



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINES

Version 2007

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Introduction

The Design Guidelines Manual provides information regarding The Town of Rocky Mountain House's Standards governing the subdivision design, servicing standards, the design and construction approval process, and the as-constructed drawing submission requirements.

The primary focus of this document is to aid the Consulting Engineer in the preparation of Construction Drawings. It is the responsibility of the Consulting Engineer to ensure that the design conforms to these Guidelines and to notify The Town if any deviations from Town Standards have been made.

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

This Manual does not attempt to set rigid policies, but rather provides the Developer with a guide outlining The Town's requirements. Where unusual or complicated design situations arise, good engineering judgement should prevail. The Town reserves the right to require a deviation from these Guidelines where conditions warrant same.

The Design Guidelines are predominately for use in new areas. Slight modifications may be required in older areas (i.e. soft conversions of the imperial line assignments, right of way restrictions, etc.).

This Manual will be updated from time to time.

1.0 General Information

1 DEFINITIONS

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

- .1 **Construction Drawings** shall mean those Engineering Plans and Profiles prepared by the Consulting Engineer, showing the details of the installation of the various Municipal Improvements within the Development using standard engineering symbols and forms, and conforming to the Design Guidelines.
- .2 **Construction Specifications** shall be the documents prepared by the Consulting Engineer specifying the legal, administrative, and technical aspects of the Municipal Improvements, all of which shall conform to the minimum requirements as outlined in The Town's Design Guidelines.
- .3 **Consulting Engineer** shall mean a Professional Engineer who is an authorized officer of a Consulting Engineering firm, retained by the Developer, who has designed the Municipal Improvements and/or supervised the installation of the same within the Development according to the approved plans and specifications.
- .4 **Developer** shall mean the registered and equitable owner of the Development lands including, but not restricted to, the Consulting Engineers, contractors, and/or subcontractors acting for or on behalf of the owner.
- .5 **Development** or **Development Area** shall mean the area to be serviced, as determined by the Developer.
- .6 **Development Agreement** shall be the document prepared by The Town specifying legal, administrative, and technical requirements of the Developer for developing lands which shall become the responsibility of the Town of Rocky Mountain House.
- .7 **Development Permit** shall be the document prepared by The Town specifying legal, administrative, and technical requirements of the Developer for developing lands which shall not become the responsibility of the Town of Rocky Mountain House.
- .8 **Engineer** shall mean the Director of Engineering & Operations or his authorized Representative.
- .9 **Level One Landscaping** means the work included in preparing the site to specified grades, placing and levelling topsoil, seeding to grass, and establishing turf; all in accordance with The Town's current Design Guidelines.

- .10 **Level Two Landscaping** means the work included in planting shrubs, trees, or other plant amenities, all in accordance with The Town's current Design Guidelines.
- .11 **Level Three Landscaping** means the work included in supplying and installing various non-vegetative park facilities and/or amenities (i.e. Trails, trail directional signs, playground equipment, bollards, post and cable fencing, site furnishings, etc.), all in accordance with The Town's current Design Guidelines.
- .12 **Level Four Landscaping** means the work included in supplying and installing optional/enhanced amenities (i.e. Ornamental structures, sculptures, feature walls, water features, fountains, spray pools, enhanced plantings, etc.) all in accordance with The Town's current Design Guidelines.
- .13 **Municipal Improvements** shall mean all improvements within the Development, including, but not restricted to:
 - .1 paved roadways, including pavement marking;
 - .2 sidewalk, curb and gutter;
 - .3 paved or gravel lanes;
 - .4 water, sanitary, and storm sewer mains;
 - .5 water, sanitary, or storm service connections;
 - .6 shallow utilities, including electrical distribution (excluding service leads), street lighting, natural gas, telephone, and cable television;
 - .7 landscaped boulevards, medians, municipal reserves, and public utility lots;
 - .8 paved, concrete, and/or shale walkways;
 - .9 park and recreation amenities (i.e. playground equipment, benches, etc.); and;
 - .10 traffic control, street name, subdivision information (including updates) signs.
- .14 **Professional Engineer** shall mean a licensed member of The Association of Professional Engineers, Geologists, and Geophysicists of Alberta;
- .15 **TAC** refers to the Transportation Association of Canada.
- .16 **Town** shall mean the Corporation of The Town of Rocky Mountain House in the Province of Alberta.

