



M.D. of Pincher Creek

DEVELOPMENT AND ENGINEERING STANDARDS



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ENGINEERING STANDARDS

October 2014



1. FORWARD

This manual is intended to provide an information guide to set standards governing design, preparation and submission of plans and specifications for construction of municipal improvements within the M.D. of Pincher Creek. It is intended for use by Developers, Engineering Consultants, Utility Companies and M.D. Departments. These standards are provided to set out the “minimum” allowable levels to which the requisite improvements are to be built. In instances where the standards do not cover a particular situation or occurrence, good engineering judgement shall be used. All development shall comply with the requirements of the M.D. of Pincher Creek, all applicable Land Use Bylaws and Provincial and Federal legislation. The M.D. of Pincher Creek is adopting these standards and as rehabilitation occurs, will rebuild infrastructure to the most current standard, at the discretion of Council.

No departure from these standards shall be permitted without the written approval of the Administrator or designate. The M.D. shall be the final authority on any disputed plans. Minor revisions may be given verbal approval by the M.D. Administrator, but a change order shall be issued to record such revisions.

All completed plans, records and documents shall be submitted a minimum of 30 days prior to final design acceptance by the M.D..

No construction shall commence until all designs have been accepted by the M.D. and the following has been submitted:

- a) Design drawings
- b) Letters of Credit
- c) Authority Contacts

M.D. of Pincher Creek address is:

1037 Herron Avenue
Pincher Creek, AB
T0K 1W0
P.O. Box 279

Ph : 403-627-3130
Fax : 403-627-5070

END OF SECTION



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GENERAL CONDITIONS AND ENGINEERING PROCEDURES
FOR MUNICIPAL DEVELOPMENT Page 2

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2. GENERAL CONDITIONS AND ENGINEERING PROCEDURES FOR MUNICIPAL DEVELOPMENT

2.1 GENERAL CONDITIONS

2.1.1 Scope

These design standards shall apply to the design and installation of the municipal infrastructure for new subdivisions and developments in the M.D. of Pincher Creek. They apply to the design and installation of storm and sanitary sewers, water mains, roads and sidewalks, together with their respective connections and appurtenances, and any other services that are required to be designed and/or installed.

These design standards also apply to the installation of water, sanitary sewer, and storm sewer services to existing properties, including surface reconstruction; the installation or alterations to roads, sidewalks, curb and gutter adjacent to existing properties; and the surface drainage of commercial, industrial, institutional and multi-family developments within the M.D. of Pincher Creek.

These design standards do not cover the design or installation of street lighting, ornamental lighting, power, gas, telephone and television services, but do include coordination with the various utility companies. The general location of such services must be approved by the M.D.

The Standard Drawings, as referred to in various sections, will form an integral part of these design standards.

No departure from these design standards will be permitted except with written approval of the M.D. Administrator. The M.D. Administrator may give verbal approval to revisions that may be considered as being sufficiently minor. A Change Order shall be issued recording such revision.

2.1.2 Definitions

In these design standards, unless the context otherwise indicates, the following words shall have the meaning hereinafter assigned to them.

“M.D.” shall mean or refer to Municipal District of Pincher Creek #9, in the Province of Alberta.

“Applicant”/“Developer” shall mean a person who has applied for the subdivision, development or installation to serve an existing parcel of land, whether as the owner or an agent for the owner of the land included therein.



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“Contractor” will mean any person, persons or corporations that shall undertake the installation of Municipal Services on behalf of either the Applicant or the M.D..

“Prime Contractor” is as defined by Occupational Health and Safety.

“Developer’s Engineer” shall mean a qualified Professional Engineer registered and licensed to practice in the Province of Alberta, who is appointed or engaged by the Developer to be responsible for the design and preparation of drawings and specifications and provision of engineering supervision during the construction of the municipal improvements for the development area.

“M.D. Administrator” means the M.D. Administrator of M.D. of Pincher Creek or an assigned designate.

“Municipal Improvements” or “infrastructure” may also mean “Local Improvements” and shall mean both underground and surface structures including, but not necessarily limited to, water mains, sewer systems, storm drainage systems, roadways, walkways, park areas, shallow utilities, signage, fencing, street lighting, and other improvements as required by the M.D., all of which shall become the property of the M.D. to operate and maintain.

2.2 PROCEDURE

2.2.1 Engineering Design

The Applicant shall retain the services of a Professional Engineer, registered and licensed to practice in the Province of Alberta, who shall be responsible for the design and preparation of drawings and specifications for all infrastructure to be constructed within and/or related to the proposed development area, as required, within the M.D. of Pincher Creek. All required municipal improvements shall be designed in accordance with accepted engineering practices and shall meet or exceed the M.D. of Pincher Creek Development and Engineering Standards as set out herein. If landscaping plans are deemed required by the M.D. Administrator the landscape plans will be prepared and stamped by a Landscape Architect or a Professional Engineer as required by Provincial Legislation.

For the installation of services or municipal infrastructure to serve an existing property, the applicant shall make application in writing on the appropriate form provided by the M.D.. These applications do not necessarily require engineer design; however, the applicant must provide proof that the installation will conform to these design standards. If the M.D. Administrator deems it necessary that the installation be



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monitored by a professional engineer, the applicant shall pay all costs for the monitoring.

The design drawings must show all existing and proposed services. It shall be the responsibility of the Developer's Engineer to coordinate with the utility companies to establish the location of their existing and proposed services.

The Developer's Engineer shall be responsible for carrying out all surveys and investigations necessary to prepare the design. It shall further be the responsibility of the Developer's Engineer to identify the need for any easements or additional right-of-way required. The plans and related documents shall be prepared by a qualified licensed Alberta Land Surveyor at the Developer's expense.

The Developer's Engineer shall bring to the attention of the Applicant and the M.D. the need for any right-of-way requirement outside the subdivision. The applicant shall provide proof of right-of-way to the M.D. prior to the installation of services on such properties. Right-of-ways shall be assigned in the name of the M.D. or, as applicable, the utility company. The applicant is to pay all costs associated with registering the right-of-way and fulfil all terms and conditions associated with establishing right-of-ways.

While the Developer's Engineer may arrange to have certain portions of the work carried out by other qualified persons, he shall remain responsible for the coordination of the work and certification of its quality and accuracy.

2.2.2 Geotechnical Report

As part of the Subdivision application the Developer shall submit a Geotechnical Engineering Report prepared by a qualified Professional Engineer that identifies and evaluates the subsurface ground characteristics of the subdivision development area.

Such report shall identify soil types and conditions, including frost susceptibility, soil stability, and water table elevations, as well as any potential difficulties that could be encountered during the construction of the municipal improvements.

At the requirement of the M.D., additional geotechnical information may be requested outlining recommended design and construction requirements and techniques that may have to be followed to satisfactorily develop the subdivision, particularly related to water and sewer main construction and roadway structures.



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2.2.3 Submission of Engineering Design

Upon completion of the design drawings, the Developer's Engineer will submit to the M.D. Administrator, two (2) complete sets of stamped and signed drawings and specifications of the proposed works, including the following:

- a) Calculations of sanitary and storm sewer capacity, as shown on the overall sewer and water plan, and pipe loading, where these services are to be installed.
- b) An area Storm Water Management Plan
- c) Water distribution analysis as specified in Water Distribution Systems.
- d) A print of the registerable plan of the subdivision (if not already supplied by the Applicant).
- e) A copy of the soils investigation report, judged by the M.D. to be pertinent to the stage of subdivision.
- f) A copy of the Contract Documents proposed for construction purposes.

All proposed streets should be named on the drawings. All street names are to be approved by the M.D. Administrator.

2.2.4 Design Review

All design drawings, specifications, and relevant data will be examined by the M.D. Administrator, and any revisions directed to the Developer's Engineer and/or marked on the prints during the review shall be incorporated in the final design drawings.

2.2.5 Design Approval

Upon completion of all revisions, the Developer's Engineer shall submit four (4) complete sets of Contract Drawings and Specifications to the M.D. Administrator.

When the design is approved, the M.D. Administrator shall return one set of the drawings to the Developer's Engineer, and issue a letter advising that the design is accepted and listing any conditions of acceptance.

No work will be commenced within any new parcel of land or any of the services to be provided by the Applicant until the M.D. has examined and approved any revised Construction Drawings.

2.2.6 Rights-of-Way and Easements

Where easement or right-of-way documents are deemed necessary, they will be prepared by a registered Alberta Land Surveyor at the Applicant's expense. Rights-of-



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way and/or easements will be provided for all utilities not located on streets, lanes, or utility lots, including rights-of-way for ditches or water courses accommodating surface runoff. Rights-of-way shall be registered in the name of the M.D. or, as appropriate, in the name of the utility company; ownership to be confirmed with the M.D.

2.2.7 Construction Approval

Upon receipt of “Approved for Construction” drawings and specifications, the Applicant may proceed to install Municipal services subject to:

- a) Satisfactory execution of a Development Agreement pertaining to the development or subdivision.
- b) “Letter of Authorization” from Alberta Environment, through the Developer’s Engineer, and a copy received by the M.D. Administrator.
- c) A list of materials that are being installed and a construction schedule submitted to the M.D.’s development office.

A copy of all approved drawings and specifications will be maintained by the applicant at the construction site during the installation of services and be made readily available to M.D. representatives.

Underground subdivision services will not be permitted to operate as part of existing municipal services until the respective subdivision services have been inspected and tested by the Developer’s Engineer and the test results have been approved in writing by the M.D. Administrator.

2.2.8 Engineering Supervision

The applicant shall retain the services of an Engineer who shall be responsible for the layout to ensure finished construction conforms to the lines and grades shown on the approved plans for inspection and approval of all materials to be used, and for supervision of installation of all services, that are the responsibility of the Applicant. The Developer’s Engineer, or his authorized representative, shall be available at all times to visit the site during the installation of services.

The Developer’s Engineer will be responsible for maintaining field surveys and recording of all “as-built” drawings.

In addition to supervision carried out by the Developer’s Engineer, the M.D. Administrator, or his agent, may periodically inspect any work being completed. The M.D. Administrator will bring the use of any unacceptable materials or practices to the attention of the Contractor and/or the Developer’s Engineer. If remedial action is not taken to the satisfaction of the M.D. Administrator, he/she may order the work to cease until such time as the corrective action has been taken.



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If the Developer's Engineer wishes to make any changes in the design, either before or during the execution of the work, he will first submit a marked print, showing proposed revisions, to the M.D. Administrator. If approval is granted for revision, the original drawing will be immediately revised and new prints issued.

2.2.9 Testing

It will be the responsibility of the Developer's Engineer to ensure that testing of all materials called for in the specifications is carried out by an accredited testing firm. Copies of all test results shall be forwarded to the M.D. Administrator as soon as possible after completing the tests. The costs of the tests shall be borne by the Developer.

2.2.10 As-Built Drawings

Within four weeks of the Construction Completion Certificate of the underground improvements, the Developer's Engineer shall deliver to the M.D. Administrator "as-built" prints indicating the service connections, tie-ins, invert charts on plan/profiles, and service invert elevations on lot grading plans. All as-built plans must also be submitted in digital format compatible with the M.D.'s latest version of AutoCAD.

No development permits or building permits will be processed until the M.D. receives a set of as-built prints, including completed design building grades for each lot. As an exception, one show home may be constructed with the written approval by the M.D. Administrator, provided the subdivision design grades have been submitted and approved.

Within two months of completion of roadway base course asphalt, the Developer's Engineer will deliver "as-built" drawings, one complete set of prints and a digital copy (in the M.D.'s latest AutoCAD software version) to the M.D. Administrator.

2.2.11 Municipal Acceptance and Maintenance Period

The Developer shall apply for a Construction Completion Certificate for each group of improvements for each stage of development. A Construction Completion Certificate will be required by the Developer from the M.D. for each group of the following improvements to be constructed and installed by the Developer; namely:

- a) Sanitary and storm sewers, and water distribution system, including service connections for water and sewer.
- b) Sidewalks, curbs and gutters, catch basins, concrete walkways, and paved and graveled lanes.
- c) Paved Roads.



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- d) Landscaping, including boulevards, uniform fencing, and subdivision signage.

The Developer shall make application to the M.D. for the issuance of a Construction Completion Certificate. No such application will be considered by the M.D. Administration unless it is requested in respect of all of the Development Area or one or more approved stages of development.

The M.D. may issue a Construction Completion Certificate, a Conditional Construction Completion Certificate, or provide a list of deficiencies that must be corrected in order to obtain a Construction Completion Certificate. The details of the process will be outlined in the development agreement.

The Developer shall maintain all Municipal Improvements constructed pursuant to this Agreement to the standard to which they were constructed, reasonable wear and tear excepted, for the period commencing upon the issuance of a Construction Completion Certificate and continuing for the periods as stated in the table below:

Table for Maintenance Period

Underground Services and Utilities	- 24 months
Roads and Sidewalks	- 24 months
Uniform fencing, grass and sod for landscape areas	- 12 months

Upon completion of the Maintenance Period, and after final inspection and correction of all deficiencies thereof, a Final Acceptance Certificate will be issued by the M.D. Administrator.

2.2.12 Development Permits

No Development Permits or building permits will be issued until the subdivision plan is registered, all essential services have been provided as specified in the Development Agreement and underground utility service as-built records have been submitted and accepted by the M.D. Administrator.

2.2.13 Existing Utilities

Prior to connecting to existing utilities, the M.D. Utilities Department shall be given a minimum of two working days notification of the work being done.

Once operational, hydrants or main line valves shall only be operated by M.D. staff.

No sanitary sewers will be used to discharge storm water



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2.2.14 Road Closures and Construction within Road Rights-of-Way

In the event that a road must be partially or fully closed due to construction activity, the party causing this event will provide all detours, signs, flag persons, barricades, and other safety requirements necessary to provide for the orderly control of traffic around the construction area. A Traffic Accommodation Strategy (TAS) must be submitted to the M.D. for approval.

2.2.15 Survey Control System

The Developer shall undertake to preserve all existing and new monuments and, should it be necessary to destroy a monument, the Developer shall establish a new one in lieu thereof and provide the M.D. and Alberta Environment, Land Administration Division, with survey measurements for it to the satisfaction of the Director of Surveys.

Any legal pins disturbed or removed during construction must be replaced prior to Final Acceptance by the M.D.. The Developer shall supply a certificate from a registered legal survey that all lot and corner pins are intact.

END OF SECTION



3. PREPARATION OF ENGINEERING DRAWINGS

3.1 DESIGN DRAWINGS

3.1.1 Scope

The following specifications will govern the preparation of Engineering Drawings for all Municipal Developments.

3.1.2 Drawing Size, Material

The Standard D drawing size (559 mm x 864 mm) will be used.

Originals will be prepared in ink on reproducible sheets.

3.1.3 Scales

Urban Residential/Industrial and Rural Industrial drawings shall be prepared using the following scales:

Overall Plans 1:1000

Plan/Profile	Horizontal 1:500	Vertical 1:50
Cross-Sections	Horizontal 1:100	Vertical 1:50

Rural Residential drawings with approval may be prepared using the following scales:

Overall Plans 1:2000

Plan/Profile	Horizontal 1:1000	Vertical 1:50
Cross-Sections	Horizontal 1:1000	Vertical 1:50

3.1.4 Drawing Technique

Points of drawing technique that are significant to the preparation of drawings are as follows:

- Care in ensuring balanced distribution of detail throughout the drawing.
- Letters and figures shall be clearly legible, well-spaced, properly formed and proportioned.
- Lines shall be uniform in weight and density.
- Dimensioning shall be in the metric system. Dimensioning of a drawing is extremely important and should be such that it will not be misinterpreted. Dimensions should be given from an iron pin, lot line, a centerline or any other reference that can be readily established. Wherever possible, all dimensions shall be provided to a minimum of two (2) property lines.



3.1.5 Title Block

All drawings must clearly show the following in the title block:

- a) Developer's / Owner's Name.
- b) Developer's Engineer or consulting engineering name.
- c) Subdivision name, including staging and / or phasing.
- d) Drawing name, number and issue date.
- e) Drawing scale, including horizontal and vertical axis.
- f) Space for dates and signature of the designer, draftsperson, reviewer or checker, and approving professional or principal.
- g) Space for professional stamps and permits.
- h) Space for revisions, including number, date, description, and approved signature.

3.1.6 General Requirements for All Drawings

Elevations will be relative to the Geodetic datum. The reference bench marks and elevations will be shown on the design drawings.

A north arrow, the name of the subdivision and, where appropriate, phase as included in the Development Agreement, adjacent lots and plan numbers, street names and the legal description of the parcel being subdivided, will all be shown on the drawing. In general, the north arrows should be orientated toward the top of the plan.

An Engineer's stamp and Permit to Practice stamp, signed by an Engineer registered in the Province of Alberta will be shown on the engineering drawings.

3.1.7 Required Engineering Drawings

The following plans will form a part of the design drawings set:

Cover Sheet:

This will show the name of the subdivision, stage of development, location plan, M.D. logo, and names of the Developer and Developer's Engineer. Space permitting, the index plan may be included here. A key plan of M.D. of Pincher Creek, or a significant portion thereof, shall be included, illustrating the location of the development or project.

Index Plan:

This plan will be prepared on a scale of 1:500, or a reduction thereof to fit the standard size sheet, and will indicate that portion of the street that relates to a particular plan/profile sheet.



Contour Plan:

This plan will be drawn at a scale of 1:1000 and will indicate the existing contours at 1.0 metre intervals (rural developments) and 0.5 metre intervals (urban developments), the proposed land use and all significant above ground features, such as buildings, structures, trees, utilities and water bodies.

Sanitary Sewer, Storm Sewer and Water Main Overall Plan:

This plan will be drawn to a scale of 1:500 and will indicate the alignments and locations of mains, size of mains, valves, hydrants, manholes, catch basins, storm catchment areas with areas labeled in hectares, direction of sewer main flows and locations of appurtenances.

Road, Sidewalk and Walkway Plan:

This plan will be drawn to a scale of 1:500 and will show all locations and widths of roads, lanes, sidewalks, walkways, and right-of-way widths and alignment, and the storm drainage system including the local drainage areas, catch basins, pipe and culvert locations, sizes, inverts, direction of flow, as well as all proposed approaches.

Lot Grading Plan:

This plan will be drawn to a scale of 1:500 and will indicate the original contours at 0.5 m intervals (shown in screened format), proposed areas of grading, finished lot corner elevations, grades and direction of finished surface drainage flows.

Shallow Utilities Plan - Power, Gas, and Communication cables.

This plan will indicate the alignments of power, gas, telephone and cable, and shall be drawn to a scale of 1:500. Existing infrastructure and other relevant features shall also be shown in detail.

Detailed Plan/Profile drawings:

Plan/Profile drawings shall be drawn to a scale of 1:500. The profile portion shall have a 10 times vertical exaggeration.

3.1.8 Detailed Plan/Profile

Generally, all underground services and surface improvement profiles are shown on the same drawing. The plan portion of the sheet shall be at the top, and the title blocks, revisions, legends, company stamps, and similar features will be placed along the bottom of the sheet.

The following information will be included on the detailed plan/profile drawings:

Requirements for Sanitary and Storm Sewer:

The following information will be shown on the profile:

- a) Size, type, class of pipe and class of bedding.



- b) Length and percent grades between manholes.
- c) Invert elevations at both inlet and outlet of manholes.
- d) Rim elevations at finished grade.

The following information will be shown on the plan:

- a) Tie location of manholes, cleanouts, and other appurtenances to property lines.
- b) Pipe offsets from property line.

The following additional information will also be shown on an appropriate part of the drawing:

- a) Manholes shall be numbered.
- b) Where the sanitary sewer or water and storm drain are to be installed in a common trench, detail a typical cross-section showing distance between pipes, class of pipe and bedding.

Requirements for Water:

- a) Tie the location of hydrants and other appurtenances to the nearest property pin.
- b) Show the offset of the main from the property line and locate the end of the main to the nearest property pin.
- c) Indicate extent of work required in making the connection to the existing water main.
- d) Indicate the size, type, class of pipe, bedding and CSA specification number on the plan.

Requirements for Roads:

- a) Both plan and profile must be tied to a property pin, preferably near or at 0 + 00 chainage.
- b) Show the road width and the curb offsets measured from the property line to the curb face.
- c) Chainages of the BC and EC of horizontal curves will be shown together with the delta angle, radius, tangent length and arc length for each curb.
- d) The percent grade, to two decimal places, shall be shown on the profile, together with the following information on vertical curves:
 - 1) The chainage and elevations of BVC, EVC and PVI.
 - 2) The external value, "e";
 - 3) The length of vertical curve.
 - 4) The elevation and chainage of the low spot of sag curves or the high spot of crest curves.



- e) Road profiles will show the Top-of-Curb or Lip-of-Gutter elevations, identifying which has been used
- f) The profile will be shown at true centerline length and projected above the plan in as close a relationship as possible.
- g) Locate catch basins (using road chainage) and show leads between the catch basin and manhole.
- h) Label limits of construction.

3.1.9 Lot Grading Plan Requirements

This plan will include:

- a) Invert and location of sewer and water services.
- b) Proposed Top-of-Curb or Back-of-Walk elevations.
- c) Existing and proposed contours at 0.5m intervals.
- d) Proposed finished lot corner elevations.
- e) Proposed finished lot elevations on side property lines at 6.0, 12.0 and 18.0 metres back from the front property line.
- f) Proposed finished lot elevations on side property lines at 6.0 metres from the rear property line.
- g) Distances from a property pin to the proposed grade break points on property lines that divide properties.
- h) Proposed finished lot elevations at grade break points.
- i) Standard detailed drawings shall govern the lot grading design, and critical swales elevations will be calculated as per the types shown.
- j) The lot grading plan will have the following note: "The surveyor shall design and stake out the house elevations and finished grades at house to meet the building code slope requirements for drainage to critical swales".
- k) The grading plan will identify lots with weak subsoil conditions and have a notation indicating the requirement for a geotechnical engineer's footing design.
- l) The grading plan will identify all lots with areas of 1.0 m of fill or greater, with these lots shaded a different colour.
- m) Direction of surface drainage and critical swale elevations on side property lines.

3.1.10 Power, Gas, and Communication Cable Utility Plan Requirements

This plan will include:



- a) Street Light Locations.
- b) Dimension of all Easements.
- c) Location of pedestals, transformers, cabinets, and other hardware.
- d) Lot Numbers.

3.2 AS-BUILT DRAWINGS

3.2.1 Scope

This procedure pertains to the as-built drawings of the following services:

- a) Storm and sanitary sewers, water mains, roads, curbs, sidewalks, culverts and other miscellaneous permanent structures.

3.2.2 General

The as-built drawings shall be affixed with the stamp and seal of a Professional Engineer who, by signing, is certifying the information to be accurate and correct.

The as-built drawings will clearly show the locations of all services, curb cocks, valves, hydrants and manholes, using right angle measurement from survey pins.

Red line as-built drawings are to be submitted for review, indicating changes.

Within three months of the installations three sets of as-built drawings are to be submitted to the M.D., along with a digital file copy.

The as-built drawings referred to in this section will also be submitted to the M.D. Administrator in digital format, as per the following requirements:

- a) Must be compatible with the M.D. version of AutoCAD.
- b) Accompanied by a layer list and description.
- c) Will conform to layering and symbol standards as established by the M.D. or their consultant.

On as-built drawings submitted to the M.D., the following information will be included on each drawing:

- a) Date of completion.
- b) Name of the contractor.
- c) Date on which "as-built" details were added.

3.2.3 Storm and Sanitary Sewer

The following information will be included for storm and sanitary sewer systems:



- a) Size, pipe material, pipe class, bedding and location of mains.
- b) Location of manholes, cleanouts, and other appurtenances.
- c) Grades, lengths, inverts of mains and rim elevation.
- d) Profile of pipe top and bottom.
- e) Corrected flow calculations.

3.2.4 Water

The following information will be included for water systems:

- a) Size, type and location of pipe.
- b) Location of valves, tees, hydrants and other appurtenances.
- c) Profile of pipe top and invert.

3.2.5 Road, Curb, Sidewalks

The following information will be included for roads, curbs, and sidewalk:

- a) Location of curbs, sidewalks and elevations of Top-of-Curb or Lip-of-Gutter.
- b) Top-of-Curb or Lip-of-Gutter for each curb.
- c) End of curb, sidewalks and pavement.
- d) Type of road structure on overall road plan and each plan profile.
- e) A typical cross-section referencing the above and representing all conditions.

3.2.6 Water, Sanitary, and Storm Service Connections

A table on each plan/profile drawing will be prepared giving the following information with respect to service connections:

- a) Lot number.
- b) Distance of service saddle from the downstream manholes.
- c) Invert elevation at the end of sanitary and storm service.

The service connection provided to each lot will be shown on the plan and the location triangulated to the property lot corners.

The typical location of the curb stop will be identified on each plan/profile, (i.e. 0.3 m F.O.W., 2.65 m B.O.W.) by means of a table chart.



3.2.7 Mechanical Systems

Where the subdivision includes mechanical systems, such as lift stations, the Developer will provide detailed drawings of the facility, as well as operation/maintenance manuals, including the make and model of all equipment, to the satisfaction of the M.D..

3.2.8 Building Grade Certificates

Prior to issuance of a Construction Completion Certificate for water, sanitary, and storm services, the Developer shall provide to the M.D. the relevant Building Grade Certificate for each lot in the Development.

As outlined in the Development Agreement, Development Permits or building permits will not be released until all of the conditions outlined in the Development Agreement are met.

Building Grade Information

The following information shall be shown on a Building Grade Certificate:

- a) Water, sanitary, and/or storm services location and inverts at property line or easement line.
- b) Power, telephone, and cable television service location.
- c) Sidewalk and boulevard width.
- d) Easements.
- e) Lot corner surface elevations.
- f) Landscape elevations at front of house.
- g) Lot drainage pattern.
- h) Streetlights, hydrants, etc.

END OF SECTION



4. WATER DISTRIBUTION SYSTEM

4.1 GENERAL

The design of the water system shall conform to the “Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta”, as published by Alberta Environment and as added to by these Guidelines and Standard Details.

4.1.1 Municipal Water System

The Contractor may be required to tie into a municipal water system or to shut off system valves to undertake the proposed Work. When this is required, the Contractor shall:

- a) Give the Municipality sufficient notice of the proposed Work and schedule so proper planning and approvals can take place.
- b) Supply all water necessary for the Work and obtain written permission from the Municipality prior to using any hydrants.
- c) Obtain written permission prior to operating any of the Municipality’s valves and/or hydrants. The Contractor shall be held responsible for any damage done to the hydrants or surrounding area. The Municipality may require their own personnel to operate their valves and/or hydrants.
- d) Make an agreement with the Municipality for payment of water used.
- e) Be responsible for the supply of all water necessary for the Work.
- f) Provide 24-hours’ notice to any property owner affected by water service disruption.
- g) Supply an alternative water service if the water disruption is longer than 4 hours.
- h) For establishments relying on an uninterrupted water source for their operations, an alternative water source shall be provided.
- i) The above noted requirements shall be done at the Contractor’s cost.

4.2 DESIGN REQUIREMENTS

The minimum size of distribution main shall be 150 mm diameter for residential, 200 mm diameter for commercial and 300 mm diameter for industrial.

PVC pipe shall be used and the value of “C” in the Hazen-Williams formula shall be 120 for all types of pipes.

Per capita consumption shall be:

Average Daily Demand	-	360 lcd
Maximum Daily Demand	-	2.0 x Average Demands



Peak Hourly Demand - 3.0 x Average Demands

The design population shall be the ultimate for the area under consideration. For non-residential developments, the minimum water consumption rate shall be equal to 0.2 litres per second per hectare. The applied peaking factor shall be $P_f = 10Q^{-0.45}$ to a maximum of 25 and a minimum of 2.5, Q being in litres per second. Where possible, water demand shall be based upon site specific requirements for identified uses. Fire flow requirements are to be included in all calculations.

An analysis will be made for Peak Hour Demand, and mains shall be sized such that there will be a minimum residual pressure of 276 kPa (40 psi) at ground level at any location in the system.

Separate analysis shall be made for Maximum Demand plus Fire Flow. The residual pressure at any location at the ground level shall not be less than 140 kPa (20 psi).

Fire flow requirements shall be in accordance with the Fire Underwriters Survey publication entitled "Water Supply for Public Fire Protection – a Guide to Recommended Practice", latest revision thereof. Generally these are: for single family residential 60 l/second, for multi-family residential 90 l/sec, for Institutional 90 l/sec, commercial 190 l/sec, and light industrial 230 l/sec.

Where the size of the area to be developed warrants, or if required by the M.D., a network analysis will be carried out and all relevant information will be submitted with the design documents.

Water main looping will be required where the number of lots exceed 20 lots.

4.2.1 Water Main - Location and Installation

Mains shall be installed to provide a minimum depth of cover of 2.75 metres below the final finished surface grade. Maximum depth of cover shall be 3.5 m unless authorized in writing by the M.D. Administrator. Additional depth may be required under roadways.

In all cases a distance of 3.0 m from the centreline of a road shall be maintained.

A minimum of a 3.0 m horizontal separation shall be maintained between a water main and any sewer main.

The minimum requirement for pipe bedding shall be Class "B" bedding.

Water main installation shall be in accordance with manufacturer's requirements and these Specifications.

4.2.2 Hydrant - Location and Installation

The maximum allowable spacing between fire hydrants shall be 150 m in single-family residential areas and 120 m in multiple-family residential, school, and 100 metres in



industrial/commercial areas. Hydrant locations shall be such that the distance to any building shall be no greater than 75 m. For the case of multi-family and/or commercial buildings with standpipes, the distance shall be 45 m unobstructed driving distances, between hydrant and standpipe.

Hydrants on the distribution main will be installed at the projection of property lines, except:

- a) Where the hydrants are installed at the intersections, they shall be installed adjacent to the cut-off corners of the lot.
- b) Where the hydrants are installed in a Cul-de-Sac, they will not be installed within the turning circle but shall be located at the tangent points.
- c) Where a hydrant and sanitary manhole fall on the same property line projection, the manhole will be moved a minimum of 5 metres away from a hydrant.

Hydrants shall be located to conform to curb and sidewalk design and shall be installed as follows:

- a) The center of the barrel is to be 2 m back of Face-of-Curb or 0.5 m back of walk. With rural cross-sections, install hydrants 1.0 m from property line.
- b) The maximum distance from the face of the curb to the hydrant shall be 3.5 metres.
- c) Shall be installed in accordance with the Standard Drawing and the Engineering Specifications outlined in these documents.
- d) Hydrants shall be plugged or draining depending on the site conditions (high ground water or poor soil drainage);
- e) A gate valve will be provided on each hydrant lead;
- f) Cathodic protection to be installed as per Drawing 4-400.
- g) All bolts to be stainless steel.
- h) All barrels to be epoxy coated.

Additional hydrants shall be installed at high value properties if deemed necessary by the M.D..

4.2.3 Valve - Location and Installation

All valve boxes located in streets shall be left flush with the base course asphalt. Immediately prior to the final lift of asphalt being placed, these valve boxes shall be raised to final grade.

Valves on the distribution mains will be installed:

- a) At the projection of a property line at intersections or in mid-block, for urban sections. One meter from property line for rural sections.
- b) With two valves at a tee and three valves at a cross.



4.2.4 Valve Box

Valve box shall be Norwood Foundry Type A, PVC or Cast. Valve box shall consist of a cast iron bonnet of sufficient size to fit over the valve, and an adjustable cast iron top box with lid.

Valve boxes shall be of suitable length for depth of bury specified for mains, with possible adjustment of 300 mm up or down from this length.

Valve box extensions shall be cast iron suitable for use with the valve box to be installed.

All cast iron surfaces to have a bituminous coating for corrosion resistance.

Distribution main valves shall be located such that during a shutdown:

- a) No more than one hydrant is taken out of service;
- b) No more than four valves are required to affect a shutdown;
- c) No more than twenty residential units are taken out of service by a shutdown, including Cul-de-Sacs; and
- d) Valves shall be installed in accordance with the Contract Specifications for the project and as per the Standard Drawing.

4.3 THRUST BLOCK

At all hydrants, plugs, tees, crosses, bends, and all other points of concentrated thrust, provide reaction blocking (thrust blocks), or manufacture approved clamps, to prevent movement. Place reaction blocking against solid undisturbed ground. Details provided herein are intended to be general, and are based upon soil load values of 7300 kg/m² or more. Where soil will not provide this load value, provide additional bands and clamps, or provide more substantial reaction blocking, as required to take the anticipated reaction. Place blocking to provide access to pipe and fittings for repairs or future extensions of the line.

Thrust blocks will be provided as per the Standard Drawing. Thrust blocking shall be Type 50 sulfate resistant concrete having a minimum compressive strength of 20 MPa at 28 days.

Pipe restraint devices shall be used separately or in conjunction with thrust blocks, where identified as being required, and shall be in accordance with the manufacturer's recommendation. All restraint devices shall be stainless steel or suitable, resistant to corrosion, to the satisfaction of the M.D..

4.4 HYDROSTATIC PRESSURE TESTING

Tests shall be made only after completion of services, partial or complete backfill, and a minimum of 24 hours after the pipe has been filled with water. No test will be applied



until at least 36 hours after the last concrete reaction or thrust block has been cast with high early strength cement, or at least seven days after the last concrete reaction or thrust block has been cast with sulfate resistant cement. The duration of each test shall be two (2) hours. Test pressure will be 2.0 times the normal system operating pressures or 1,035 kPa, whichever is greater. Test pipeline in sections not exceeding 365 meters in length.

4.4.1 Disinfection

All water mains will be disinfected in accordance with AWWA specification C651, latest revision.

Before being placed in service, and before certification of completion by the Engineer, all installed mains will be disinfected according to the AWWA Standard C651-99 "Disinfecting Water Mains" and tested for bacterial content and chlorine residual.

On completing the chlorination of the mains, the Contractor shall set the system in operation as directed by the Engineer.

De-chlorination of the chlorinated water may be required in some circumstances before discharging the water to the environment, in order to meet the regulatory requirements of M.D. of Pincher Creek or Alberta Environmental Protection. De-chlorination, if required, is to be performed by adding neutralizing chemicals (AWWA C651-86, Appendix B) to the chlorinated water as it is flushed from the system and before it enters the receiving environment.

4.4.2 Cathodic Protection

All buried fittings and valves shall be cathodically protected with a 2.3 kg Zinc Anode, and all hydrants shall be cathodically protected with a 5.5 kg Zinc Anode., per Standard Detail 4-400.

Zinc Anodes shall conform to ASTM B418-73, Type II.

Lead Wires No. 10A WG/7, two metres long.

Wire shall be connected to fittings with a cadweld.

A minimum of three litres of water shall be poured on each Anode to initiate the Anode's operation.

4.4.3 Flushing of Existing and New Water Mains

Prior to flushing of any water mains, M.D. of Pincher Creek Public Works Office will receive a minimum of two working-days' notice. Only M.D. personal will operate existing valves.



4.4.4 Usage of M.D. Water

The Developer's Engineer shall be responsible for calculating the water used for flushing of mains. This calculation shall be submitted to the M.D. at the time of the Construction Completion Certificate (CCC). The Developer shall be responsible for the cost of the water used to flush the mains and shall be invoiced accordingly. The cost of this water shall be calculated using the current charges, as may be amended from time to time, as outlined in the Water Rates Bylaw.

4.5 FIRE PONDS

Fire protection requirements are to be in accordance with the most current Fire Underwriters Survey publication entitled Water Supply for Public Fire Protection - A Guide to Recommended Practice.

For details regarding the design of fire ponds consult Alberta Environment's wet pond standards in the publication entitled "Storm Water Management Guidelines for the Province of Alberta". Some general design parameters to consider for fire ponds are:

- a) Minimum water surface area of 2 ha
- b) Maximum 4:1 to 5:1 side slopes above active storage zone
- c) Maximum 5:1 to 7:1 interior side slopes in active storage zone
- d) Maximum 3:1 exterior side slopes
- e) Permanent depth to be a maximum of 3.0m and a minimum of 2.0m
- f) Maximum water level should be below adjacent house basement footings
- g) All-weather access required with minimum seven meter (7m) road width
- h) Pond to be located not farther than thirty meters (30m) from main roadway
- i) Pond to have a one point eight meter (1.8m) high Paige-wire fence enclosure with warning signs
- j) Armored emergency overflow spillway
- k) Provide details showing how fire pond levels will be maintained or recharged.

4.6 STANDARDS DRAWINGS – WATER DISTRIBUTION SYSTEM

- | | |
|-------|--------------------------------|
| 4-100 | Valve Box Construction Detail |
| 4-101 | Valve Box Detail |
| 4-102 | Main Valve Casing Detail |
| 4-200 | Typical Hydrant & Valve Detail |
| 4-201 | Blow-Off Valve |
| 4-300 | Thrust Block Details |



- 4-301 Vertical Bend Thrust Block Detail
- 4-400 Typical Anode Installation at Valves - Iron Fittings and Hydrants
- 4-401 Anode Installation Cadweld
- 4-500 Air Relief Valve and Flushing Chamber
- 4-600 Hydrant Location and Approach Detail
- 4-700 Catch Basin Barrel – Dry Hydrant
- 4-701 Typical Dry Hydrant

END OF SECTION



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5. SANITARY SEWERAGE SYSTEM

5.1 GENERAL

The design of the sanitary sewer system shall conform to the “Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta”, as published by Alberta Environment and as added to by these Guidelines and Standard Details.

5.2 DESIGN FACTORS

The sanitary sewerage system shall be of sufficient capacity to carry peak flows plus infiltration. Foundation weeping tile and roof leaders shall **not** be connected for discharge into the sanitary sewer system. The following factors shall be used in design of sanitary sewerage systems:

a) Residential

Population estimates for the purpose of system design shall be based upon the actual lots proposed for the development and a person’s dwelling estimate of not less than 4.0.

The M.D. reserves the right to require additional system capacity to accommodate potential future subdividing of larger lots.

Average Sewage Flow - 340 lcd

Peaking Factor - $1 + 14 / (4 + p^{0.5})$

(Harmon’s Formula)

Where “p” equals the equivalent population in 1,000’s

Infiltration - 0.20 L/s/ha

b) Commercial, Industrial and Institutional:

Average Sewage Flow - Commercial: 40,000 l/ha/d

Industrial: 20,000 l/ha/d

Peak Flow - 3.0 x Average Flow

Infiltration - 0.28 l/s/ha (24,000 l/ha/d)

Minimum Velocity - 0.61 m/s

Pipe sizing shall be determined by using the Manning’s Formula with an “N” value of 0.013.

The minimum size for sanitary sewer mains shall be 200 mm diameter for residential and 250 mm for industrial/commercial areas.



Minimum pipe slopes shall be as recommended by Alberta Environment.

Sanitary sewers may have to be oversized to conform to the M.D.'s Sanitary Sewer planning.

5.3 SEWER MAIN INSTALLATION AND LOCATION

Mains shall be installed to provide a minimum depth of 2.75 m from top of pipe to final finished grade at the surface.

Mains shall be installed to provide adequate sewer service connection depth at the property line.

Mains shall be located within the road right-of-way in accordance with the Roadway Cross-Section Standard Drawings.

Pipe bedding shall be provided for all mains in accordance with the Standard Drawings.

5.4 MANHOLE INSTALLATION AND LOCATION

Manholes shall be located at the end of each line, at all changes in pipe size, grade or alignment, at all junctions, and at intervals no greater than 120 m along the length of the sewer.

Inverts in manholes at changes in direction shall have at least 50 mm fall across manhole. To maintain a continuous energy gradient through manholes, the obvert (crown) elevation of the lowest upstream pipe shall be equal to, or higher than, the obvert of the downstream pipe.

Manholes shall be installed as shown on Standard Drawings. Manhole bases shall be pre-cast slabs, concrete poured bases, vaults or pre-cast tees. Pre-benched manholes shall be used when possible. All manholes shall be 1200 mm inside diameter for all pipe 900 mm diameter and less. For pipe exceeding 900 mm diameter, manhole diameter shall be pipe diameter plus 600 mm, or a Tee-Riser shall be used.

Manhole frames and covers to be Type F-39 in landscaped areas, Type NF-80 in paved areas and Type NF-90 gasket in sags. All manhole covers are to be clearly stamped "Sanitary Sewer".

An interior drop manhole shall be used where invert levels of inlet and outlet pipes differ by more than 750 mm.

All joints shall be watertight.

Safety platforms at intermediate levels are required for manholes greater than 5.0 m in depth when measured from the top of the frame to the lowest invert.



5.5 CURVED SEWERS

Curved sewers will be permitted, with the following restrictions:

- a) The sewer shall be laid as a simple curve, with a radius equal to or greater than 90 m or the manufacturer's minimum recommended radius, whichever is larger.
- b) Manholes shall be located at the beginning and end of the curve.
- c) Manholes shall be located at intervals not greater than 90 m along the curve.
- d) The main shall run parallel to the curb or street centerline.
- e) The minimum grade for sewers on curve shall be 50% greater than the minimum grade required for straight runs of sewers.

5.6 INSPECTION AND TESTING

Prior to issuance of the Construction Completion Certificate of the project, all sewer mains shall be tested as follows:

- a) Closed Circuit Television Inspection

All sections of sanitary sewers shall be inspected with closed circuit television camera equipment prior to F.A.C. A written report and a colour video in an approved format, shall be submitted to the M.D. for their approval and records.

- b) Leakage Test:

The M.D. Administrator may require each section of sewer main and service connections to be tested for water tightness by an exfiltration test and/or infiltration test. In areas where the water table rises up to the sewer pipe invert or higher, each section of the sewer main and service connections shall be tested for water tightness by an infiltration test. In all other situations, an exfiltration test shall be conducted. The test results shall be recorded for each section of the main tested and the results forwarded to the M.D. Administrator.

5.7 STANDARDS DRAWINGS – SANITARY SEWERAGE SYSTEM

- | | |
|-------|---------------------------------|
| 5-100 | Manhole Detail Type 5A Pre-Cast |
| 5-201 | External Drop Manhole |
| 5-202 | Interior Drop Manhole Detail |
| 5-300 | Pre-benched Manhole Base |
| 5-400 | Manhole Safety Platform |
| 5-500 | Pipe Bedding Details |
| 5-600 | Typical Trench Detail |

END OF SECTION



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6. STORM DRAINAGE SYSTEM

6.1 DESIGN FACTORS

The storm sewers or storm drainage system shall be designed as a separate system and shall be of sufficient capacity to carry storm runoff from the ultimate development the area is zoned for. The storm system should be designed considering both the minor and major drainage systems.

The minor system comprises of piping, manholes, catch basins and outfall structures. The minor system shall convey runoff from snowmelt and rainfall events to an adequate receiving water body (river, stream, lake or pond) without sustaining any surface ponding or excessive surface flows for events up to and including a 1-in-5-year return period. Where required by the M.D. Administrator, high value commercial areas shall have their minor systems designed to accommodate a 1-in-10-year return period event.

The major system comprises the street system, detention facilities, parkland and any other land required to convey runoff from events up to and including a 1-in-100 year return period to the receiving water. The major system shall be evaluated in a manner sufficient to determine that no flooding that may cause significant property damage (e.g. flooding of buildings) occurs during the 100 year event.

Effluent from sanitary sewers and any drainage from industrial, agricultural or commercial operations that may potentially be contaminated shall not be discharged to the storm sewers.

Roof leaders of residential buildings shall be splashed on the surface and shall not be connected to the storm sewer system. Roof drainage from one-family and two-family dwellings shall discharge to grassed or pervious areas. The point of discharge shall be a sufficient distance (i.e. at least 1.0 m) to ensure the water flows away from the building. Roof drainage from apartment buildings, commercial areas, and industrial areas may discharge to the storm sewer, without the drainage crossing a sidewalk, if approved in writing by the M.D. Administrator.

The post development runoffs rates from properties shall not exceed the existing pre-development runoff rates being discharged to the storm drainage system, thus resulting in a no net increase to the storm drainage system.

Where pre-development runoff rates are considered excessive for the existing drainage system, the developer shall consider alternatives to reduce the existing runoff to a level acceptable by the M.D. Administrator.

The developer shall provide these designs and calculations to M.D. of Pincher Creek for approval.



Ponding of runoff on roofs, parking lots or landscaped areas to reduce runoff rates must be considered.

All development shall provide sump pumps to discharge weeping tile water to grassed surface areas or splash pad. Splash pads are required to insure positive drainage away from the building. Should the Geotechnical Report indicate a high water table, the M.D. may request other alternatives to surface discharge of weeping tile.

No sump pump connections to the storm system are allowed unless approved in writing by the M.D. Administrator.

Control shall be provided to minimize sediment discharge to the storm sewers. This shall be in the form of properly graded and surfaced streets and lanes, landscaping, sediment control structures at pond and lake inlets, or other means where appropriate.

The following criteria shall be used in the design of the minor storm sewer system:

- a) For areas less than 65 ha, the Rational Method shall be used to design the storm sewer system:

$$Q=2.78 CIA$$

Where Q = the design peak flow rate in litres per second
I = the intensity of rainfall in millimetres per hour, corresponding to the time of concentration
A = the contributing area in hectares
C = the runoff coefficient

- b) Rainfall Intensity-Duration-Frequency Curves used are to be terrain applicable based on the Pincher Creek or the Lethbridge Airports.

- c) The following runoff coefficients shall be used for the 1-in-5 year analysis:

Parks	=	0.15
Residential	=	0.35
Industrial	=	0.70
Commercial	=	0.70
Multiple Family	=	0.70

- d) The weighted average of pervious and impervious area runoff coefficients shall be estimated from the following equation:

$$C = (C_p * A_p + C_i * A_i) / (A_p + A_i)$$

In these standards, where the subscripts “p” and “i” indicate the pervious and impervious surfaces, respectively, $C_p = 0.15$ and $C_i = 0.90$.

- e) The duration of rainfall used to determine the intensity is equal to the time of concentration. The time of concentration is comprised of the overland time to the storm sewer inlet and the time of travel in the conduit. The



overland flow time to curbside in residential and commercial areas shall not exceed 10 minutes in duration (specific overland flow times shall be computed separately for industrial and undeveloped areas). Gutter flow time shall not exceed 5 minutes and shall be estimated based on methods outlined in "Modern Sewer Design" (AISI, 1980). The time of travel in the conduit shall be based on the pipe flow velocity.

For areas greater than 65 ha:

- a) Computer models shall be used to determine design flows and the sizing of systems that contain non-pipe storm-water management facilities (e.g. detention ponds) or systems that include a significant amount of undeveloped land.
- b) The selection of an appropriate computer model shall be based on an understanding of the principles, assumptions and limitations in relation to the system being designed.
- c) Wherever possible, the computer model shall be calibrated. In all analyses, the parameters used, the drainage boundaries, the pipe network and its connectivity shall be clearly identified on an overall drawing, computer printouts and a design summary report.
- d) The critical design rainfall hyetograph shall be selected. Both the AES Distribution (for long duration) and the Chicago Distribution (for short duration) will be evaluated.
- e) The storm duration of an event is critical for the system being designed and shall be used to determine pipe sizes. The 5 year 4-hour Chicago Distribution event shall be selected. For systems involving storage design, both short duration and longer duration events such as the AES 24 hour event should be evaluated.

The minimum velocity within a piped system shall be 1 m/s. Where greater velocities in excess of 1 m/s are attained, special provisions shall be made to protect against displacement by erosion or impact.

Pipe sizing shall be determined by utilizing the Manning's Formula, using an "N" value of 0.013.

Storm sewer pipe shall be designed to convey the design flow when flowing full, with the hydraulic grade line at the pipe crown. All pipe crown elevations shall match at manhole junctions.

Surface water shall not be permitted to run a distance greater than 250 m along gutters without provision of interception by the first catch basin. Within the piped drainage system, or on Collector or Arterial roadways, surface runoff shall not run a distance greater than 120 m without interception.

Minimum gutter grade shall be 0.50%. Cul-de-Sacs and curb returns are minimum 0.8% to 1%.



Roadway ditches and swales will efficiently convey run-off through the storm drainage system. Roadway ditches and swales will not be used for stormwater detention or retention.

6.2 STORM SEWER MAINS

6.2.1 Sewer Mains

The minimum size of storm sewer mains shall be 300 mm diameter.

Pipe classes shall be determined to withstand subsequent superimposed loadings.

Various factors affecting the pipe class shall be taken into account, and pipe class shall be evaluated as per standard engineering practice.

6.2.2 Catch Basins

a) Catch basin barrels with pre-cast base and pre-cast slab top shall be:

- 1) 900mm I.D. pipe barrel conforming to CSA-A257.2. Joints to be confined O-ring to CSA-A257.3 using rubber gasket.
- 2) Catch basin manholes shall be 1200 mm in diameter in accordance with the Standard Drawing.
- 3) Catch basin manholes shall be used in place of a catch basin when the lead exceeds 30 m in length or one catch basin discharges into another.
- 4) Catch basins are to have 300 mm deep sumps.

b) Catch basin frames and covers shall be:

- 1) Standard frame, grate and 2 piece side inlet curb component for use with 900 mm barrel equal to Norwood F-51 for straight faced curb and gutter.
- 2) Top inlet standard round top equal to Norwood F-38 for swales or lanes.
- 3) Top inlet standard round top equal to Norwood F-39 grate for landscaped areas.

c) Catch basin leads:

- 1) The minimum size of catch basin leads shall be 250 mm diameter with a minimum grade of 1.0%.
- 2) The minimum grade on a 300 mm catch basin lead shall be 1.0%.
- 3) Two catch basins may be connected in series. The catch basin lead connecting to the storm sewer manhole shall be 300 mm at a minimum slope of 1.0%.



