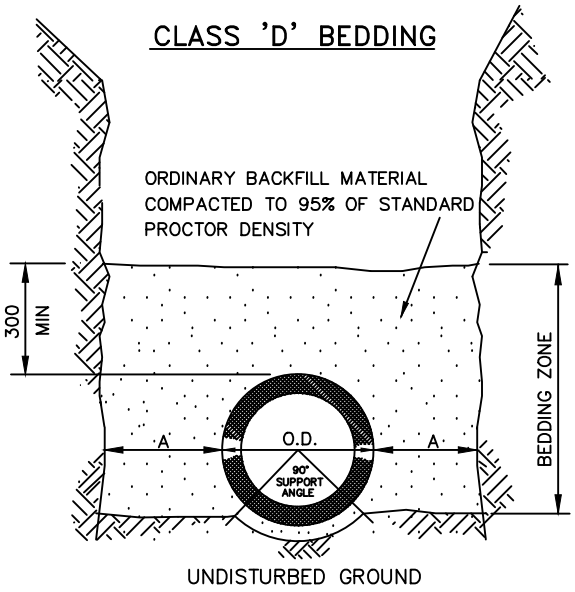
CLASS 'B' BEDDING



CLASS 'C' BEDDING



CLASS 'D' BEDDING



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. ALL MATERIAL TO BE PLACED AND COMPACTED IN 150mm LAYERS.
3. WHERE INSTRUCTED OR AS SHOWN ON DRAWINGS REPLACE FINE GRANULAR WITH COARSE GRANULAR MATERIAL.
4. TRENCH WALL CLEARANCE: $200 \leq A \leq 300$
5. IF $A > 300$ BACKFILL MUST BE COMPACTED TO 100% OF STANDARD PROCTOR DENSITY.
6. APPLICABLE ONLY TO SINGLE PIPE INSTALLATIONS IN TRENCHES EXCAVATED IN UNDISTURBED GROUND.
7. UNLESS OTHERWISE INSTRUCTED USE CLASS 'B' BEDDING WITH FINE GRANULAR MATERIAL.

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PIPE BEDDING DETAILS

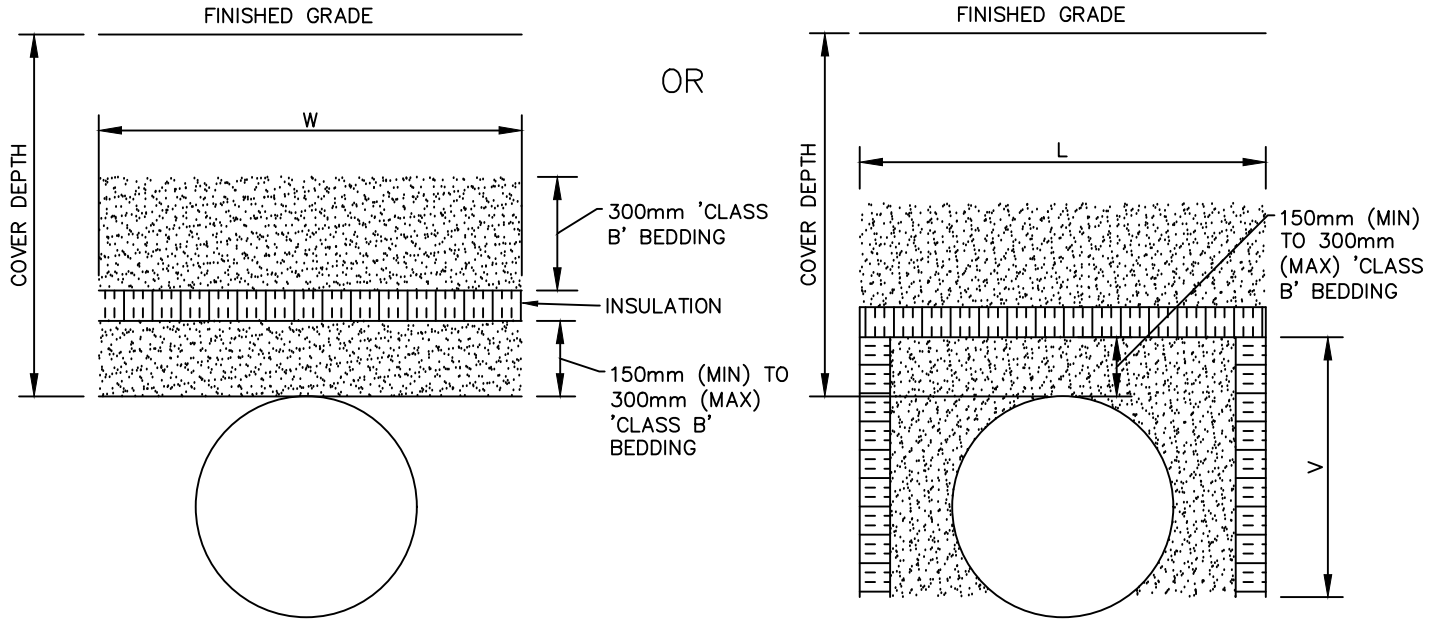
Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
9-02

COVER DEPTH m	THICKNESS mm (IN)	WIDTH (W) m
1.1 – 1.4	90 (3.5)	3.4
1.4 – 1.7	75 (3.0)	2.8
1.7 – 2.0	75 (3.0)	2.2
2.0 – 2.3	50 (2.0)	1.6
2.3 – 2.75	50 (2.0)	1.0
>2.75	–	–



HORIZONTAL

INVERTED U

W= L+2V
V TO BE LESS THAN OR EQUAL TO L

NOTES:

1. ALL DIMENSION ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. APPLICABLE WHEN USING FILLCRETE, GRANULAR OR CLAY BACKFILL FOR WATER MAINS WITH DEPTH OF COVER LESS THAN 2.75m
3. USE DOW HI–40 STYROFOAM BOARD (MIN 50mm THICK), OR APPROVED EQUAL.
4. STORM SEWER ONLY REQUIRES INSULATION WHEN THE COVER DEPTH IS LESS THAN 1.8m.
5. INSULATION IS TO BE USED AS A FINAL SOLUTION. DESIGN SHOULD AIM TO INCREASE THE COVER DEPTH RATHER THAN USING INSULATION.
6. REFER TO THE TOWN OF MILLET MUNICIPAL ENGINEERING STANDARDS FOR FURTHER DETAILS ON DEPTH REQUIREMENTS.

PROFESSIONAL ENGINEER ALBERTA
ANDREW D. HEAT
ID 30650
8 Feb 2022
Approved Sealed

REVISIONS		
Date	Details	Drawn
2022/02/01	DRAWING CREATION	J.ZILINSKI

WATER, STORM AND SANITARY INSULATION REQUIREMENTS

Millet
Proud to be

4528 - 51 STREET
MILLET, ALBERTA
T0C 1Z0

Scale: N.T.S.

STD. DWG NO.
9-03

Appendix 'B' – Forms

Construction Completion Certificate
Final Acceptance Certificate
Request for a Variance to the Engineering Standards

Appendix ‘C’ – Revision Log

This section details changes made to the Municipal Development Standards.

- April 2018 – Municipal Development Standards adopted by the Town of Millet
- February 2022 – Municipal Development Standards Updated including updates to Appendix A – Standard Drawings