2 DEVELOPMENT AGREEMENTS

2.1 General

The construction of Municipal Improvements within a subdivision is subject to the terms and conditions of a Development Agreement, together with the special clauses, including all financial, construction, maintenance, and security requirements of the Developer. The standard Development Agreement may be registered on the title of the affected lands.

Following the approval of the preliminary Construction Drawings, the Developer shall request, in writing, that The Town of Rocky Mountain House proceed with the preparation of the Development Agreement.

2.2 Development Schedule

The Development Agreement processing time may vary depending on the number of approvals required, size and complexity of the Development and other factors.

2.3 Performance and Maintenance Security

Security requirements shall be determined by the Engineer in accordance with the terms and conditions of the Development Agreement.

2.4 Site Clearing and Grading

The Developer may complete site clearing and rough grading prior to execution of a Development Agreement.

2.5 Permission to Install Underground Utilities and Construct Surface Improvements

No construction shall take place until the Development Agreement has been properly executed by the Developer, including payment of associated charges and provision of securities and insurance. Following approval, construction may proceed in accordance with the terms and conditions outlined in the Development Agreement.

2.6 Submissions

.1 Construction Drawings and Specifications

The Developer shall provide the following information to The Town of Rocky Mountain House's Engineer for review prior to the request for a development agreement.

- .1 Construction Drawings conforming to the requirements of Section 2. The drawing review set shall include the Shallow Utilities Drawing showing all approved shallow utility alignments.
- .2 Construction Specifications meeting or exceeding the requirements of The Town of Rocky Mountain House's Design Guidelines.
- .3 Geotechnical Report.
- .4 Letters from the shallow utility companies approving the proposed alignments and utility right of way plan(s).
- .5 Anticipated Development schedule.
- .6 Letter and plan from Canada Post illustrating proposed community mailbox locations within the Development.
- .7 Cost estimate for all Municipal Improvements associated with the Development.
- .8 Letter from Parkland Community Planning Services outlining the conditions of subdivision set by the Subdivision Committee and indicating the amount of money due in lieu of reserve dedication, if any.
- .9 One copy of the approved land use (zoning) plan, four copies of the tentative legal plan, four copies of each utility right of way plan and a copy of the approved set back plan.
- .10 Copy of the application made by the Consultant to Alberta Environment for the Approval to Construct. Copy of the Approval to be submitted prior to final execution of the Development Agreement.
- .11 Provide computer graphic files for the approved legal plans and approved construction drawings in AutoCAD 2000 DWG format.

.2 *Final Development Agreement Submissions*

Following the review of the Draft Development Agreement, the Developer shall return the Draft Development Agreement with comments regarding errors and/or omissions, if any, and provide the following information to The Town.

- .1 Letters from the Shallow Utility Companies approving the proposed alignments and utility rights of way plan(s).
- .2 Proposed Development Schedule.
- .3 Copy of the approved land use (zoning) plan.
- .4 Copy of the tentative legal plan.

- .5 Copy of each utility right of way plan.
- .6 Copy of the approved setback plan.
- .7 Copy of the Letter of Authorization.
- .8 Copies of the following Alberta Environmental Protection Act documents:
 - i) Copy of “Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System”.
 - ii) Copy of “Letter of Authorization for Storm Drainage Treatment Facilities”.
- .9 Water Distribution System Flushing Drawing approved by the Engineer.
- .10 Pavement Marking and Signage Drawings approved by the Engineer.
- .11 Landscape Drawings approved by the Engineer.

2.7 Performance and Maintenance Security

The Engineer shall determine security requirements in accordance with the Terms and Conditions of the Development Agreement.

3 COMMUNITY MAILBOXES

3.1 General

The Consulting Engineer shall submit a copy of the current subdivision plan along with a request for mailbox locations to Canada Post.

3.2 Location Criteria

Canada Post will determine the final location of community mailboxes based on various criteria, including the affect upon the ratepayer who is immediately adjacent to the scheduled community mailbox location.

Upon receipt of the mailbox location plan from Canada Post, the Consulting Engineer shall ensure that the community mailbox locations, wherever possible are:

- .1 Along the flankage (side yard) of corner lots midway between the front and rear property lines.

Note: Current design standards for local roadways allow for a 1.0 m boulevard (back of walk to property line); however, the width of the concrete pad for the community mailbox is 1.2 m (back of walk to back of pad). The length of the pad parallel to the sidewalk will vary depending on the number of

modules to be located at any location. The Developer will be required to provide a 0.5 m easement along the sideyard of a lot at these locations to allow for the encroachment of the community mailbox onto private property.