- 4) The maximum length of a catch basin lead shall be 30 m.
- 5) If a lead of over 30 m in length is required, a catch basin manhole shall be installed at the upper end.
- 6) Catch basin leads shall have a minimum cover of 1.2 m to obvert.

6.3 STORM SEWER INSTALLATION AND LOCATION

Mains shall be installed to provide a minimum depth to pipe obvert of 1.50 m below final finished grade.

Pipe bedding shall be provided for all mains in accordance with the Standard Drawings.

6.4 MANHOLE INSTALLATION AND LOCATION

Manhole spacing on storm sewers greater than 750 mm in diameter may exceed 120 m if approved by the M.D. Administrator.

Benching in manholes shall be provided to minimize hydraulic losses. The downstream invert in a manhole shall be a minimum of 25 mm lower than the lowest upstream invert. At a change in direction, the drop shall be at least 50 mm. If an influent pipe diameter is greater than 525 mm and the bend is greater than 45 degrees or if the outflow pipe velocity exceeds 1.5 m/s, then minor losses shall be considered (see AISI, 1980).

Tee riser manholes may be utilized on lines 900 mm diameter and larger. Tee riser manholes must be bedded in concrete to the springline of the pipe.

6.5 CONNECTIONS TO STORM SEWERS

Only catch basins and site surface drains shall be connected to a storm sewer.

6.6 CURVED SEWERS

Refer to (Sanitary Sewerage System).

6.7 INSPECTION AND TESTING

Refer to (Sanitary Sewerage System)

6.8 STORMWATER MANAGEMENT FACILITIES

6.8.1 Design Requirements Common to Stormwater Management Storage Facilities

a) General

The use of stormwater facilities may be required to reduce peak flow rates to downstream sewer systems and/or watercourses, or to provide a temporary receiving area for peak major drainage flows. Their approximate location and size must be identified at the time of the Subdivision Outline Plan approval to avoid conflicts with adjacent land



uses. The effects of the maximum pond water levels shall be considered in the design of the minor system and lot grading. If possible, the crown elevations of the pipes in the first manhole upstream of a pond shall be at or above the maximum pond level during the five-year storm event.

b) **Geotechnical Considerations**

Soils investigation specific to the detention facility shall be undertaken to determine the soil's permeability and salinity (or other potential contaminants), and the height of the groundwater table. Where the facility is sited above a shallow aquifer the potential for groundwater contamination must be minimized. Where the pond bottom is below the water table, weeping tile systems may be required to keep the pond bottom dry enough to support grass growth and maintenance equipment traffic.

c) **Sediment Control**

A sediment control plan is required as a part of the Stormwater Management Study to define measures that must be taken for the control of sediment into the pond and into the receiving stream.

6.8.2 Master Drainage Plan

a) The Master Drainage Plan shall be prepared and used in developing and comparing alternatives, and to select the optimum storage and drainage solution for a development area. This Master Plan should provide, as a minimum, the following information:

- 1) Detailed description of the development area, including proposed street layout, locations of parks, direction of overland flow, natural storage and drainage sub-catchment boundaries, etc.
- 2) Identify and quantify the amount of upstream drainage entering onto the proposed development lands, including all points of entry.
- 3) Identify the impact of the proposed development on the watershed.
- 4) Identify all existing flow channels, drainage patterns or routes, and containment areas.
- 5) 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.
- 6) Provide details of water quality enhancement facilities.
- 7) Identify all licensing requirements as may be required by Alberta Environment.



- 8) Post-development hydrographs for the 5-year and 100-year events to be determined at key points in the system.
- 9) Delineation of flood lines for the 100-year design storm for creeks or watercourses.
- 10) Description and discussion of storage alternatives. All alternative storage and runoff control methods shall be reviewed and shall include, but not be limited to:
 - retention storage;
 - detention storage;
 - off-line stream storage;
 - channel storage;
 - on-line storage; and
 - wet ponds (retention storage) or dry ponds (detention storage).

In reviewing the alternatives, the optimum number and location of the stormwater facilities shall be determined, bearing in mind the total system.

- 11) Detailed description of the selected alternatives.

6.8.3 Emergency Spillway Provisions

The feasibility of an emergency overflow spillway is to be evaluated for each storage facility (wet or dry) design, and, where feasible, such provisions are to be incorporated in the pond design.

As part of the pond design process, the probable frequency of operation of the spillway should be determined. Where it is not possible to provide an emergency spillway route, the design is to include an analysis of the impact of over-topping the pond and a significant freeboard above the 100-year level.

The functional requirements of the spillway, and the impact analysis for the absence of one, are to consider the possible consequences of blockage of the system outlet or overloading due to the run-off events, such that the storage capacity of the facility may be partially or completely unavailable at the beginning of a run-off event.

6.8.4 Dry Detention Ponds

Dry pond (detention) storage is the storm water management method where the storm run-off is collected and the excess run-off is temporarily detained for a short period of time, and released after the storm run-off from the contributing area has ended. Generally, low flows do not enter the pond.



Dry ponds should have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the subdivision. Where possible, and as agreed by the M.D. Administrator, they should be associated with municipal reserve areas to take advantage of the joint use ability of the facilities (e.g. extension of sport fields or passive park uses into the detention pond). Active park uses should not be located adjacent to the inlet/outlet facilities nor in areas that flood frequently (more than twice per year on average). The M.D. should be contacted to provide input to the design of detention facilities from the concept stage through to detailed design and construction.

6.8.5 Safety Provisions at Inlets and Outlets

All inlet and outlet structures associated with dry ponds shall have grates provided over their openings to restrict access and prevent entry into the sewers by unauthorized persons. A maximum clear bar space of 150mm shall be used for gratings.

Grated outlet structures are to be designed with a hydraulic capacity of at least twice the required capacity to allow for possible plugging. Further, the velocity of the flow passing through the grating should not exceed 1.0 m/s. Appropriate fencing and guard rails are to be provided to restrict access and reduce the hazard presented by the structure head and wingwalls.

6.8.6 Design Parameters

The following general design parameters should be considered for a dry pond in a residential subdivision:

- a) Storage capacity for up to the 100-year storm event.
- b) Detention time to be determined based on downstream capacity; recommended maximum detention time is 24 hours.
- c) Maximum active retention storage depth of 1.5m. The maximum water level should be below adjacent house basement footings (a greater freeboard may be required if an emergency overflow route cannot be provided).
- d) Maximum interior sideslopes of 5:1 (7:1 is recommended).
- e) Maximum exterior sideslopes of 3.5:1.
- f) Minimum freeboard of 0.6m above 1:100 year high water level (a greater freeboard may be required if an emergency overflow route cannot be provided).
- g) Maximum 4:1 ratio of effective length to effective width measured at 100 year high water level.



- h) Dimensions must be acceptable to the M.D. when the bottom of the pond is to be used for recreational facilities.
- i) Minimum lateral slope in the bottom of the pond of 1.0% (2.0% is preferred) and a minimum longitudinal slope of 0.5% (1.0% is preferred),
- j) Low flow bypass for flows from minor events to be provided.
- k) French drains are to be provided within pond bottom where water table is near pond bottom.
- l) Address all safety issues (particularly during operation).

6.8.7 Wet Detention Ponds (Residential Subdivision)

Wet pond (retention) storage functions the same as dry pond detention except that a portion of the stormwater is permanently retained.

If approved, the developer will be responsible for all construction costs in excess of the cost to construct the original dry pond facility. The Developer will also be required to provide maintenance of the pond through the warranty period.

Design of a wet pond is to be in accordance with the Alberta Environment publication entitled "Stormwater Management Guidelines for The Province of Alberta". Some general design parameters to consider are:

- a) 2.0 ha minimum water surface area.
- b) Maximum sideslopes of 7:1 between the high water level and 1.0 m below normal water level.
- c) Minimum permanent pool depth of 2.0 m
- d) Maximum 1:100 year storage depth of 1.5 m
- e) Sediment forebays required at each inlet.
- f) Hard edge treatment required along lake perimeter.
- g) Minimum freeboard depth of 0.6 m. House footings must be above freeboard elevation.
- h) Water recirculation and make-up system required.
- i) Provide access for maintenance and emergency equipment.
- j) Design of outlet control structure to be capable of maintaining permanent pool depth and capable of draining the permanent pool for maintenance purposes.



6.9 OUTFALLS

Outfall structures shall be placed at the end of all storm sewers discharging to an open channel, watercourse, river or other receiving water body such as a lake. The purpose of the structure is to reduce velocities and prevent erosion. All outfall structures must be approved by Alberta Environment. It is the responsibility of the Developer to obtain the necessary approvals and permits from the above mentioned Authorities.

The outfall structure may be a chute, spillway drop structures and energy dissipaters, stilling basin or plunge pool with head wall. A cut off wall is required at the end of the outfall apron to prevent undermining of the structure.

Obverts of outfall pipes shall be at least 150 mm above the 5-year flood level in the receiving stream. Inverts of outfall pipes shall be above winter ice level, otherwise outfall pipes shall be submerged below the bottom of ice level. In addition, outfalls shall be located to avoid damage from moving ice during breakup.

If the downstream channel is relatively flat, the apron shall be 150 mm to 225 mm above the channel invert to prevent collection of debris on the apron.

Rip-rap and a filter layer shall be placed downstream of the outfall structure, where required to prevent erosion. Where erosion control or bank stability work must be done, preservation of watercourse aesthetics and wildlife habitat must be considered. Weeping tile shall be placed under the structure to reduce any water pressure behind the head wall.

Grills or trash bars shall be placed over all storm sewer outlets to prevent access.

Railings shall be placed along the head wall and wingwalls of the outfall structure.

Outfalls shall be landscaped designed with low maintenance, to aesthetically blend in with surrounding areas.

Measures, such as detention ponds, should be incorporated in new developments to prevent any increase in the amount of erosion and downstream flooding to existing receiving streams.

6.10 STANDARDS DRAWINGS – STORM DRAINAGE SYSTEM

6-100	Catch Basin Manhole
6-101	Catch Basin Typical 900mm
6-102	Typical Perched Manhole for 600 to 1050mm Diameter Pipes
6-103	T-Riser Manhole for Pipes 1200mm and Larger
6-200	Typical Catch Basin Installation
6-201	Storm Catch Basin Assembly c/w 300mm Sump



- 6-300 Trash Grate Inlet
- 6-301 Typical Culvert Installation
- 6-302 Typical Rip-Rap for Culvert Size 400-1200 Diameter
- 6-400 Concrete Drainage Swales

END OF SECTION



7. SEWER AND WATER SERVICE CONNECTIONS

7.1 SERVICE CONNECTIONS – MINIMUM REQUIREMENTS

The minimum size of service connections to a single-family dwelling shall be as follows:

Sanitary Sewer	100 mm diameter
Water Service	20 mm diameter

The minimum grade on a 100 mm sewer service shall be 2.0% and on a 150 mm service shall be 1.0%.

Connection to a main sewer line shall be by means of a tapped service saddle (full wrap) at the top quadrant of the main on existing mains. In-line tees may be used with prior approval of the M.D..

Where bends are utilized, the long radius type or a combination of 22½ degree bends and straight pipe shall be used.

For water services sized 50 mm and smaller, the tapping shall be at the 2 to 3 o'clock position on the distribution main.

Water mains shall be tapped under pressure.

All water services to be direct tapped or utilize service clamps.

7.2 SANITARY SEWER SERVICE

Service pipe shall be PVC SDR 35 (minimum) building service pipe.

Service fittings shall be either in-line tees or saddle tees, complete with gasket and stainless steel straps and nuts.

7.3 SERVICE CONNECTIONS – INSTALLATION REQUIREMENTS

Where the water service is 50 mm or smaller in size, the water and sanitary services shall be installed in a common trench to the middle of each lot.

The services shall be installed so that, when facing the lot being served, the water service is on the right of the sanitary service.

Where two services are installed in a common trench, they shall be installed per the Standard Drawing.

The minimum depth of cover over the water and sanitary services at the property line shall be 2.7 m and the maximum shall be 3.5 m.



Where the sewer services are required to connect to mains in excess of 4.50 m deep, risers shall be installed to within 3.60 m of finished surface.

Corporation main stops and curb stops shall be installed in accordance with the Standard Drawing. Material to be Mueller or approved equal.

Where a copper service is installed, there shall be a vertical loop near the corporation main stop. Water service is to be goosenecked. Service shall be snaked in the trench to allow for thermal contraction.

Service box for residential service to have adjustable sliding top section, standard block iron pipe with threaded top. Top section to be 600 mm in length, with a minimum ID of 35 mm and a 10 mm set screw. The service box shall be adjustable from 2.5 to 3.5 m bury. The threaded steel cap shall have a slotted top with a 19 mm pentagon brass plug.

The casing shall be standard block iron pipe with an OD of 33.5 mm. The rod should be T-304 stainless steel, 12.5 mm diameter by 2.2 m long, complete with standard pig tail for 25 mm ID pipe and welded bottom bracket with an 8 mm cored hole. Rod to be complete with a 6 mm diameter cotter pin of sufficient length.

Box bottom boot to be cast or ductile iron, factory coated, with a clear opening to allow curb stop access. The boot is to attach to the casing by means of a threaded joint.

Curb stops shall be installed at property or easement lines as shown on the Standard Drawing and shall be stop and drain unless approved otherwise based on site conditions.

Sewer services shall be installed at property or easement lines as shown on the Standard Drawing, and shall be properly capped or plugged to prevent the entry of earth, water or deleterious material into the pipe.

All services shall be laid on 75 mm of granular bedding, and the bedding material shall be placed up to a level of 300 mm above the crown of the highest service in the trench.

Painted stakes of 50 mm x 100 mm size shall be extended from the end of the service connections to a minimum of 0.70 m above the ground level, per the Standard Drawing.

7.4 SERVICE CONNECTION REPORT

The Developer's Engineer shall provide detailed as-built drawings for all installed service connections, with such drawings providing information related to pipe dimensions, invert elevations, depth of service lines, location of services relative to property line(s), manholes and/or watermain valves.



7.5 STANDARDS DRAWINGS – SEWER AND WATER SERVICE CONNECTIONS

- 7-100 Single and Double Service Layout
- 7-101 Typical Water Service Connection
- 7-102 Typical Sanitary Service Connection
- 7-103 Typical Standard Riser Detail
- 7-104 Residential Sanitary Service Riser Connection
- 7-200 Water Service Connection – Manufactured Home
- 7-201 Sanitary Service Connection – Manufactured Home
- 7-300 Anode on 50mm and Smaller Copper Water Service

END OF SECTION



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8. ROADWAYS

8.1 GENERAL

Road construction standards and specifications to conform to the current Alberta Transportation standards for rural roadways or current City of Lethbridge standards for urban roadways, unless amended herein. Where no applicable specification is referenced the developer shall use the stricter of Alberta Transportation or the City of Lethbridge specifications.

8.2 CLASSIFICATION

Roadways within the Municipal District shall be classified into the following categories:

Provincial - Primary and secondary highways that are maintained by the Province and Sustainable Resource Development (SRD), forestry roads that are maintained by the municipality on a frequency identified by the M.D..

Arterial - Standard roadway width of 8.0 metres. Statutory road or Road Plan exists; more than 9 developments or development agreements to which approved and constructed approaches are required; or any combination of numbers of developments requiring an approach and 5 or more private, local, collector or arterial roads along its length; may also include high seasonal use; must end in a provincial primary or secondary highway or access to another jurisdiction (town/village, SRD); only road type approved for pavement. Priority one summer maintenance. 250 to 400+ Annual Average Daily Traffic (AADT).

Collector - Standard roadway width of 7.0 metres. Statutory road or Road Plan exists; more than 3 developments or development agreements on file on adjacent properties to which approved and constructed approaches are required; or none to many developments along the road or channels traffic to 2 or more local roads or private roads from an arterial road, provincial highway or another jurisdiction (town/village, SRD); may be hard surfaced, may be upgraded to arterial if paved. Usually fewer than 250 Annual Average Daily Traffic (AADT).

Local - Standard roadway width of 6.0 metres. Statutory road or Road Plan exists; less than 4 developments or development agreements on file (residential or building permits approved) on adjacent properties; approved and constructed approaches are required to properties adjacent to the road; legal and practical access requirements must be available for accessing adjacent property (an unimproved road would convert to a local road as soon as a building permit for a cabin-in-the-woods was approved); may be upgraded to collector only if a private road approach accesses a grouped country subdivision. Usually less than 25 Annual Average Daily Traffic (AADT).



Unimproved - Standard roadway width of 6.0 metres. Statutory road or road plan exists; no development permit on file or development agreement for any adjacent property along its length; example is a bare-land trail or one with minimal maintenance such as blading ruts, gravel in low spots; often has seasonal access restrictions (summer only), access may be limited by topography, hydrology, forest cover or rock fall; provides 'legal access only' as required by Municipal Government Act for statutory adjacent property access. May or may not have daily traffic.

Private - No statutory road allowance or road plan exists, or road is listed on title and/or included as an easement or in renderings in a plan of subdivision.

Urban - Streets and Lanes located within hamlets.

8.3 GEOMETRIC DESIGN STANDARDS

Geometric design shall be in accordance with:

- The Transportation Association of Canada (TAC) Manual - Geometric Design Standards for Canadian Roads and Streets latest edition.
- Alberta Transportation Highway Geometric Design Guide.
- City of Lethbridge Design Standards

The following are general minimum requirements and shall be used in the design of roadways.

Roadway cross-sections shall be as defined by the Standard Drawings and design standards specified above. Curb and gutter will be required in some areas, at the discretion of the M.D..

Straight face curb and gutter shall be constructed on all streets, in accordance with the design Drawings. With written approval by the M.D. Administrator, rolled curb and gutter may be constructed in accordance with the drawings.

Separate Sidewalks shall be preferred, although conditions requiring monolithic sidewalks may occur. Separate sidewalks shall be 1.5 m wide and shall be constructed in accordance with the Standard Drawing, with written approval by the M.D. Administrator. Monolithic curb, gutter and sidewalks may be constructed in accordance with the Standard Drawing. Sidewalks shall be clear of all obstructions including surface utilities. Sidewalk locations shall be in accordance with the Standard Roadway Drawings. Wider sidewalks may be required in areas of high pedestrian activity, as determined by the M.D. Administrator.

Rear lanes (alleys) shall have a surfaced width of 5.5 m within a 6.0 m right-of-way. Where rear lane traffic activity is expected to be high, such as certain commercial developments, a wider surfaced width and right-of-way may be required as determined by the M.D. Administrator.



All driveways shall be constructed to give a minimum of 1.5 m clearance from any structure, (e.g. hydrants, light standards, service pedestals), and shall be constructed in accordance with the Standard Drawing.

Curb ramps shall be constructed in accordance with Standard Drawing.

8.4 VERTICAL ALIGNMENT

Minimum gutter grades around all curves and along all tangents shall not be less than 0.5%. Minimum gutter grades on curb returns shall be 0.8%.

All roadways shall be crowned or shall have a crossfall as shown on the applicable standard drawings. The standard crossfall rate is 2.0% for paved roadways and 3.0% for gravel surfaced roadways.

The grades at intersections for all roadway classifications shall not exceed 2% for a minimum distance of thirty (30) metres, measured from the shoulder edge of the receiving road.

All vertical curves shall be designed to meet or exceed the Alberta Transportation Highway Geometric Design Guide Standards. Refer to Table B.4.4.

Rear lanes (alleys) shall have a minimum longitudinal grade of 0.6%. If gravel-surfaced, the lane shall be cross sloped to one side at 3.0%. If paved, the lane shall be cross sloped to one side at 2.0%. Paved lanes that have a centre swale must be approved in writing by the M.D. and shall have cross slopes of 2.0%.

8.5 HORIZONTAL ALIGNMENT

The minimum radius is relative to the Road Classification, the design speed and the maximum superelevation.

All horizontal curves shall be designed to meet the minimum design requirements for the specified design speed.

Minimum edge of pavement radius for Cul-de-Sacs is 12.0m in residential areas and 15.0m in industrial areas.

Flares at intersecting roadways shall have the following minimum radius from shoulder to shoulder:

- Residential access and local 10.0 metres
- Residential collector 15.0 metres
- Industrial local and collector 15.0 metres

**8.5.1 Curb Returns**

Curb returns at residential local street intersections shall be constructed to a radius of 8.0m at face of curb.

Curb returns at residential collector street intersections shall be constructed to a radius of 12.5m at face of curb.

In industrial/commercial areas the face of curb radius should be 15.0m to accommodate truck turning movements.

For arterial street intersections the curb returns shall be designed in consideration of the type and volume of the turning traffic. Two and three centred curves, with or without islands, may be required.

Curb ramps are required at all intersections which have sidewalks.

8.6 CUL-DE-SACS

The maximum length of a Cul-de-Sac is one hundred fifty (150) metres from the entrance at property line of the intersecting road to the center of the Cul-de-Sac. Watermain looping will be required where Cul-de-Sacs in excess of 150 metres are proposed. Cul-de-Sacs greater than 150 metres may require an emergency access, which is at the discretion of M.D. of Pincher Creek.

The minimum radius for Cul-de-Sacs is 13.0 metres to lip of gutter in residential areas and 15.0 metres for industrial/commercial developments.

8.7 CULVERTS AND DRAINAGE

- a) The minimum allowable ditch grade shall be 0.5%. Ditch grades in excess of 2.0% shall be protected against erosion through rock ditch checks, silt fences, Enviroberm fences and/or erosion control blankets.
- b) Ditch side slopes and back slopes shall not be steeper than 3:1.
- c) The minimum ditch bottom width shall be 3.0 metres, sloping away from the roadway at a minimum of 5.0%.
- d) Culvert size requirements shall be determined through the storm water drainage analysis; however, the minimum size culverts shall be as follows:
 - Roadway cross culvert 800 mm
 - Residential approach culvert 600 mm
 - Industrial approach culvert 600 mm
- e) Culverts shall be new galvanized C.S.P. (corrugated steel pipe) with a minimum wall thickness of 1.6 mm, or as required by the loading criteria.



- f) All culverts shall be installed in accordance with the manufacturer's recommendations.

In high density residential developments, all culverts shall be installed with bevelled end sections on both the inlet and outlet sides, with the invert extended to the toe of the side slope.

- a) All culverts, except those in industrial developments, shall be installed to provide a minimum depth of cover of 300 mm or one-half the culverts diameter, whichever is greater. This should be measured from the finished shoulder grade of the roadway to the top of the culvert as shown on the Standard Detail Drawing. Installation. Culverts in industrial developments shall be installed to provide a minimum depth of cover of 500 mm or one-half the culverts diameter, whichever is greater, as measured from the finished shoulder grade of the roadway to the top of the culvert.
- b) Rip-rap shall be placed around the inlet and outlet of each culvert in accordance with Alberta Transportation Geometric Design Guide. Rip-rap 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. A typical rip-rap installation is illustrated in the Standard Detail Drawing.

8.8 ROAD APPROACHES

This sub-section outlines the requirements respecting the design and construction of approaches within subdivision developments.

- a) Residential approaches shall typically be located as follows:
- For low density residential, the approach shall typically be located to provide the best and most direct access to the building site on the lot.
 - For internal high-density residential lots, the approach shall typically be centered on the lot frontage.
- b) A residential approach shall not exceed eight (8.0) metres in width; and industrial lot approach shall not exceed fifteen (15.0) metres in width. Any deviation from these maximum widths requires the approval M.D. Administrator.
- c) All approaches shall be constructed to the same structure as the adjoining roadways, with asphalt surfacing extending to the following limits:
- Low-density residential 1.5 m past road shoulder,
 - High-density residential 6.0 m past road shoulder,
 - Industrial/commercial to property line.



- d) All residential subdivision development shall require the Developer to construct one approach to each lot, consistent with the standard outlined herein.
- e) Approaches to industrial/commercial lots are required to be constructed by the Developer where the access locations are known. Where access locations cannot reasonably be determined, the M.D. may choose to have the Developer provide materials and/or securities to permit future construction of the approaches.

8.9 ROAD SURFACE FINISHES

- a) The M.D. presently approves three types of roadway surface finishes:
 - Gravelled surface,
 - Asphalt stabilized base course surface (A.S.B.C.),
 - Asphaltic concrete (hot mix asphalt) pavement surface (A.C.P.)
- b) Roadways in all subdivision developments shall be surfaced with gravel and be constructed and prepared for asphaltic concrete pavement (hot mix asphalt). The exception is in high-density residential subdivisions where asphaltic concrete pavement (hot mix asphalt) is required. The M.D. will require the developer to supply a deposit to complete the road surfacing as part of the development agreement.
- c) Irrespective of the roadway surface finish approved by the M.D. for a specific development, good roadway industry construction practices and techniques shall be employed at all times. Furthermore, roadway subgrade and base construction shall be undertaken with the view that an asphaltic concrete pavement will ultimately be placed as the surface finish for the roadway.
- d) Should a gravelled surface be approved, even for an interim period, the surface gravel shall be a minimum compacted layer of 50 mm depth of 20 mm crushed gravel. All approaches shall be similarly treated.

8.10 PAVEMENT STRUCTURE

A geotechnical report with recommended pavement designs shall be conducted by a Professional Engineer and submitted to the M.D. for review.

Paved roadways shall be designed in accordance with the Asphalt Institute Method of pavement design, using minimum design loadings of 8,165 kg (18,000 pound) axle loads. The design parameters, such as traffic count, percentage of trucks, California Bearing Ratio (CBR), are to be outlined to the M.D. Administrator. The M.D. reserves the right to request the Developer to engage an engineering firm to carry out tests, prior to paving, to confirm adequacy of design.



The following are the minimum pavement structure requirements. An independent pavement design is required for all developments. Additional pavement structure strengths and/or materials may be required in areas with poor subgrade materials, pending the results of the geotechnical investigation.

Street	Residential Land Use	Industrial/Commercial Land Use
Local	150 mm Subgrade Prep. to 100% SPD 250 mm Aggregate Base Course 90mm Asphaltic Concrete Surface(Light Duty)-2 lifts 50 mm/40 mm final*	300 mm Subgrade Prep. to 100% SPD 250 mm Aggregate Base Course 100 mm Asphaltic Concrete Surface (Heavy Duty)
Collector	150 mm Subgrade Prep. to 100% SPD 300 mm Aggregate Base Course 100 mm Asphaltic Concrete Surface (Heavy Duty)	300 mm Subgrade Prep. to 100% SPD 350 mm Aggregate Base Course 100 mm Asphaltic concrete Surface (Heavy Duty)
Arterial	300 mm Subgrade Prep. to 100% SPD 350 mm Aggregate Base Course 125 mm Asphaltic Concrete Surface(Heavy Duty)	300 mm Subgrade Prep. to 100% SPD 350 mm Aggregate Base Course 125 mm Asphaltic Concrete Surface (Heavy Duty)

Note: *The final 40 mm lift of asphaltic concrete shall be placed in the second year of the maintenance period, 60 days prior to FAC.

Alternative pavement designs, such as soil cement base, may be considered. Approval of alternate pavement designs must be obtained in writing from the M.D. Administrator prior to submission of design drawings.

Gravel surfacing is permitted on rear lanes (alleys). Aggregate base material shall be used to a minimum depth of 200 mm, with 150 mm placed during initial construction and 50 mm placed during the final year of the maintenance period.

8.11 RIGHT-OF-WAY PREPARATORY REQUIREMENTS

The entire road right-of-way (R.O.W.) shall be cleared of all vegetation (trees, shrubs, brush, etc.) including removal of all tree roots and stumps. All such material shall be removed from the site for disposal at approved locations. No burying of this material, or any portion thereof, shall be permitted within the R.O.W.

Organic soil and material are not acceptable as subgrade materials and shall be stripped within the roadway, ditch and back slope portion of the new construction. Organic soils (horizon A) shall be stockpiled in approved locations for the re-spreading on the ditches and backslopes after completion of the roadway construction.



8.12 STANDARDS DRAWINGS - ROADWAYS

- 8-100 Local Residential (Urban)
- 8-102 Residential Collector (Urban)
- 8-103 Local Industrial (Urban)
- 8-104 Rural Subdivision Residential - 20.0m R/W
- 8-105 Rural Industrial – 30.0m R/W (Utilities below ditch)
- 8-106 RV Resort Cross Section
- 8-107 Typical Trail Cross-Sections
- 8-108 Local Residential Cul-De-Sac
- 8-109 Urban Residential Cul-De-Sac – Down-Hill Drainage
- 8-110 Rural Residential Cul-De-Sac – Up-Hill Drainage
- 8-111 Local Industrial/Commercial Cul-De-Sac
- 8-200 500mm Curb & Gutter
- 8-201 250mm Standard Curb & Gutter
- 8-202 250mm Rolled Curb and Gutter
- 8-203 1.50m Standard Monolithic Sidewalk
- 8-204 1.50m Rolled Monolithic Sidewalk
- 8-205 1.20m or 1.50m Separate Sidewalk
- 8-300 Wheelchair Ramp Details on Tangent
- 8-301 Wheelchair Ramp Details at Both Curb Returns
- 8-302 Wheelchair Ramp Details at Centre of Curb Return
- 8-303 Wheelchair/Bike Ramp Locations
- 8-400 Industrial/ Commercial Curb and Gutter Crossing
- 8-401 Typical Monolithic Lane and Driveway Crossing
- 8-402 Asphalt Speed Bump
- 8-500 Typical Road Intersections
- 8-501 Typical Residential Approaches
- 8-502 Typical Industrial Approaches
- 8-600 Rural Road Standard Cross-Section
- 8-700 Barrier Posts

END OF SECTION



9. TEXAS GATES

9.1 GENERAL

The municipal District has authority and responsibility for all Texas gates installed within municipal road allowances. All Texas gates shall conform to current Alberta Transportation and Infrastructure standards and specifications unless amended herein.

Texas gates installed in a municipal right-of-way within the Municipal District may become obsolete because of land ownership changes or changes in land use. Council encourages the removal of Texas gates, especially in those cases where they are no longer required or do not conform with the land use adjacent to the roadways. At the time the need for a Texas gate at a certain location is questionable, or from time to time, the M.D. may undertake a survey of landowners with property adjacent to the existing Texas gates, to determine whether the need for the Texas gate is current.

When the need for a Texas gate can no longer be substantiated or when the landowner is in agreement, the M.D. will pay the cost of materials for the initial fence installation, to the landowner adjacent to a municipal roadway where an agreement has been reached to remove an existing Texas gate. The Municipal District will pay the price of materials to the current Alberta Transportation specification for a four (4) barb wire fence, per linear metre, for fence on one or both sides of the roadway. Payment will be made on the completion of the fencing project at which time the fence ownership shall revert to the landowner.

9.2 CLASSIFICATION

The existing Texas gates within the Municipal District have been classified into three categories;

- 1 Arterial/Collector "Major" Roads where there are more than three land owners who access parcels beyond the Texas gate or the road is a major thoroughfare;
- 2 Local/Unimproved "Minor" Road where three or less resident access parcels across a Texas gate; and
- 3 "Private Texas gate" where the gate accesses private property. All private Texas gates are to be placed on private property.

Texas gates that provide residents access to their properties from a municipal road allowance will be considered private Texas gates and will not be considered part of this standard. They must be adequate for Municipal District equipment to travel over to be considered for snow removal and the owner will be responsible for all repairs. Where a private Texas gate is currently positioned within the public road allowance it



will be relocated to private property by the land owner at the time it is identified or by the Municipal District at the time of significant road improvements.

No new Texas gates will be installed on “Major Roads” except in exceptional circumstances and approved by council.

Land owners wishing to install a Texas gate on minor roads at a new location on a Municipal District Road allowance will be required to:

- Make an application to Council;
- Purchase and engineered Texas gate, minimum 7.32mx2.54m (pending road surface dimension) similar to Alberta Infrastructure and Transportation drawing number CB6-2.13M7 or CB6-2.13M11; and
- Pay for the Municipal District to install the Texas gate.

9.3 INSTALLATION

All Texas gates shall be installed as per current Alberta Transportation Civil Works Master Specification, Section 02843. Once installed within the Municipal District’s road a Texas gates will be the responsibility of the Municipal District. The gate will receive a minimum, one inspection per year, by the municipality, preferably in spring, to determine the condition of the Texas gate and appurtenances. Repairs or cleaning identified during inspections will be the responsibility of the Municipal District.

The Municipal District shall be responsible for purchasing, installing and maintaining “Texas Gate Ahead” and “Cattle at Large” signs.

END OF SECTION



10. TRAFFIC CONTROL DEVICES, STREET NAME SIGNS & PAVEMENT MARKINGS

Plans shall be provided to the M.D. Administrator that depicts the locations and details of all traffic control devices (traffic signs and traffic signals), street name signs and pavement markings.

All traffic control devices and pavement markings shall be designed and installed in accordance with the manual "Uniform Traffic Control Devices for Canada" as issued and revised from time to time by the Transportation Association of Canada (formerly RTAC).

Guide and information signing shall be designed and installed in accordance with the "Urban Guide and Information Sign Manual" as issued by the Alberta Government.

Street signing shall be standard aluminum, white on blue, with a minimum vertical dimension of 150 mm.

Materials:

All signs shall utilize High Intensity reflectorized material to ASTM-D4956, Type III.

All sign posts shall be U Channel, galvanized Schedule 40 steel unless otherwise approved in writing by the M.D. Administrator.

Along arterial streets and at arterial street intersections, pavement markings shall be of a "permanent" type, thermoplastic. Painted markings are acceptable elsewhere.

10.1 INSTALLATION

All traffic control signs shall be mounted to provide 2.0 m vertical clearance to the lowest portion of the sign, unless otherwise approved by the M.D. Administrator.

All signs shall be mounted to provide a minimum of 0.3 m of horizontal clearance from back of curb or back of walk. Where there is no curb or walk within the right-of-way, the sign location is to be approved by the M.D..

END OF SECTION



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11. STREET LIGHTING

11.1 GENERAL

The following standards are applicable to all types of development in M.D. of Pincher Creek, except for industrial developments. Standards for industrial developments shall be determined by the M.D. during the initial planning stages of the proposed development.

All street lighting cables in new subdivisions shall be installed underground. Additional street lights in neighbourhoods with overhead cabling may be installed if approved by the M.D. Administrator.

11.2 DESIGN

Street lighting posts with fixtures shall be steel posts, comparable to the existing posts within the neighbourhood, for the several types of streets. Wooden Poles may be permitted in existing neighbourhoods where additional lighting is being added and wooden poles presently exist.

The location and density of street lights shall provide the following minimum lighting levels:

- a) Street lighting fixtures shall be LED type.
- b) Street lighting design shall be in accordance with current Transportation Association of Canada (TAC) Standards.

11.3 LOCATION

The Developer shall coordinate the location of street lights to ensure that they do not interfere with other utilities and driveways.

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.

All street light standards shall be galvanized in a manner comparable to the existing standards within the M.D..

11.4 COSTS

Any capital contribution that the utility company may charge for installation of underground street lighting shall be paid by the Developer.

END OF SECTION



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12. LOT GRADING

12.1 DESIGN

The grading design shall complement the overall design of both the minor and major storm drainage system. In general, the lots shall be graded and sloped in such a manner that a minimum of surface run-off water will be conducted to other properties. Where surface drainage swales direct run-off from one lot to the next, the necessary drainage easements shall be registered concurrently with the plan of subdivision.

Reserves and public lands shall be graded to drain towards developed streets and/or storm water catch basins or drainage channels.

Boulevard areas shall be graded to provide a minimum slope of 2% from property line to top of curb.

Commercial and industrial lots shall be graded to drain to on-site storm water catch basins.

In cases where the backyard slopes towards the building, provisions are required to keep the runoff at least 3.0 m away from the building, with the possibility of draining the surface water along the lot lines onto the streets.

Where drainage swales are provided on rear property lines in laneless subdivisions, the developer shall provide an approved concrete drainage swale. The drainage swale shall be provided on one side of the property line and be placed in a drainage easement.

The maximum slope draining towards property lines shall not exceed 10% within 1.5 metres of the property line. The slope away from buildings shall meet the minimum requirements of the Alberta Building Code. Downspouts from eavestroughs and discharges hoses from sump pumps shall not discharge within 0.6 metres from the property line.

12.2 RETAINING WALLS

Where extremes in elevation of adjoining lots require the construction of a retaining wall, such shall be indicated on the proposed grading plan and no work or construction will be permitted on the building lots that are the subject of, or adjacent to, the said retaining wall without a commitment by either owner of the two lots involved to construct such retaining wall at the time of construction of the proposed building.

12.3 STANDARDS DRAWINGS - LOT GRADING

12-100 Typical Lot Grading
Sample Building Certificate

END OF SECTION



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13. LANDSCAPING

13.1 STORM WATER MANAGEMENT FACILITIES

Dry pond and areas surrounding new storm water management lake facilities must be graded, topsoiled, seeded or sodded, and landscaped by the Developer to the satisfaction of the M.D. Administrator.

Plant materials will be selected to respect hydrological and soil saturation characteristics of the facility.

Public lands within the facility must be planted with a minimum of 30 trees per landscaped acre above normal water line, and designed and massed into major groupings. Minimum deciduous tree caliper 60 mm, minimum coniferous tree height 2.5 metres. Tree mix 60% coniferous and 40% deciduous suggested.

Shrubs may be substituted for trees at a rate of five shrubs for one tree, to a minimum of 15 trees per landscaped area, with approval from the M.D. Administrator.

Shrubs to be massed within large planting beds above the 1:5 year flood line to create major focal areas on the slopes of the dry pond. Minimum shrub size to be five gallon pot planted 1 m O.C. or appropriate to species. Minimum shrub height and spread 600 mm, subject to availability. Suggest trees be positioned within planting beds.

Planting bed layouts will provide a minimum width of turf areas between planting beds of 2.0 m. Landscape edging may be required in formal shrub beds.

Planting beds shall be designed complete with weed liners. Use of weed liners for planting beds located in flood prone areas is strongly recommended.

Major storm water outlets/inlets should be landscaped with plant materials and large rockery to provide visual screening and security buffering for pedestrians and dry pond users.

Where possible, relatively flat open areas should be designed to encourage active recreational use.

Approved furniture may be provided by the Developer and placed at strategic locations within the dry pond.

Lighting, if provided, to be to the satisfaction of the M.D. Administrator.

Special or unique features, such as recreational facilities, bridges and architectural and structural features will be designed and sealed by recognized accredited professionals.

13.1.1 Natural Areas

Existing natural and naturalized areas impacted by the proposed improvements that cannot be protected during construction must be re-naturalized with native plant



materials having regard for the surrounding environment, new drainage patterns, soil conditions, and ecological rehabilitation.

The Developer will determine the level of restoration to be completed in consultation with the M.D. Administrator.

The Developer will design an appropriate mix of native trees, shrubs, ground covers and wild seed mixes to rehabilitate impacted naturalized areas.

The Developer will design any required subsurface drainage, surface drainage and erosion control measures in the rehabilitation area.

The Developer shall, if required, coordinate this rehabilitation with other consultants to implement geotechnical, structural and bioengineering principles and recommendations.

The landscape drawings will identify all plant communities to be established and all other information necessary to implement the proposed improvements.

The Developer will specify all tree, shrub and ground cover sizes. No minimum or maximum sizes are specified. Tree mix to match natural setting.

Forestry stock, seedlings, deciduous tree whips, and propagated and rooted cuttings are acceptable for use.

All plant materials to be nursery stock or obtained from Provincial Government approved sources.

The Landscape Architect will identify appropriate planting installation specifications and detailing on landscape drawings.

“Round-Up” or other approved herbicides may be used to eradicate natural slopes prior to planting of trees and shrubs. Herbicide shall be applied by a licensed applicator.

13.1.2 Maintenance Period

The maintenance period for all planted material shall be two (2) years from the date of issuance of a Completion Certificate.

Any plant that is dead, not true to name or size as specified, or not in satisfactory growth, as determined by the M.D. Administrator, shall be removed from the site. In case of any question regarding the condition and satisfactory establishment of a rejected plant, the Contractor may elect to allow such a plant to remain through another complete growing season, at which time the rejected plant, if found to be dead or in an unhealthy or badly impaired condition, shall be replaced by the Contractor.

The applicant shall be responsible for, and at his own expense to remedy, any defect, fault or deficiency in the completed works during the maintenance period.



END OF SECTION



14. UTILITY COMPANIES

The following guidelines apply to all developers for the construction of municipal improvements, as well as Utility companies wishing to repair, replace or otherwise modify their existing services, within M.D. of Pincher Creek.

14.1 ELECTRICAL POWER, GAS, AND COMMUNICATION CABLES

14.1.1 General

Private Utility Companies provide Electrical Power service, Gas Service, Telephone service, and Cable TV service.

14.1.2 Rights-of-Way

Where required, the Developer shall provide right-of-way and easements of sufficient size and location to satisfy the above mentioned Utility Companies.

Utilities shall be located according to the Standard Drawings, or as directed in writing by M.D. Administrator.

All easements on M.D. property shall be registered in the name of M.D. of Pincher Creek.

14.1.3 Installation

An approval must be obtained for any excavation on M.D. property.

All distribution cables shall be installed in one common trench, a minimum of 300 mm wide, at the required alignment. All power and communication cable trenches on the road allowance shall be at a minimum of 1.5 m below finished grade level. The trench bottom shall be free of stones, loose earth and sharp objects.

All gas trenches on the road allowance shall be at a minimum of 1.0 m below finished grade level. Trenches shall be a minimum of 300 mm wide. The trench bottom shall be free of stones, loose earth and sharp objects.

Gas lines shall be installed in a separate trench from cable installations, and shall maintain a minimum distance of 3.0 m from any valve, hydrant, catch basin, manhole, vault and sanitary and storm water lines. A minimum 3.0 m clearance is required to any water lines.

Power, communication cables shall maintain a minimum distance of 3.0 m from any valve, hydrant, catch basin, manhole, vault, watermains, sanitary mains, and storm water line. A minimum clearance of 0.3 m in all directions is to be maintained when crossing gas service lines.

Extreme care must be taken when backfilling so as not to disturb any Legal survey pins. Any survey pins disturbed during installation shall be replaced at the Utility Company's expense.



Trenches shall not be left open, with cables or gas line exposed, longer than forty-eight (48) hours without permission of the M.D. Administrator. In such cases, the open trenches shall be properly marked and barricades with flashers provided by the developer. In locations where flooding of the trenches may occur, or the open trench creates a public hazard, the M.D. Administrator may, at his discretion, require the excavation to be appropriately covered.

The use of trench digging machinery will be permitted, except where its operations will cause damage to trees, buildings, fences, or other existing structures or municipal infrastructure above or below the ground. At such locations, hand digging or hydrovacating shall be employed to avoid damage.

To protect persons from injury and to avoid property damage, adequate barricades, construction signs, warning lights and guards, as required, shall be placed. Whenever required, watchmen shall be provided to prevent accidents.

Backfill material shall be native soil material excavated from the ditch/trench or Fillcrete, at the discretion of the M.D. Administrator. Sand must be substituted for poor existing soils. Poor existing soils are defined as organic soils, peat, black loam, sod, clay that has hardened and stones. Backfill material shall be compacted to 95% density of the maximum density of a standard proctor compaction test within boulevards and 98% within streets under concrete, asphalt structures or lanes. All backfill material may be subject to the approval of the M.D. Administrator.

Augering, in some instances, may be required. In cases where augering is necessary, the diameter of the augered hole shall not be over 50 mm greater than the diameter of the duct to be installed.

14.1.4 Costs

Any capital contribution that the utility company may charge for installation of the above services shall be paid by the developer.

END OF SECTION

APPENDIX A

APPENDIX A - Abbreviations

The following abbreviations may be used in this document:

BC	-	Beginning of curve
BOW	-	Back of walk
BVC	-	Beginning of vertical Curve
CCC	-	Construction Completion Certificate
EC	-	End of Curve
EOP	-	Edge of Pavement
EVC	-	End of vertical Curve
FAC	-	Final Acceptance Certificate
FOW	-	Face of walk
ha	-	Hectare
ID	-	Inside diameter
Kg	-	Kilogram
lcd	-	Litres per capita per day
LOG	-	Lip of Gutter
m ³	-	meter cubed
OC	-	On centre
OD	-	Outside diameter
PVI	-	Point of vertical intersection

Other abbreviations may be used or defined elsewhere in this document. Where undefined, an abbreviation shall carry a meaning consistent with industry standards. Ascertaining the meaning of a word or abbreviation in context is the responsibility of the Developer.

APPENDIX B

APPENDIX B – Standard Drawings

Water Distribution System

4-100	Valve Box Construction Detail
4-101	Valve Box Detail
4-102	Main Valve Casing Detail
4-200	Typical Hydrant & Valve Detail
4-201	Blow-Off Valve
4-300	Thrust Block Details
4-301	Vertical Bend Thrust Block Detail
4-400	Typical Anode Installation at Valves - Iron Fittings and Hydrants
4-401	Anode Installation Cadweld
4-500	Air Relief Valve and Flushing Chamber
4-600	Hydrant Location and Approach Detail
4-700	Catch Basin Barrel – Dry Hydrant
4-701	Typical Dry Hydrant

Sanitary Sewerage System

5-100	Manhole Detail Type 5A Pre-Cast
5-201	External Drop Manhole
5-202	Interior Drop Manhole Detail
5-300	Pre-benched Manhole Base
5-400	Manhole Safety Platform
5-500	Pipe Bedding Details
5-600	Typical Trench Detail

Storm Drainage System

6-100	Catch Basin Manhole
6-101	Catch Basin Typical 900mm
6-102	Typical Perched Manhole for 600 to 1050mm Diameter Pipes
6-103	T-Riser Manhole for Pipes 1200mm and Larger
6-200	Typical Catch Basin Installation
6-201	Storm Catch Basin Assembly c/w 300mm Sump
6-300	Trash Grate Inlet
6-301	Typical Culvert Installation
6-302	Typical Rip-Rap for Culvert Size 400-1200 Diameter
6-400	Concrete Drainage Swales

Sewer and Water Service Connections

7-100	Single and Double Service Layout
7-101	Typical Water Service Connection
7-102	Typical Sanitary Service Connection
7-103	Typical Standard Riser Detail
7-104	Residential Sanitary Service Riser Connection
7-200	Water Service Connection – Manufactured Home
7-201	Sanitary Service Connection – Manufactured Home
7-300	Anode on 50mm and Smaller Copper Water Service

Roadways

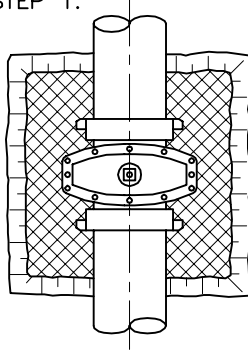
8-100	Local Residential (Urban)
8-102	Residential Collector (Urban)
8-103	Local Industrial (Urban)
8-104	Rural Subdivision Residential - 20.0m R/W
8-105	Rural Industrial – 30.0m R/W (Utilities below ditch)
8-106	RV Resort Cross Section
8-107	Typical Trail Cross-Sections
8-108	Local Residential Cul-De-Sac
8-109	Urban Residential Cul-De-Sac – Down-Hill Drainage
8-110	Rural Residential Cul-De-Sac – Up-Hill Drainage
8-111	Local Industrial/Commercial Cul-De-Sac
8-200	500mm Curb & Gutter
8-201	250mm Standard Curb & Gutter
8-202	250mm Rolled Curb and Gutter
8-203	1.50m Standard Monolithic Sidewalk
8-204	1.50m Rolled Monolithic Sidewalk
8-205	1.20m or 1.50m Separate Sidewalk
8-300	Wheelchair Ramp Details on Tangent
8-301	Wheelchair Ramp Details at Both Curb Returns
8-302	Wheelchair Ramp Details at Centre of Curb Return
8-303	Wheel Chair/Bike Ramp Locations
8-400	Industrial/ Commercial Curb and Gutter Crossing
8-401	Typical Monolithic Lane and Driveway Crossing
8-402	Asphalt Speed Bump
8-500	Typical Road Intersections

- 8-501 Typical Residential Approaches
- 8-502 Typical Industrial Approaches
- 8-600 Rural Road Standard Cross-Section
- 8-700 Barrier Posts

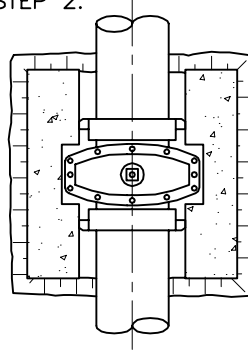
Lot Grading

- 12-100 Typical Lot Grading
- SAMPLE Building Certificate

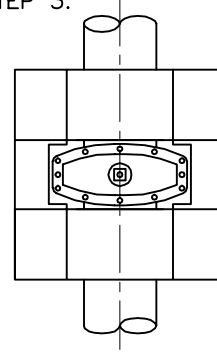
STEP 1.



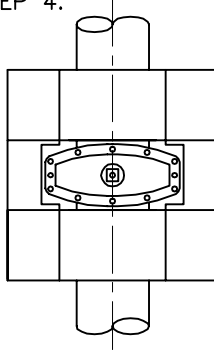
STEP 2.



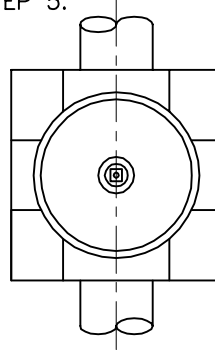
STEP 3.



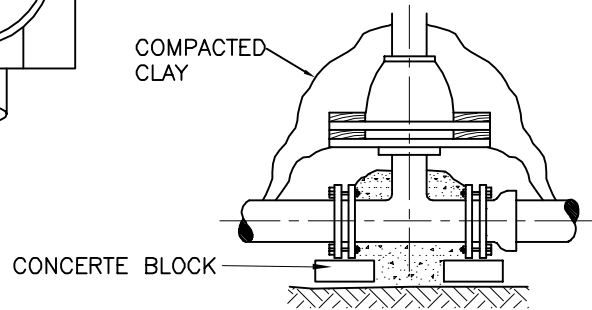
STEP 4.