Note: Canada Post will confirm the final location of the mailbox pad with the Developer and/or property owner prior to installation.

- .2 Next to an open space or playground.
- .3 On the predominantly homecoming side of the street, so that people can pick up their mail on the way home without crossing the street.
- .4 On the Town boulevard, close to the sidewalk, to avoid creating grass areas that are difficult to cut.
- .5 Not along Town major thoroughfares, since no parking is allowed on these roads.
- .6 Not closer than 10 m from a fire hydrant.
- .7 Not on a utility easement or over a utility trench (deep or shallow).
- .8 Not too close to streetlight standards, street name poles or any raised utility boxes such as a transformer.
- .9 The location of the boxes shall not impede the pedestrian and vehicular sight distances.
- .10 Community mailboxes are normally installed within public road rights of way. Multiple unit developments, such as townhouses or condominiums, may have the community mailboxes installed within the boundaries of said private development lands. The Developer must enter into a Delivery Services Agreement/License with Canada Post if this type of delivery is desired or required. The Developer should contact Canada Post for further information.

The Consulting Engineer shall advise Canada Post of the acceptability of the locations or suggest a revised location for consideration by Canada Post.

The community mailbox locations must also be shown on all applicable drawings and sales brochures.

4 ALBERTA ENVIRONMENTAL PROTECTION - STANDARDS AND GUIDELINES FOR MUNICIPAL WATERWORKS, WASTEWATER, AND STORM DRAINAGE SYSTEMS IN ALBERTA

The purpose of this publication is to provide Standards and Guidelines for Municipal Water Supply, Wastewater, and Storm water Drainage Systems in Alberta. Under the Environmental Protection Enhancement Act (EPEA), municipal water supply, wastewater,

and storm water drainage systems must be designed to meet these Standards or to a standard required by the Director of Standards and Approvals.

The current edition of the above noted Standards is to be used in conjunction with the Town's Design Guidelines, and the minimum requirements of each must be met.

5 ALBERTA ENVIRONMENT APPROVALS

5.1 General

Construction of water distribution systems, wastewater collection systems and storm drainage systems, including major components; such as water pumping stations, water reservoirs, sewage lift stations, storm ponds, storm outfall structures, etc. require approval from Alberta Environmental Protection. The applicable approval must be obtained prior to construction.

5.2 Wastewater and Storm Drainage Regulations 119/93

Wastewater and Storm Drainage Regulations 119/93 apply to the construction and operation of storm drainage treatment facilities.

"Storm drainage treatment facility", as defined in the Regulations, means any structure or thing used for the physical, chemical or biological treatment of storm drainage, and includes any of the storage or management facilities that buffer the effects of the peak runoff.

Note: The Regulations do not apply to storm water treatment units installed upstream of a storm water storage facility as these units are included in the Code of Practice for Wastewater (*Sanitary Sewer and Storm*) Collection Systems.

As specified in the Regulations, the Developer shall apply for a "**Letter of Authorization**" for the design and construction of storm drainage treatment facilities. A copy of the "Application for a Letter of Authorization for Storm Drainage Treatment Facilities" is appended to this Section.

The Town of Rocky Mountain House will not allow construction to proceed until the required EPEA and/or Water Act approvals have been received.

5.3 Codes of Practice

The design and construction of water distribution systems, sanitary sewer collection systems and storm drainage systems is regulated by numerous Codes of Practice regulated by Alberta Environment. Applicable notifications or approvals are required prior to construction of any of these systems.

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

6.1 General

A Crossing, Proximity, Ground Disturbance and/or Encroachment Agreement may be required if the Developer's proposed work includes crossings of and/or construction activity adjacent to the following:

- .1 oil or gas pipelines,
- .2 overhead or underground telecommunications lines,
- .3 overhead or underground power lines,
- .4 creeks and rivers,
- .5 streets or highways,
- .6 railways, and/or
- .7 *other registered rights of way.*

6.2 Application Preparation and Submission

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

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

Applications shall be prepared as specified by the various approving agencies.

7 ROAD CLOSURES AND DETOURS

7.1 General

The Developer must submit an application for a road closure or detour to the Engineer at least three weeks prior to the start of any work.

The Developer will not be allowed to proceed with hauling across a roadway or the construction of any Municipal Improvement across a roadway until all approvals, if required, have been received.

The closure/detour must be advertised in the local paper at least 48 hours prior to the start of any work.

The Developer shall prepare a Traffic Accommodation Plan to be submitted to the Engineer upon request. The Developer shall use the *Alberta Infrastructure and Transportation Traffic Accommodation Strategy Urban Supplement* as a basis for this plan.

7.2 Application Preparation and Submission

The Developer shall be fully responsible for the preparation and submission of plans and application for a road closure/detour to the Engineer to obtain the necessary permission to enter upon, cross over, or construct under said roadway.

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

The application shall be prepared as follows:

- .1 A covering letter requesting approval to close all or part of a roadway.
- .2 Three copies of drawings (11" x 17" or 8 1/2" x 11") clearly marking in **RED** the location of the proposed crossing or detour.

8 DEVELOPER'S SUBDIVISION SIGNS

8.1 Detention Pond Warning Signs

Detention Pond Warning Signs shall be installed near the boundary of the detention pond site indicating where the public may obtain information related to the detention pond operation. The sign shall be similar in design to the sample "Detention Pond Warning Signs" included in the drawings.

Sign locations shall be shown on the Engineering Drawings.

8.2 Street Name Signs

Streets name signs shall conform to the Town's standards.

2.0 Construction and As-Constructed Drawing Standards

1 GENERAL

This Section lists the requirements for the preparation and submission of Construction Drawings, As-constructed Drawings, Building Grade Certificates and Digital As-constructed Drawing Standards.

All drawings shall conform to the general standards noted in this Section. The Construction Drawings shall generally illustrate the information listed in Clauses 2, 3 and 4 of this Section. Specific design standards and requirements are provided in the following Sections 5-11:

2 GENERAL CONSTRUCTION DRAWING REQUIREMENTS

2.1 General

- .1 Individual Plan Drawings are to be prepared for each Municipal Improvement being constructed. The preparation of individual drawings is a requirement for the submission of "As-constructed" Drawings as noted in Clause 7 of this Section.
- .2 Street names shall be shown on all drawings for reference purposes.
- .3 The "Limits of Construction" shall be shown on all Plan Drawings.

2.2 Sheet Size

Drawing sheet sizes to be as follows:

- .1 560 mm x 864 mm (A1) preferred
- .2 610 mm x 914 mm acceptable
- .3 707 mm x 1000 mm (B1) acceptable

2.3 Sheet Material

Construction drawings are to be submitted using bond or vellum media.

2.4 Title Block

Title blocks shall be placed along the right side or bottom of the drawing.

2.5 North Arrow

Place the north arrow in the upper right-hand corner of sheet. The drawing should be oriented such that north faces the upper, right quadrant of the sheet.

2.6 Dimensions

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

2.7 Lettering

The lettering is to be an engineering style font. Vertical lettering should represent existing information and slanted lettering for proposed information. Discretion is to be used in selection of lettering size and line weight. Plotted lettering size should be readable at a scale of 1:1000. Line weight should differentiate between existing and proposed construction.

2.8 Drawing Scale

The following scales are to be used for the preparation of the construction Drawings. Exceptions will be noted for specific drawings.

- .1 A scale of 1:1000, 1:750, 1:500 or 1:250 should be used for all Plan Drawings,
- .2 *A drawing scale of 1:500 should be used for all Plan/Profile Drawings.*

3 PLAN CONSTRUCTION DRAWING REQUIREMENTS

3.1 Cover Sheet(s)

- .1 Name of subdivision or project,
- .2 Names of Developer and Consulting Engineer (Logos optional),
- .3 Town map showing project location; scale 1:25,000,
- .4 Index plan showing street names and limits of each Plan/Profile Drawing,
- .5 List of drawings.

3.2 Clearing and Grading Drawing(s)

- .1 *General Drawing Requirements*
 - .1 Identify the owners of all lands adjacent to or within the clearing and grading area,
 - .2 Identify intended clearing and grading on adjacent lands, including details of edge conditions, back sloping requirements, and areas where

topsoil is to be placed and/or seeded until natural conditions are restored,

- .3 Show Phase boundaries: indicate the area expected to be developed during the current year and the type of soil stabilization proposed for areas to be developed in following years,
 - .4 Any unusual site conditions,
 - .5 Existing utility rights of way (easements),
 - .6 Existing survey control stations and markers,
 - .7 Existing ground contours,
 - .8 Proposed ground contours,
 - .9 Test hole locations and original ground elevations at test hole location,
 - .10 Identify natural features that are to be preserved and/or removed,
 - .11 Details of topsoil stockpiles; include height, width, length and volumes,
 - .12 Location of all existing (i.e. water, sanitary sewers, storm sewers, gas, electrical, etc.),
- .2 *Cut/Fill Plans*
- .1 Cut/Fill Plans showing cut/fill design elevations and depth of cut or fill are required for all clearing and grading projects. Recommended grid spacing is 15 m x 15 m, maximum grid is 20 m x 20 m. Cut/Fill contours could also be used.
 - .2 Areas with fills ≥ 1.0 metre are to be highlighted on the drawing(s).