STEP 5.



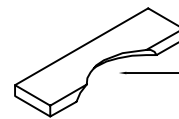
STEP 6.



PROCEDURE:

- STEP 1. BUILD A 609 mm X 609 mm LEVEL FLAT BASE OF COMPACTED CLAY USING A FLAT TAMPER UP TO WITHIN 12 mm OF THE TOP OF THE TOP FLANGE.
- STEP 2. CUT OR NOTCH OUT TWO OF THE 50X200X600 CONCRETE BLOCKS THE WIDTH OF VALVE FLANGE AND LAY ON BASE PARALLEL TO PIPE.
- STEP 3. INSTALL TWO 50x200x600 CONCRETE BLOCKS TRANSVERSELY OR AT RIGHT ANGLES TO THE FIRST SET AND NO CLOSER TO THE FLANGE THAN THE CUTOUT SO THAT THEY DO NOT PROTRUDE OVER THE FLANGE.
- STEP 4. ADD ALTERNATE LAYERS OF CONCRETE BLOCKS MAKING SURE EDGES ARE NO CLOSER TO VALVE THAN CUTOUT, CONTINUE UNTIL MINIMUM REQUIRED CLEARANCE (100 mm) FROM TOP OF VALVE BONNET TO VALVE NUT IS OBTAINED.

- STEP 5. TWO PIECES OF CONCRETE BLOCKS ARE NOW CUT OUT TO OUTSIDE CIRCUMFERENCE OF BONNET AND UNDERCUT TO COMODATE BONNET THICKNESS.



CUT TO
CIRCUMFERENCE
OF VALVE
BONNET AND BEVEL

- STEP 6. APPROPRIATE LENGTHS OF BOTTOM AND TOP SECTION OF CASING ARE NOW INSTALLED AND BACKFILLED WITH COMPACTED CLAY TO ABOVE JOINT.



VALVE BOX CONSTRUCTION DETAIL

STANDARD DETAILS

Date:

OCTOBER, 2013

Drawn By:

RS

Checked By:

Scale:

NTS

Drawing No.

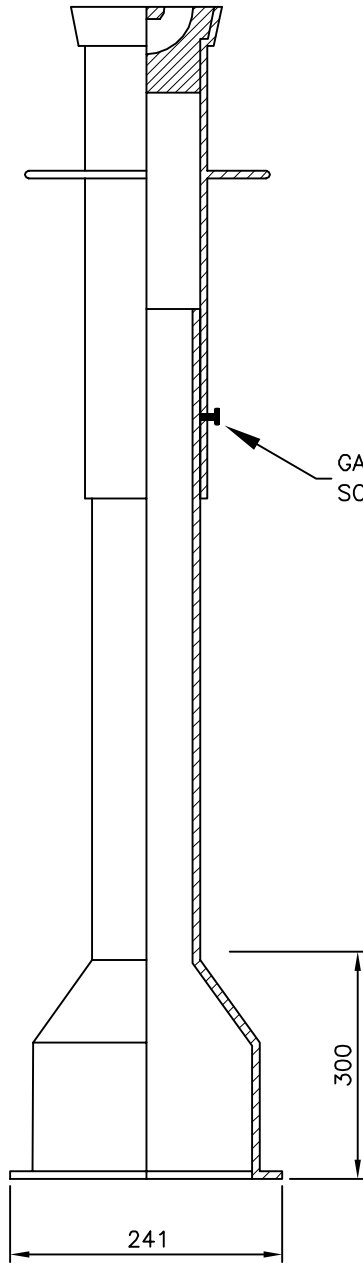
4-100



STANDARD VALVE PLUG

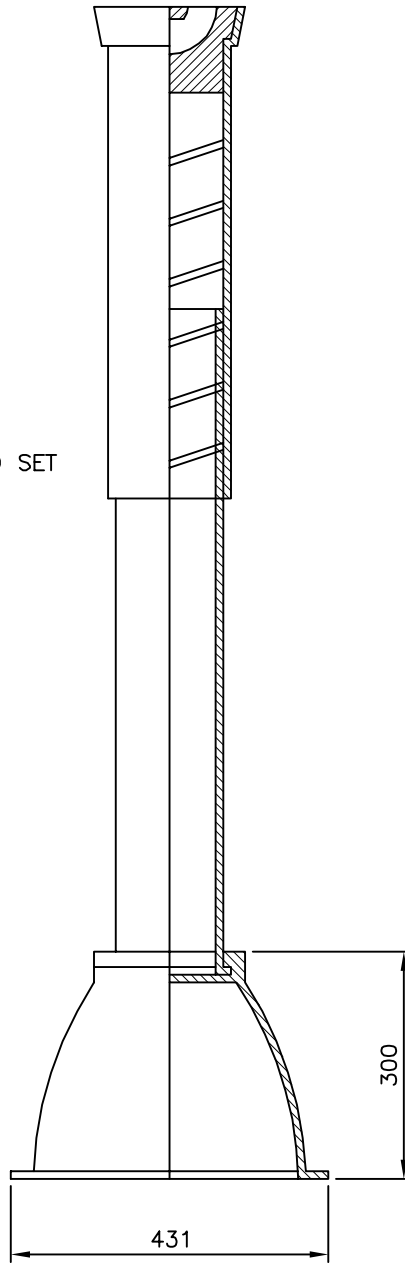
NOTES:

1. VALVE BOXES SHALL BE EXTERNALLY AND INTERNALLY COATED WITH ASPHALTIC OR EPOXY COATING.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



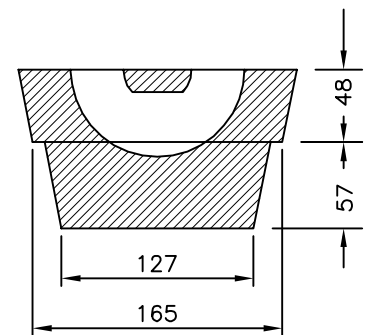
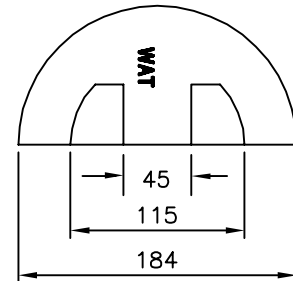
SLIDING TYPE A

GALVANIZED SET SCREW



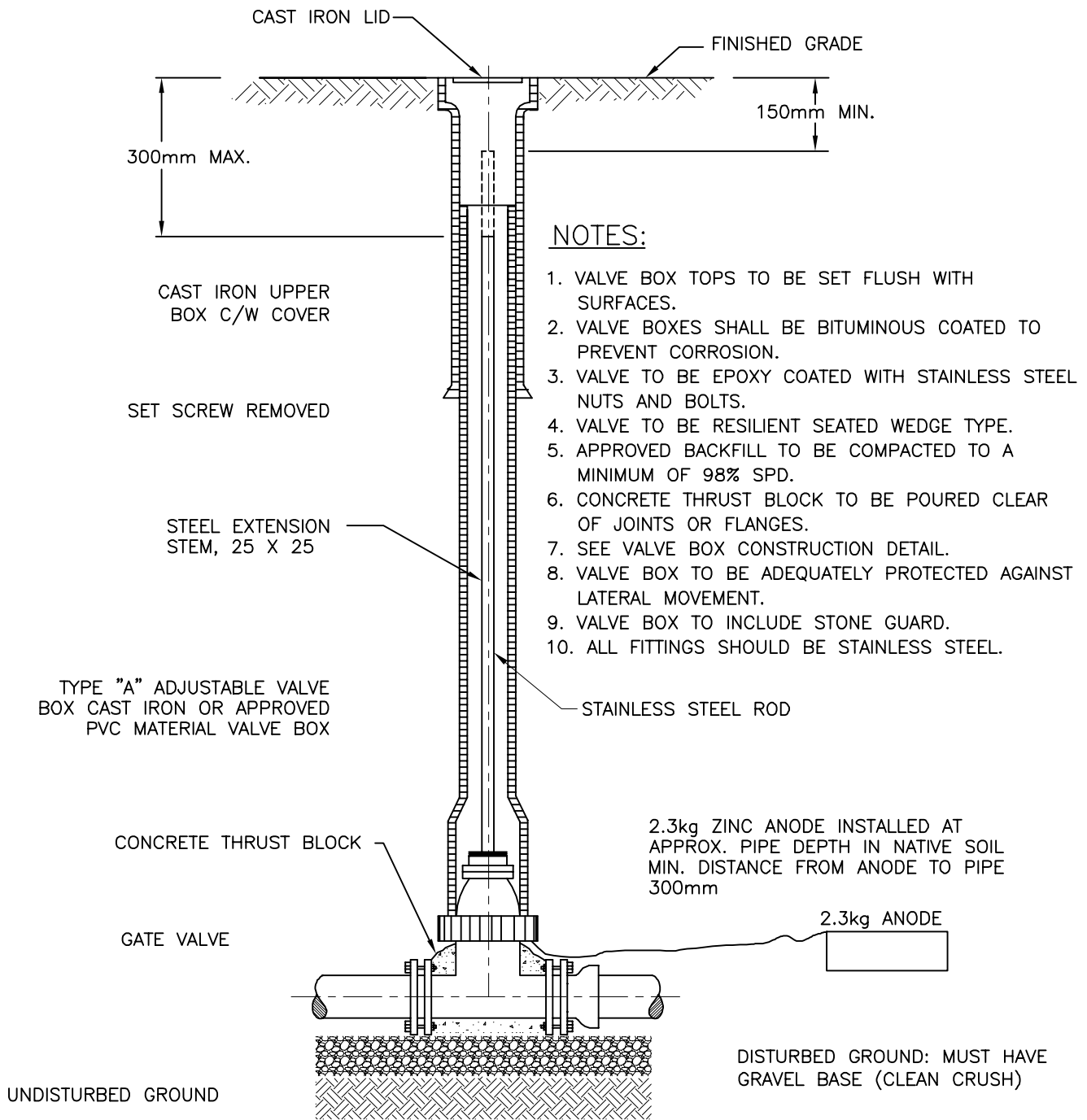
SCREW TYPE B

PLUG C/W CORED HANDHOLES AND MARKED 'WATER'



**VALVE BOX DETAIL
SLIDING TYPE A AND SCREW TYPE B
STANDARD DETAILS**

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-101
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NOTES:

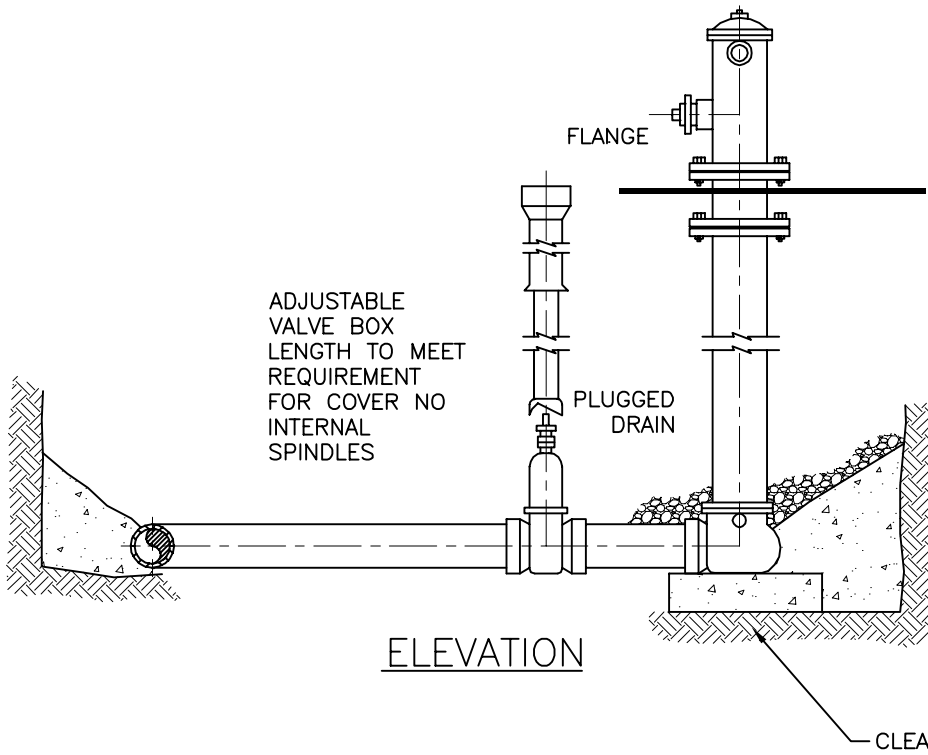
1. VALVE BOX TOPS TO BE SET FLUSH WITH SURFACES.
2. VALVE BOXES SHALL BE BITUMINOUS COATED TO PREVENT CORROSION.
3. VALVE TO BE EPOXY COATED WITH STAINLESS STEEL NUTS AND BOLTS.
4. VALVE TO BE RESILIENT SEATED WEDGE TYPE.
5. APPROVED BACKFILL TO BE COMPACTED TO A MINIMUM OF 98% SPD.
6. CONCRETE THRUST BLOCK TO BE POURED CLEAR OF JOINTS OR FLANGES.
7. SEE VALVE BOX CONSTRUCTION DETAIL.
8. VALVE BOX TO BE ADEQUATELY PROTECTED AGAINST LATERAL MOVEMENT.
9. VALVE BOX TO INCLUDE STONE GUARD.
10. ALL FITTINGS SHOULD BE STAINLESS STEEL.



MAIN VALVE CASING DETAIL

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-102
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HYDRANT TYPE
AS SPECIFIED

PUMPER NOZZLE TO FACE
STREET WHERE APPLICABLE
FINISHED GRADE

EXTENSION ASSEMBLY
AS REQUIRED

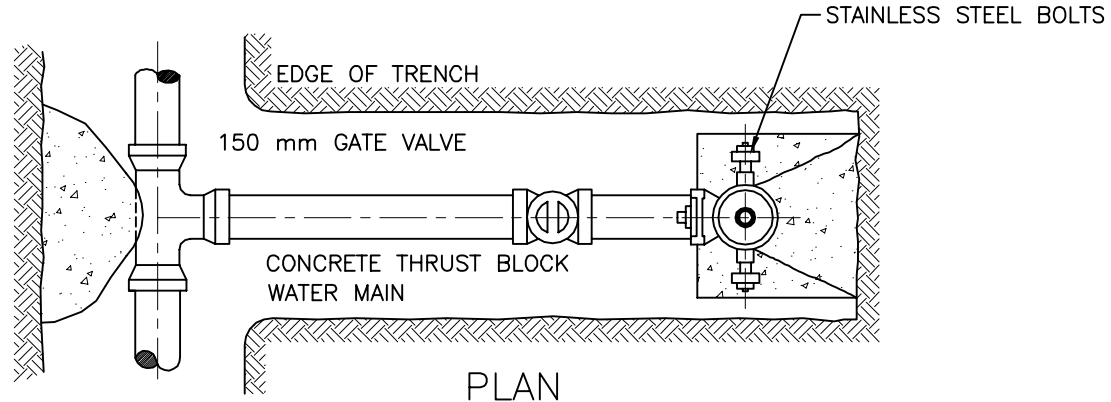
MIN. 1.0cu.m. OF COARSE
GRAVEL OR BROKEN STONE
HYDRANT DRAIN SUMP
WRAPPED WITH FILTER FABRIC

UNDISTURBED GROUND

CONCRETE TO BE MIN. 50mm
BELOW FLANGE NUTS

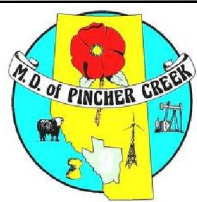
CONCRETE BLOCKING TO BE
POURED AFTER HYDRANT HAS
BEEN POSITIONED

450x450x150mm
PRECAST SULPHATE RESISTANT
CONCRETE BASE



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. CONCRETE TO BE 25MPa @ 28 DAYS.
3. HYDRANTS SHALL BE COMPRESSION TYPE CONFORMING TO AWWA C502 COMPLETE WITH PLUGGED DRAINS, STAINLESS STEEL BOLTS AND ASPHALTIC COATED HYDRANT COMPONENTS.
4. PROVIDE CATHODIC PROTECTION AS SHOWN ON STD. DWG. NO. A-110.
5. THRUST BLOCKS TO BE PLACED AGAINST UNDISTURBED GROUND HAVING A MINIMUM BEARING OF 7300kg/m²
6. CONCRETE TO BE POURED CLEAR OF ALL FLANGES, JOINTS, AND HYDRANT DRAIN.
7. APPROVED BACKFILL TO BE COMPACTED TO A MINIMUM OF 98% SPD.
8. DO NOT ALLOW PONDING OR STANDING WATER AROUND HYDRANT.
9. PLACEMENT OF HYDRANT AND ORIENTATION OF PUMPER NOZZLE TO BE APPROVED.
10. HYDRANT TO BE PLUGGED OR DRAINING AS DICTATED BY SITE CONDITIONS.
11. THREAD SIZES SHOULD CONFORM TO AMERICAN STANDARD THREAD SIZES.



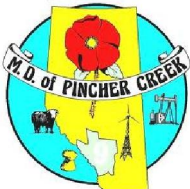
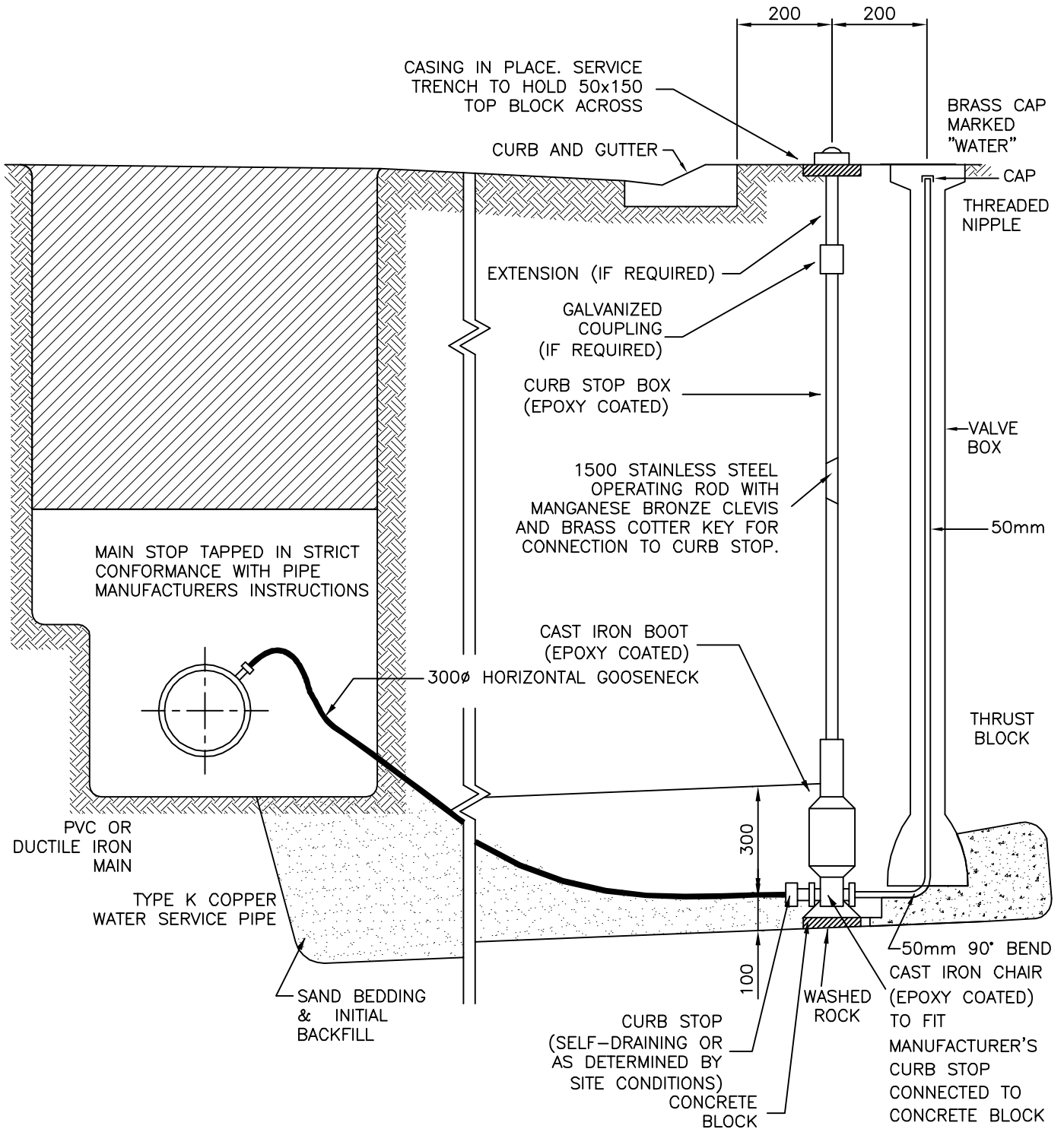
TYPICAL HYDRANT & VALVE DETAIL

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-200
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NOTES:

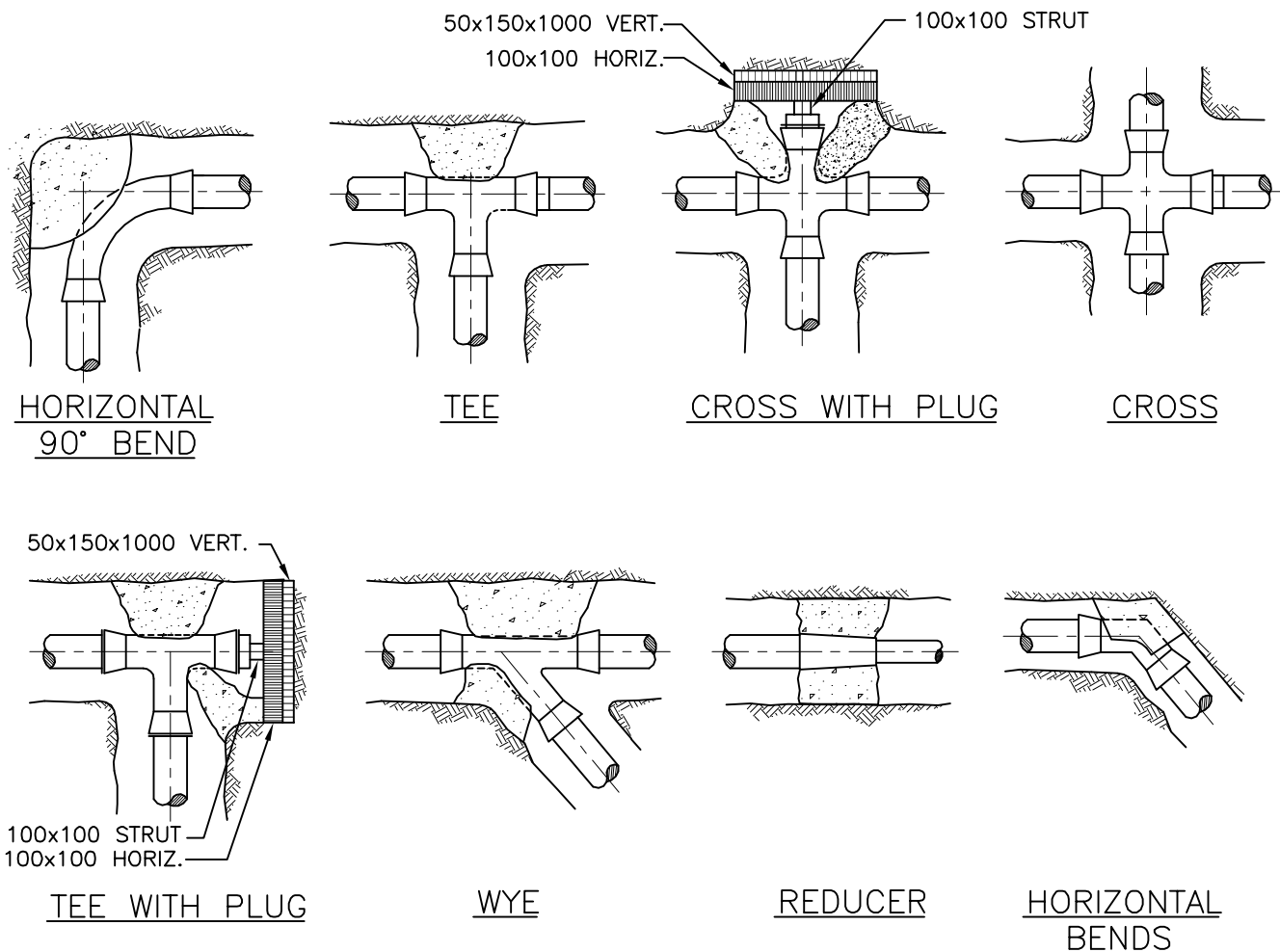
1. COPPER LINE SHALL BE ONE CONTINUOUS PIECE, UNLESS LENGTH EXCEEDS 30m MIN. AND ONLY THEN WILL A DOUBLE UNION BE ALLOWED.
2. INVERT ELEVATION SHALL BE 2.4m BELOW ESTABLISHED FINISHED GRADE UNLESS APPROVED BY THE M.D. OF PINCHER CREEK.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



BLOW-OFF VALVE

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-201
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NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. ALL FITTINGS TO BE WRAPPED IN 6MIL POLYETHYLENE PRIOR TO POURING CONCRETE.
3. ALL CONCRETE TO BE MIN. 28MPa @ 28 DAYS.
4. THE REQUIRED BEARING AREA SHALL BE DETERMINED BY THE CONTRACTOR TO SUIT SOIL CONDITIONS AND AS APPROVED BY THE M.D. OF PINCHER CREEK.

HORIZONTAL THRUST BLOCK BEARING AREA						
MINIMUM CONCRETE AREA IN CONTACT WITH UNDISTURBED SOIL (sq. m)						
FITTING	SIZE OF MAIN (mm)					
	150	200	250	300	400	500
DEAD END MAIN & TEE	0.35	0.62	0.97	1.40	2.49	3.90
11 1/4 DEGREE BEND	0.07	0.12	0.20	0.28	0.50	0.78
22 1/2 DEGREE BEND	0.14	0.24	0.38	0.55	0.97	1.52
45 DEGREE BEND	0.27	0.48	0.75	1.07	1.91	2.98
90 DEGREE BEND	0.50	0.88	1.38	1.98	3.53	5.51
VALVE & REDUCER	0.35	0.62	0.97	1.40	2.49	3.90

NOTE:

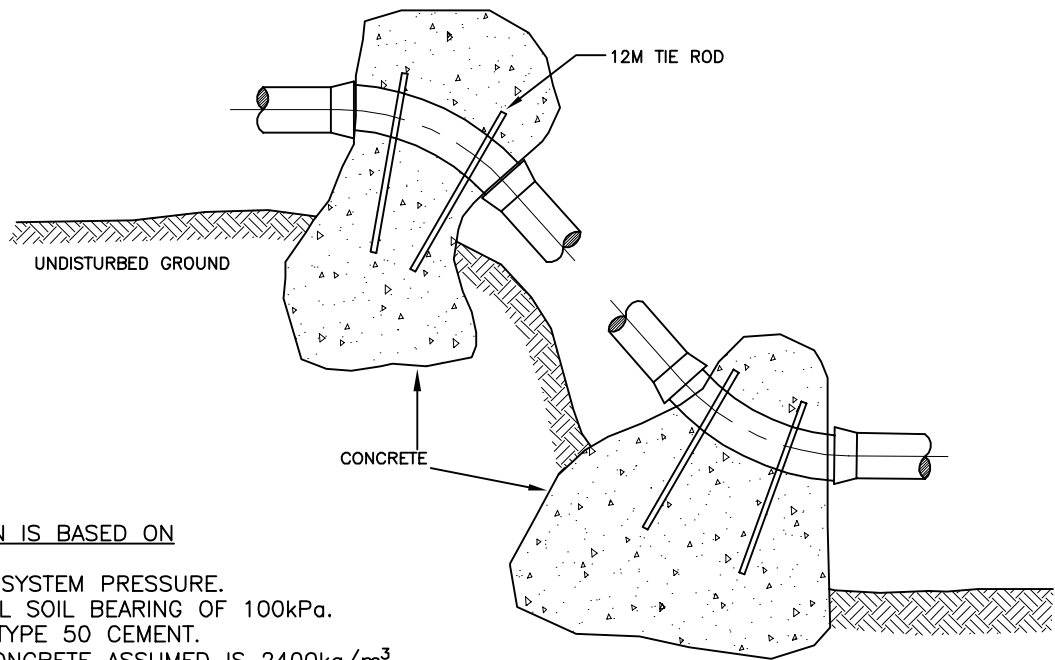
- BEARING AREA CALCULATED USING THE FOLLOWING:
 - (a) HYDRAULIC PRESSURE 1380kPa.
 - (b) SOIL BEARING CAPACITY 72kPa.
- CONCRETE STRENGTH TO BE 20MPa.
- CONCRETE TO BE CLEAR OF BELLS & PIPE.
- PLACE 6MIL POLYETHYLENE BETWEEN CONCRETE AND PIPE.
- SEE DWG. 5-500 FOR "CLASS B BEDDING DETAILS" FOR "d" DEPTH.



THRUST BLOCK DETAILS

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-300
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THRUST BLOCK DESIGN IS BASED ON

1. 1035kPa MAXIMUM SYSTEM PRESSURE.
2. A MINIMUM VERTICAL SOIL BEARING OF 100kPa.
3. CONCRETE 20MPa TYPE 50 CEMENT.
4. UNIT WEIGHT OF CONCRETE ASSUMED IS 2400kg/m³

UPWARD THRUST (GRAVITY) TABLE

FOR CALCULATION OF BASIC THRUST BEARING AREA (m²)

PIPE SIZE BEND	150	200	250	300	350	400	450
11.25°	0.16	0.28	0.45	0.64	0.87	1.14	1.44
22.50°	0.32	0.57	0.88	1.27	1.73	2.26	2.82
30°	0.42	0.75	1.17	1.69	2.3	3.00	3.80
45°	0.62	1.11	1.73	2.50	3.40	4.44	5.62

DOWNWARD THRUST TABLE

FOR CALCULATION OF BASIC THRUST BEARING AREA (m²)

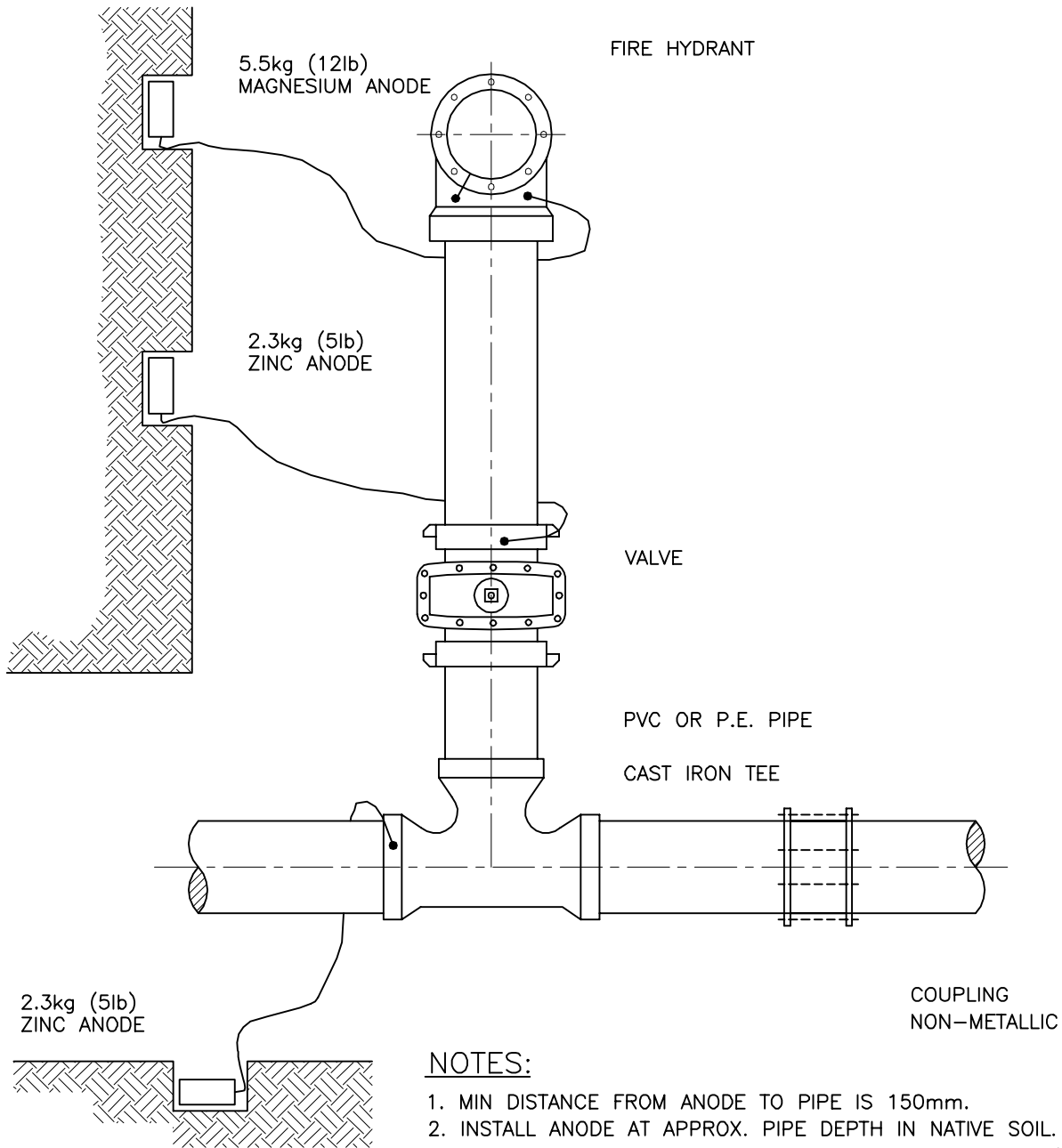
PIPE SIZE BEND	150	200	250	300	350	400	450
11.25°	0.04	0.07	0.11	0.15	0.21	0.27	0.34
22.50°	0.08	0.13	0.21	0.30	0.41	0.53	0.67
30°	0.10	0.18	0.28	0.40	0.54	0.71	0.89
45°	0.15	0.26	0.41	0.59	0.80	1.05	1.32



VERTICAL BEND THRUST BLOCK DETAIL

STANDARD DETAILS

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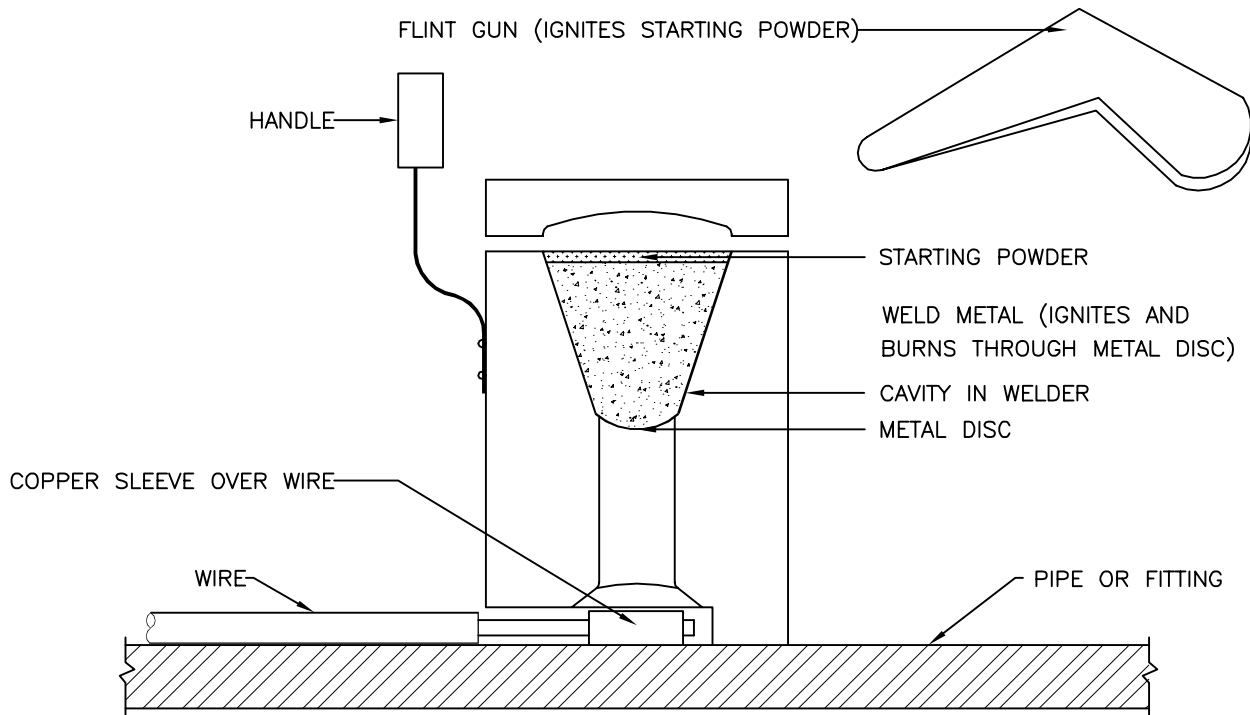
NOTES:

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 2.3kg (5lb).
4. ALL ZINC ANODES ON HYDRANTS ARE 5.5kg (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. REPLACE CLAY OVER ANODES AND COMPACT.

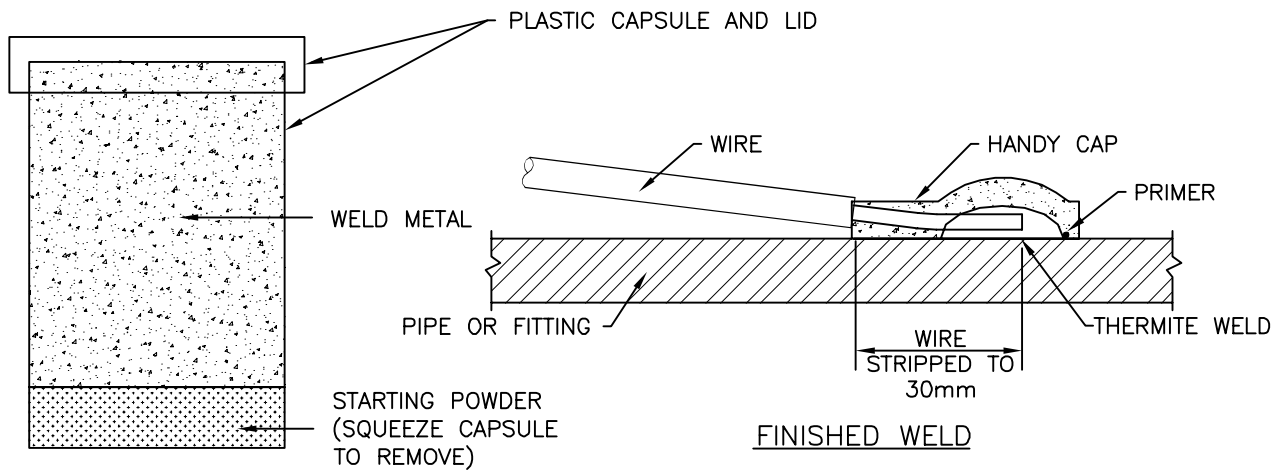


**TYPICAL ANODE
INSTALLATION AT VALVES, IRON FITTINGS
AND HYDRANTS** **STANDARD DETAILS**

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-400
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CADWELD

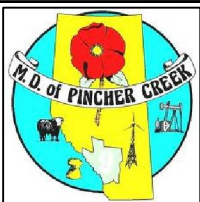


FINISHED WELD

WELD METAL CAPSULE

NOTE:

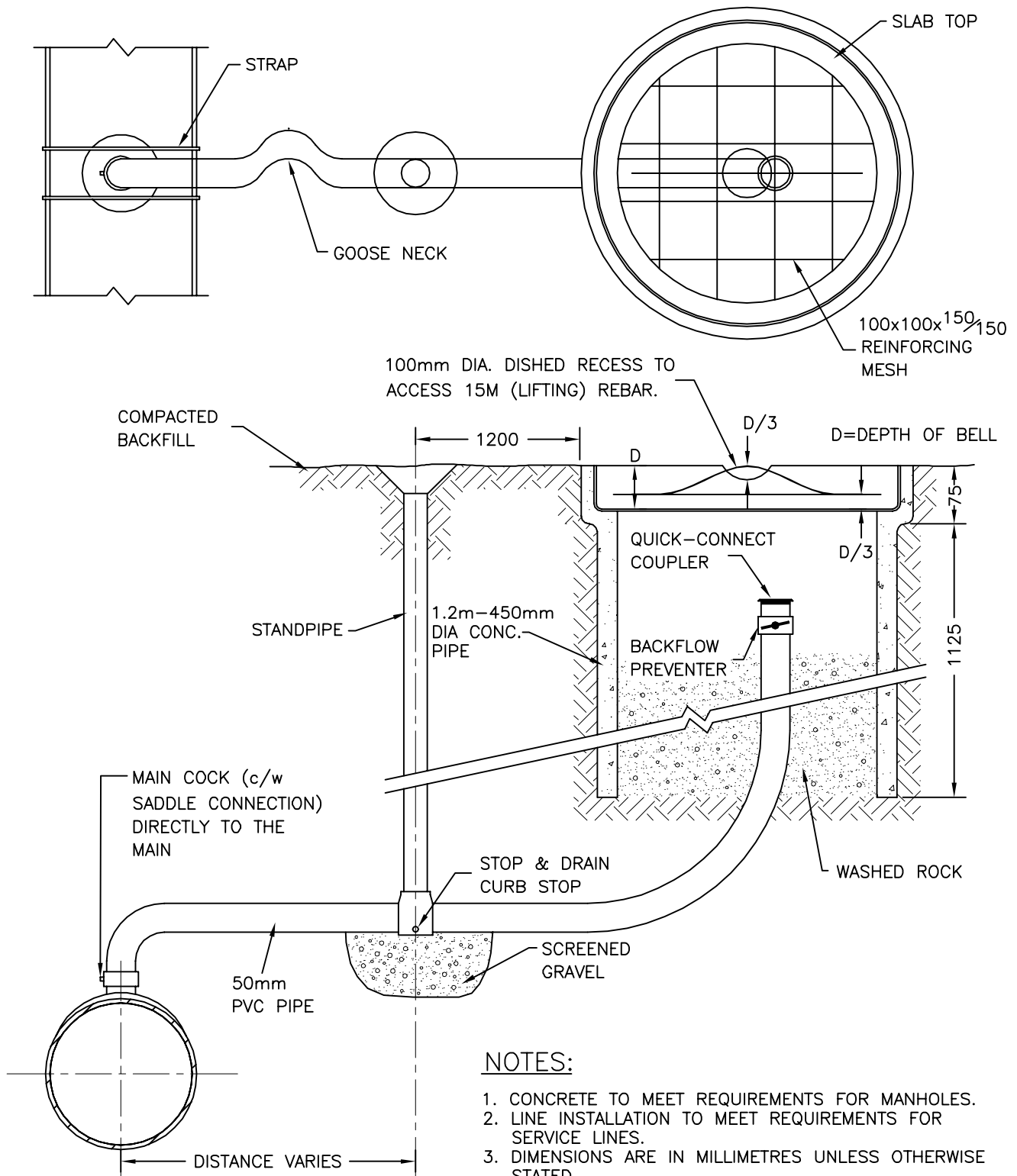
CADWELD TO BE PERFORMED AS PER MANUFACTURERS SPECIFICATIONS



ANODE INSTALLATION CADWELD

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-401
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AIR RELIEF VALVE AND FLUSHING CHAMBER

STANDARD DETAILS

Date:

OCTOBER, 2013

Drawn By:

RS

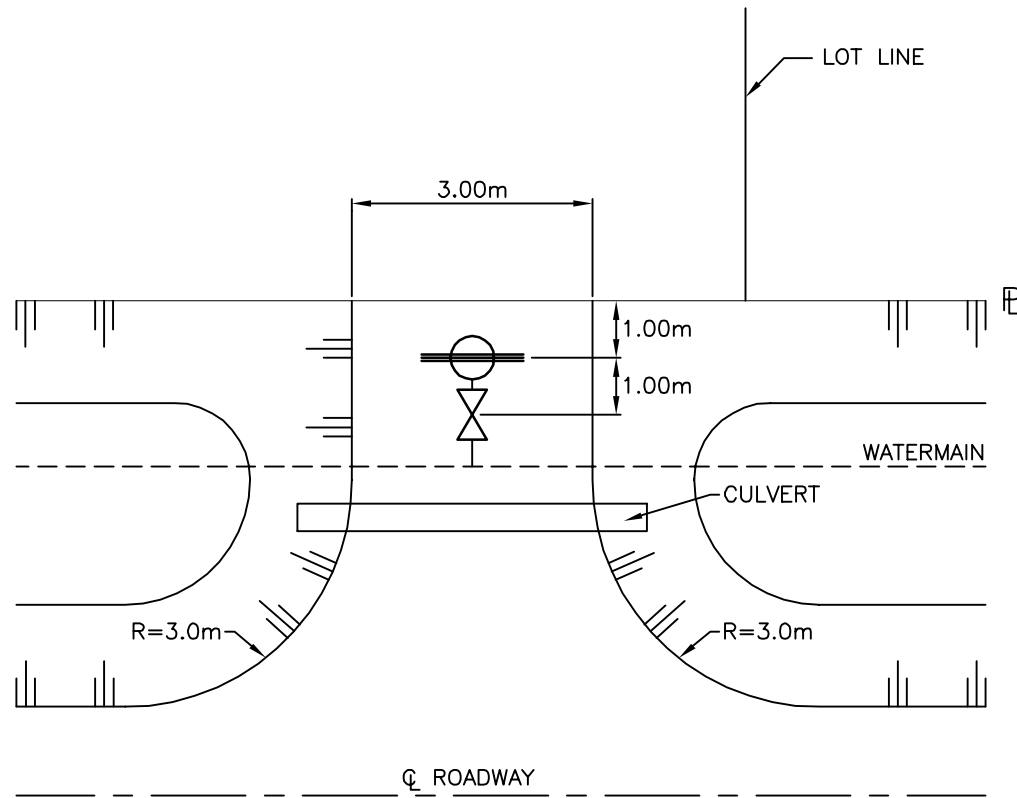
Checked By:

Scale:

NTS

Drawing No.

4-500



NOTES:

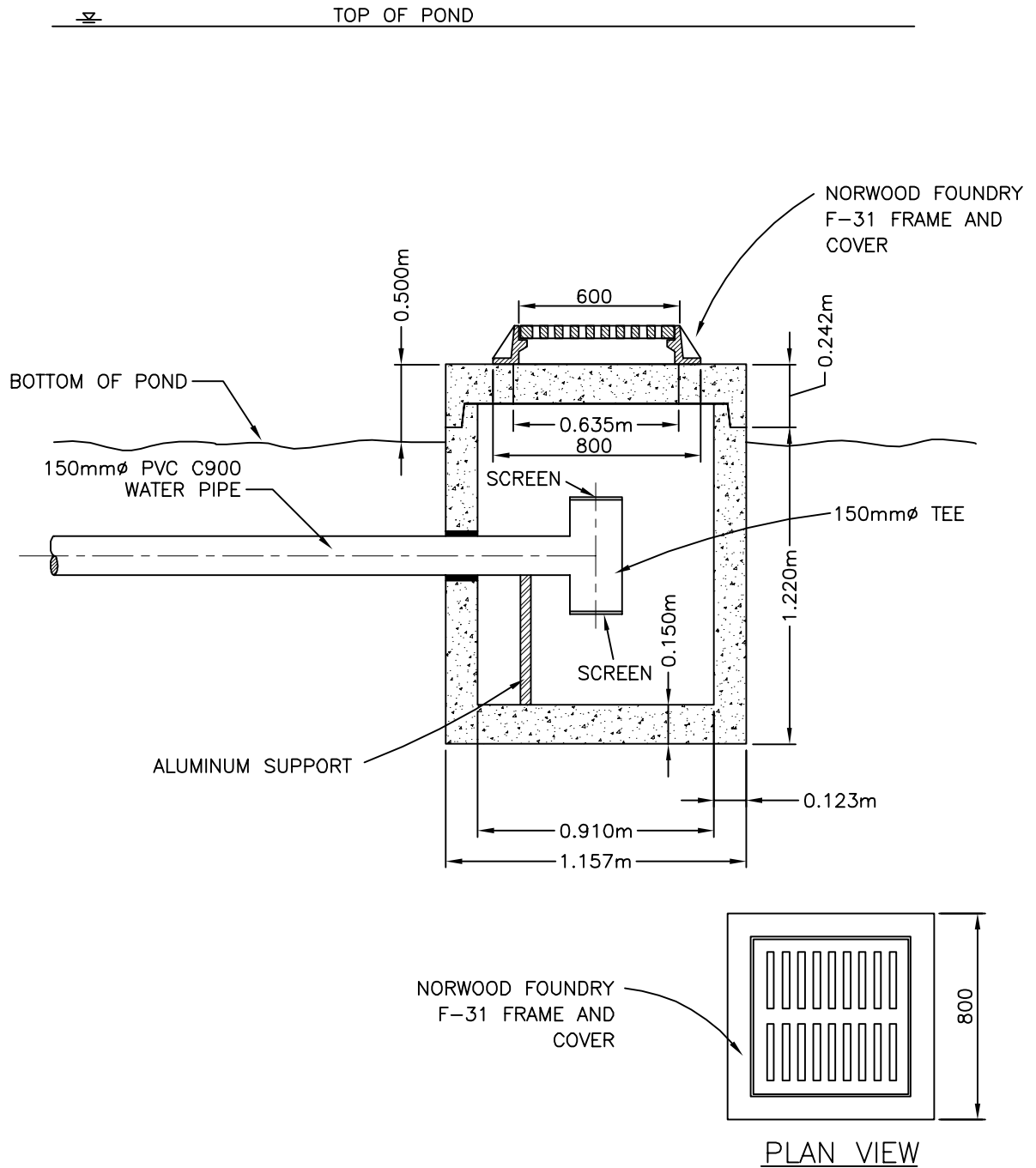
1. WHEN CULVERTS ARE REQUIRED THEY MUST BE C.S.P. CULVERTS AND BE THE FOLLOWING MIN. DIAMETER OF 0.400mm.
2. CULVERTS MUST BE SET BACK A MINIMUM OF 4m FROM SHOULDER OF ROAD.



HYDRANT LOCATION AND APPROACH DETAIL

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-600
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NOTE:

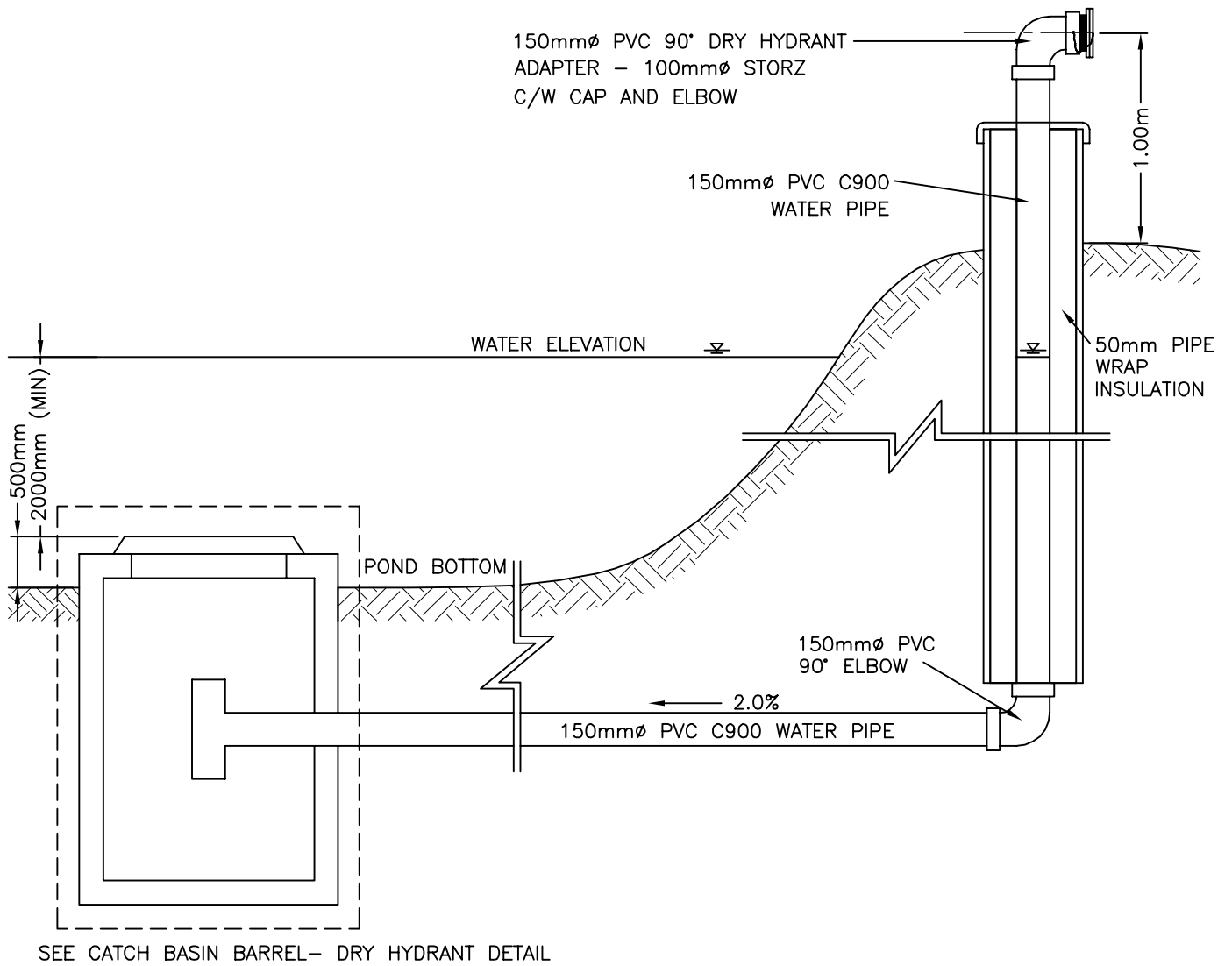
PLACE PVC SLOTTED DRAIN COVERS IN 150mm \varnothing TEE OR MANUFACTURE A SCREEN ASSEMBLY TO REDUCE PARTICLE SIZE ENTERING DRY HYDRANT.



CATCH BASIN BARREL-DRY HYDRANT

STANDARD DETAILS

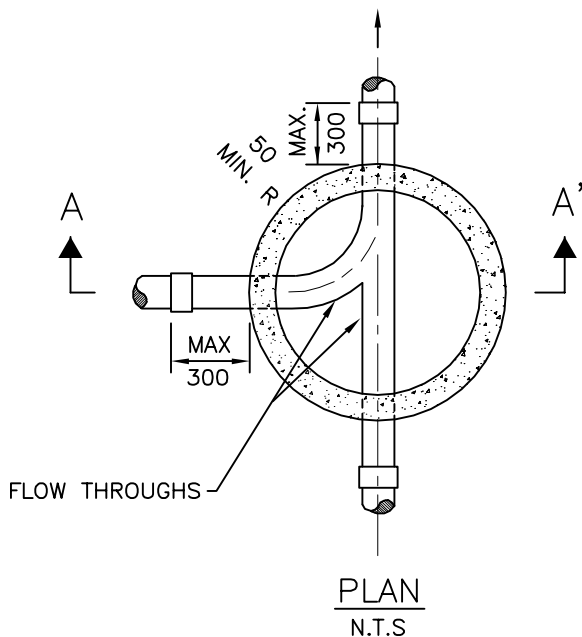
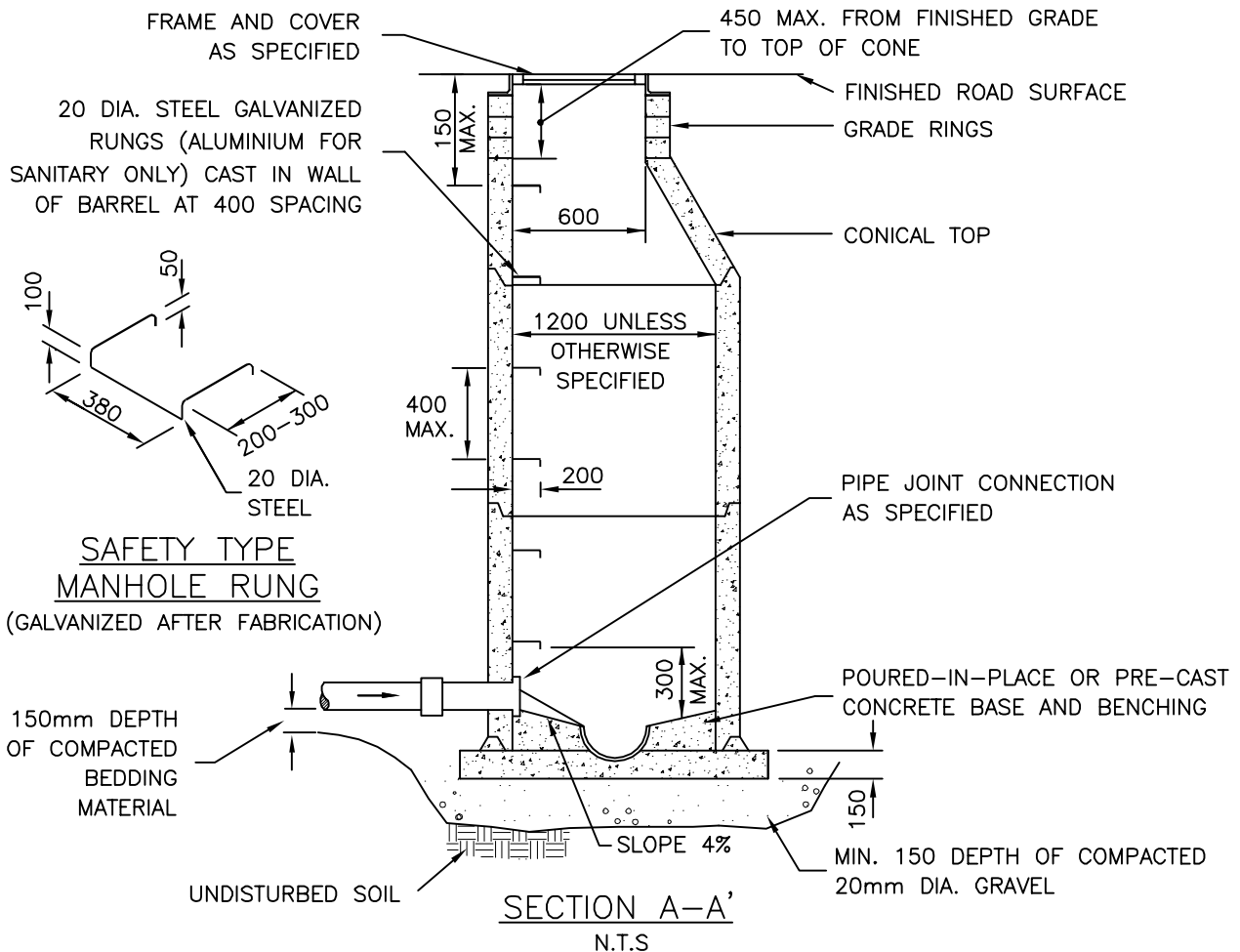
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
			Drawing No. 4-700



TYPICAL DRY HYDRANT

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 4-701
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NOTES:

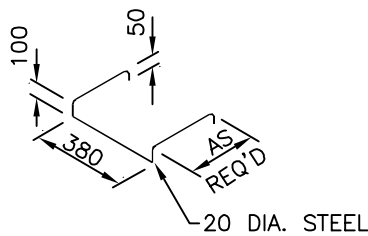
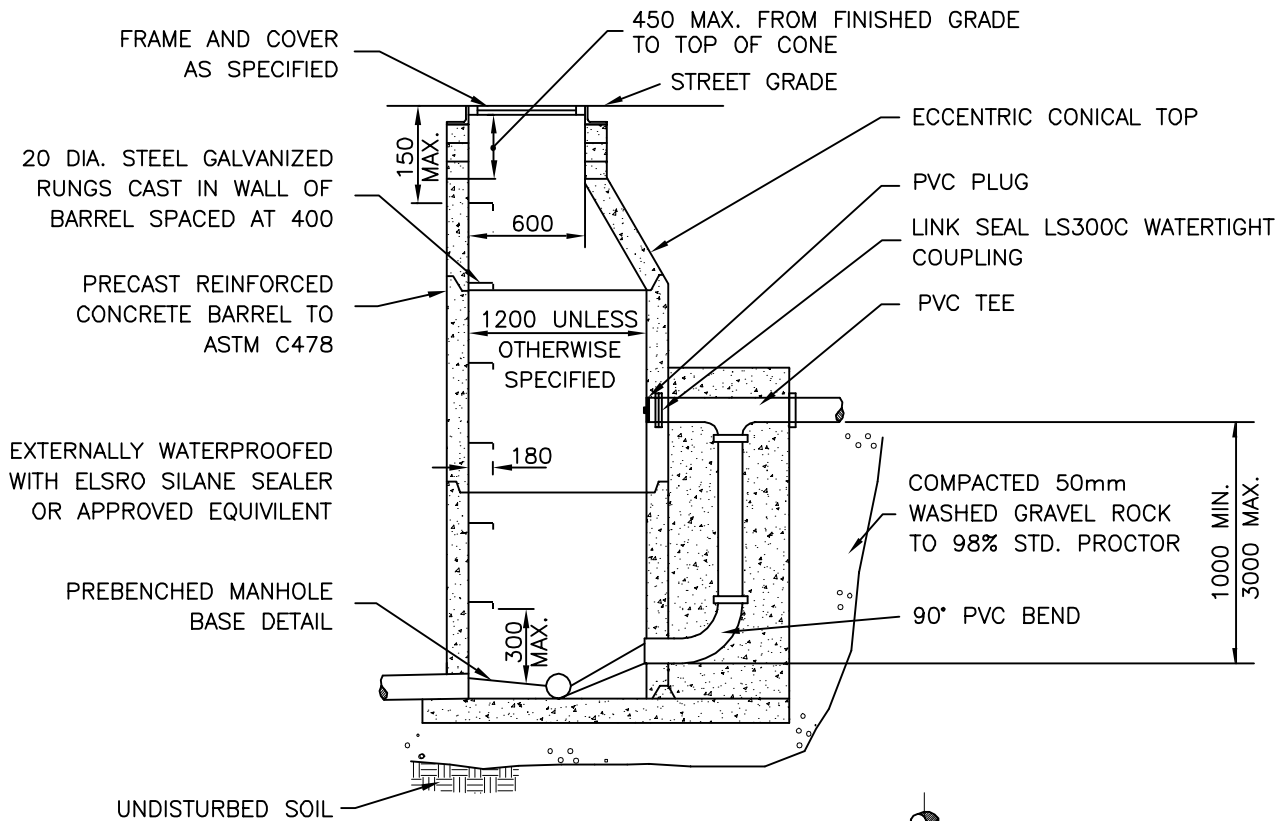
1. ALL PRE-CAST MANHOLES MUST CONFORM TO A.S.T.M. SPECIFICATIONS C478.
2. POURED-IN-PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH OF AT LEAST 25MPa.
3. ALL JOINTS TO BE SET WITH RUBBER GASKET AND SET WITH NON-SHRINK GROUT, INSIDE AND OUT, FOR THE FULL CIRCUMFERENCE.
4. FORM FLOW TROUGH IN PARTIALLY SET CONCRETE AND TROWEL SMOOTH.
5. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
6. BACKFILL AROUND MH. WITH SELECT NATIVE MATERIAL. COMPACT TO 98% S.P.D.
7. FLAT TOP SECTION TO BE USED FOR MANHOLES UP TO 1.8m BURY.
8. ALL JOINTS TO BE WATERTIGHT. METHODS TO BE CONSISTENT WITH SITE CONDITIONS.
9. FOR MANHOLES 5.0m IN DEPTH OR GREATER, A SAFETY PLATFORM SHALL BE INSTALLED.
10. MANHOLES TO MEET REQUIREMENTS OF MANHOLE DETAILS AND SPECIFICATIONS.
11. SAFETY STEPS TO BE PROVIDED, SPACED AT 400 MAX. FIRST STEP 150 MAX. BELOW FRAME, LAST STEP 300 MAX. ABOVE BASE.



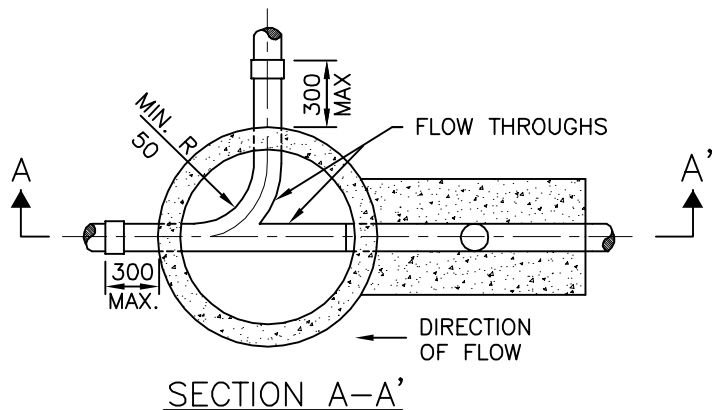
TYPE 5A PRE-CAST MANHOLE DETAIL

STANDARD DETAILS

Date:	Drawn By:	Checked By:	Scale:	Drawing No.
OCTOBER, 2013	RS		NTS	5-100



SAFETY TYPE MANHOLE RUNG
(GALVANIZED AFTER FABRICATION)



NOTES:

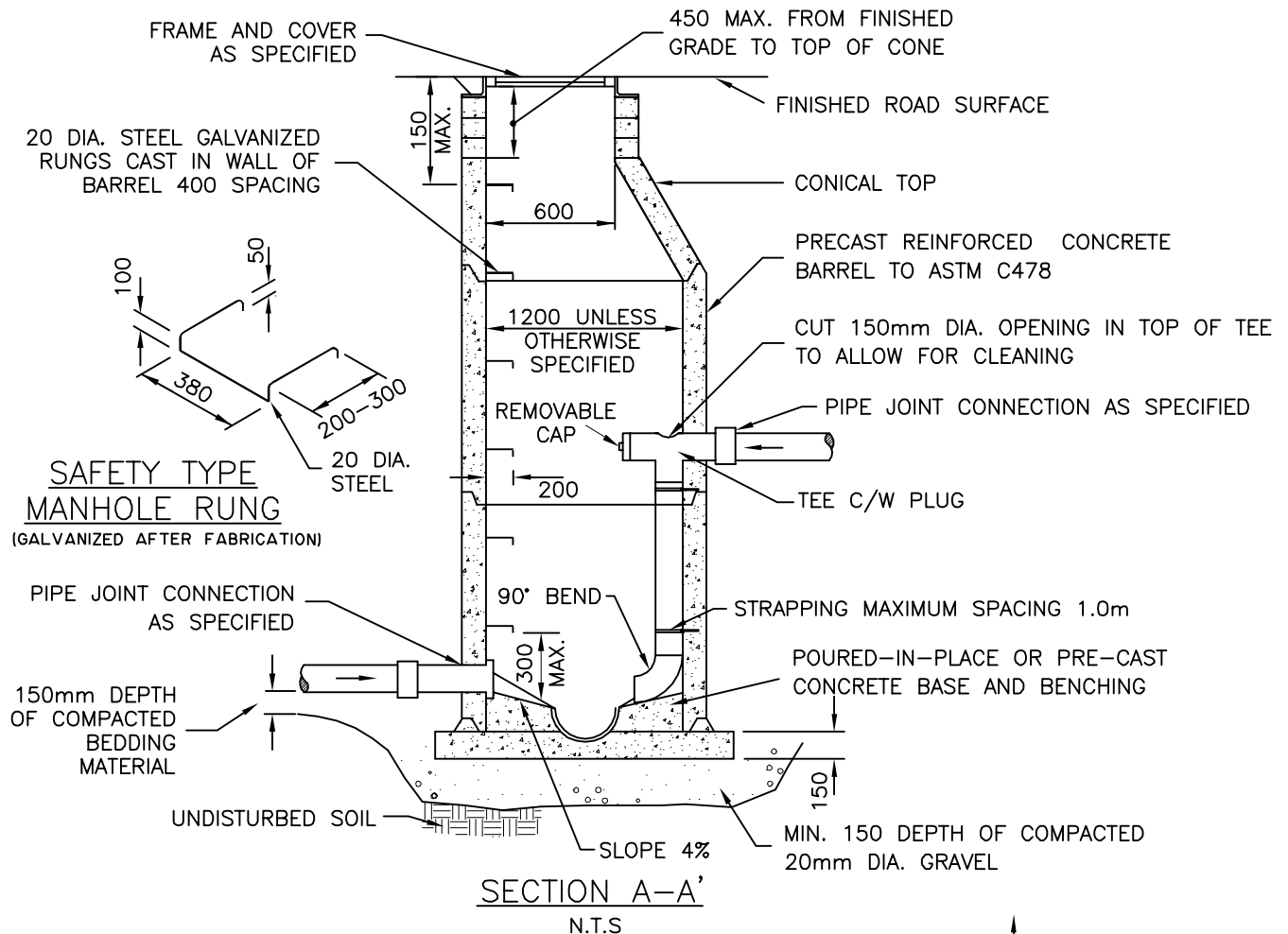
1. ALL PRE-CAST MANHOLES MUST CONFORM TO A.S.T.M. SPECIFICATIONS C478.
2. POURED-IN-PLACE CONCRETE SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF AT LEAST 25MPa.
3. ALL JOINTS TO BE SET WITH RUBBER GASKET AND SET WITH NON-SHRINK GROUT, INSIDE AND OUT, AROUND FULL CIRCUMFERENCE.
4. FORM FLOW TROUGH IN PARTIALLY SET CONCRETE AND TROWEL SMOOTH.
5. ALL DIMENSIONS IN MILLIMETRES.
6. BACKFILL AROUND MH. WITH SELECT NATIVE MATERIAL COMPACT TO 98% S.P.D.
7. FLAT TOP SECTION TO BE USED FOR MANHOLES UP TO 1.8m BURY.
8. ALL JOINTS TO BE WATERTIGHT. METHODS TO BE CONSISTENT WITH SITE CONDITIONS.
9. FOR MANHOLES 5.0m IN DEPTH OR GREATER, A SAFETY PLATFORM SHALL BE INSTALLED. SEE DETAIL B-110.
10. MANHOLES TO MEET REQUIREMENTS OF MANHOLE DETAILS AND SPECIFICATIONS.
11. SAFETY STEPS TO BE PROVIDED, SPACED AT 400 MAX. FIRST STEP 150 MAX. BELOW FRAME, LAST STEP 300 MAX. ABOVE BASE.
12. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.



EXTERIOR DROP MANHOLE DETAIL

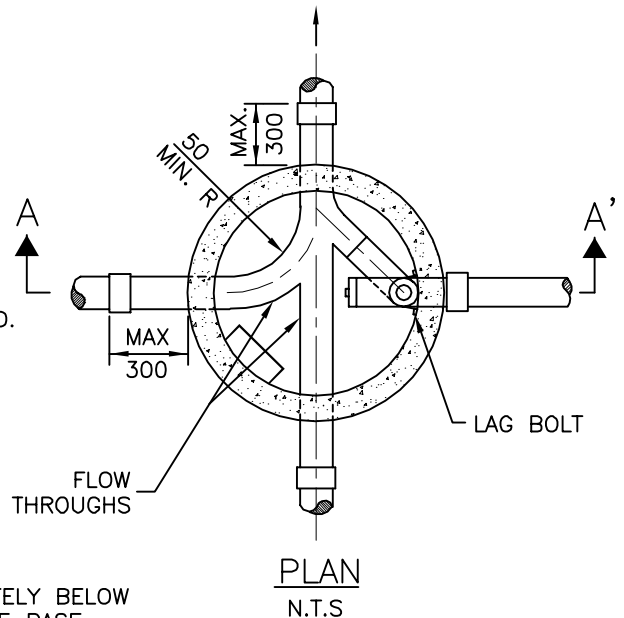
STANDARD DETAILS

Date:	Drawn By:	Checked By:	Scale:	Drawing No.
OCTOBER, 2013	RS		NTS	5-201



NOTES:

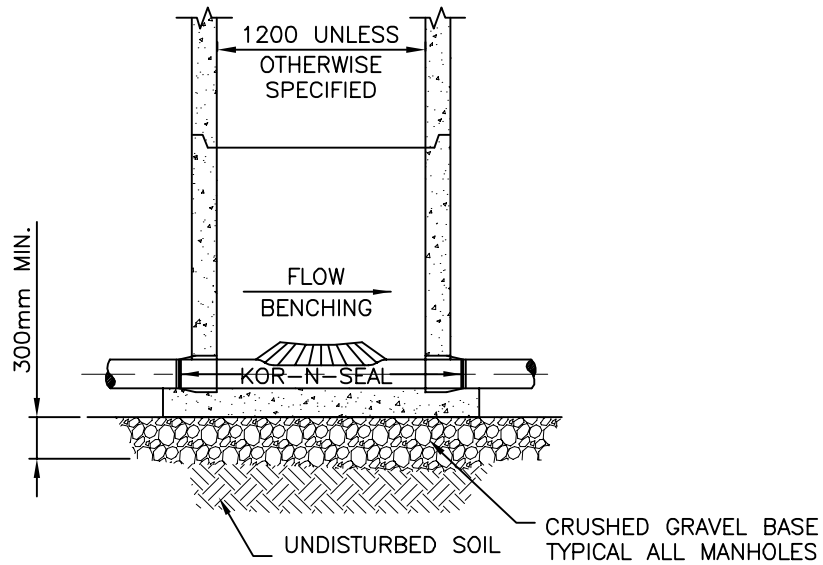
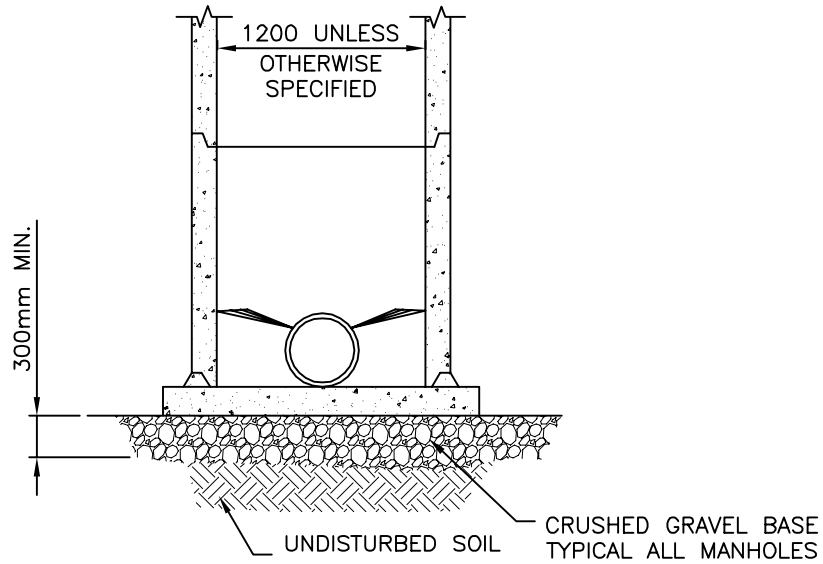
1. ALL PRE-CAST MANHOLES MUST CONFORM TO A.S.T.M. SPECIFICATIONS C478.
2. POURED-IN-PLACE CONCRETE SHALL HAVE 28 DAYS COMPRESSIVE STRENGTH OF AT LEAST 25MPa.
3. ALL JOINTS TO BE SET WITH RUBBER GASKET AND SET WITH NON-SHRINK GROUT, INSIDE AND OUT, FOR THE FULL CIRCUMFERENCE.
4. FORM FLOW THROUGH IN PARTIALLY SET CONCRETE AND TROWEL SMOOTH.
5. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
6. BACKFILL AROUND MH. WITH SELECT NATIVE MATERIAL AND COMPACT TO 98% S.P.D.
7. FLAT TOP SECTION TO BE USED FOR MANHOLES UP TO 1.8m BURY.
8. ALL JOINTS TO BE WATERTIGHT. METHODS TO BE CONSISTENT WITH SITE CONDITIONS.
9. FOR MANHOLES 5.0m IN DEPTH AND GREATER, A SAFETY PLATFORM SHALL BE INSTALLED.
10. MANHOLES TO MEET REQUIREMENTS OF MANHOLE DETAILS AND SPECIFICATIONS.
11. LAG BOLTS AND STRAPPING ARE TO BE INSTALLED IMMEDIATELY BELOW THE TEE AND A CONTINUAL 1.0m VERTICAL SPACING TO THE BASE.
12. DIAMETER, SIZE, AND TYPE OF VERTICAL PIPE TO MATCH INLET PIPE.
13. SAFETY STEPS TO BE PROVIDED, SPACED AT 400 MAX. FIRST STEP 150 MAX. BELOW FRAME, LAST STEP 300 MAX. ABOVE BASE.



INTERIOR DROP MANHOLE DETAIL

STANDARD DETAILS

Date:	Drawn By:	Checked By:	Scale:	Drawing No.
OCTOBER, 2013	RS		NTS	5-202



NOTES:

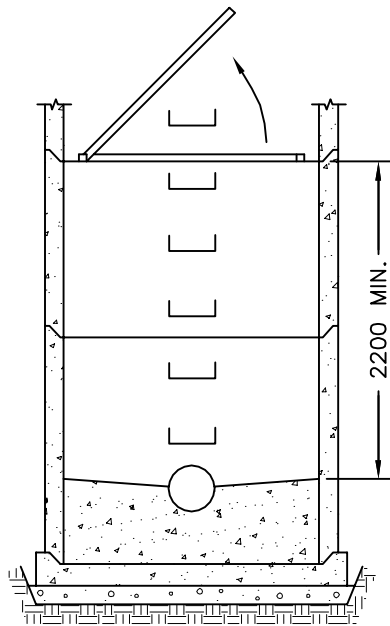
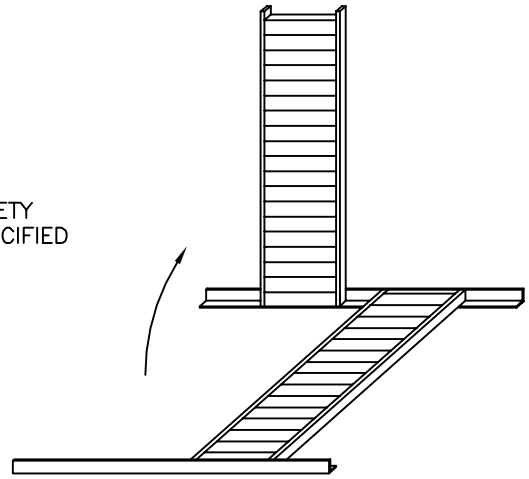
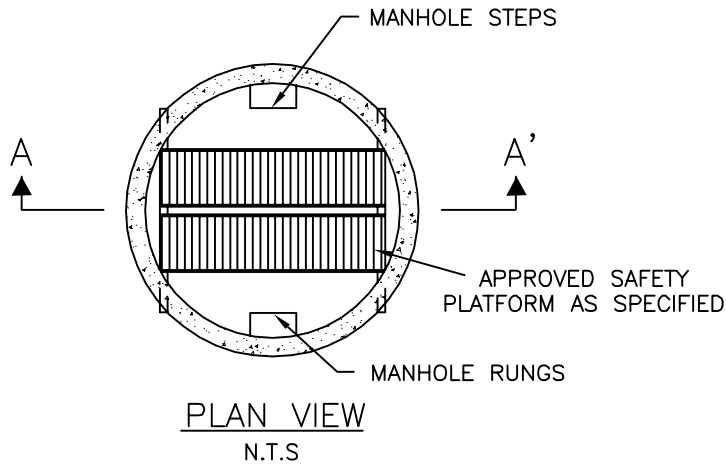
1. PREBENCHED MANHOLE BASES AS SUPPLIED BY CONCRETE MANUFACTURER.
2. SULPHATE RESISTANT CEMENT TO BE USED.
3. PIPE PENETRATIONS THROUGH MANHOLE WALL TO BE MADE USING KOR-N-SEAL MANHOLE TO PIPE SEALS.



PREBENCHED MANHOLE BASE

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 5-300
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NOTES:

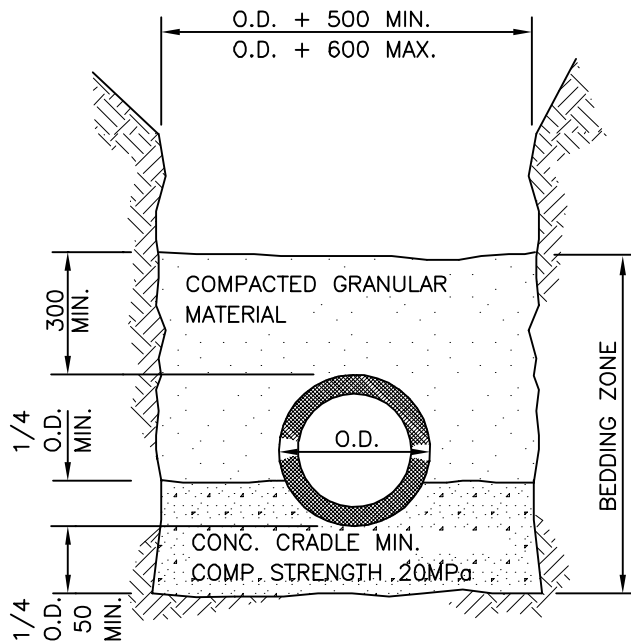
1. TO BE INSTALLED ON MANHOLES GREATER THAN 5.0m DEEP.
2. MAXIMUM SPACING BETWEEN PLATFORMS TO BE 5.0m.
3. ALUMINUM GRATES TO BE MSU MISSISSAUGA OR APPROVED EQUAL.
4. TO BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.



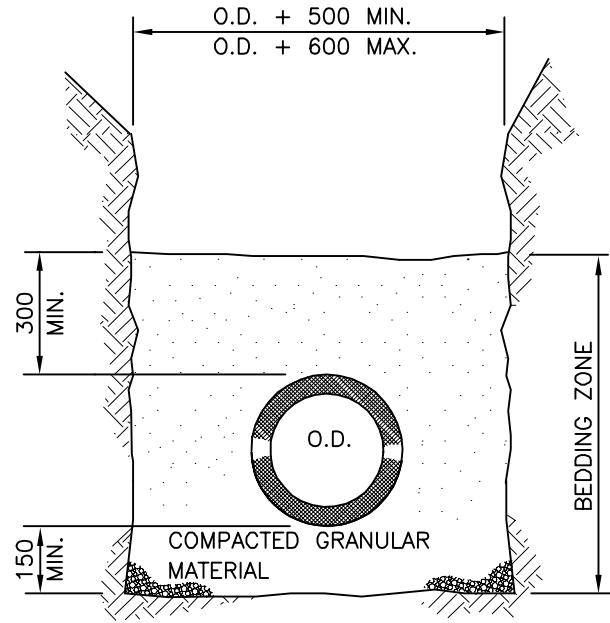
MANHOLE SAFETY PLATFORM

STANDARD DETAILS

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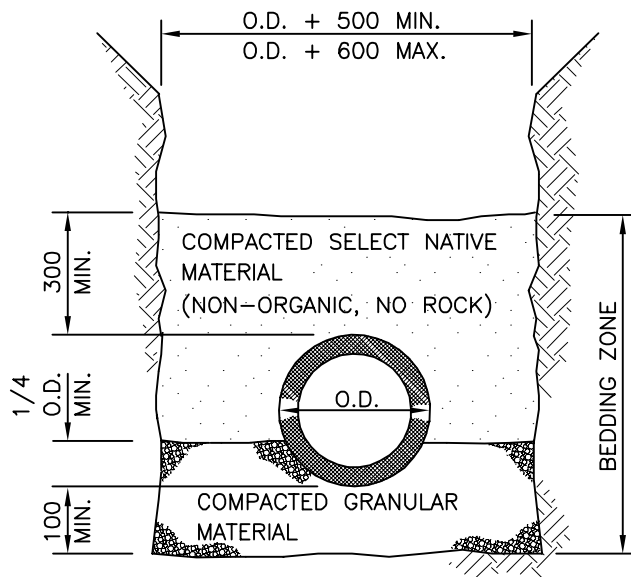
CLASS 'A' BEDDING



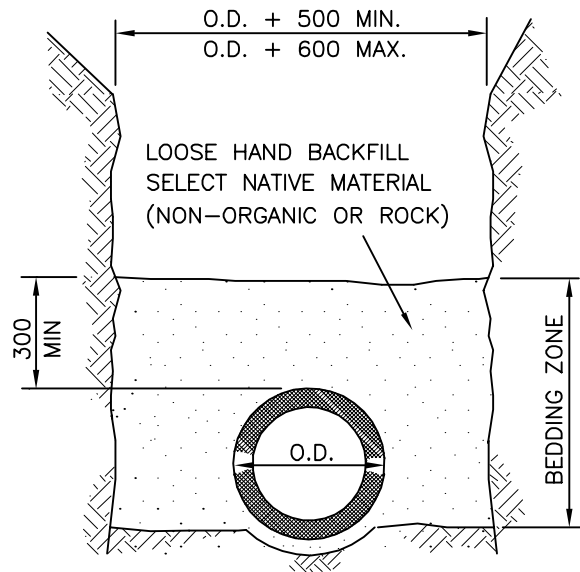
CLASS 'B' BEDDING

NOTES:

1. COMPACTION OF BEDDING ZONE SHALL BE AS PER SPECIFICATIONS. (MIN. 95% S.P.D).
TOP METRE MUST CONFORM TO SPECIFICATIONS (MIN 98% S.P.D.)
2. ALL DIMENSIONS ARE GIVEN IN MILLIMETRES UNLESS OTHERWISE STATED.
3. BACKFILL COMPACTION REQUIREMENTS WILL VARY. BACKFILL ABOVE PIPE ZONE TO BE APPROVED MATERIAL.
4. TRENCH SIDE SLOPES TO BE CONSISTENT WITH OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS.



CLASS 'C' BEDDING



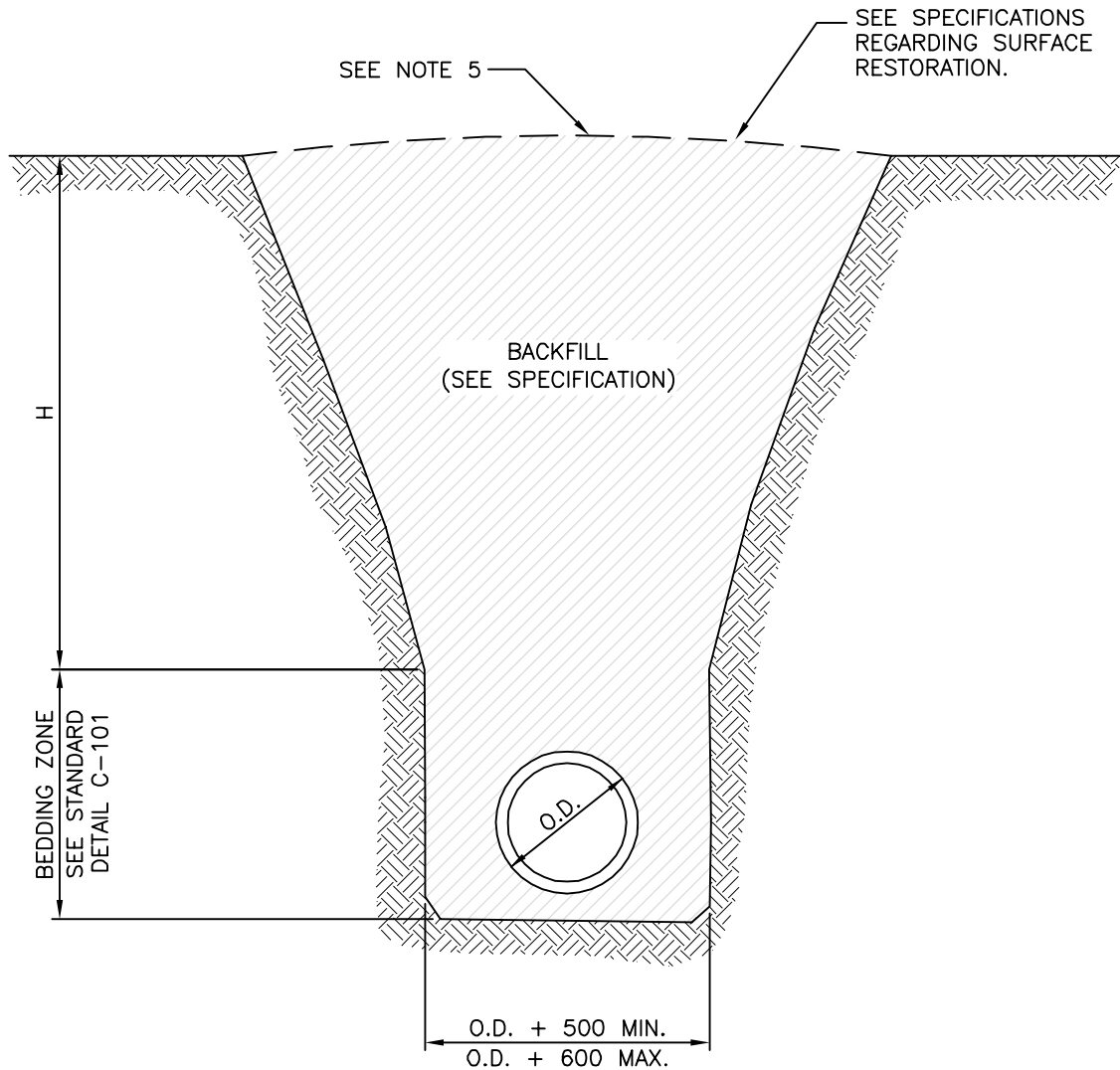
CLASS 'D' BEDDING



PIPE BEDDING DETAILS

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 5-500
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NOTES:

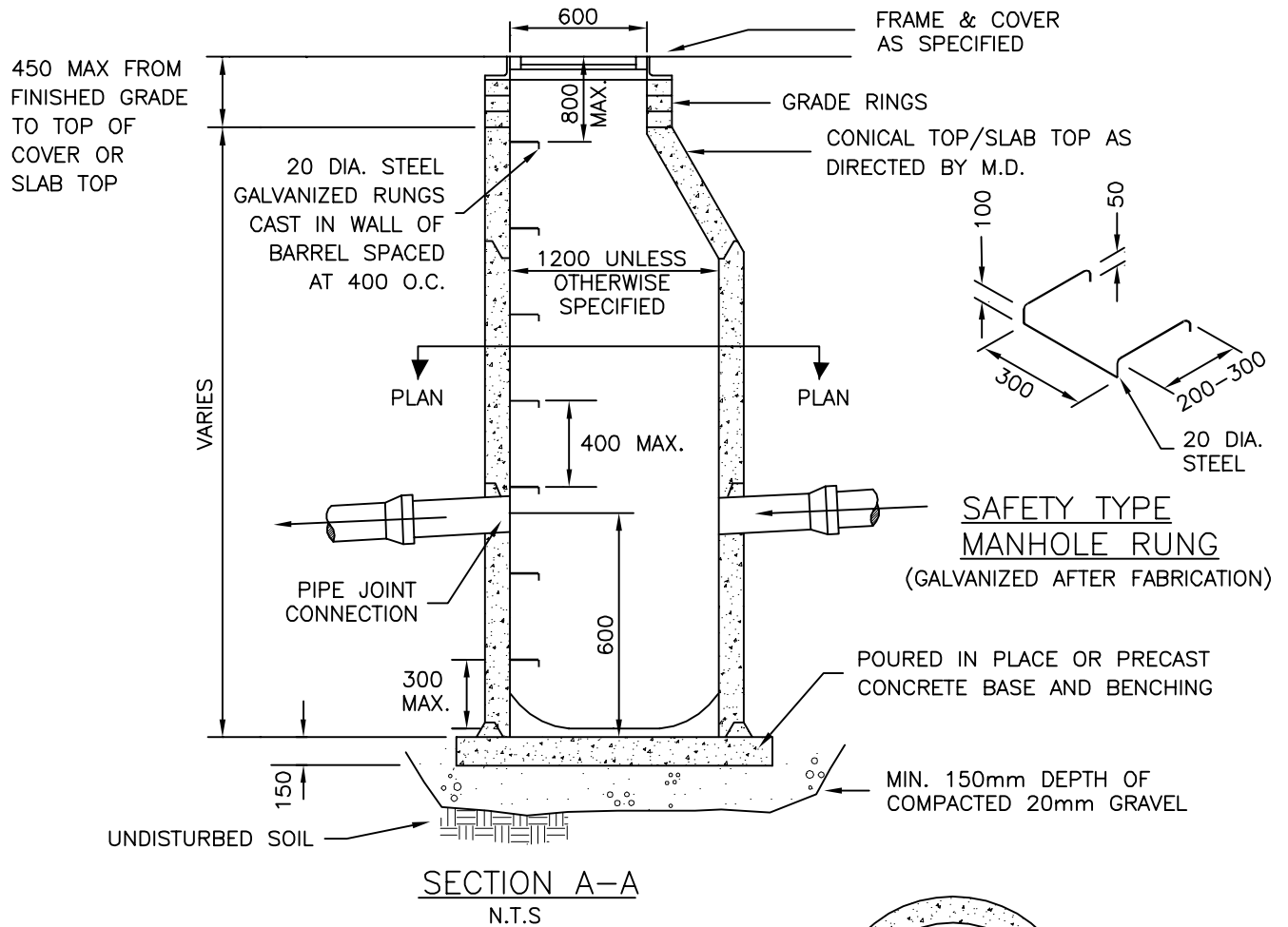
1. WHEN CUT BACK SLOPES ARE TO BE USED IN LIEU OF CAGES AND SHORING, THESE SLOPES ARE TO MEET REQUIREMENTS OF LOCAL CODES.
2. SEE SPECIFICATIONS FOR MINIMUM COVER ABOVE PIPE.
3. MIN. PIPE ZONE WIDTH IS SPECIFIED TO ALLOW PROPER PIPE ZONE COMPACTION.
4. O.D. = OUTSIDE PIPE DIAMETER.
5. FOR UNCOMPACTED BACKFILL, CROWN TRENCH BY $0.1 \times H$.



TYPICAL TRENCH DETAIL

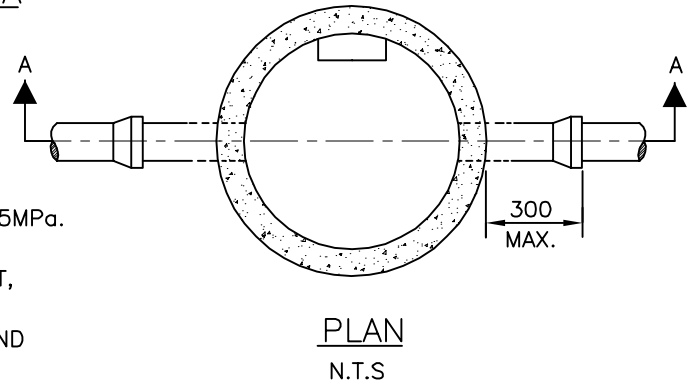
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 5-600
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NOTES:

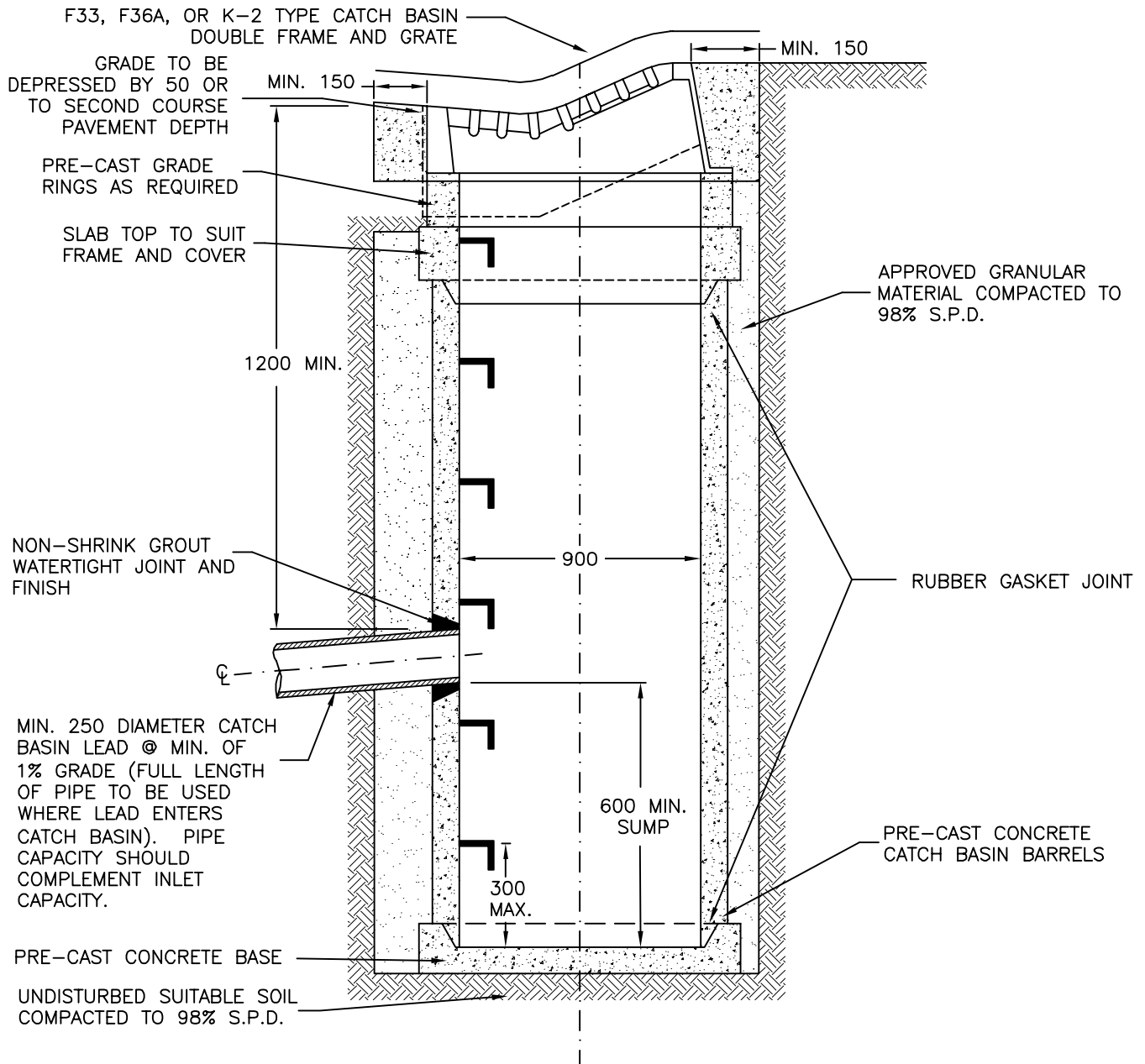
1. ALL PRE-CAST MANHOLES MUST CONFORM TO A.S.T.M. SPECIFICATIONS C478.
2. POURED-IN-PLACE CONCRETE SHALL HAVE A 28 DAYS COMPRESSIVE STRENGTH OF AT LEAST 25MPa.
3. ALL JOINTS TO BE SET WITH RUBBER GASKETS AND SET WITH NON-SHRINK GROUT, INSIDE AND OUT, FOR THE FULL CIRCUMFERENCE.
4. FORM FLOW TROUGH IN PARTIALLY SET CONCRETE AND TROWEL SMOOTH.
5. PIPES TO BE FLUSH WITH WALL.
6. MAX. DIST. FROM RIM TO TOP RUNG IS 800mm.
7. BACKFILL AROUND MH. WITH SELECT NATIVE MATERIAL AND COMPACT TO 98% S.P.D.
8. FLAT TOP SECTION TO BE USED FOR MANHOLES UP TO 1.8m BURY.
9. ALL JOINTS TO BE WATERTIGHT. METHODS TO BE CONSISTENT WITH SITE CONDITIONS.
10. FOR MANHOLES 5.0m IN DEPTH OR GREATER, A SAFETY PLATFORM SHALL BE INSTALLED.
11. MANHOLES TO MEET REQUIREMENTS OF MANHOLE DETAILS AND SPECIFICATIONS.
12. DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
13. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
14. SAFETY STEPS TO BE PROVIDED, SPACED AT 400 MAX. FIRST STEP 150 MAX. BELOW FRAME, LAST STEP 300 MAX. ABOVE BASE.