3.3 Roads, Lanes, and Walkways Drawing

- .1 Street and/or Lane Name (i.e. Lane "A"),
- .2 Cross-section designation (i.e. 15-10 Local Roadway),
- .3 Carriageway widths (FOC to FOC),
- .4 Sidewalk and/or curb type and width,
- .5 Boulevard widths,
- .6 Roadway P.I. elevations,
- .7 Roadway centre line distance and grade between P.I.'s,

- .8 Direction of flow along roadways,
- .9 Vertical curve information (length and mid-ordinate difference in elevation),
- .10 Face of curb radii for all curves and curb returns (general note acceptable for all curb returns),
- .11 Lane and Public Utility Lot P.I. elevations,
- .12 Lane and Public Utility Lot distance and property line grade between P.I.'s,
- .13 Direction of flow along lanes and utility lots,
- .14 Catchbasin manholes and catchbasins, including type and identification number,
- .15 Reinforced lane and/or driveway crossings,
- .16 Paraplegic ramps,
- .17 Berms complete with top of berm grades,
- .18 Temporary access roads and/or turnarounds,
- .19 Walkways, including bollard locations,
- .20 Typical cross sections for all roadway designations,
- .21 Subdivision Entrance Signs,

3.4 Pavement Marking and Signage Drawing

- .1 Traffic Signs,
- .2 Pavement Markings,
- .3 Detention Pond Warning Signs.

3.5 Water Distribution Drawing

- .1 Invert elevation at all P.I.'s,
- .2 Distance, pipe size, pipe material (general note acceptable), and grade between P.I.'s,
- .3 Main alignments,
- .4 Hydrants and hydrant identification numbers, invert and top of flange elevations,
- .5 Valves and valve identification numbers,

- .6 Fittings.

3.6 Water Distribution Disinfection and Flushing Drawing

- .1 Show proposed sequence of flushing, including valve opening and closing sequence,
- .2 Show receiving sanitary sewer.

3.7 Sanitary Sewer Drawing

- .1 Invert elevation at all manholes,
- .2 Distance, pipe size, pipe material (general note acceptable), and grade between manholes,
- .3 Main alignments,
- .4 Direction of pipe flow,
- .5 Manholes and manhole identification numbers,
- .6 Identify Drop Manholes (interior/exterior).

3.8 Storm Sewer Drawing A – Major/Minor System

This drawing should be prepared at a scale of 1:2000 (copy of Servicing Study Storm Drawing) and show the entire drainage area, not just the immediate development phase.

- .1 Phase/Project boundary,
- .2 Major drainage routes,
- .3 Location of trapped lows,
- .4 Minor drainage catchment areas,
- .5 Minor drainage main alignments,
- .6 Direction of minor drainage pipe flow,

3.9 Storm Sewer Drawing B – Minor System

- .1 Invert elevation at all manholes,
- .2 Distance, pipe size, pipe material (general note acceptable), and grade between manholes,
- .3 Main alignments,

- .4 Direction of pipe flow,
- .5 Manholes, catchbasin manholes, and manhole identification numbers,
- .6 Catchbasin type and identification numbers,
- .7 Catchbasin leads (size & type, general note acceptable),
- .8 Detention Ponds, including contours, perimeter drainage facilities, outline of playing field (if applicable), etc.

3.10 Shallow Utilities Drawing

- .1 Alignments for all shallow utilities including power, telephone, cable television, and gas,
- .2 Location of transformers, switch gear, URD boxes, and streetlights, telephone facilities and cable television facilities (i.e. pedestals, cabinets, etc.),
- .3 Location of Community mailboxes,
- .4 All utility rights of way (easements).