CATCH BASIN MANHOLE

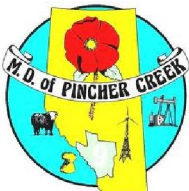
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-100
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NOTES:

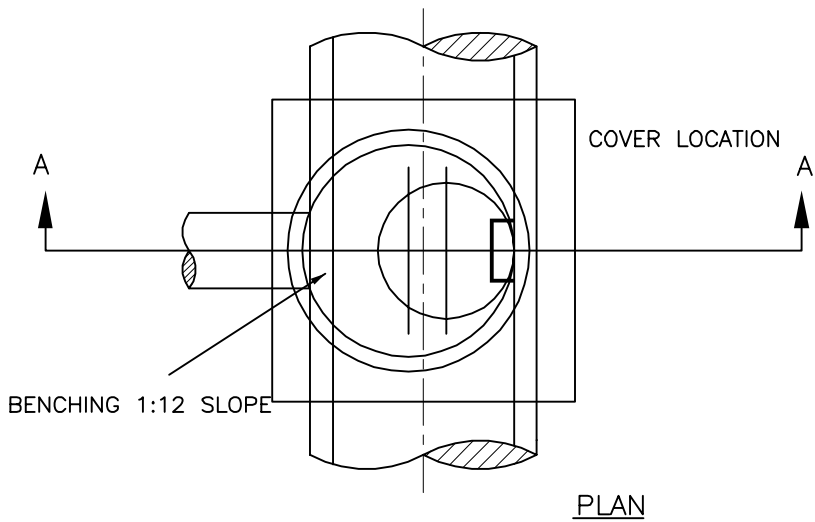
1. SAFETY STEPS TO BE SPACED AT 400 MAX. FIRST STEP 150 MAX. BELOW FRAME, LAST STEP 300 MAX. ABOVE BENCHING.
2. PRE-CAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
3. CAST-IN-PLACE-CONCRETE TO BE 25MPa AT 28 DAYS.
4. ALL JOINTS TO BE WATERTIGHT; SET WITH RUBBER GASKET WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR THE FULL CIRCUMFERENCE. THIS INCLUDES JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND FRAMES, AND BETWEEN GRADE RINGS AND SLAB TOPS.
5. PRE-CAST CONCRETE BASE THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC CATCHBASIN DEPTH AND SOIL CONDITIONS.
6. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.
7. WICK DRAINS TO CONNECT TO CATCH BASIN SUCH AS TO ENSURE WATERTIGHT JOINTS.
8. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.



CATCH BASIN TYPICAL-900mm

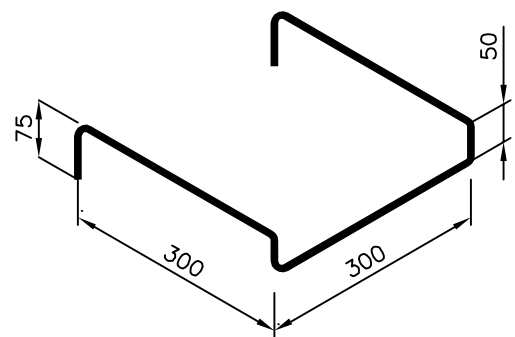
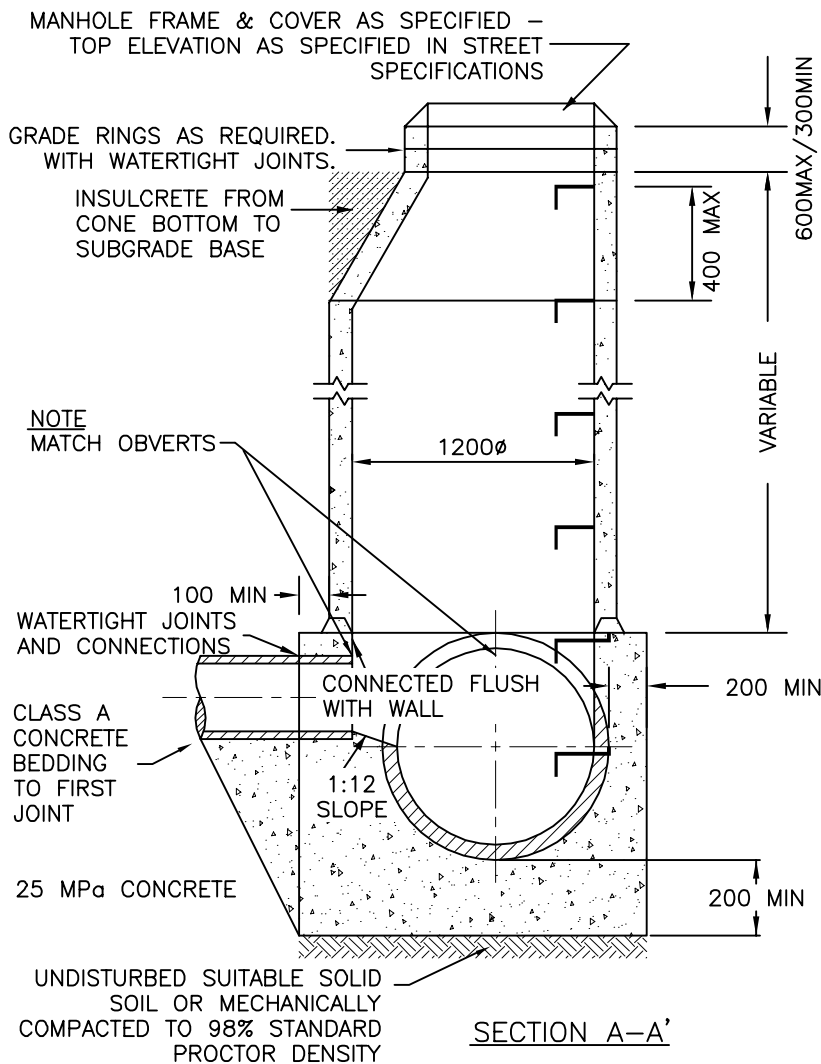
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-101
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NOTES:

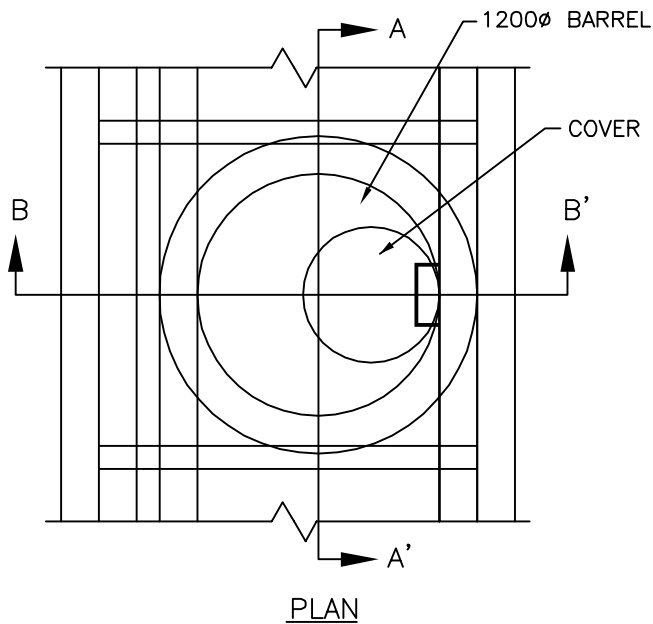
1. PRE-CAST CONCRETE COMPONENTS MUST CONFORM TO A.S.T.M. SPECIFICATIONS C478.
2. POURED-IN-PLACE CONCRETE TO HAVE 28 DAYS COMPRESSIVE STRENGTH OF AT LEAST 25MPa.
3. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT, INSIDE AND OUTSIDE, FOR THE FULL CIRCUMFERENCE.
4. FORM FLOW TROUGH IN PARTIALLY SET CONCRETE AND TROWEL SMOOTH.
5. ALL DIMENSIONS GIVEN IN MILLIMETRES UNLESS OTHERWISE STATED.
6. MAX. DIST. FROM RIM TO TOP RUNG IS 800.
7. BACKFILL AROUND MH. WITH SELECT NATIVE MATERIAL COMPACT TO 98% S.P.D.
8. FLAT TOP SECTION TO BE USED FOR MANHOLES UP TO 1.8m BURY.
9. ALL JOINTS TO BE WATERTIGHT. METHODS TO BE CONSISTENT WITH SITE CONDITIONS.
10. FOR MANHOLES 5.0m IN DEPTH OR GREATER, A SAFETY PLATFORM SHALL BE INSTALLED.
11. MANHOLES TO MEET REQUIREMENTS OF MANHOLE DETAILS AND SPECIFICATIONS.
12. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
13. CHANNELLING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.



TYPICAL PERCHED MANHOLE FOR 600-150mm DIAMETER PIPES

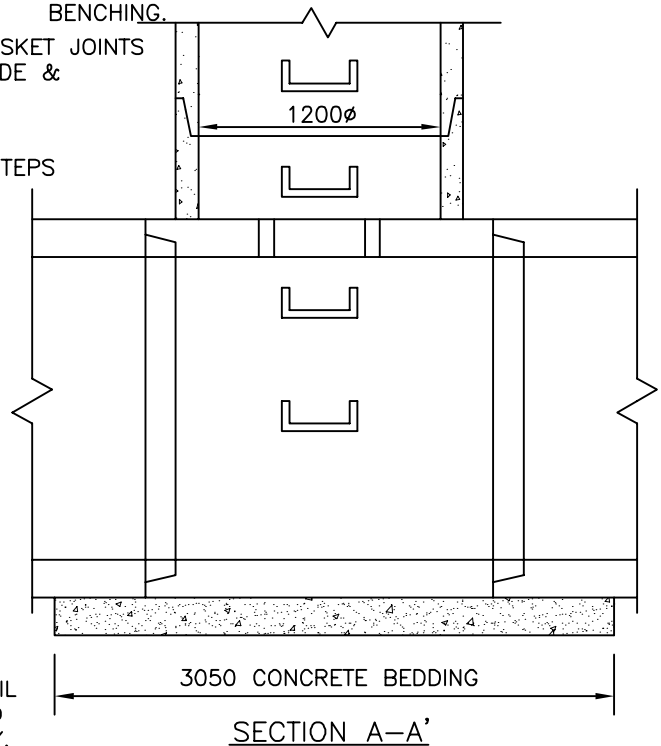
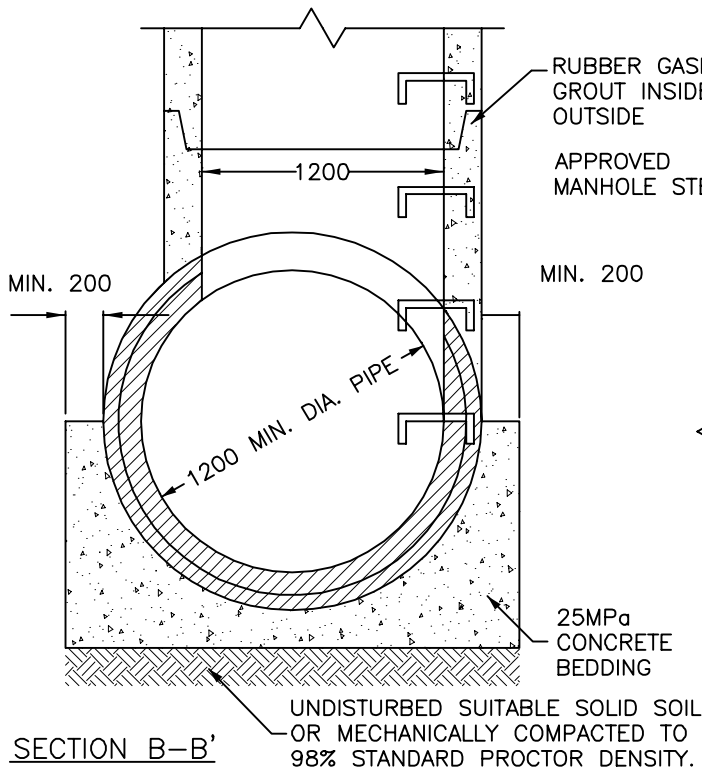
STANDARD DETAILS

Date:	Drawn By:	Checked By:	Scale:	Drawing No.
OCTOBER, 2013	RS		NTS	6-102



NOTES:

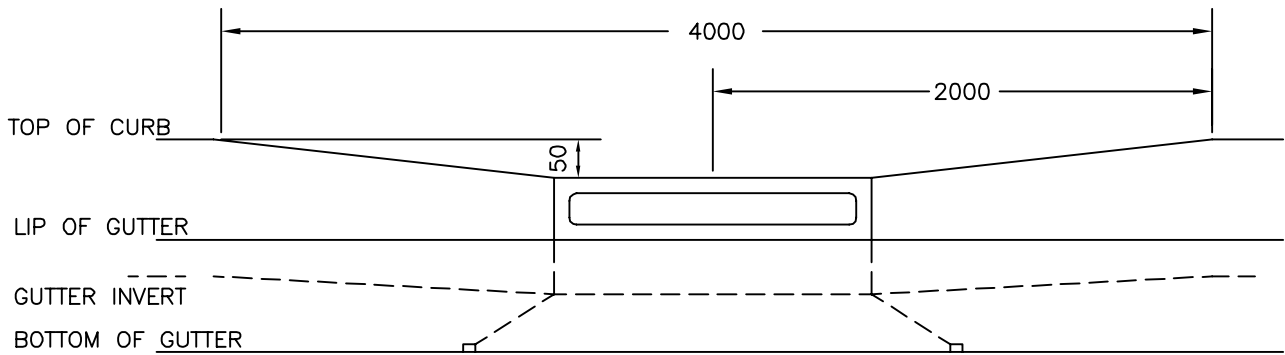
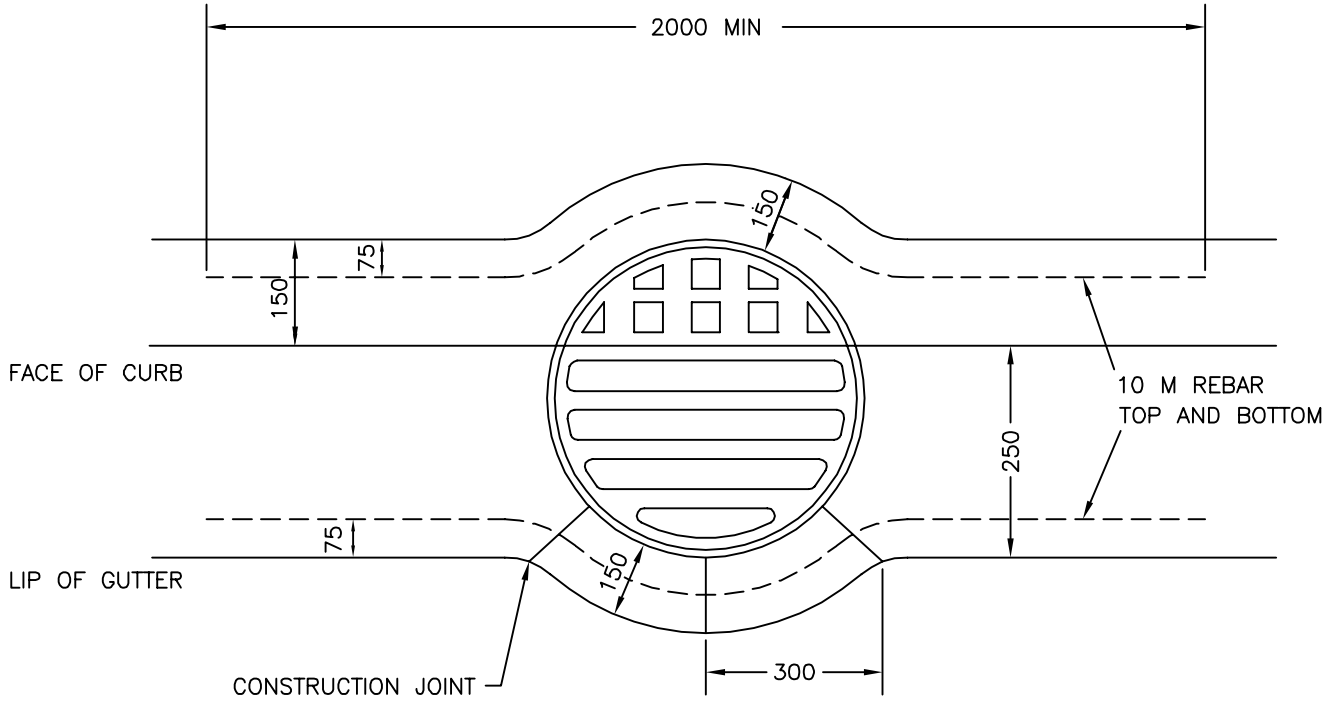
1. THIS TYPE OF MANHOLE IS TO BE BUILT ONLY ON MAINS OF 1200 DIAMETER OR LARGER AND WHERE THERE IS NO CHANGE IN DIRECTION OF FLOW.
2. ALL PRE-CAST MANHOLES MUST CONFORM TO A.S.T.M. SPECIFICATIONS C478.
3. POURED-IN-PLACE CONCRETE SHALL HAVE A 28 DAYS COMPRESSIVE STRENGTH OF AT LEAST 25MPa.
4. ALL JOINTS TO BE SET WITH RUBBER GASKETS AND SET WITH NON-SHRINK GROUT, INSIDE AND OUT, FOR THE FULL CIRCUMFERENCE.
5. FORM FLOW TROUGH IN PARTIALLY SET CONCRETE AND TROWEL SMOOTH.
6. ALL DIMENSIONS GIVEN IN MILLIMETRES UNLESS OTHERWISE STATED.
7. MAX. DIST. FROM RIM TO TOP RUNG IS 800mm.
8. BACKFILL AROUND MH. WITH SELECT NATIVE MATERIALS AND COMPACT TO 98% S.P.D.
9. ALL JOINTS TO BE WATERTIGHT. METHODS TO BE CONSISTENT WITH SITE CONDITIONS.
10. FOR MANHOLES 5.0m IN DEPTH OR GREATER, A SAFETY PLATFORM SHALL BE INSTALLED.
11. MANHOLES TO MEET REQUIREMENTS OF MANHOLE DETAILS AND SPECIFICATIONS.
12. SEE DETAIL C-4 FOR TOP OF MANHOLE AND STEP DETAILS.
13. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE MAX. 300 ABOVE BENCHING.



**T-RISER MANHOLE FOR PIPES
1200mm AND LARGER**

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-103
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NOTE:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.



**TYPICAL CATCH BASIN INSTALLATION
150 CURB AND 250 GUTTER**

STANDARD DETAILS

Date:

OCTOBER, 2013

Drawn By:

RS

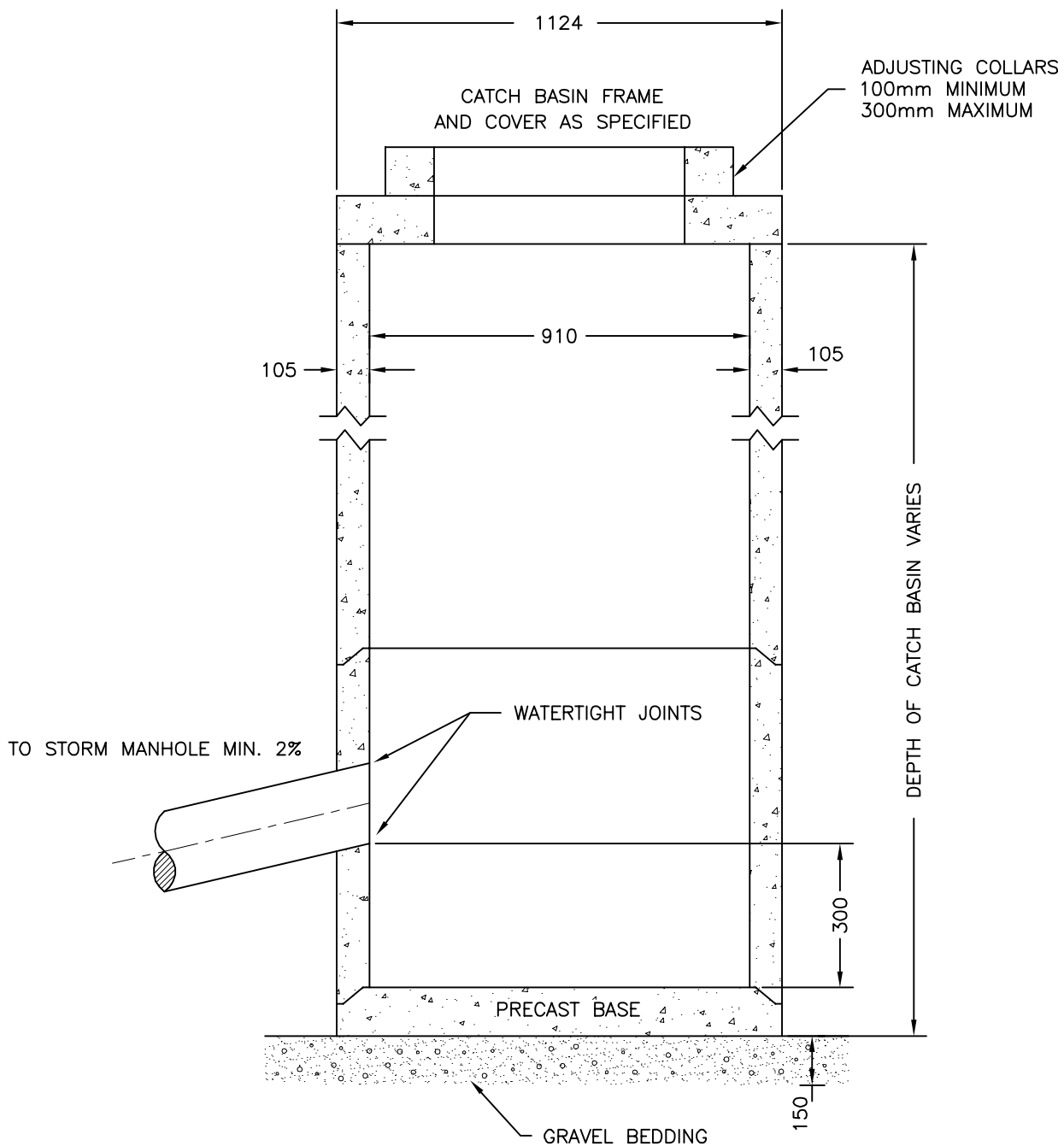
Checked By:

Scale:

NTS

Drawing No.

6-200



NOTES:

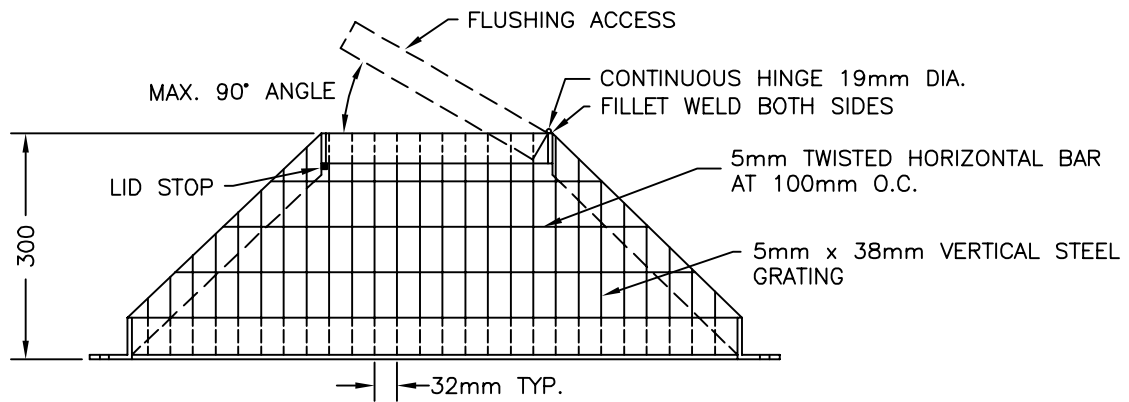
1. SAFETY STEPS TO BE PROVIDED, SPACED AT 400 MAX. FIRST STEP 150 MAX. BELOW FRAME; LAST STEP 300 MAX. ABOVE BASE.
2. PRE-CAST CONCRETE COMPONENTS MUST CONFORM TO A.S.T.M. SPECIFICATIONS C478.
3. POURED-IN-PLACE CONCRETE SHALL HAVE A 28 DAYS COMPRESSIVE STRENGTH OF AT LEAST 25MPa.
4. ALL JOINTS TO BE SET WITH RUBBER GASKETS AND NON-SHRINK GROUT, INSIDE AND OUT, FOR THE FULL CIRCUMFERENCE.
5. ALL DIMENSIONS IN MILLIMETRES, UNLESS OTHERWISE STATED.
6. ALL JOINTS TO BE WATERTIGHT. METHODS TO BE CONSISTENT WITH SITE CONDITIONS.



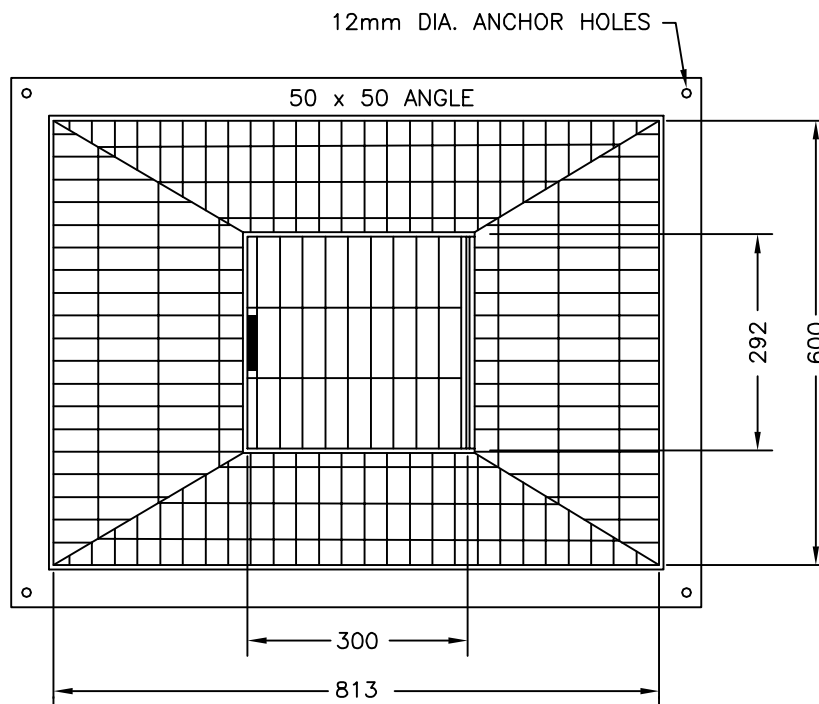
**STORM CATCH BASIN ASSEMBLY
300mm SUMP**

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-201
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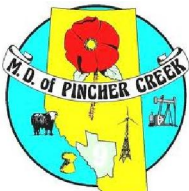
PROFILE



PLAN VIEW

NOTES:

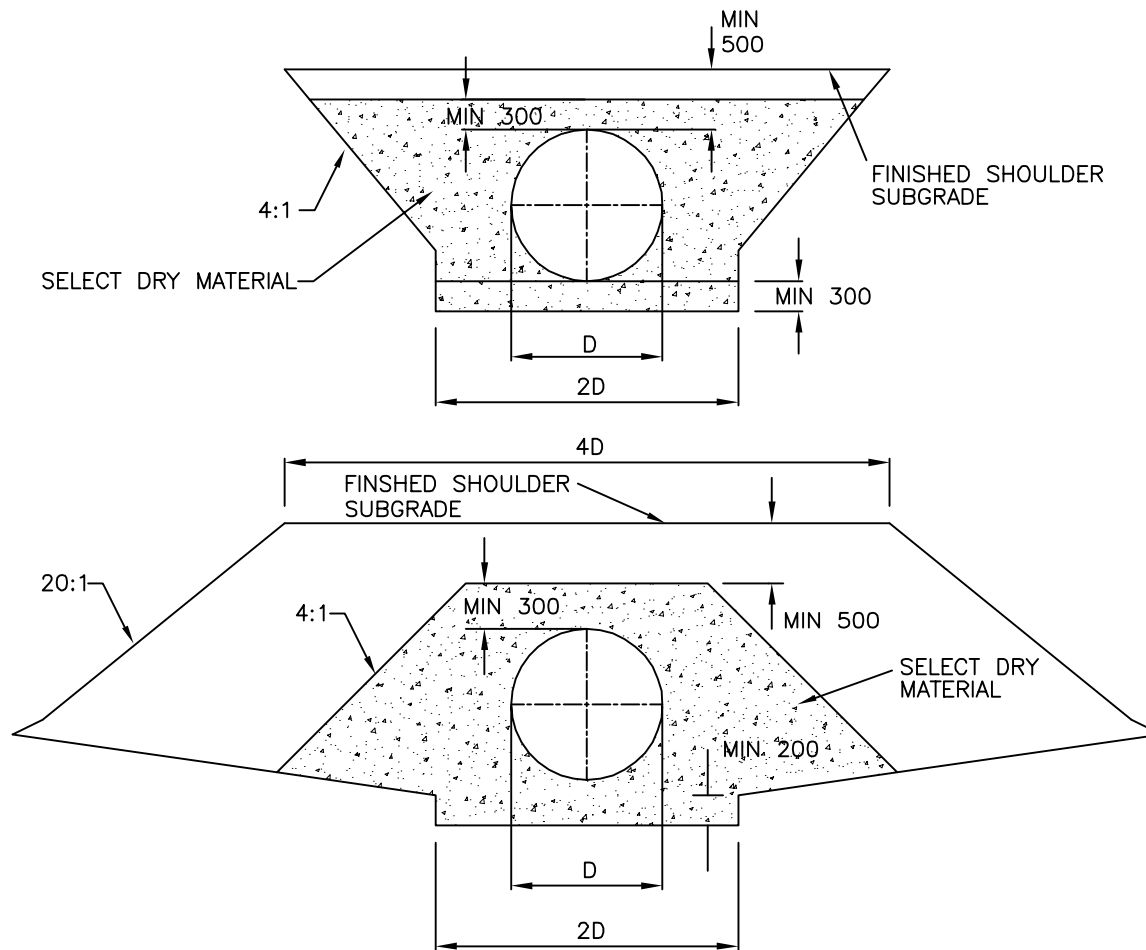
1. DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. GALVANIZED STEEL MATERIAL.



TRASH GRATE INLET

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-300
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1. SELECT DRY MATERIAL SHALL BE PLACED IN 150mm COMPACTED LIFTS. IF SAND BACKFILL IS USED A 600mm CLAY PLUG SHALL BE PLACED ON INLET AND OUTLET ENDS OF THE PIPE.
2. IN SOFT WET AREAS (IE MUSKEG) DEPTH OF SUBCUT BELOW THE PIPE WILL BE DETERMINED BY THE DEVELOPERS ENGINEER AS APPROVED BY THE DIRECTOR.
3. WHEN PIPES ARE PLACED PRIOR TO EMBANKMENT CONSTRUCTION, A MINIMUM OF 1000mm OF MATERIAL SHALL BE PLACED OVER TOP OF PIPES FOR PROTECTION DURING CONSTRUCTION.
4. ALL CULVERT INVERTS WILL BE STAKED IN THE FIELD BY THE DEVELOPERS ENGINEER.
5. GEOTEXTILE FABRIC TO BE WOVEN POLYPROPYLENE MONOFILAMENT WHICH FORMS A DIMENSIONALLY STABLE CONSTRUCTION FABRIC AND WITH A MINIMUM OPEN PERCENTAGE OF 10%.

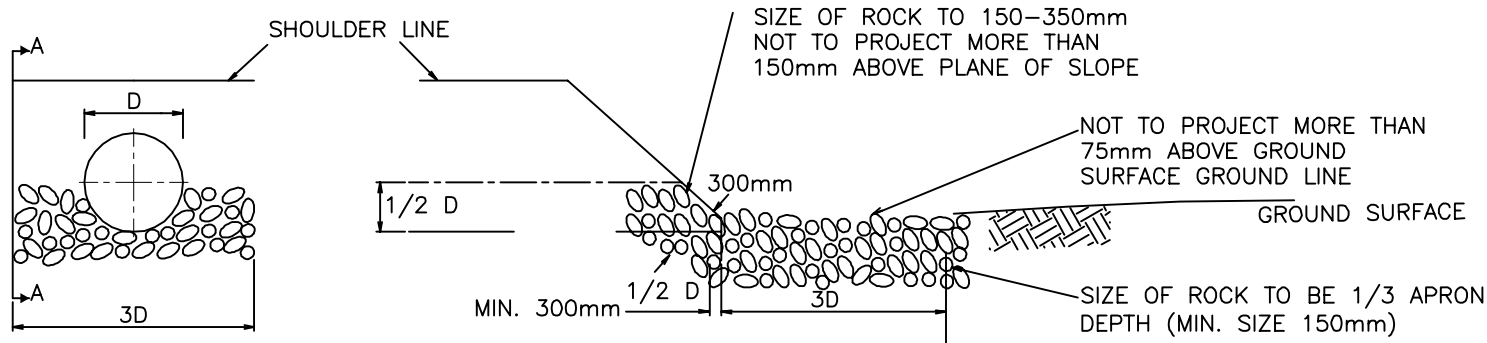
ALL UNITS ARE mm UNLESS OTHERWISE NOTED



TYPICAL CULVERT INSTALLATION

STANDARD DETAILS

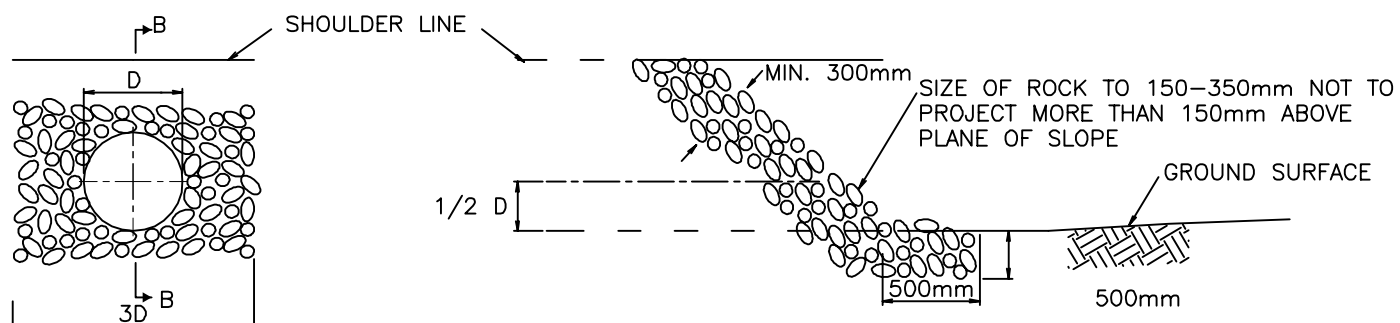
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-301
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FRONT ELEVATION - OUTLET

SECTION A-A

OUTLET



FRONT ELEVATION - INLET

SECTION B-B

INLET

D	400	500	600	700	800	900	1000	1200
APRON DEPTH	500					600		

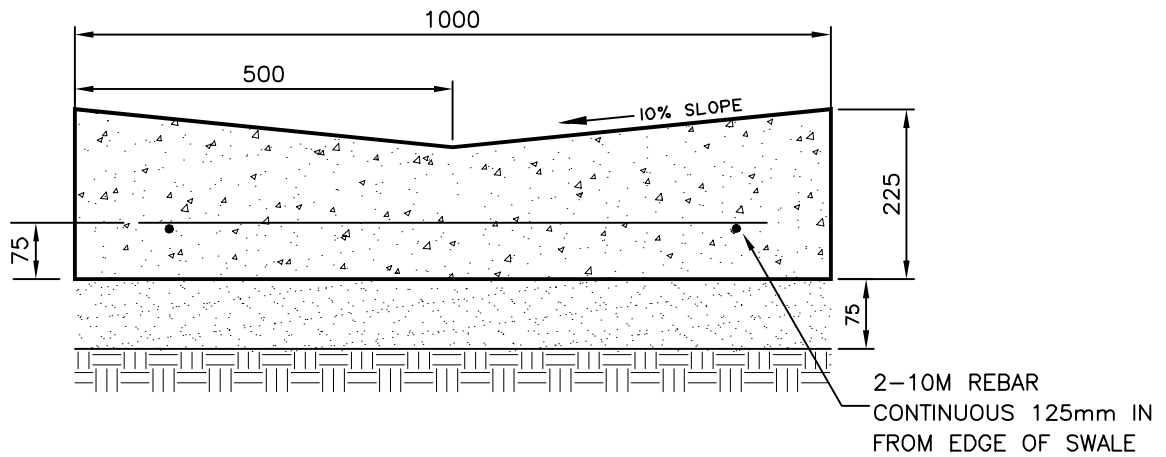
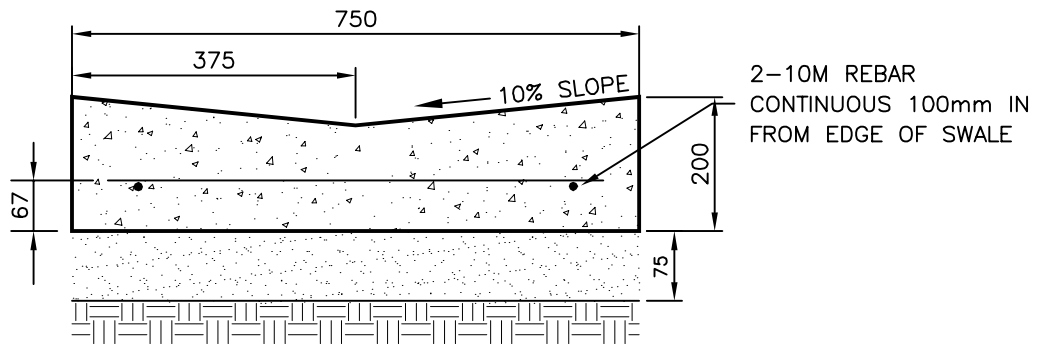
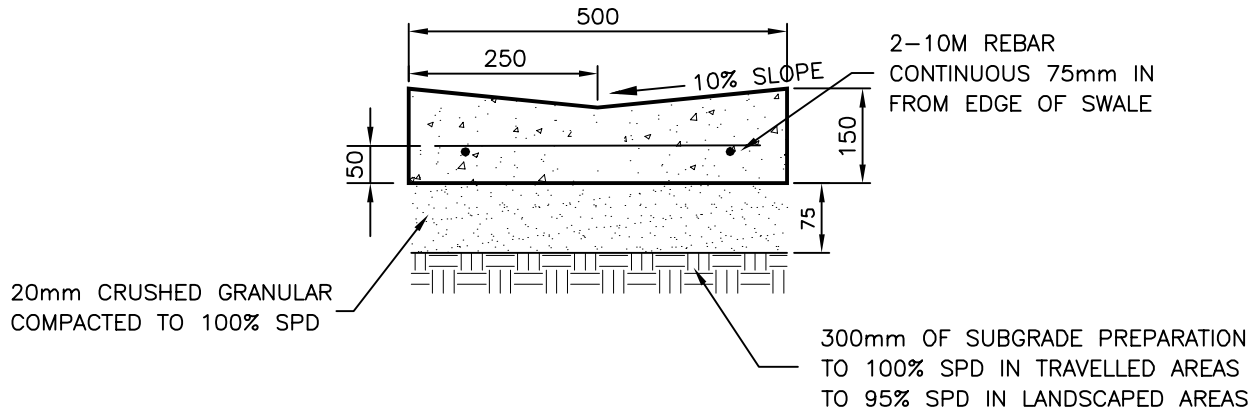
NOTE: ALL DIMENSIONS ARE IN MILLIMETERS



TYPICAL RIP-RAP FOR CULVERT SIZE 400-1200mm DIAMETER

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-302
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NOTES:

1. REINFORCING BARS ARE REQUIRED AT CONSTRUCTION JOINTS AND FUTURE TIE-IN LOCATIONS.
2. REINFORCING BARS SHALL EXTEND INTO CONCRETE A MINIMUM OF 300mm.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
4. CONCRETE TO MEET REQUIREMENTS OF SPECIFICATIONS.

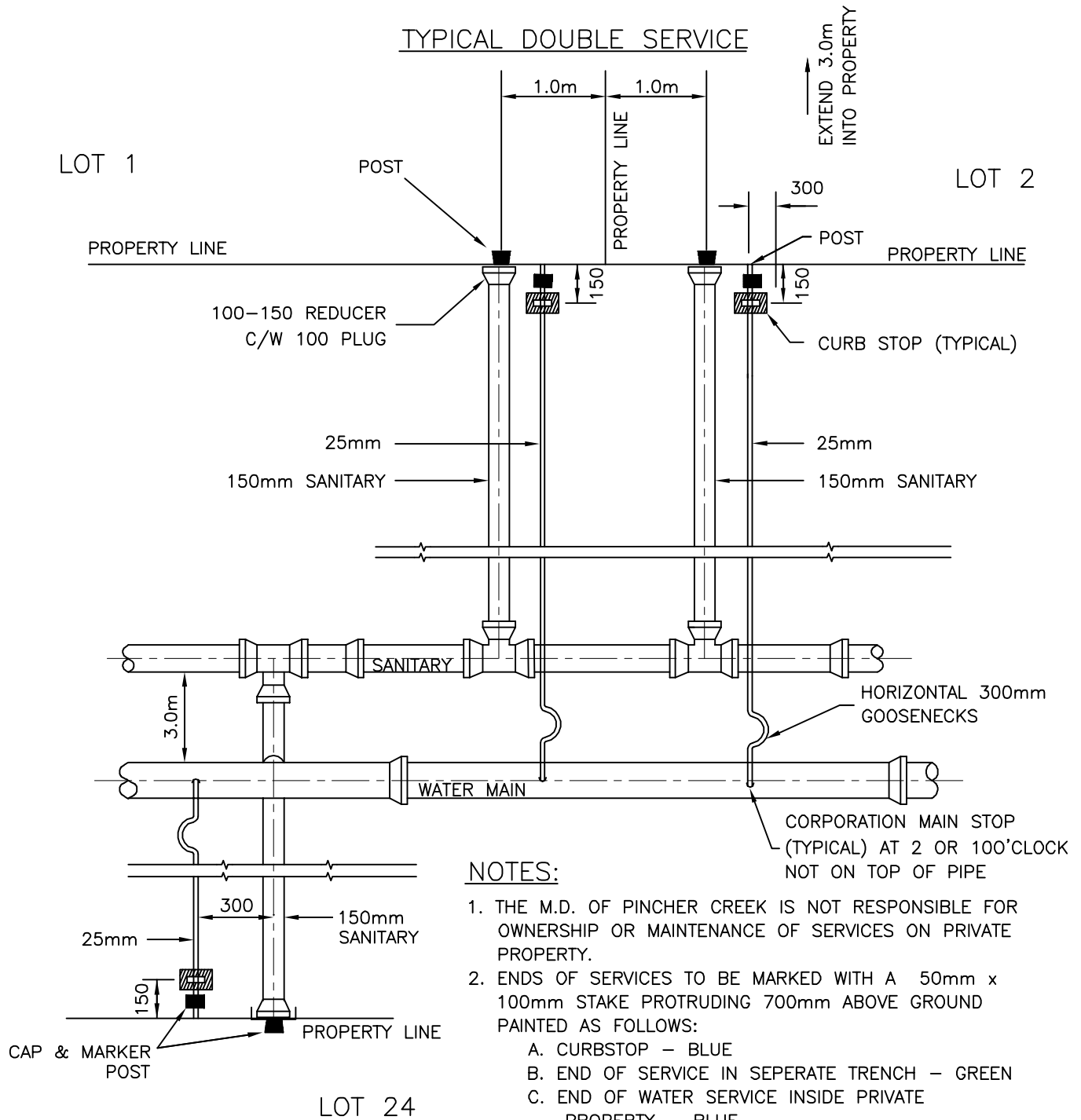


CONCRETE DRAINAGE SWALES

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 6-400
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TYPICAL DOUBLE SERVICE



TYPICAL SINGLE SERVICE

NOTES:

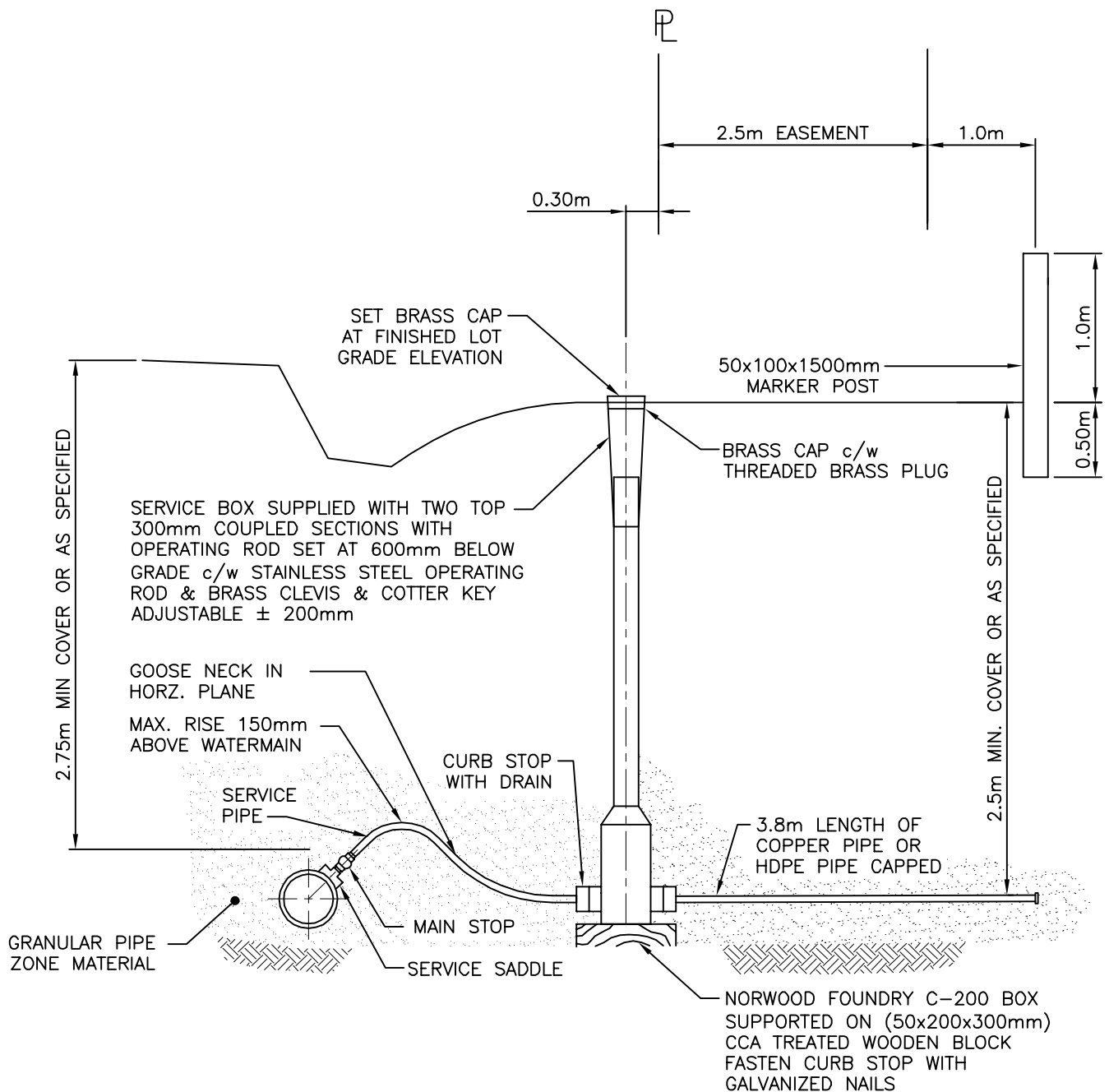
1. THE M.D. OF PINCHER CREEK IS NOT RESPONSIBLE FOR OWNERSHIP OR MAINTENANCE OF SERVICES ON PRIVATE PROPERTY.
2. ENDS OF SERVICES TO BE MARKED WITH A 50mm x 100mm STAKE PROTRUDING 700mm ABOVE GROUND PAINTED AS FOLLOWS:
 - A. CURBSTOP – BLUE
 - B. END OF SERVICE IN SEPERATE TRENCH – GREEN
 - C. END OF WATER SERVICE INSIDE PRIVATE PROPERTY – BLUE
3. WHERE STORM SEWER SERVICE IS TO BE INSTALLED, PLACE 0.3m FROM SANITARY ON FAR SIDE FROM WATER.
4. SEWER SERVICES MUST BE PROPERLY CAPPED.
5. ALL DIMENSIONS GIVEN IN MILLIMETRES UNLESS OTHERWISE STATED.
6. THE M.D. OF PINCHER CREEK MAY REQUIRE ALTERNATE PLACEMENT OF CURB STOP.
7. SINGLE SERVICE TO ENTER LOT WITHIN 2.25m OF CENTER.



SINGLE AND DOUBLE SERVICE LAYOUT

STANDARD DETAILS

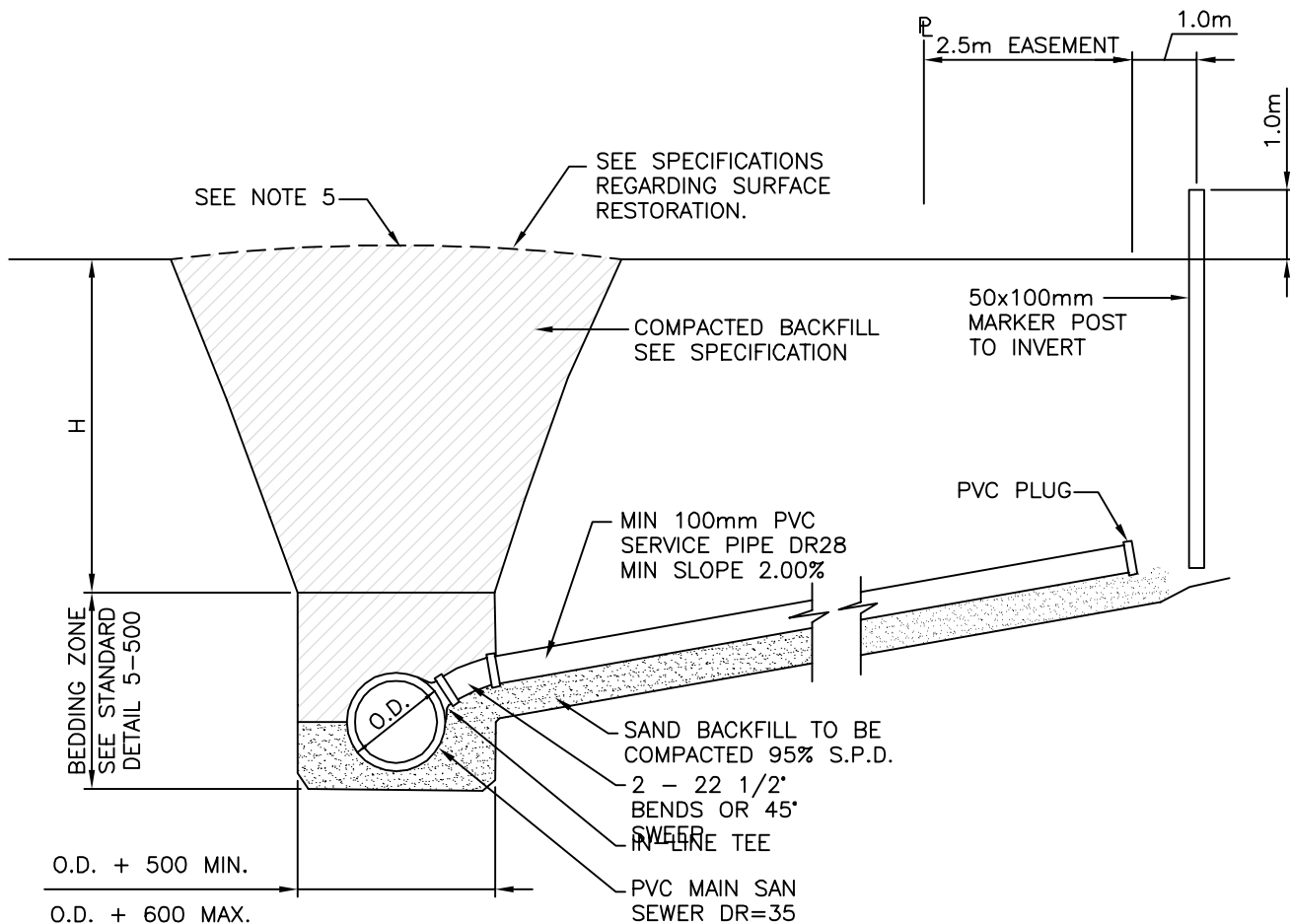
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
Drawing No.			7-100



TYPICAL WATER SERVICE CONNECTION

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 7-101
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NOTES:

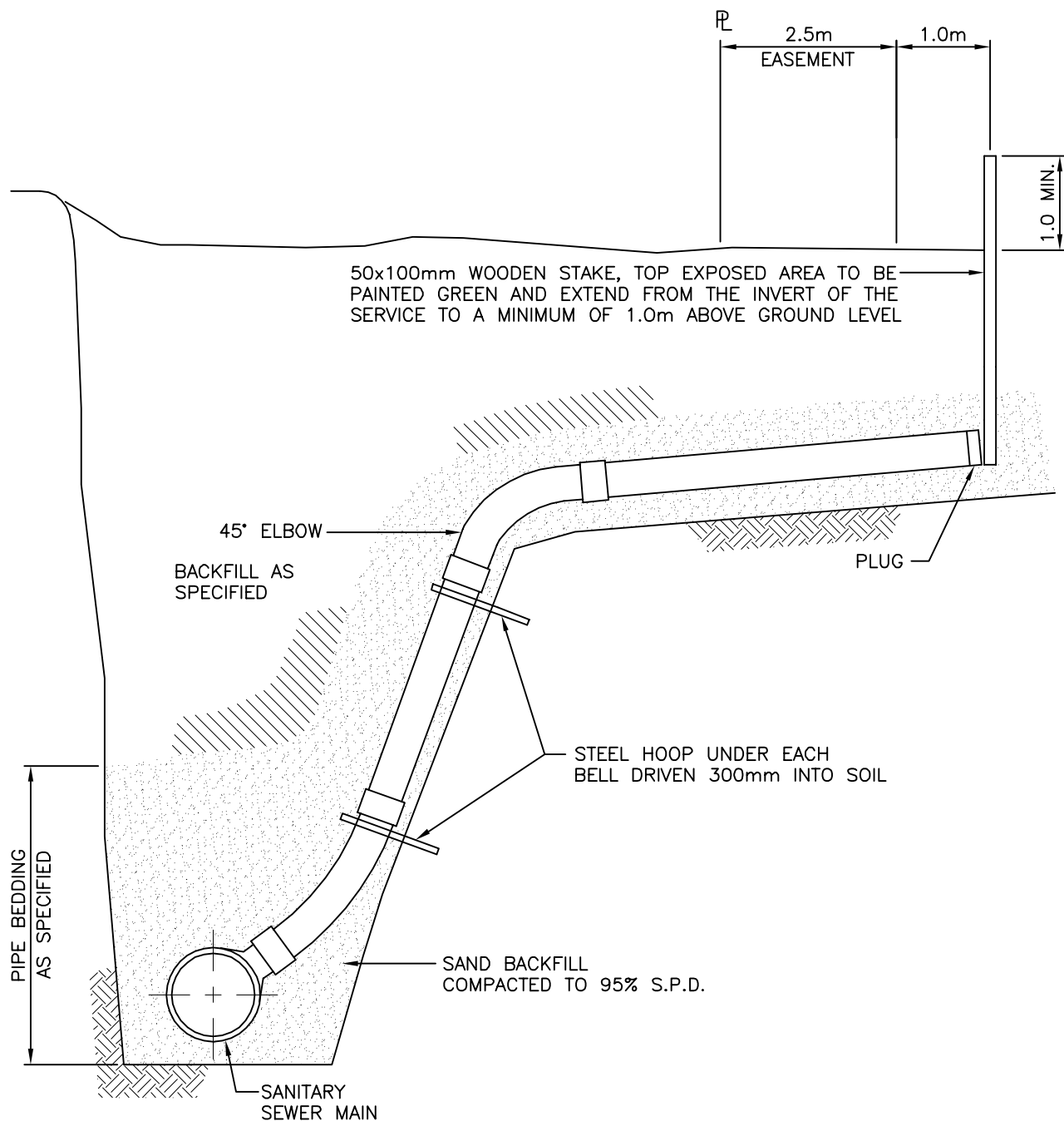
1. WHEN CUT BACK SLOPES ARE TO BE USED IN LIEU OF CAGES AND SHORING, THESE SLOPES ARE TO MEET REQUIREMENTS OF LOCAL CODES.
2. SEE SPECIFICATIONS FOR MINIMUM COVER ABOVE PIPE.
3. MIN. PIPE ZONE WIDTH IS SPECIFIED TO ALLOW PROPER PIPE ZONE COMPACTION.
4. O.D. = OUTSIDE PIPE DIAMETER.
5. FOR UNCOMPACTED BACKFILL, CROWN TRENCH BY $0.1 \times H$.



TYPICAL SANITARY SERVICE CONNECTION

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
		Drawing No. 7-102	



NOTES:

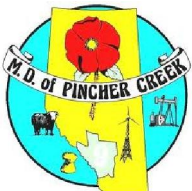
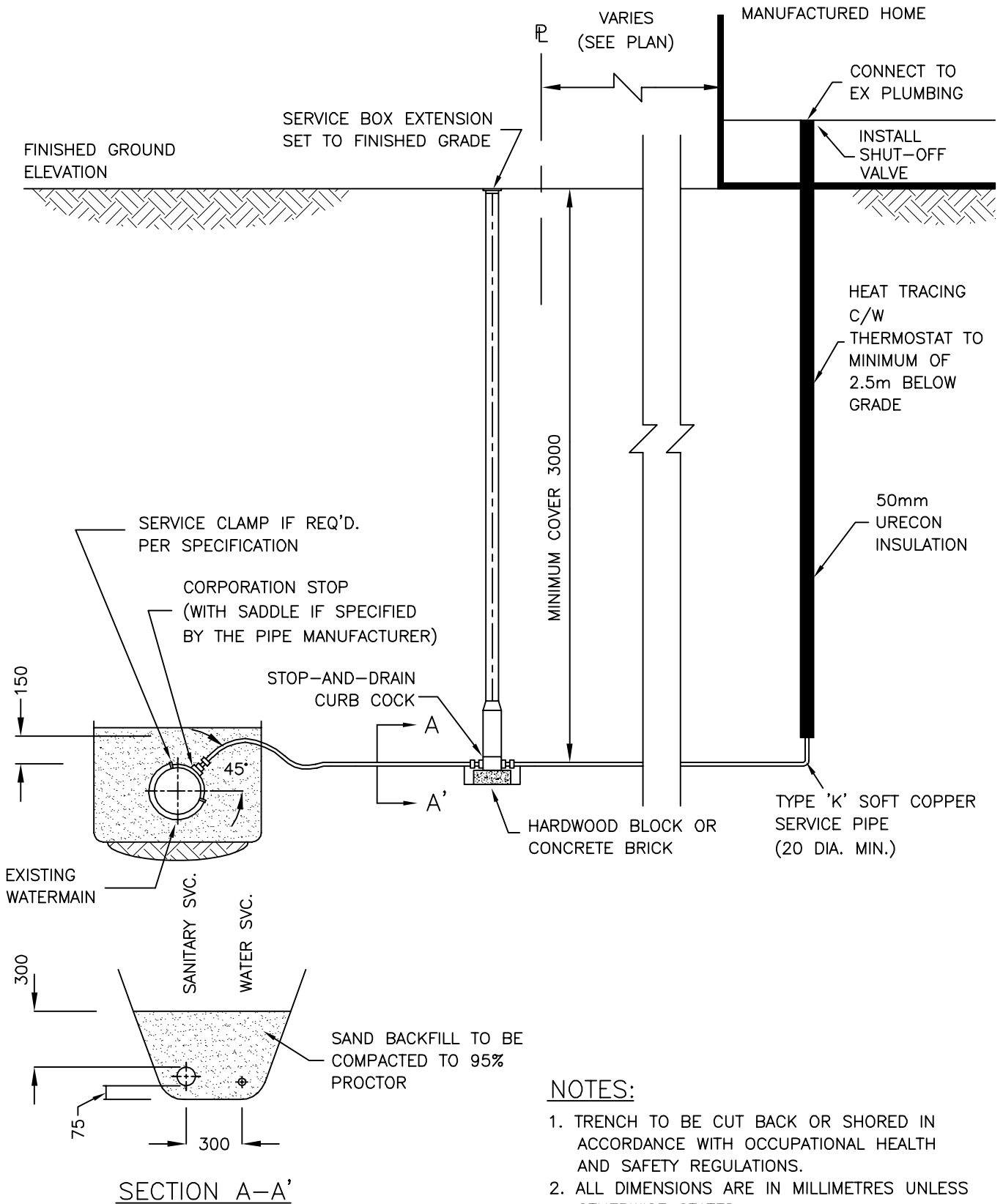
1. WHEN CUT BACK SLOPES ARE TO BE USED IN LIEU OF CAGES AND SHORING. THESE SLOPES ARE TO MEET REQUIREMENTS OF LOCAL CODES.
2. MINIMUM COVER ABOVE PIPE 2.5m.
3. MINIMUM PIPE WIDTH IS SPECIFIED TO ALLOW PROPER PIPE ZONE COMPACTION.
4. FOR UNCOMPACTIONED BACKFILL, CROWN TRENCH BY H X 0.1



TYPICAL STANDARD RISER DETAIL

STANDARD DETAILS

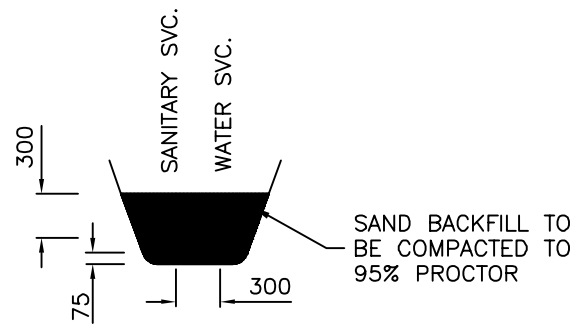
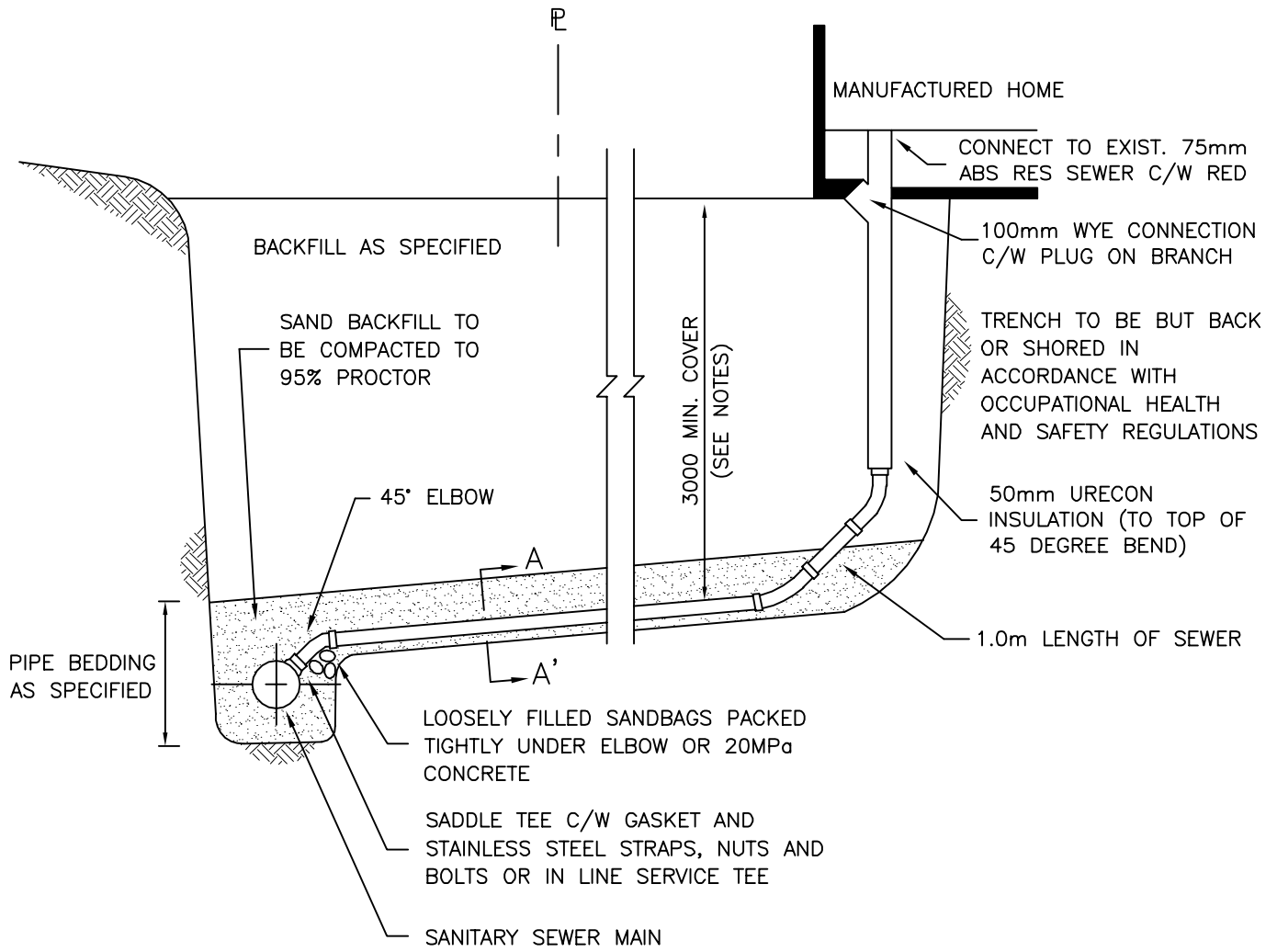
Date:	Drawn By:	Checked By:	Scale:	Drawing No.
OCTOBER, 2013	RS		NTS	7-103



WATER SERVICE CONNECTION MANUFACTURED HOME

STANDARD DETAILS

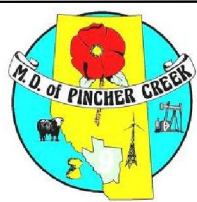
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 7-200
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SECTION A

NOTES:

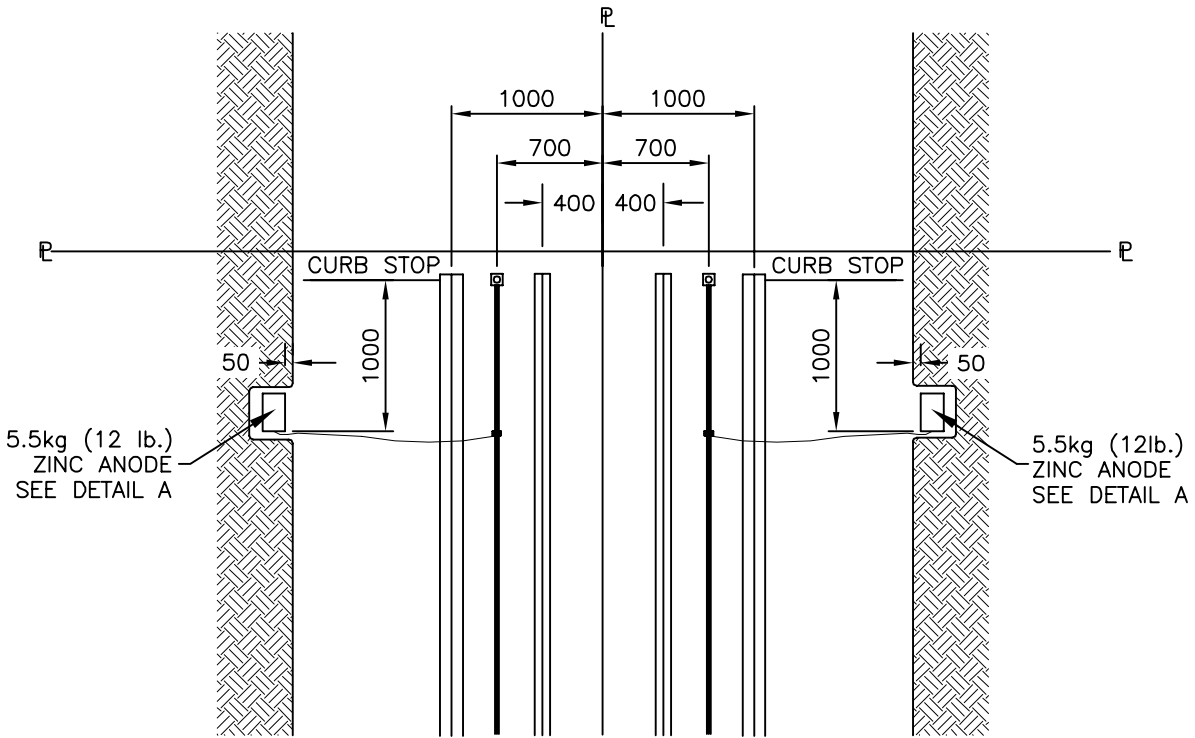
1. MIN. SLOPE FOR 100mm DIA. PIPE IS 2%.
2. SERVICE CONNECTIONS SHALL BE 100mm UNLESS SPECIFICALLY SHOWN ON THE DRAWINGS.
3. 50mm URECON INSULATION WILL BE REQUIRED.
4. TRENCH TO BE CUT BACK OR SHORED IN ACCORDANCE WITH OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED.



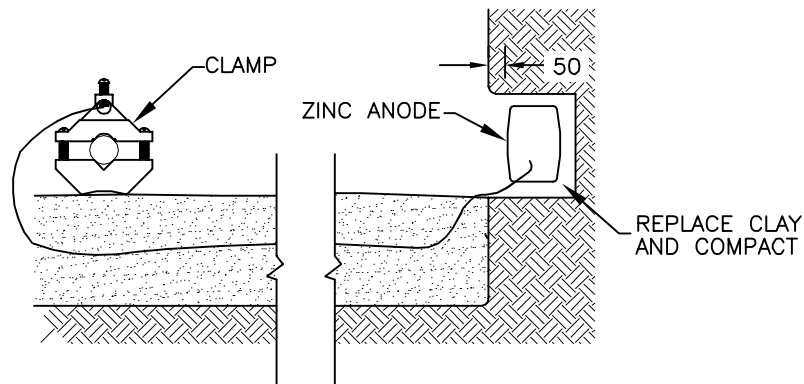
SANITARY SERVICE CONNECTION MANUFACTURED HOME

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
			Drawing No. 7-201



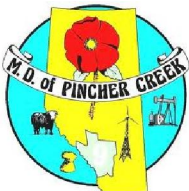
PLAN VIEW



DETAIL A

NOTES:

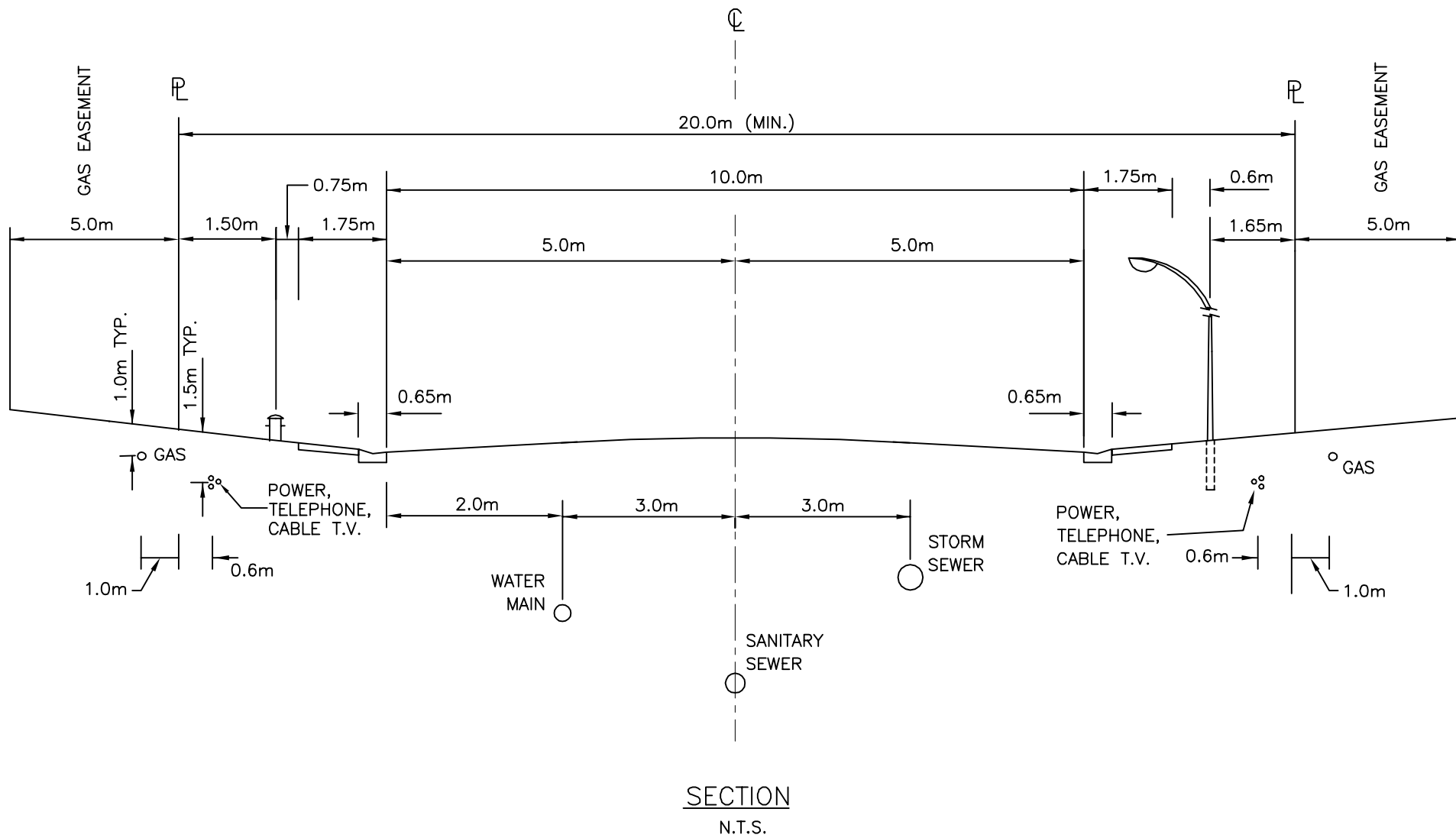
1. PIPE CLAMP TO BE ALL BRASS OR APPROVED EQUIVALENT
2. ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm COMPACTED SOIL COMPLETELY AROUND ANODES.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.



ANODE ON 50mm AND SMALLER COPPER WATER SERVICE

STANDARD DETAILS

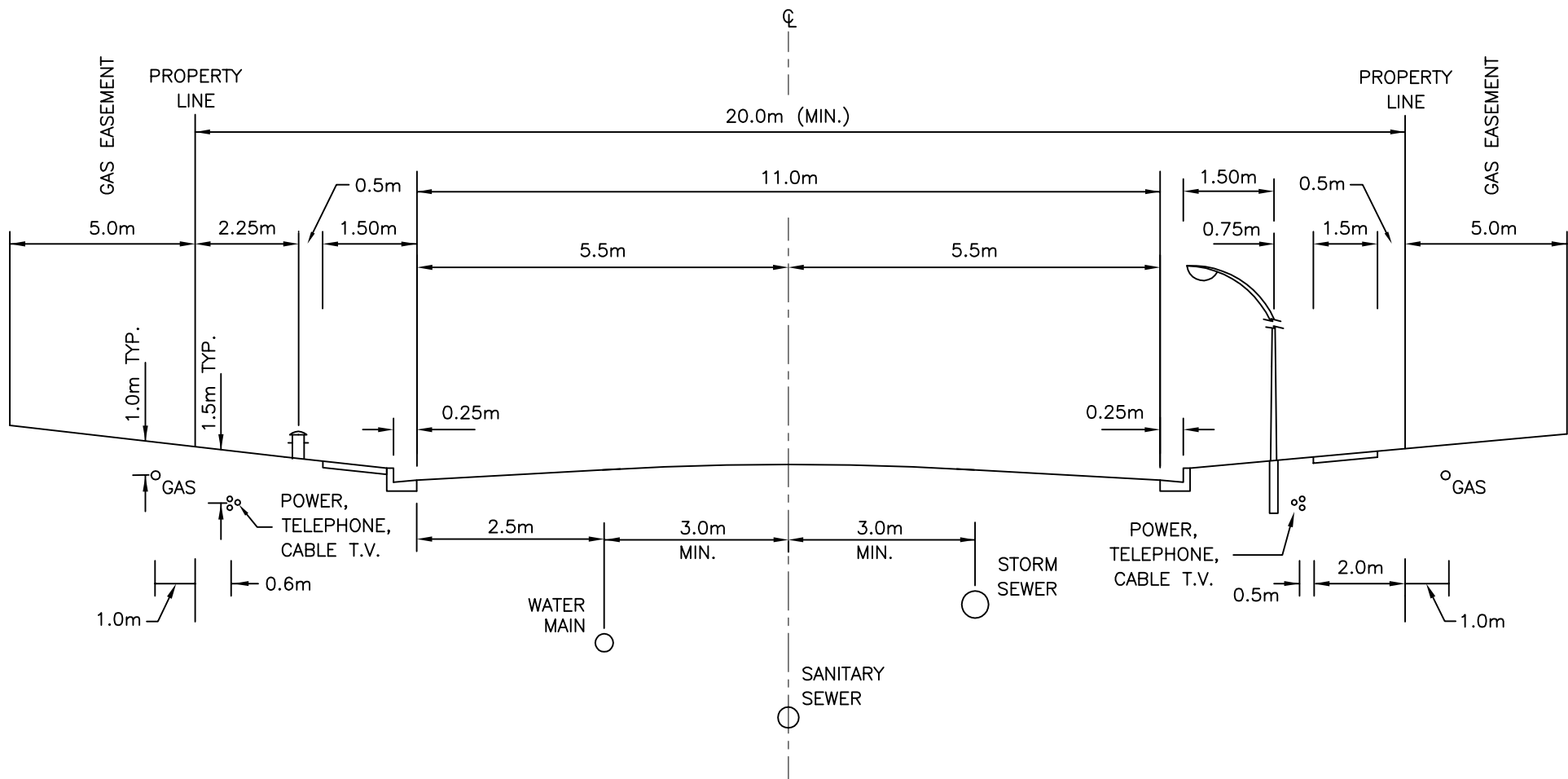
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 7-300
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LOCAL RESIDENTIAL (URBAN)

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
			Drawing No. 8-100



SECTION

NOTES:

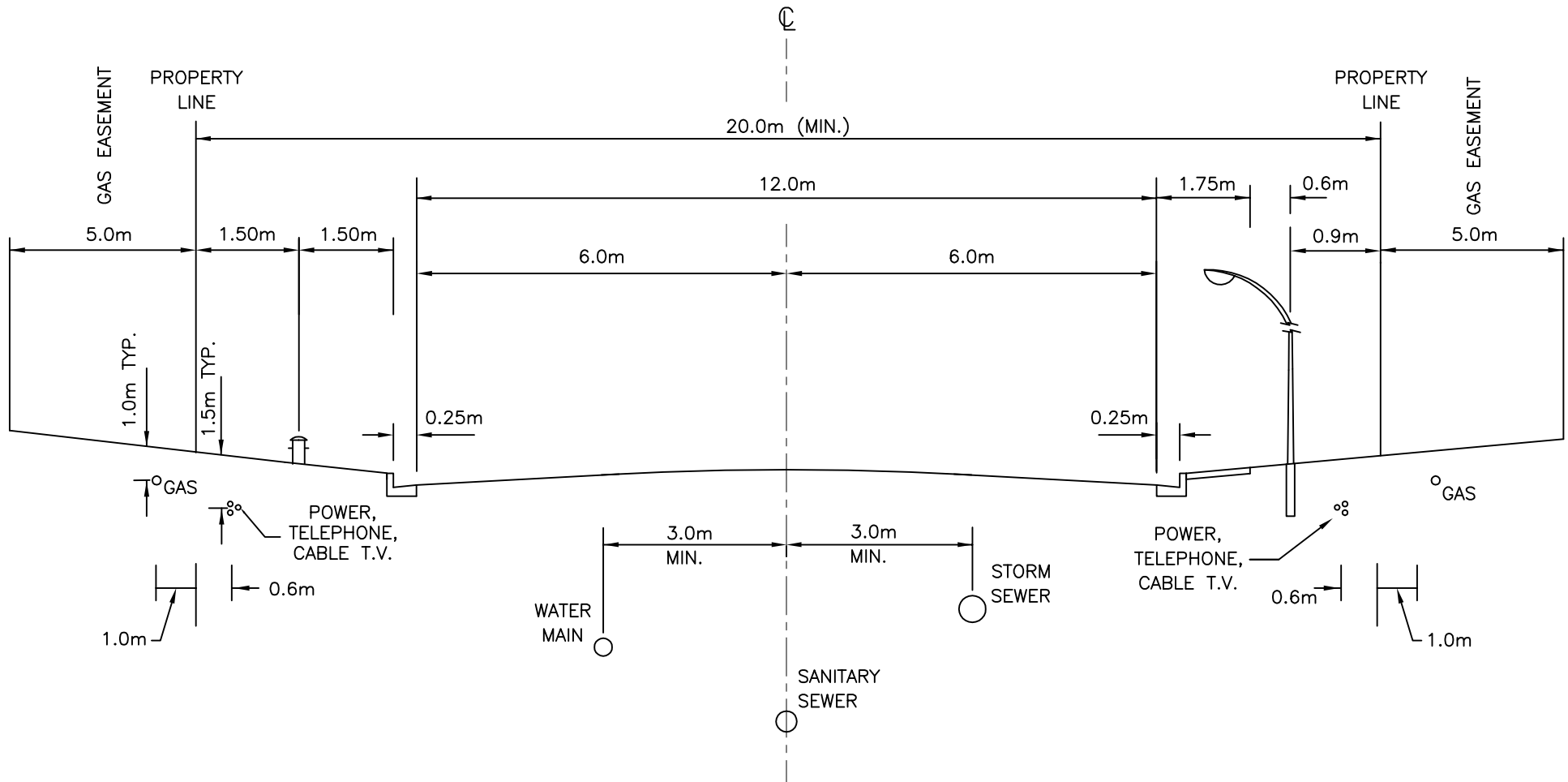
1. SIDEWALK MAY BE EITHER SEPERATE OR MONOLITHIC AS REQUIRED BY THE M.D. OF PINCHER CREEK.
2. IF NO GAS EASEMENT, CURB STOP TO BE INSTALLED 0.15m INSIDE ROAD RIGHT-OF-WAY.



RESIDENTIAL COLLECTOR (URBAN)

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-102
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SECTION
N.T.S

NOTES:

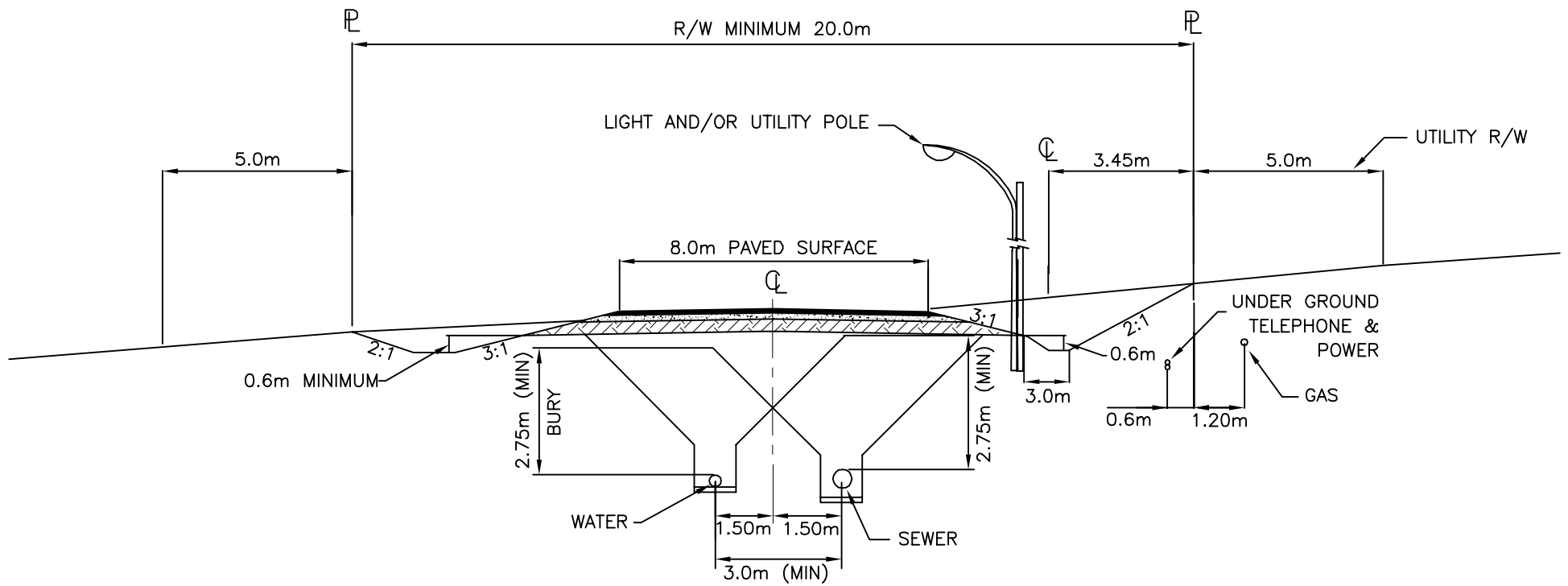
1. SIDEWALK MAY BE EITHER SEPERATE OR MONOLITHIC AS REQUIRED BY THE M.D. OF PINCHER CREEK.



LOCAL INDUSTRIAL (URBAN)

STANDARD DETAILS

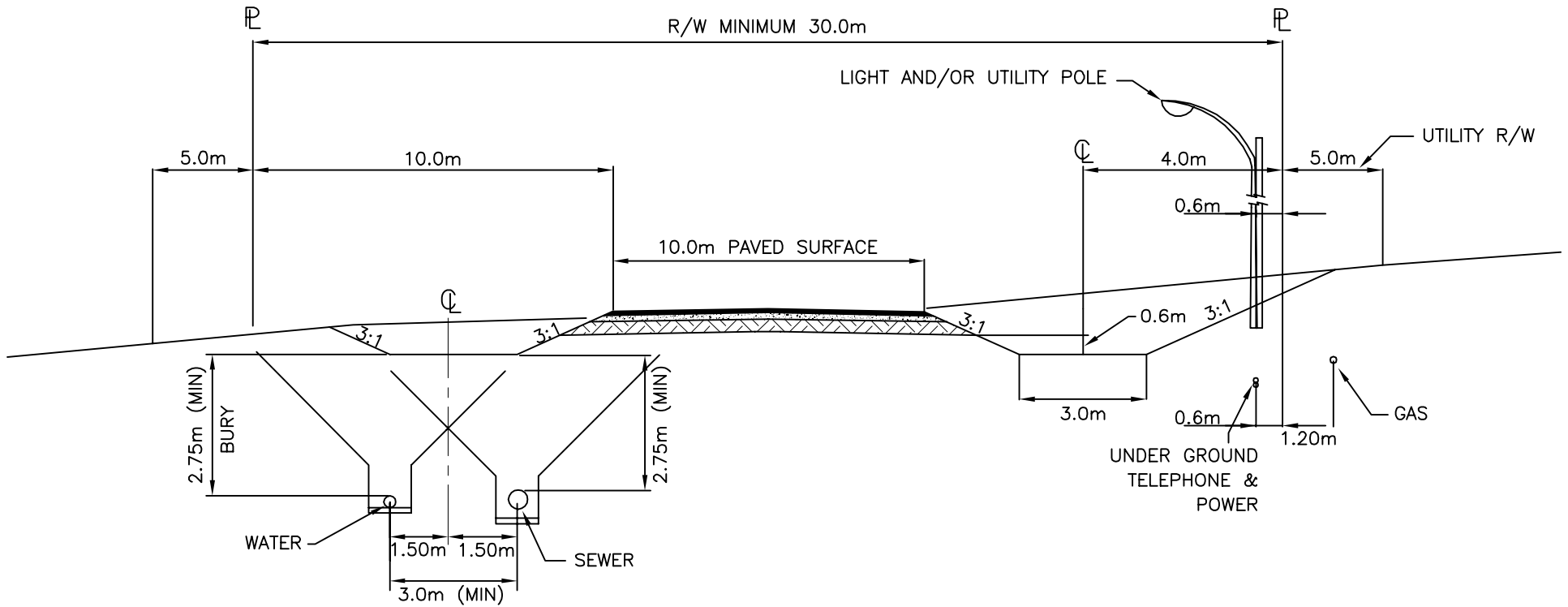
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-103
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RURAL SUBDIVISION RESIDENTIAL - 20.0m R/W

STANDARD DETAILS

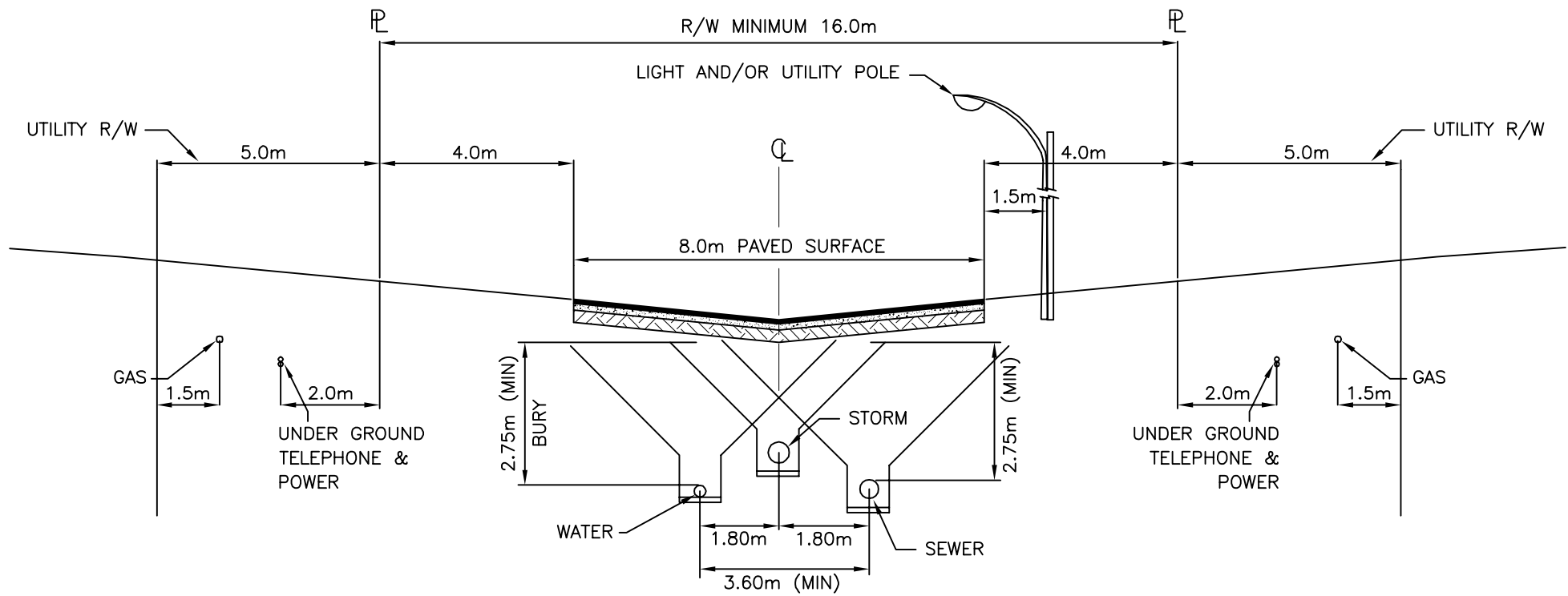
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-104
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RURAL SUBDIVISION INDUSTRIAL - 30.0m R/W (UTILITIES BELOW DITCH)

STANDARD DETAILS

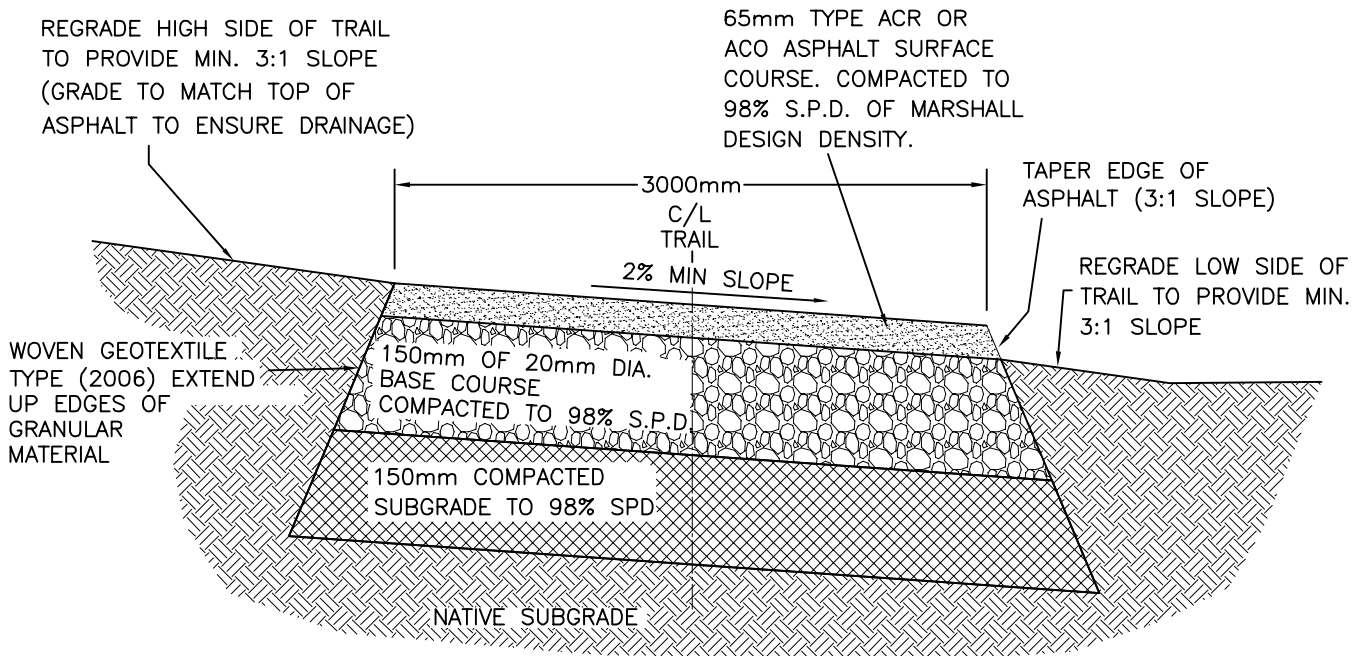
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-105
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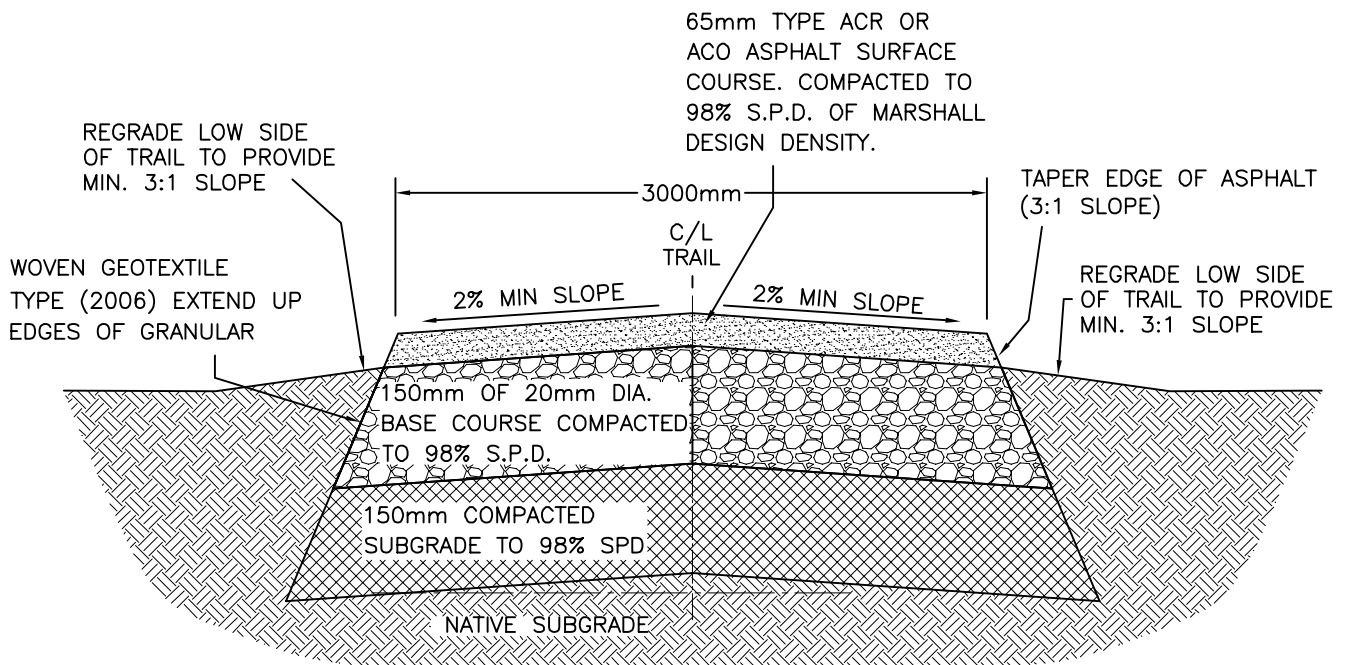
RV RESORT CROSS SECTION

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-106
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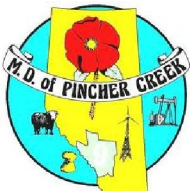
TYPICAL TRAIL SECTION – CROSSFALL
NTS



TYPICAL TRAIL SECTION – CROWN
NTS

NOTES:

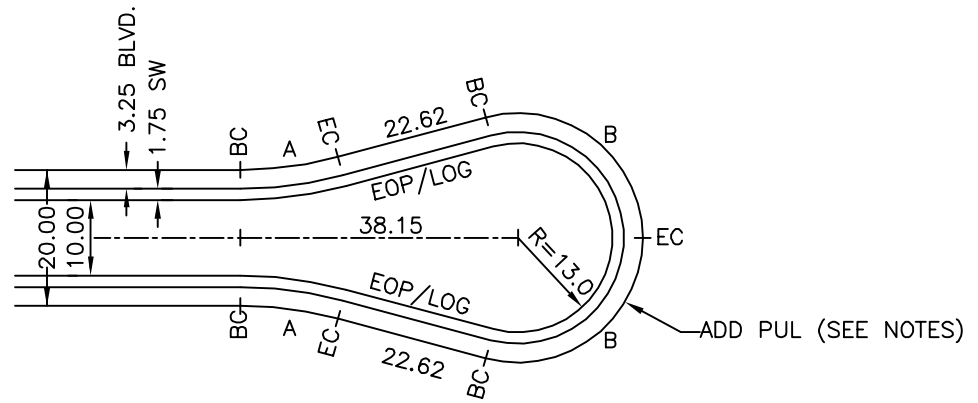
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. MAKE ALL JOINTS WITH EXISTING VEGETATION SMOOTH AND CONTINUOUS, WHERE NECESSARY TRIM BACK ROOTS AND CLEAR DEBRIS
3. WHERE THE M.D. CHOOSES TO DELETE ASPHALT, INCREASE GRAVEL THICKNESS ACCORDINGLY. MAINTAIN GRADE AS SHOWN.



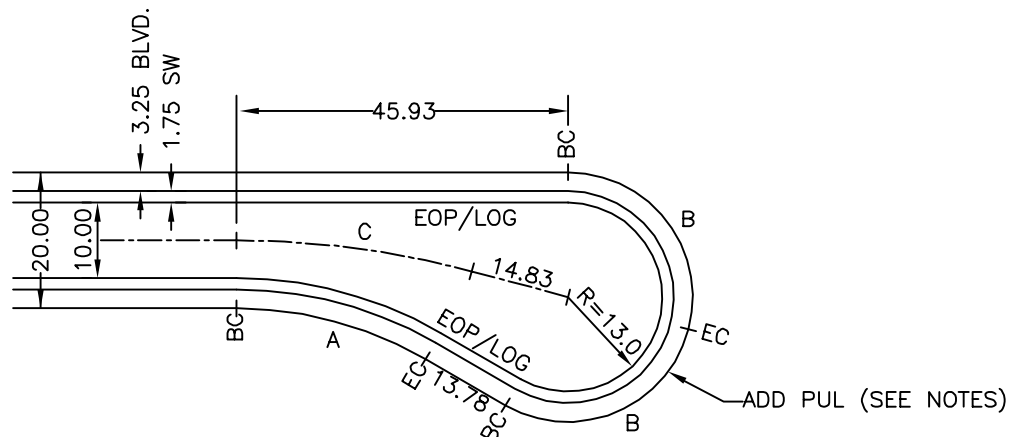
TYPICAL TRAIL CROSS-SECTIONS

STANDARD DETAILS

Date:	Drawn By:	Checked By:	Scale:	Drawing No.
OCTOBER, 2013	RS		NTS	8-107



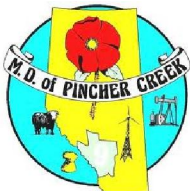
CURVE "A"	CURVE "B"
$\Delta = 15^{\circ}00'00''$	$\Delta = 105^{\circ}00'00''$
$R = 50.00$	$R = 18.0$
ARC = 13.09	ARC = 32.99
TAN = 6.58	TAN = 23.46
(at property line)	(at property line)



CURVE "A"	CURVE "B"	CURVE "C"
$\Delta = 30^{\circ}00'00''$	$\Delta = 105^{\circ}00'00''$	$\Delta = 15^{\circ}00'00''$
$R = 50.00$	$R = 18.0$	$R = 122.11$
ARC = 26.18	ARC = 32.99	ARC = 31.97
TAN = 13.40	TAN = 23.46	TAN = 16.08
(at property line)	(at property line)	

NOTES:

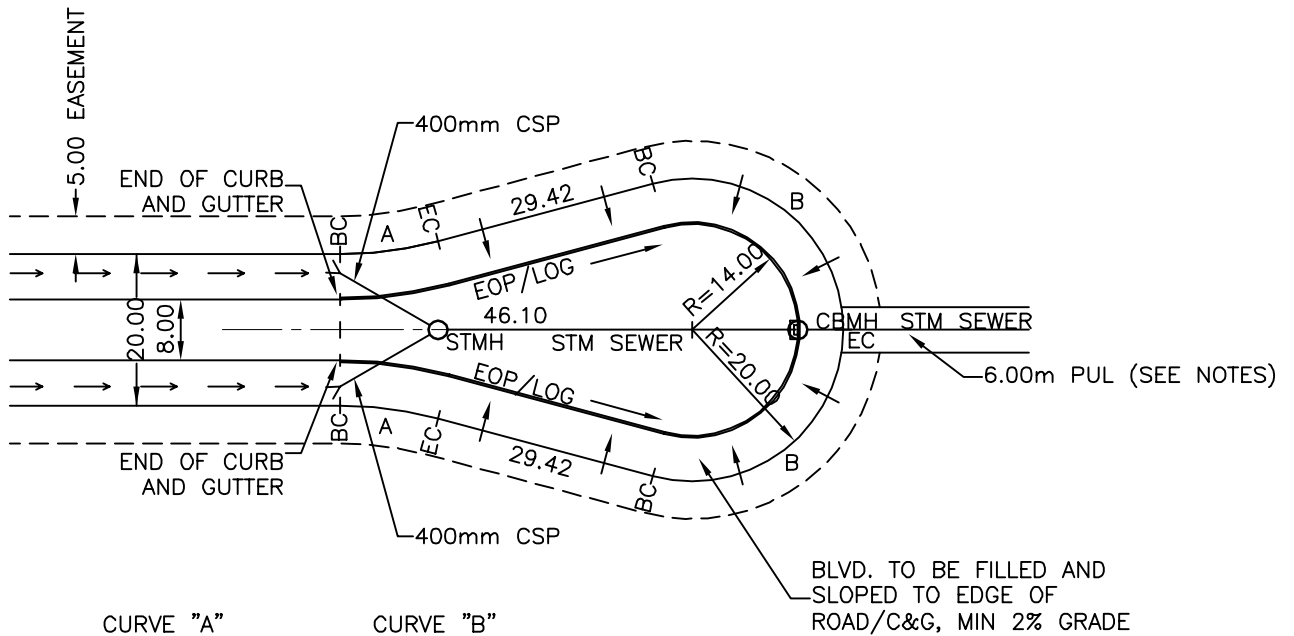
1. A PUL WITH A WIDTH NO LESS THAN 5.0m MUST BE ADDED TO ALLOW FOR SNOW MOVEMENT AND STORAGE
2. THE CURB AND GUTTER MUST BE DEPRESSED AT THE PUL TO ALLOW FOR SNOW MOVEMENT



LOCAL RESIDENTIAL CUL-DE-SAC CURB & GUTTER

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
			Drawing No. 8-108



CURVE "A"
 $\Delta = 15^{\circ}00'00''$
 $R = 50.00$
 $ARC = 13.09$
 $TAN = 6.58$
 (at property line)

CURVE "B"
 $\Delta = 105^{\circ}00'00''$
 $R = 20.00$
 $ARC = 36.65$
 $TAN = 26.06$
 (at property line)

NOTES:

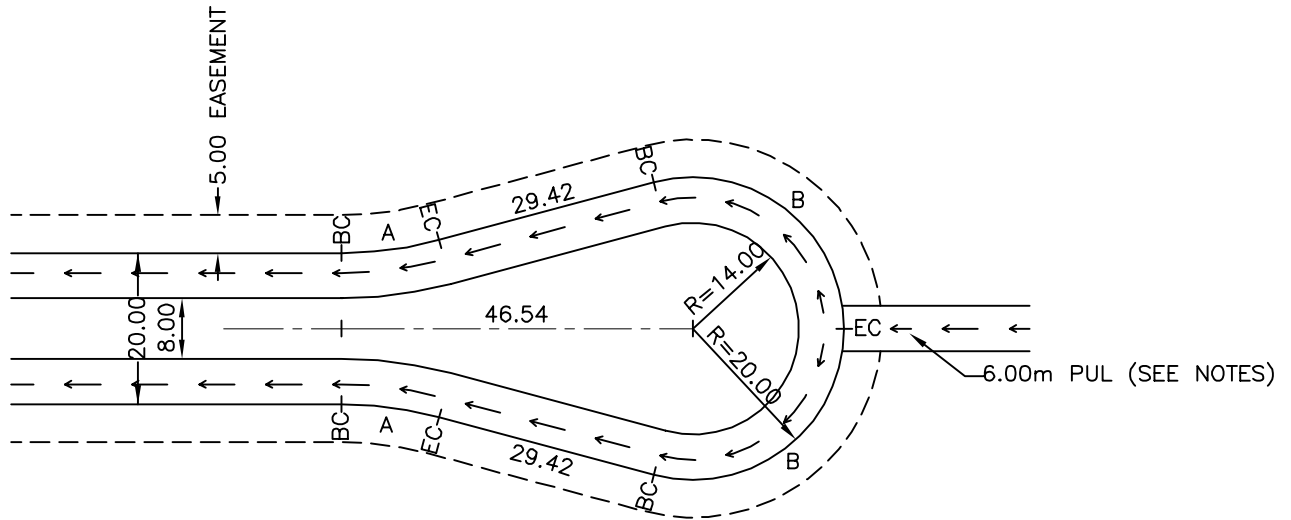
1. A PUL WITH A WIDTH NO LESS THAN 6.0m MUST BE PROVIDED TO ALLOW FOR STORM DRAINAGE IF THE CUL-DE-SAC CAN NOT BE GRADED TO DRAIN TOWARDS THE INTERSECTION.
2. LOG = LIP OF GUTTER



URBAN RESIDENTIAL CUL-DE-SAC DOWNHILL DRAINAGE

STANDARD DETAILS

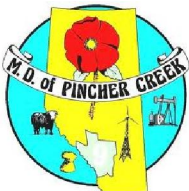
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
			Drawing No. 8-109



CURVE "A"	CURVE "B"
$\Delta = 15^{\circ}00'00''$	$\Delta = 105^{\circ}00'00''$
R = 50.00	R = 20.00
ARC = 13.09	ARC = 36.65
TAN = 6.58	TAN = 26.06
(at property line)	(at property line)

NOTES:

1. A PUL WITH A WIDTH NO LESS THAN 6.0m MUST BE PROVIDED TO ALLOW FOR STORM DRAINAGE IF THE CUL-DE-SAC CAN NOT BE GRADED TO DRAIN TOWARDS THE INTERSECTION.

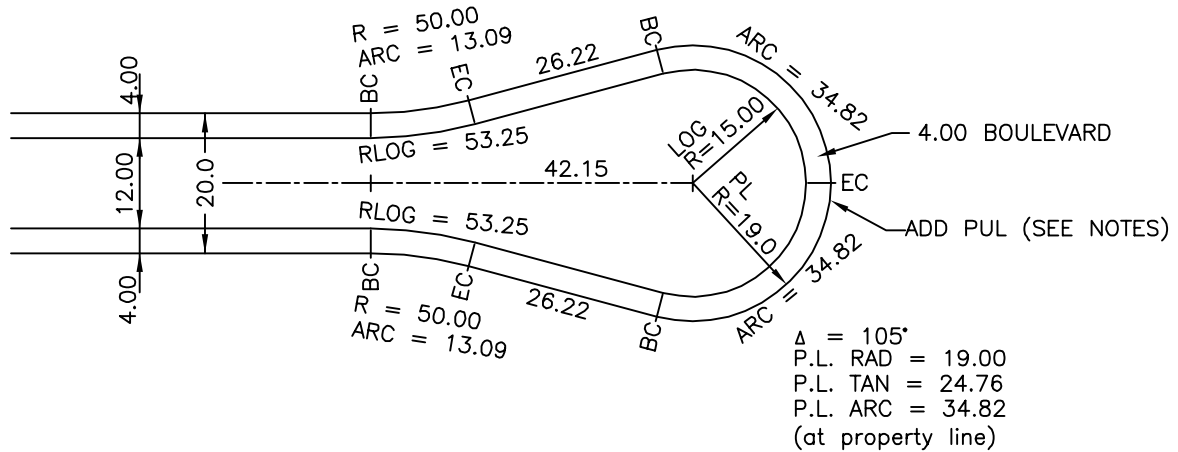


URBAN RESIDENTIAL CUL-DE-SAC UPHILL DRAINAGE

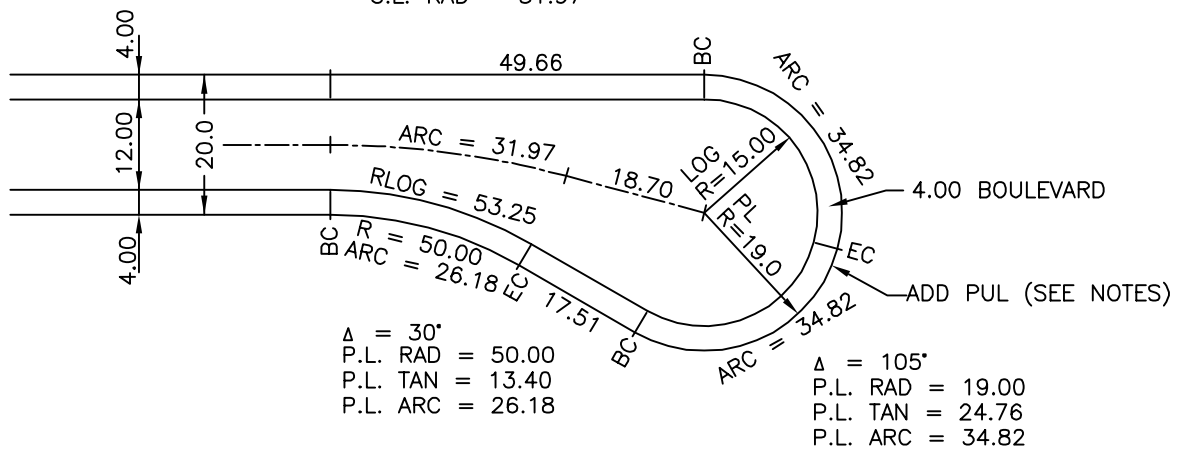
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-110
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$\Delta = 15^\circ$
 P.L. RAD = 20.0
 P.L. TAN = 6.58
 P.L. ARC = 13.09
 (at property line)



$\Delta = 15^\circ$
 C.L. RAD = 122.11
 C.L. TAN = 16.08
 C.L. RAD = 31.97



NOTES:

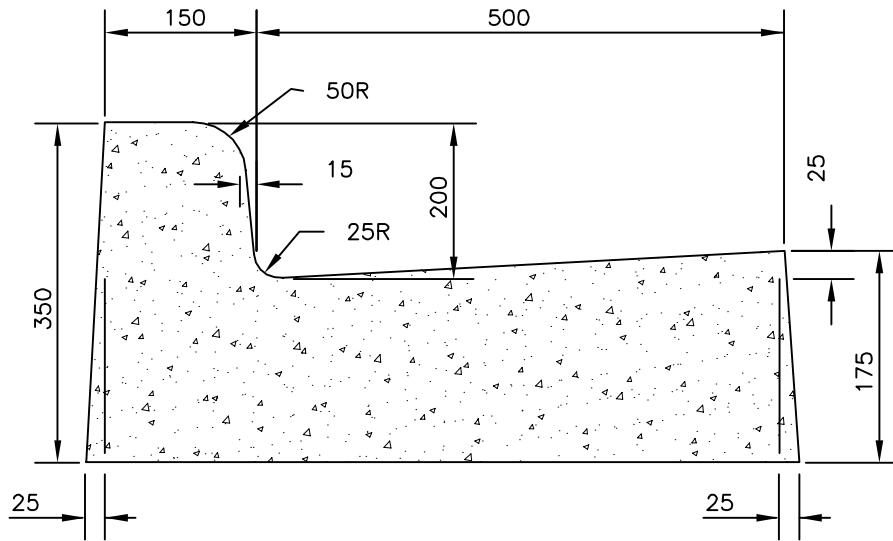
1. A PUL WITH A WIDTH NO LESS THAN 5.0m MUST BE ADDED TO ALLOW FOR SNOW MOVEMENT AND STORAGE
2. THE CURB AND GUTTER MUST BE DEPRESSED AT THE PUL TO ALLOW FOR SNOW MOVEMENT
3. LOG = LIP OF GUTTER



**LOCAL INDUSTRIAL / COMMERCIAL
CUL-DE-SAC CURB AND GUTTER**

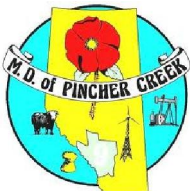
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-111
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NOTES:

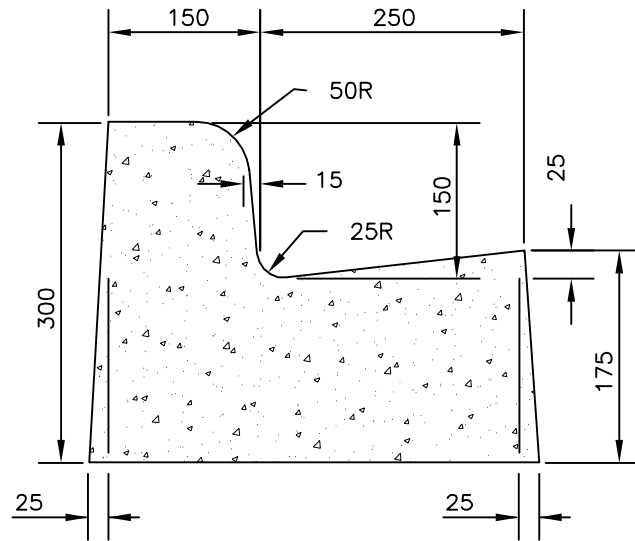
1. 25mm BATTER NOT REQUIRED FOR HANDFORMED.
2. ALL DIMENSIONS IN MILLIMETRES.



500mm CURB & GUTTER FOR ARTERIAL ROADWAYS

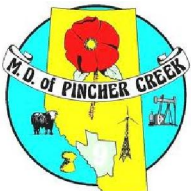
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
			Drawing No. 8-200



NOTES:

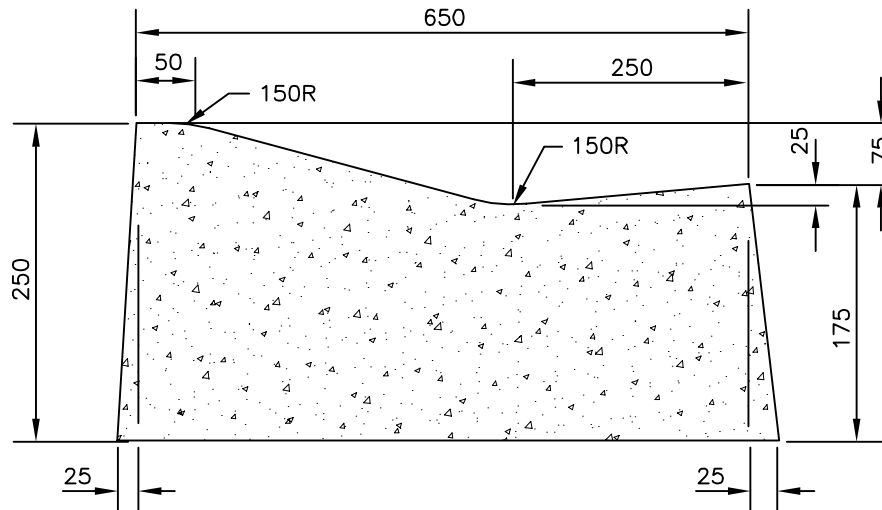
1. 25mm BATTER NOT REQUIRED FOR HANDFORMED.
2. ALL DIMENSIONS IN MILLIMETRES.



250mm STANDARD CURB & GUTTER

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-201
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NOTES:

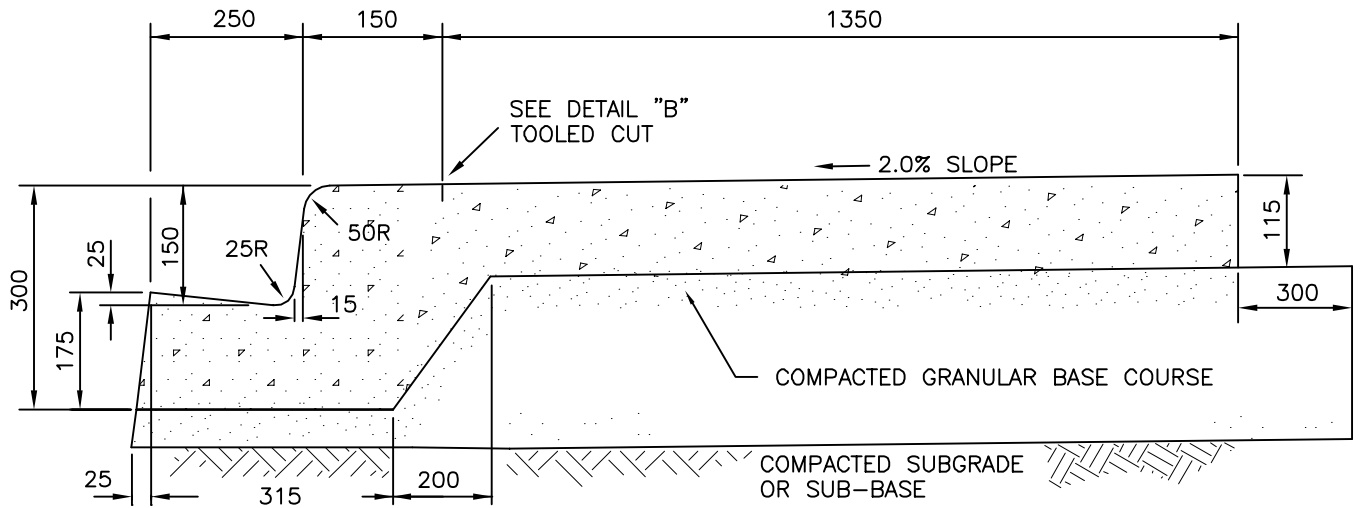
1. 25mm BATTER NOT REQUIRED FOR HANDFORMED.
2. ALL DIMENSIONS IN MILLIMETRES.



250mm ROLLED CURB & GUTTER

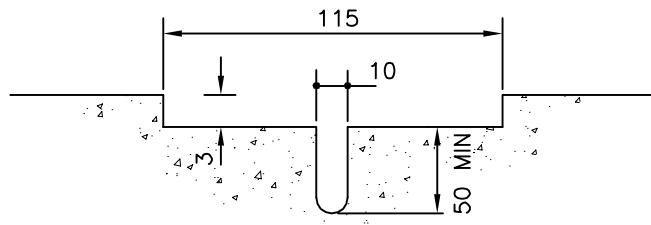
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-202
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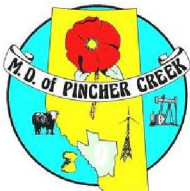


NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETRES.



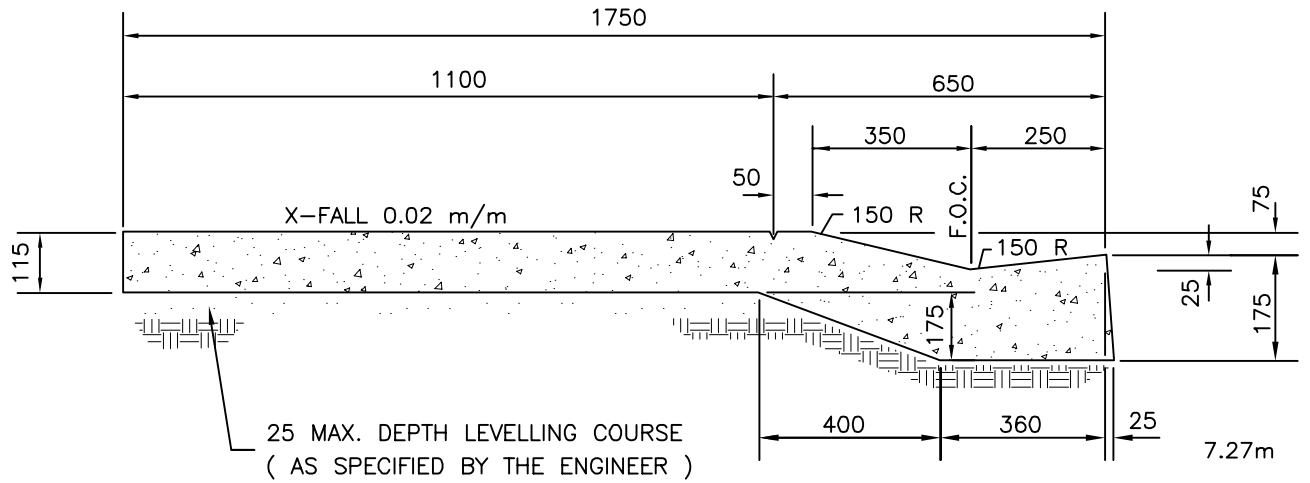
DETAIL "B"



1.50m STANDARD MONOLITHIC SIDEWALK

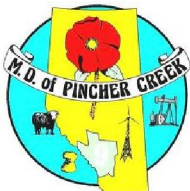
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-203
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NOTES:

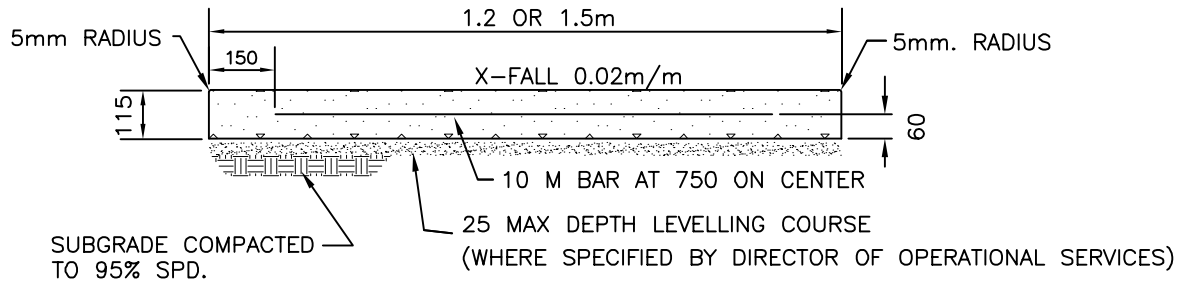
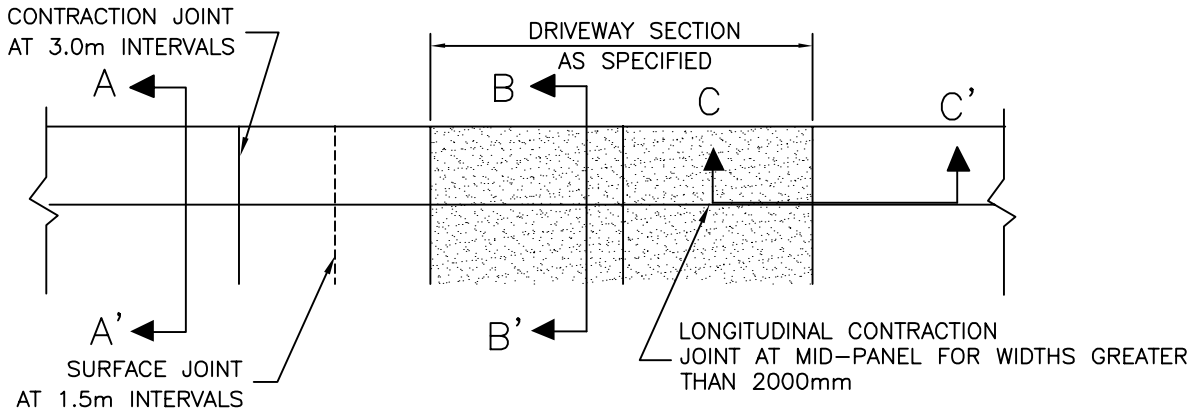
1. 25mm BATTER NOT REQUIRED FOR HANDFORMED.
2. ALL DIMENSIONS IN MILLIMETRES.



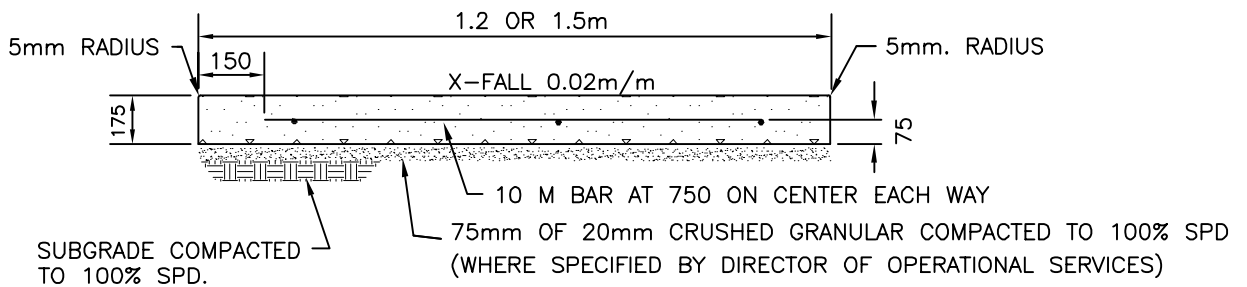
1.50m ROLLED MONOLITHIC SIDEWALK

STANDARD DETAILS

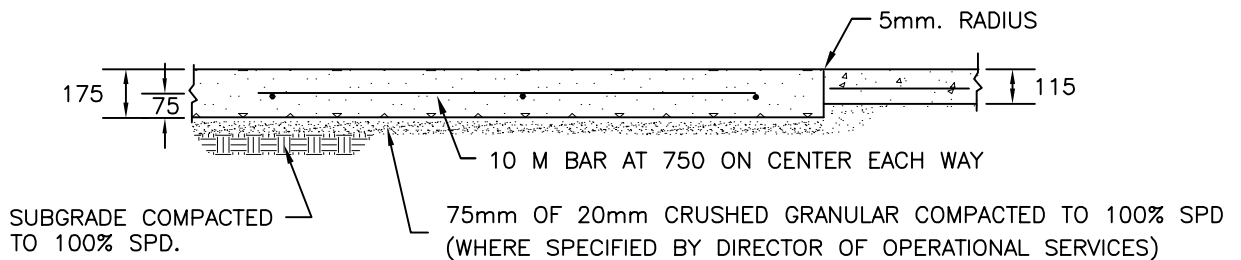
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-204
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SECTION A-A' STANDARD SIDEWALK



SECTION B-B' DRIVEWAY SECTION



SECTION C-C' TRANSITION

NOTE:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.



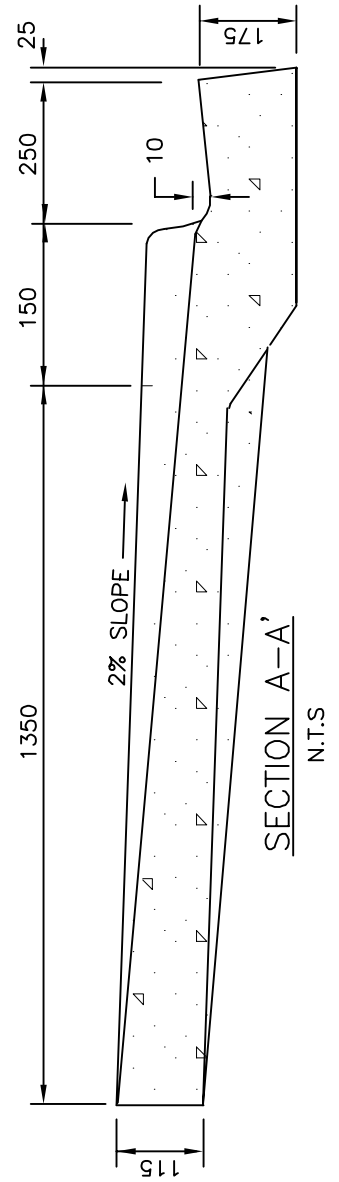
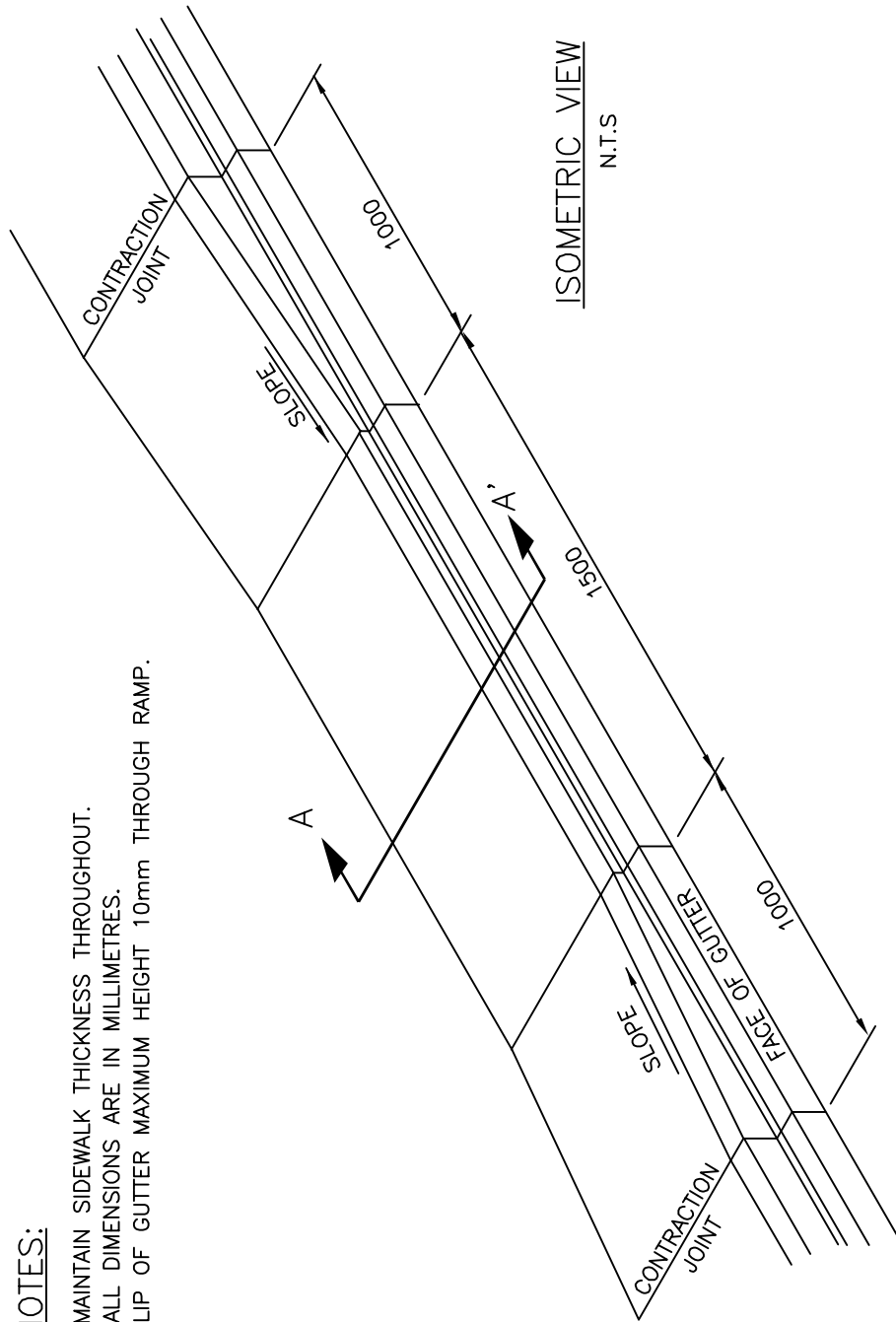
1.20m OR 1.50m SEPERATE SIDEWALK

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-205
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NOTES:

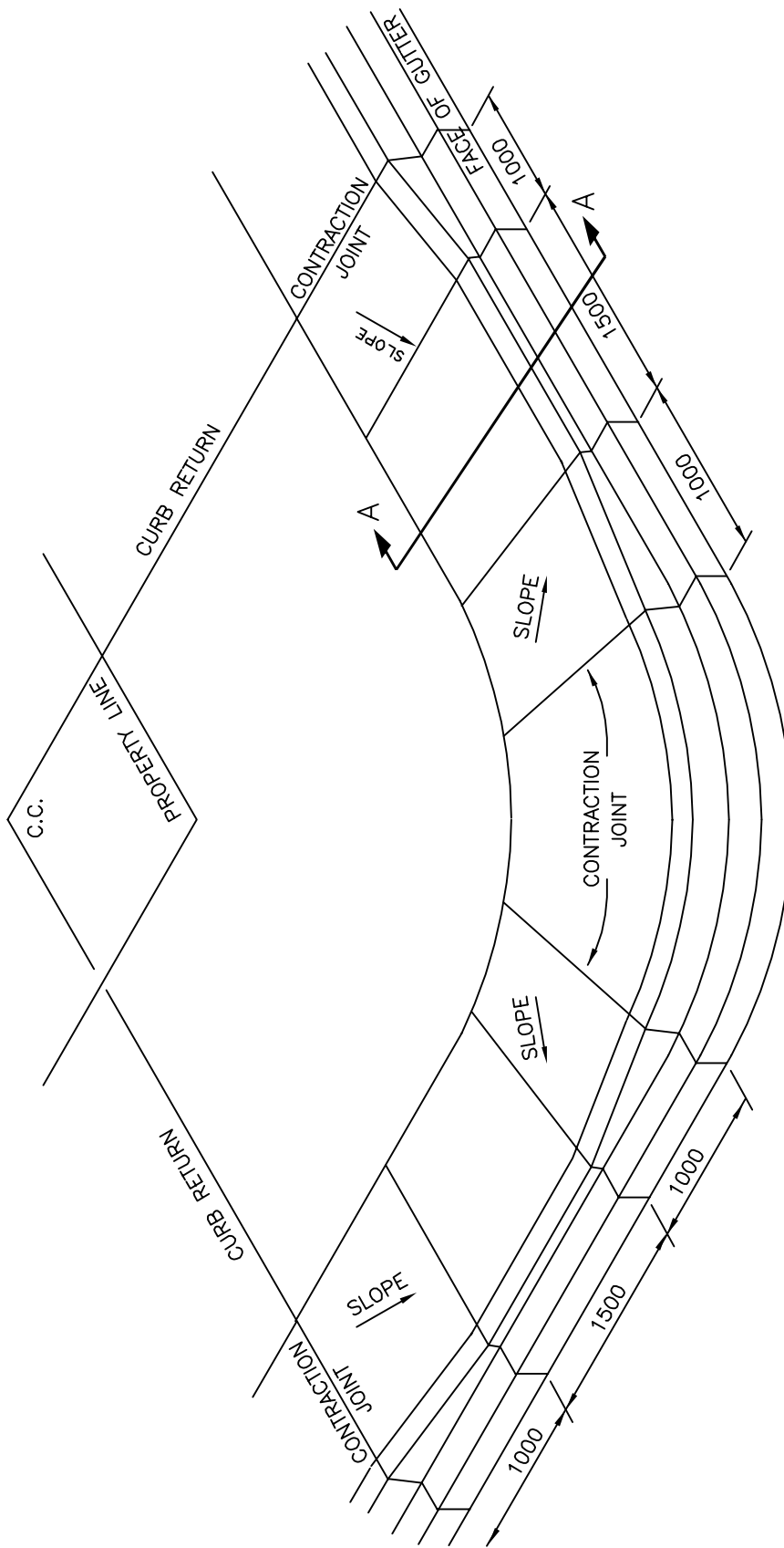
1. MAINTAIN SIDEWALK THICKNESS THROUGHOUT.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. LIP OF GUTTER MAXIMUM HEIGHT 10mm THROUGH RAMP.



WHEEL CHAIR RAMP DETAILS ON TANGENT

STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS
			Drawing No. 8-300

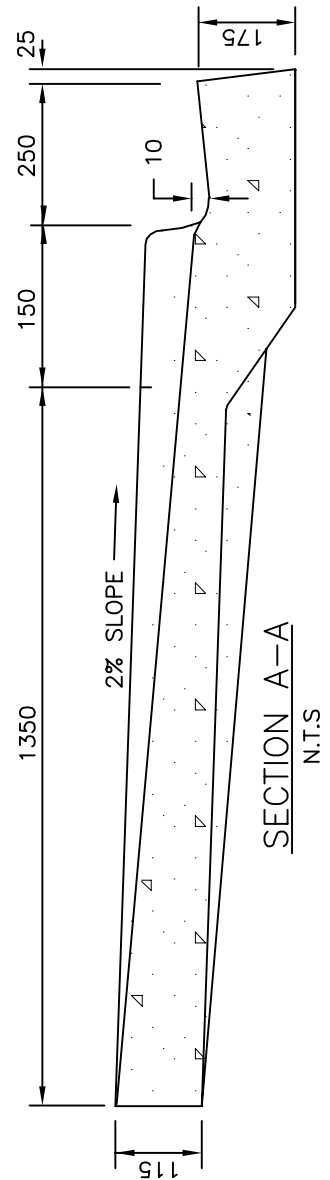


NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. MAINTAIN SIDEWALK DEPTH THROUGHOUT.
3. LIP OF GUTTER MAXIMUM HEIGHT 10mm THROUGH RAMP.

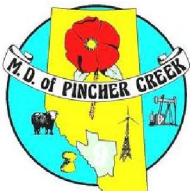
ISOMETRIC VIEW

N.T.S



SECTION A-A

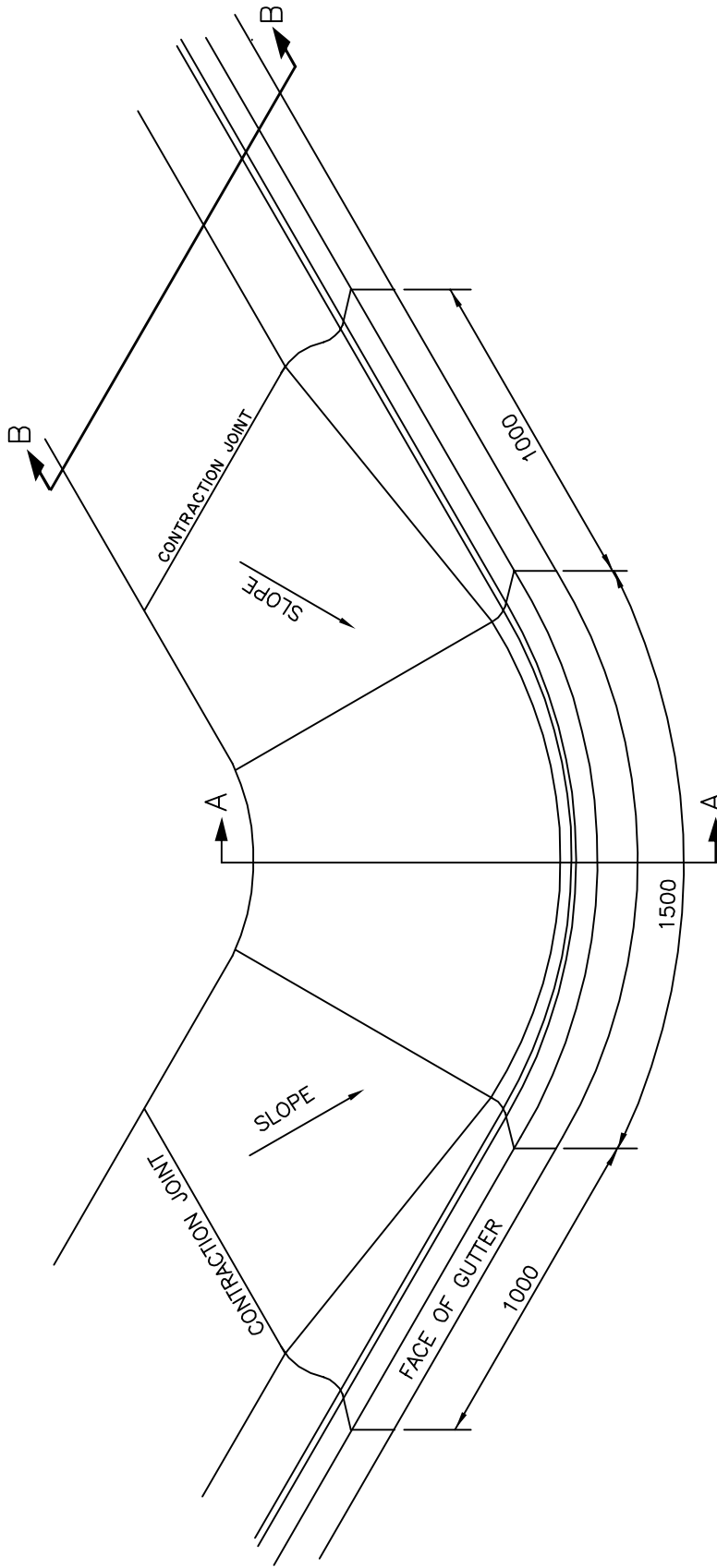
N.T.S



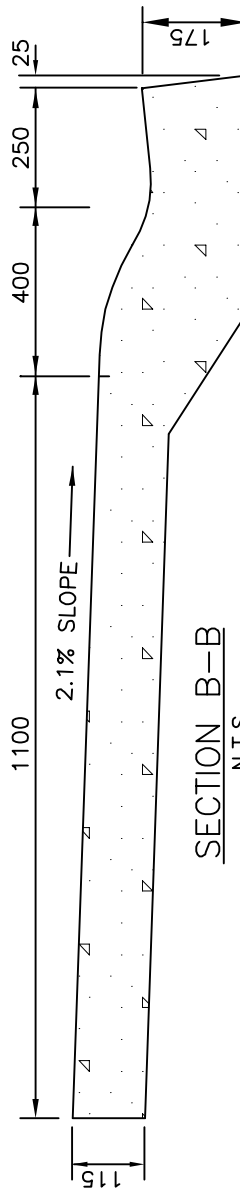
**WHEEL CHAIR RAMP DETAILS
AT BOTH CURB RETURNS**

STANDARD DETAILS

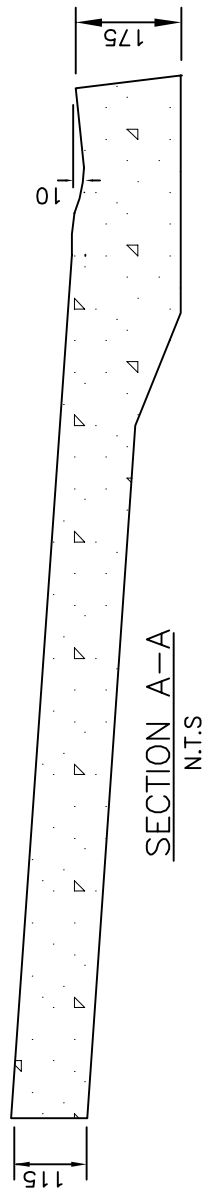
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-301
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ISOMETRIC VIEW
N.T.S



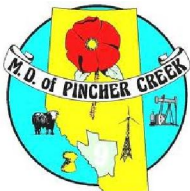
SECTION B-B
N.T.S



SECTION A-A
N.T.S

NOTES:

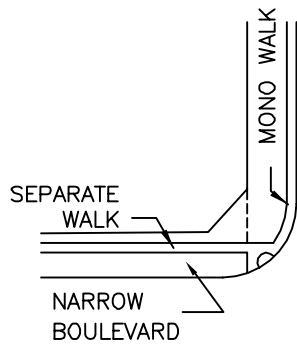
1. MAINTAIN SIDEWALK DEPTH THROUGHOUT.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. LIP OF GUTTER MAXIMUM HEIGHT 10mm THROUGH LIP.



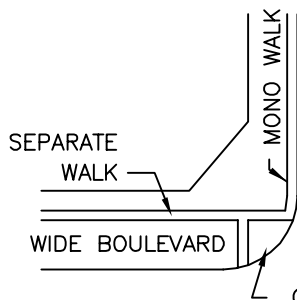
WHEEL CHAIR RAMP DETAILS AT CENTRE OF CURB RETURN-ROLLED CURB

STANDARD DETAILS

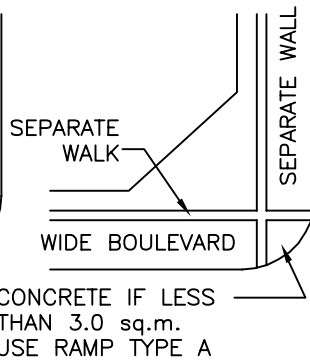
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-302
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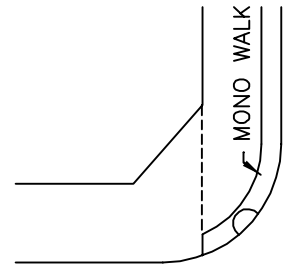
RAMP TYPE A



RAMP TYPE B

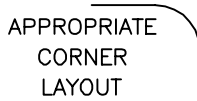
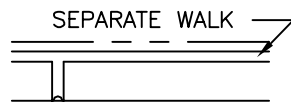
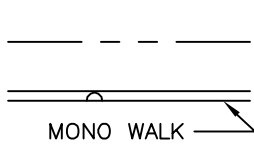


RAMP TYPE B



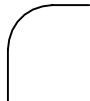
RAMP TYPE A

CORNER LAYOUT



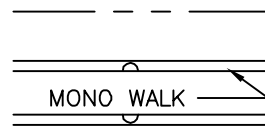
LOCATE RAMPS DIRECTLY ACROSS FROM CORNER RAMPS

RAMP TYPE C

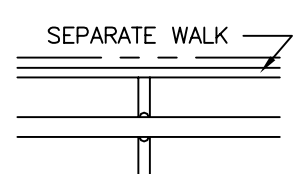


LOCATE RAMPS DIRECTLY ACROSS FROM CORNER RAMPS

RAMP TYPE D

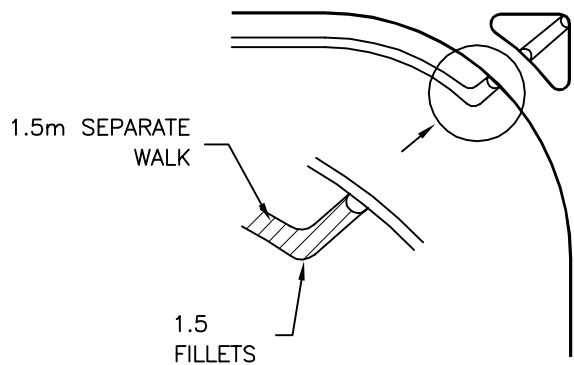


RAMP TYPE C



RAMP TYPE D

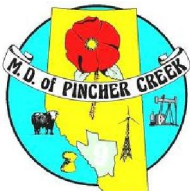
TANGENT LAYOUT



RAMP TYPE D

INTERSECTION LAYOUT

N.T.S.



WHEELCHAIR / BIKE RAMP LOCATIONS

STANDARD DETAILS

Date:

OCTOBER, 2013

Drawn By:

RS

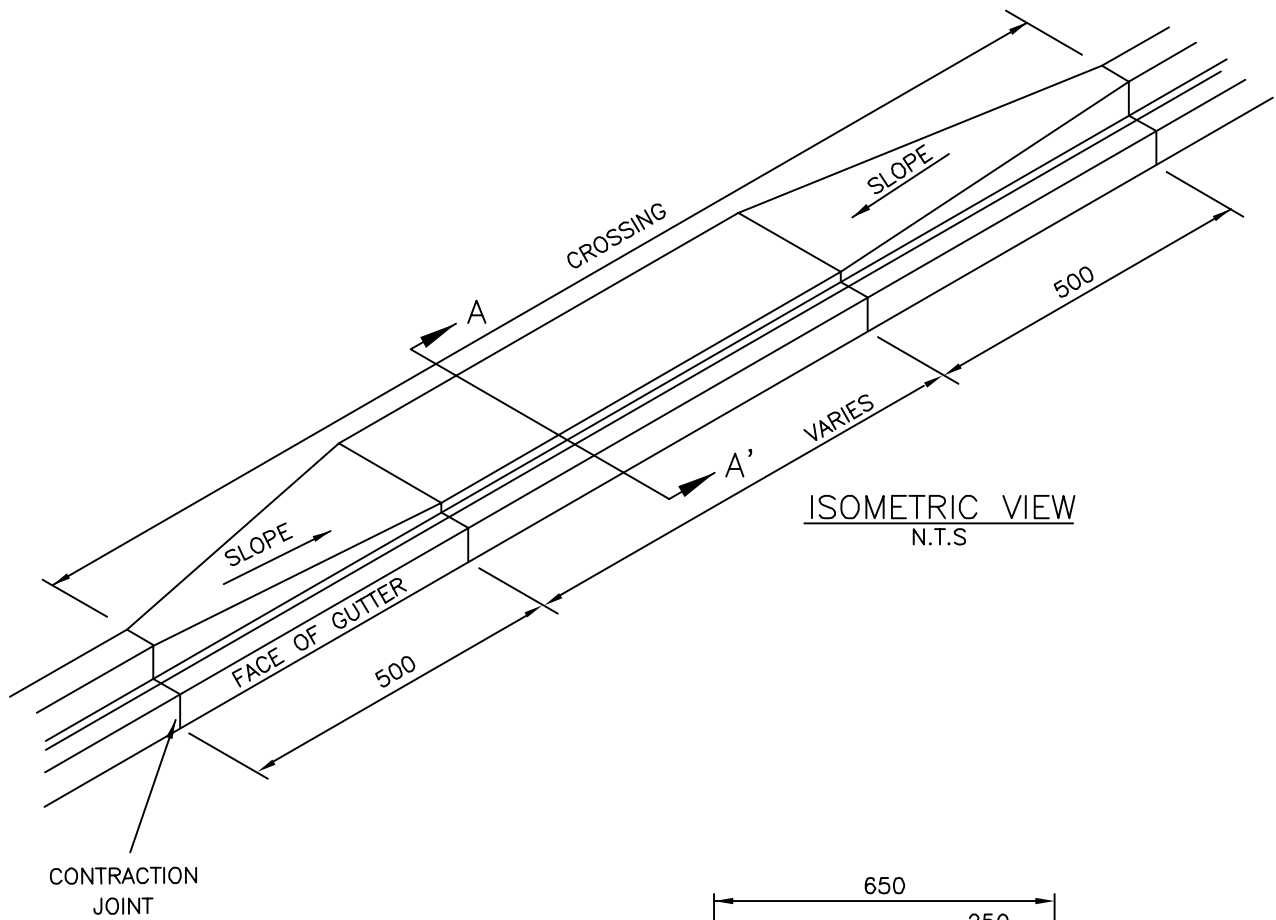
Checked By:

Scale:

NTS

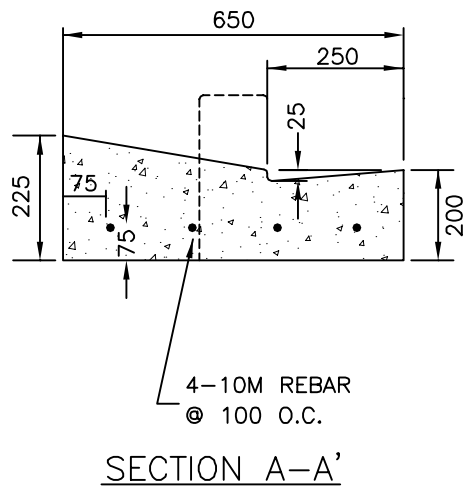
Drawing No.

8-303



NOTES:

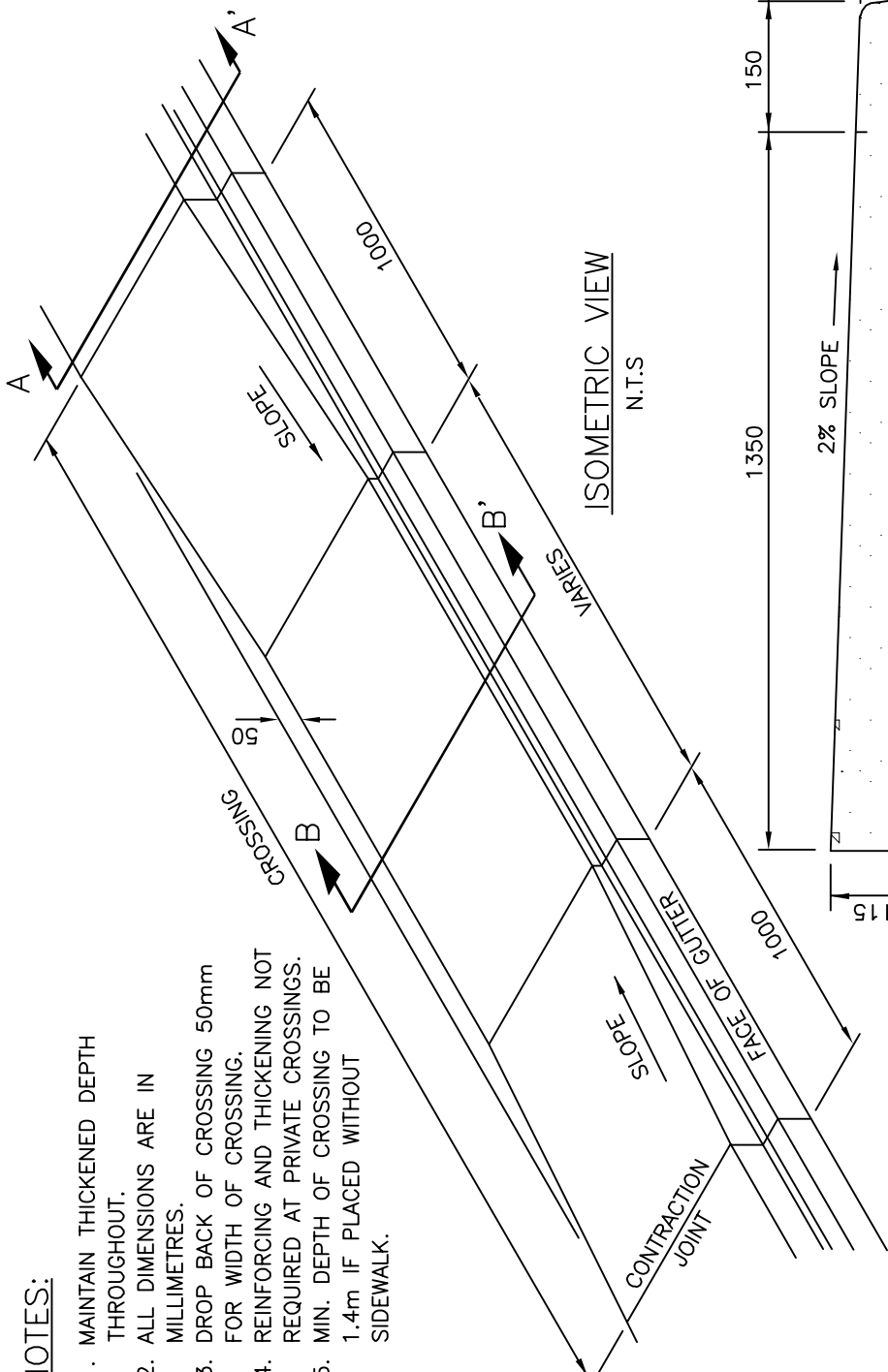
1. MAINTAIN THICKENED DEPTH THROUGHOUT.
2. ALL DIMENSIONS ARE IN MILLIMETRES.



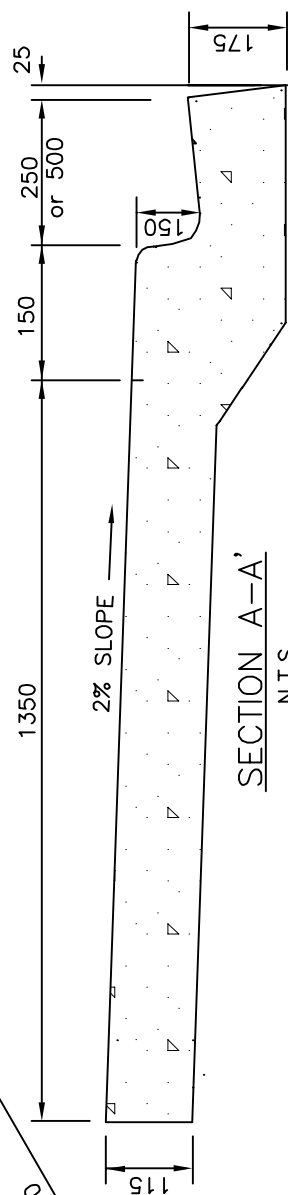
INDUSTRIAL / COMMERCIAL CURB & GUTTER CROSSING

STANDARD DETAILS

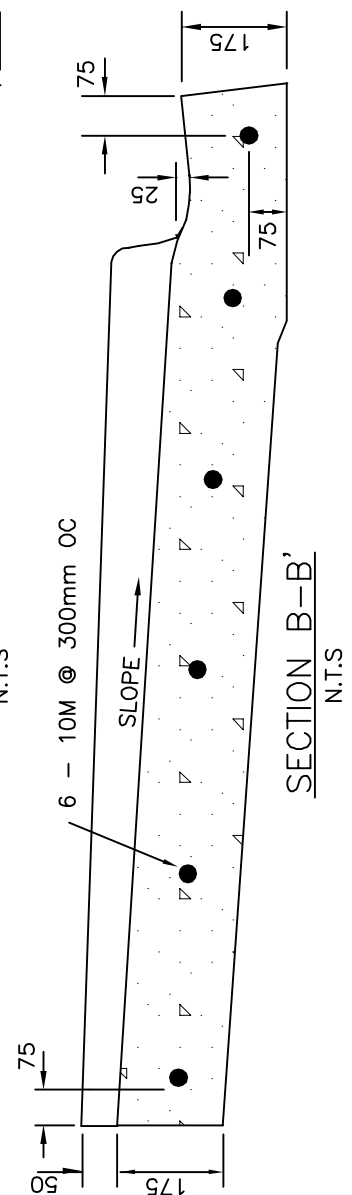
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-400
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ISOMETRIC VIEW
N.T.S



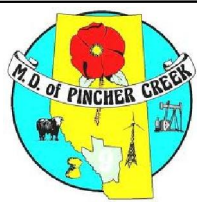
SECTION A-A'
N.T.S



SECTION B-B'
N.T.S

NOTES:

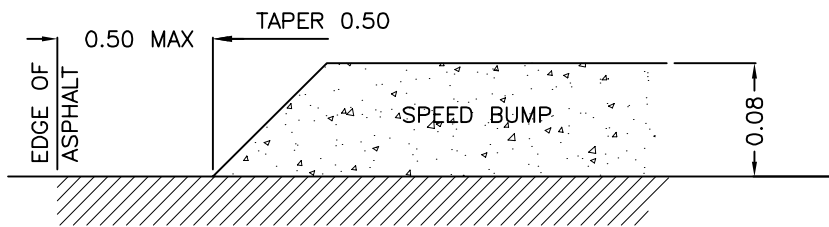
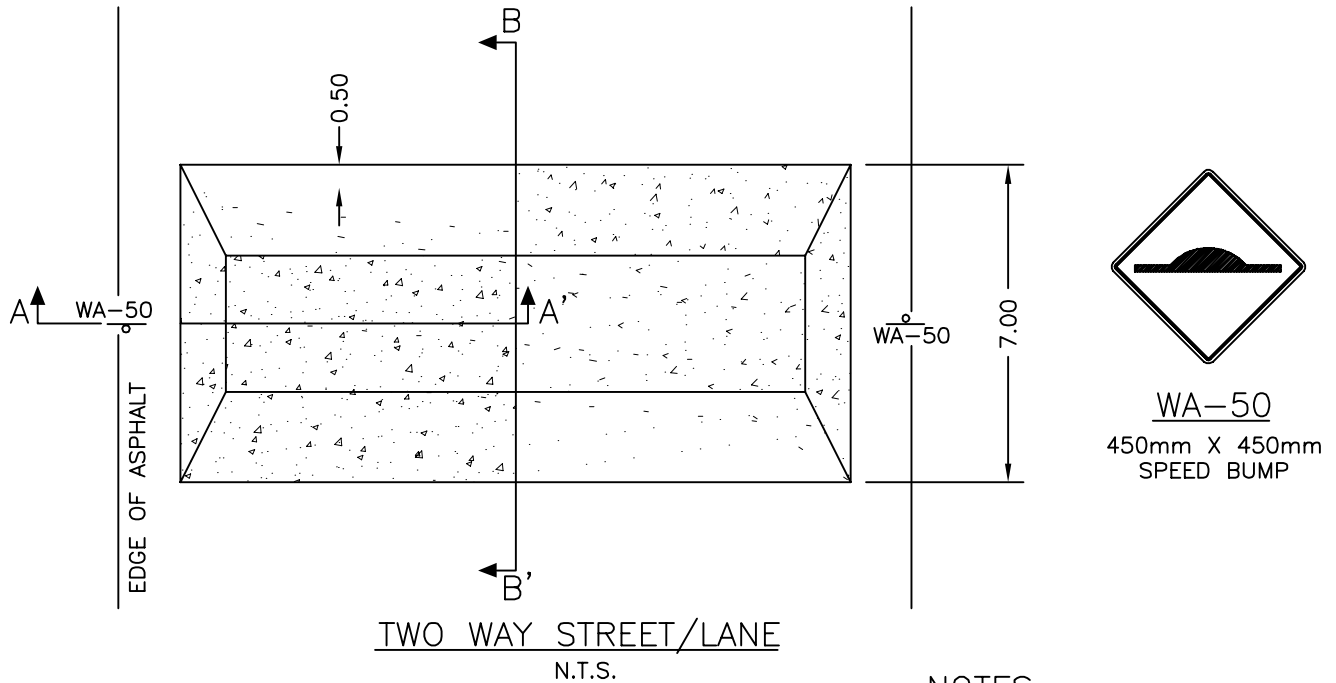
1. MAINTAIN THICKENED DEPTH THROUGHOUT.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. DROP BACK OF CROSSING 50mm FOR WIDTH OF CROSSING.
4. REINFORCING AND THICKENING NOT REQUIRED AT PRIVATE CROSSINGS.
5. MIN. DEPTH OF CROSSING TO BE 1.4m IF PLACED WITHOUT SIDEWALK.



TYPICAL MONOLITHIC LANE AND DRIVEWAY CROSSING

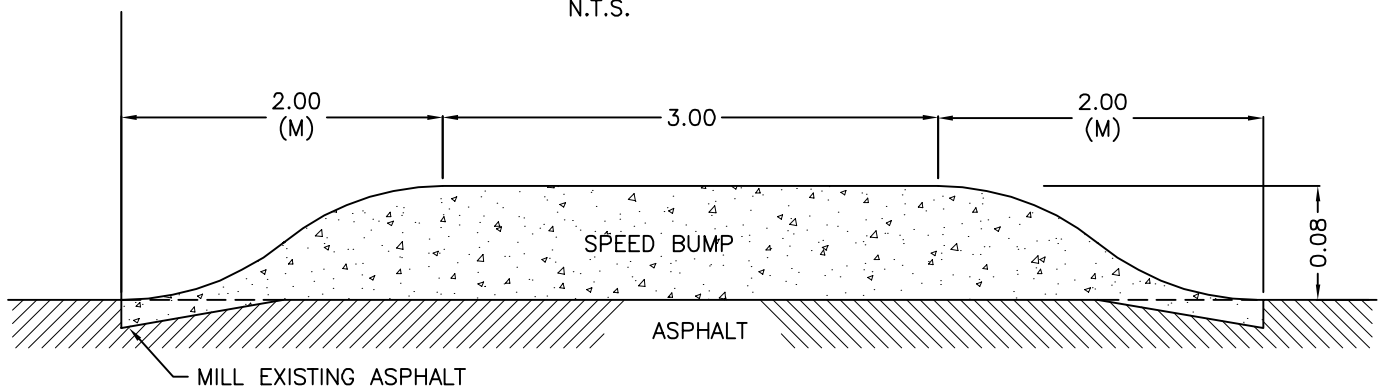
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-401
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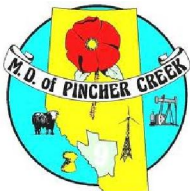
NOTES:

1. PAINT 1.0m WIDE YELLOW LINE ACROSS BOTH FACES OF BUMP.
2. PAINT 0.6m WIDE CHEVRON PATTERN ON ENTIRE SURFACE.
3. ALL DIMENSIONS ARE IN MILLIMETRES.



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

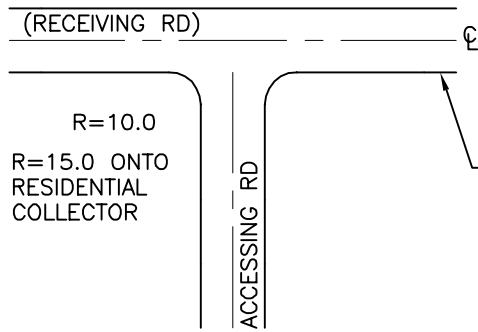


ASPHALT SPEED BUMP

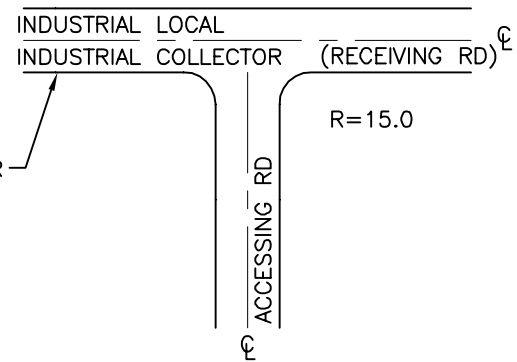
STANDARD DETAILS

Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-402
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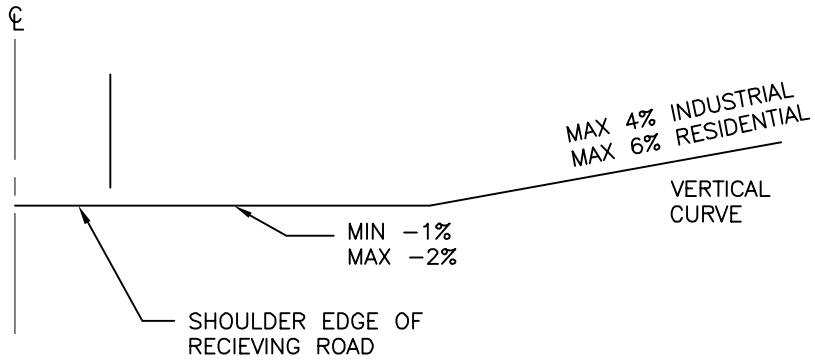
RESIDENTIAL ACCESS
RESIDENTIAL LOCAL
RESIDENTIAL COLLECTOR



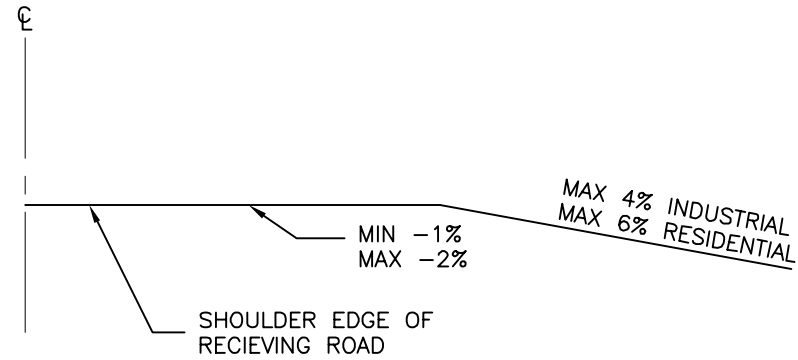
RESIDENTIAL ACCESS
RESIDENTIAL LOCAL



INDUSTRIAL LOCAL
INDUSTRIAL COLLECTOR



PROFILE – ACCESSING ROAD IN CUT



PROFILE – ACCESSING ROAD IN FILL

NOTES:

1. LENGTH OF VERTICAL CURVE SHALL CONFORM TO T A C MANUAL
2. ALL DIMENSIONS ARE IN METERS
3. REFER TO Z-8A FOR SIGHT DISTANCE GUIDELINES



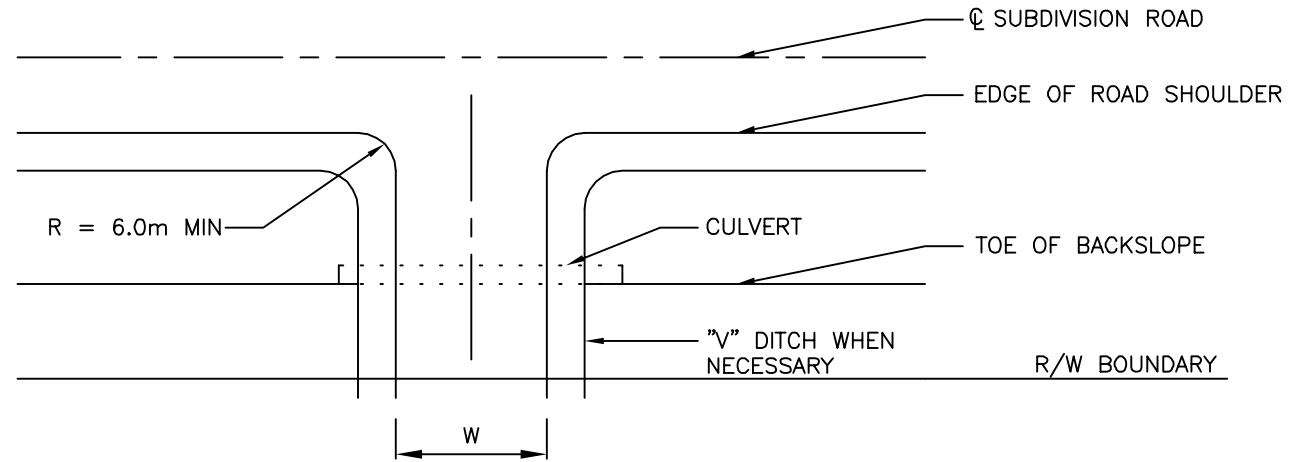
TYPICAL ROAD INTERSECTIONS

STANDARD DETAILS

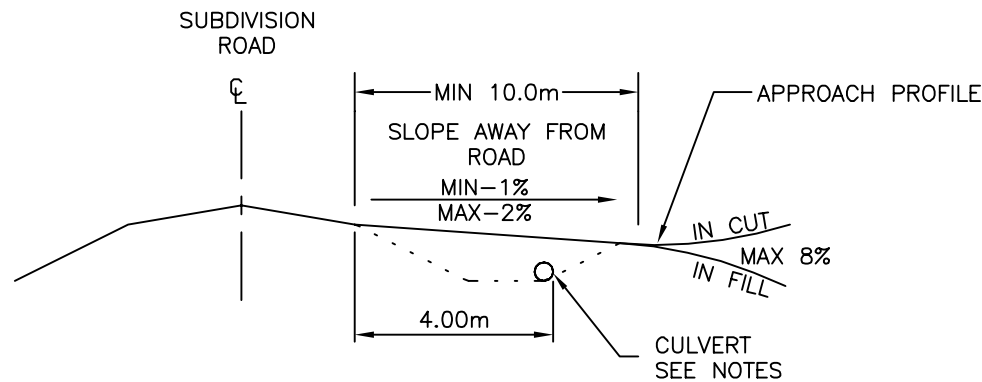
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-500
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NOTES:

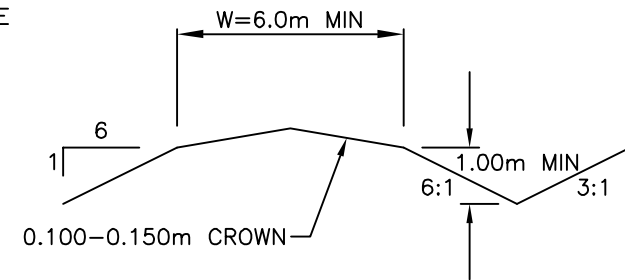
1. WHEN CULVERTS ARE REQUIRED THEY MUST BE C.S.P. CULVERTS AND BE A MINIMUM DIAMETER OF 0.400m
2. CULVERTS MUST BE SET BACK A MINIMUM OF 4m FROM SHOULDER OF ROAD
3. ALL DIMENSIONS SHOWN ARE IN METERS



APPROACH PLAN



DITCH AND CULVERT LOCATION



APPROACH CROSS SECTION



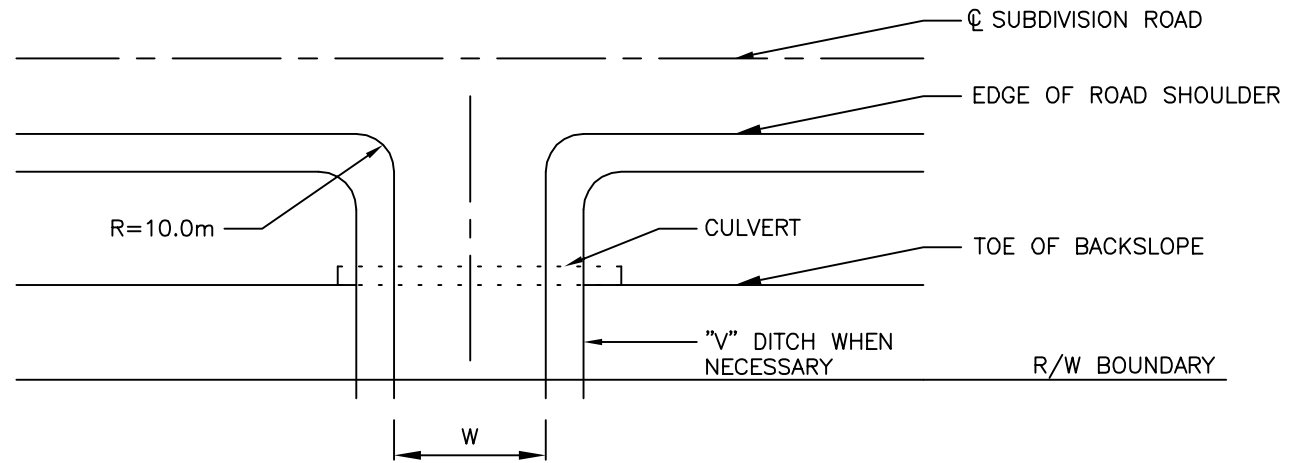
TYPICAL RESIDENTIAL APPROACHES

STANDARD DETAILS

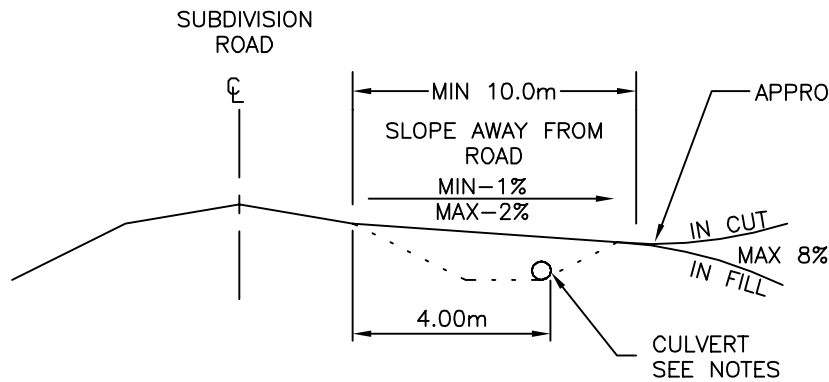
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-501
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NOTES:

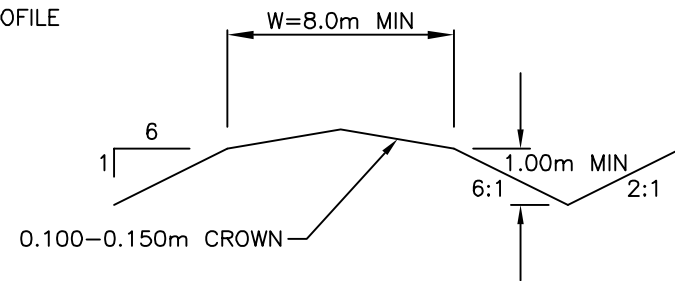
1. WHEN CULVERTS ARE REQUIRED THEY MUST BE C.S.P. CULVERTS AND BE A MINIMUM DIAMETER OF 0.500m.
2. CULVERT MUST BE SET BACK MINIMUM OF 4m FROM SHOULDER OF ROAD.
3. ALL DIMENSIONS SHOWN ARE IN METERS.



APPROACH PLAN



DITCH AND CULVERT LOCATION



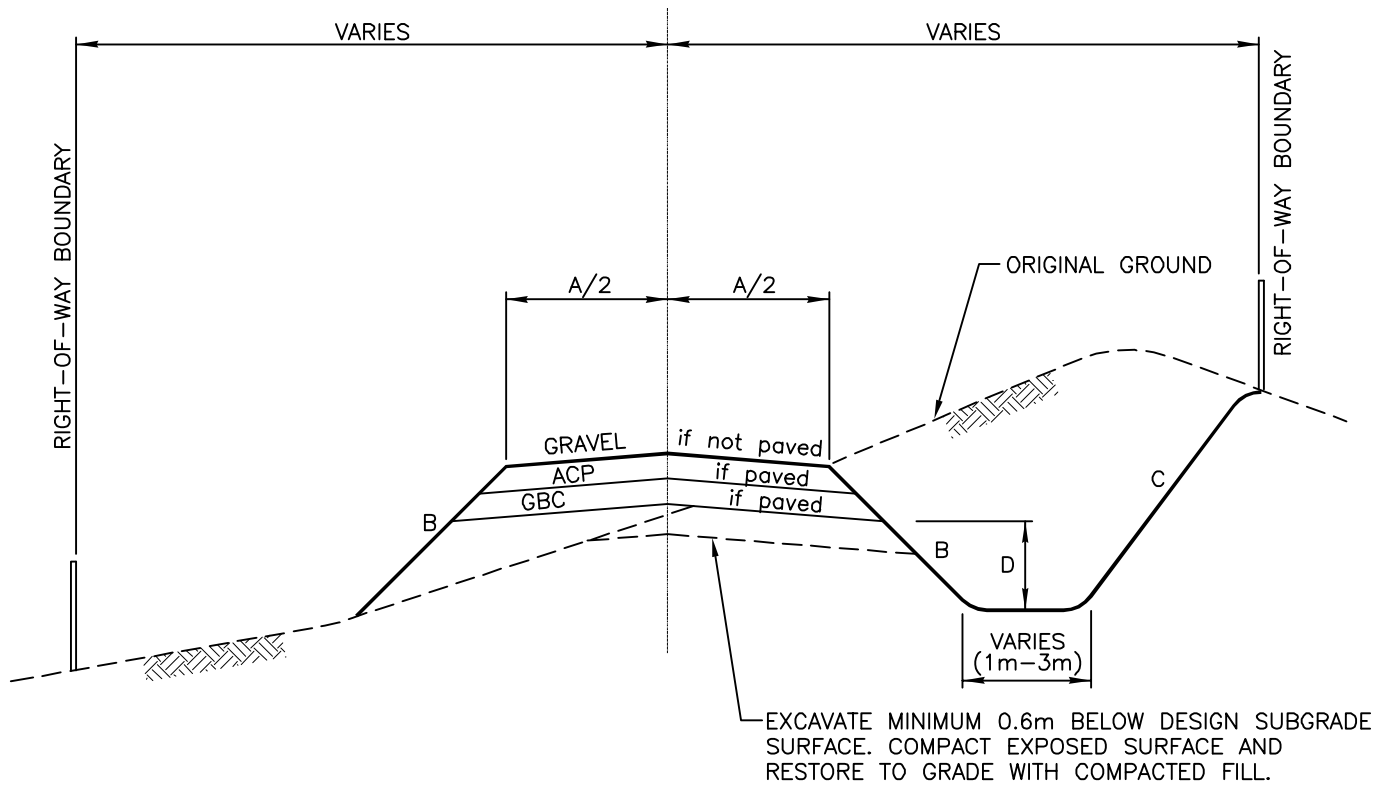
APPROACH CROSS SECTION



TYPICAL INDUSTRIAL APPROACHES

STANDARD DETAILS

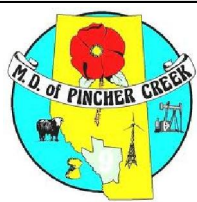
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-502
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NOTES:

1. IF ADDITIONAL RIGHT-OF-WAY IS REQUIRED, TRY TO OBTAIN BY BACKSLOPING AGREEMENT OTHERWISE PURCHASE.
2. ACP AND GBC WILL HAVE A DESIGNED THICKNESS ACCORDING TO REQUIREMENTS OF APPLICATION AND TRAFFIC TYPE.
3. 2% CROWN FOR ACP, 3% FOR ALL OTHER SURFACE TYPES.
4. SURFACING GRAVEL SHALL BE APPLIED AT THE SPREAD RATE SHOWN BELOW FOR UNPAVED ROADS

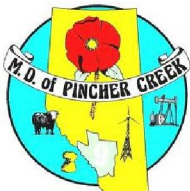
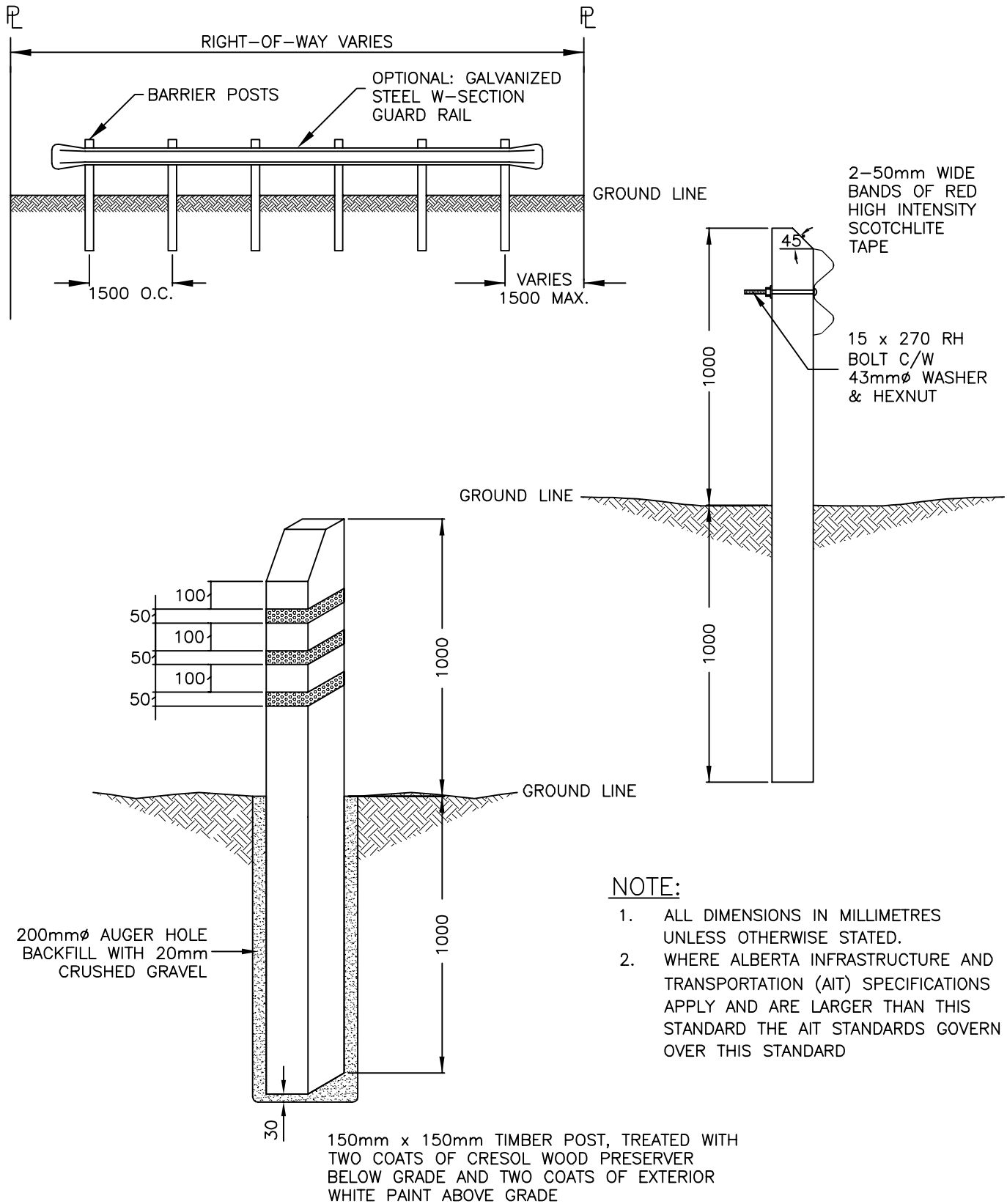
ROAD DESIGNATION	A	B	C	D	GRAVEL SPREAD RATE
	SURFACE WIDTH	NORMAL SIDE SLOPE	MAXIMUM BACK SLOPE	MIN. HEIGHT OF FILL	
UNIT OF MEASURE	m	RATIO	RATIO	%	m
ARTERIAL	8	4:1	2:1	8.0	1.0
COLLECTOR	7	4:1	2:1	8.0	1.0
LOCAL	6	4:1	2:1	8.0	1.0
UNIMPROVED	6	TBD	TBD	TBD	TBD



RURAL ROAD STANDARD CROSS-SECTION

STANDARD DETAILS

Date: OCTOBER, 2014	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 8-600
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BARRIER POSTS

STANDARD DETAILS

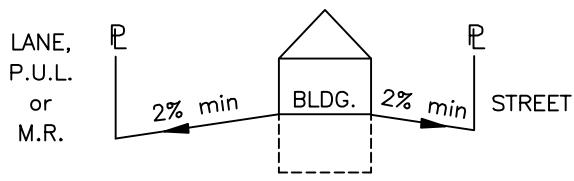
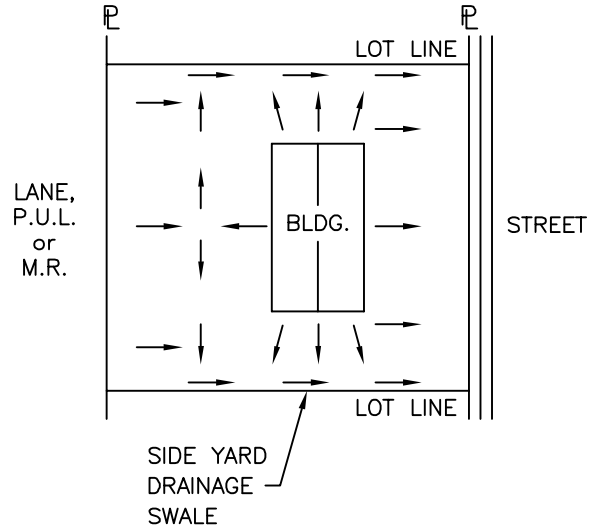
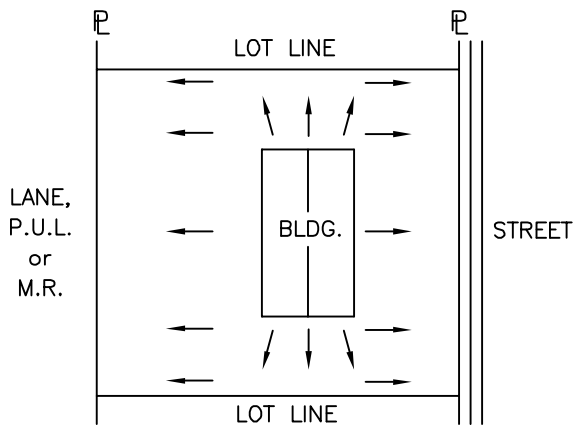
Date:
OCTOBER, 2013

Drawn By:
RS

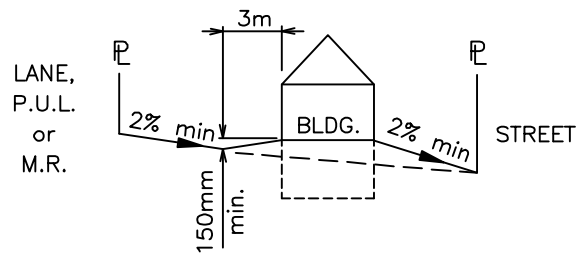
Checked By:

Scale:
NTS

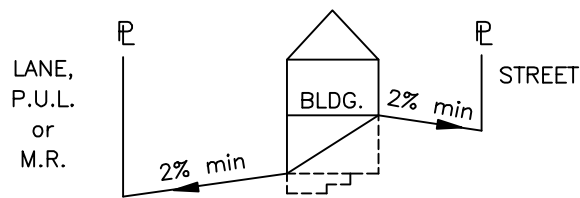
Drawing No.
8-700



SPLIT DRAINAGE



BACK TO FRONT DRAINAGE



REARYARD BASEMENT WALKOUT SPLIT DRAINAGE



TYPICAL LOT GRADING

STANDARD DETAILS

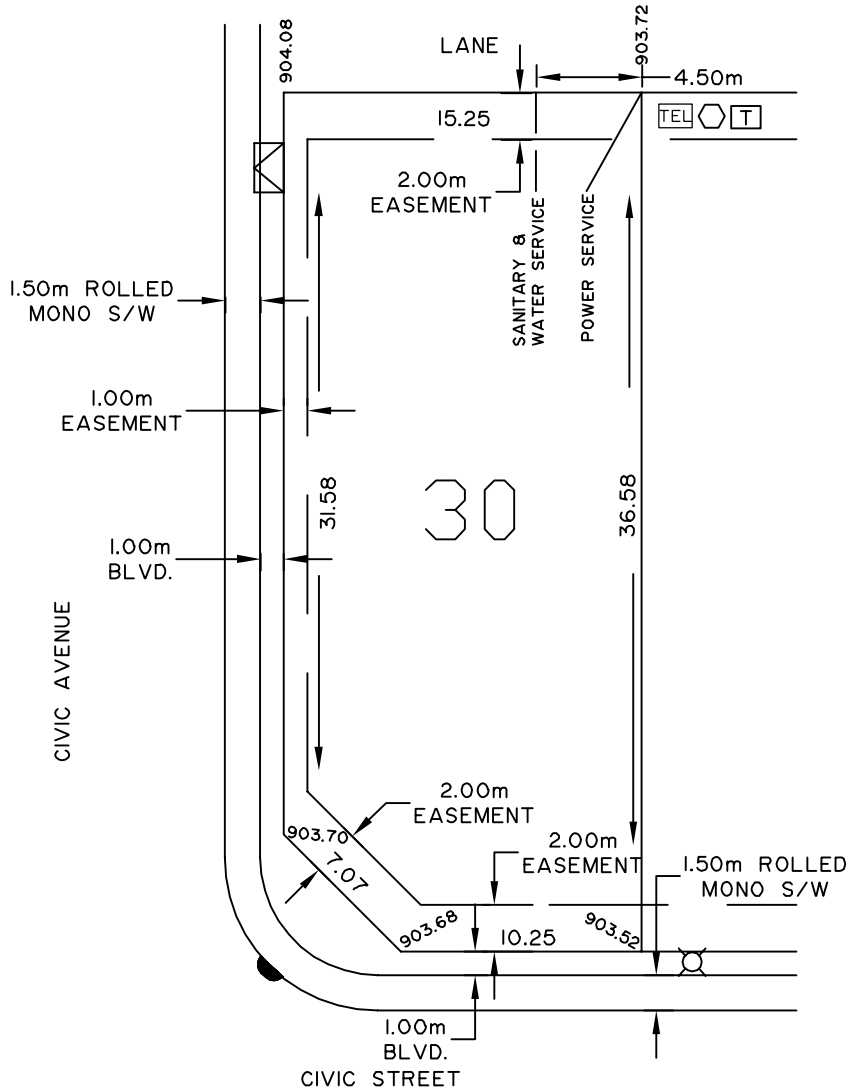
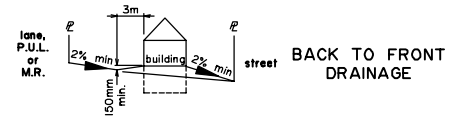
Date: OCTOBER, 2013	Drawn By: RS	Checked By:	Scale: NTS	Drawing No. 12-100
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Building Grade Certificate

Issued by:

No.

1. When excavating in a right-of-way (easement), check for utilities.
2. Standing at the water shut-off and facing the building, the sanitary service is on the left side of the water service.
3. All dimensions are in metres and decimals thereof. The elevations are in metres above geodetic mean sea level.
4. Elevations noted on the Certificate are within 100mm of actual.
5. The builder must construct to within 100mm of the design landscape elevation and illustrated drainage patterns unless otherwise approved by the Development Officer.
6. If the information on this Certificate has been prepared by a private developer or their agent, the MD accepts no responsibility for its accuracy.



- ☐ TRANSFORMER
- ELECTRICAL BOX
- TEL TELUS PEDESTAL
- △ CA.T.V. PEDESTAL
- ☒ MAIL BOX
- ⊗ LIGHT STANDARD
- HYDRANT
- ▬ CATCH BASINS
- DRAINAGE PATTERN

TOP OF FOOTING ELEVATIONS:
 Max. depth below average sidewalk= DEPTH
 Lowest elevation= LTF

AS-BUILT SEWER INVERT ELEVATIONS:
 Sanitary at right-of-way line= SANI
 Storm at right-of-way line= STM

DESIGN LANDSCAPE ELEVATIONS:
 Elevation at the front of house= GRADE
 Elevation at the rear of house= GRADE

Civic Address: CIVIC
 Lot: LOT Block: BLOCK Plan No.: PLAN
 Developer: DEV Scale: SCALE
 Drawn By: XYZ ENGINEERING SERVICES LTD. Date: DATE
 Approved By: _____ Date: _____
 Received By: _____ Date: _____

I certify that the final landscape grade will be (front) _____ (rear) _____
 Signature of owner or representative _____
 Print full name _____