3.11 Building Grade Drawing

- .1 The Building Grade Drawing shall be drawn at a scale of 1:500 or 1:750 to better illustrate all of the requested information,
- .2 Legal description (Lot and block number) for each parcel of land,
- .3 Civic (Municipal) Address,
- .4 Back of walk elevations at lot lines,
- .5 Lane/public utility lot elevations at lot lines,
- .6 Service locations and invert elevations,
- .7 Recommended lowest top of footing elevation,
- .8 Recommended ground (landscape) elevation at house,
- .9 Location of power, telephone, and television service,
- .10 Location of hydrants, streetlights, transformers, switch gear cubicles, URD's, telephone pedestals, and cable television pedestals,
- .11 Indication of areas where depth of fill exceeds 1.0 m (bearing certificates required).

3.12 Landscape Drawing

- .1 Show all municipal reserves, berms, parks, roadway boulevards, utility lots, and buffers, including grades where appropriate,
- .2 Show all existing and proposed Municipal Improvements located within and/or adjacent to the site,
- .3 Show existing vegetation to be retained, topography, and encumbrances,
- .4 Show adjacent land uses and roads,
- .5 Show proposed layout of park, school and recreational facilities including playgrounds, baseball diamonds, sports fields, buildings, pathways, rinks, tennis courts, etc., including appropriate grades,
- .6 Show conceptual tree and shrub planting.
- .7 *Streetlights, mailboxes, and other street furniture, etc.*

4 PLAN PROFILE CONSTRUCTION DRAWING REQUIREMENTS

4.1 General

The Plan Profile Drawing is divided into three parts, two plan views and one profile view.

4.2 Top Plan View – Surface Improvements

The following information related to surface improvements should be illustrated in the top plan view:

- .1 Street and/or Lane Name (i.e. Lane “A”),
- .2 Cross-section designation (i.e. 15-10 Local Roadway),
- .3 Carriageway widths (Face of Curb to Face of Curb),
- .4 Sidewalk and/or curb type and width,
- .5 Boulevard widths,
- .6 Roadway P.I. elevations,
- .7 Roadway centre line distance and grade between P.I.’s,
- .8 Direction of flow along roadways,
- .9 Vertical curve information (length and mid-ordinate difference in elevation),

- .10 Face of curb radii, including all curb returns,
- .11 Lip of Gutter (L.O.G.)/Edge of Pavement (E.O.P.) at the following locations:
 - .1 Vertical Points of Intersection (V.P.I.'s),
 - .2 Beginning of Vertical Curves (B.V.C.'s) and End of Vertical Curves (E.V.C.'s),
 - .3 Beginning of Horizontal Curves (B.H.C.), Point of Curve to Curve (P.C.C.'s) and End of Horizontal Curves (E.H.C.'s),
 - .4 Beginning (B.V.C.), Midpoint (M.P.) and End (E.V.C.) for all curb returns,
 - .5 Location and rim elevation of any catch basins.
- .12 L.O.G. grades for all curbs,
- .13 Curb return grades,
- .14 Lane and Public Utility Lot P.I. elevations,
- .15 Lane and Public Utility Lot distance and property line grade between P.I.'s,
- .16 Direction of flow along lanes and utility lots,
- .17 Catchbasin manholes and catchbasins, including type and identification number,
- .18 Reinforced lane and/or driveway crossings,
- .19 Paraplegic ramps,
- .20 Berms complete with top of berm grades,
- .21 Temporary access roads and/or turnarounds,
- .22 Walkways, including bollard locations,
- .23 Reference drawing number(s) for adjacent sheets.

4.3 Bottom Plan View – Underground Utilities

The following information related to underground utilities should be illustrated in the bottom plan view:

- .1 Property lines,
- .2 Main sizes, lengths, and alignments,
- .3 Hydrant locations and identification numbers,

- .4 Valve locations and identification numbers,
- .5 Fitting sizes and locations,
- .6 Manhole and catch basin locations and identification numbers,
- .7 Catch basin lead sizes, lengths, and alignment,
- .8 Direction of flow (storm and sanitary mains).

4.4 Profile View

The profile view should illustrate the following road and utility information:

- .1 Stationing for road, lane and/or utility lot centre lines,
- .2 Vertical and horizontal point of intersection (P.I.) elevations for utility mains and surface improvements,
- .3 Invert and obverts of all pipes,
- .4 Length and grade between P.I.'s for utility mains and surface improvements,
- .5 Vertical curve information, if applicable,
- .6 Vertical alignments of manholes, valves, and hydrants,
- .7 Hydrant flange elevations,
- .8 Manhole rim and invert elevations,
- .9 Utility main lengths, sizes, materials, and gradients.

5 SUBMISSION OF PROPOSED CONSTRUCTION DRAWINGS

5.1 General

Two complete sets of Construction Drawings, including the Shallow Utility and Building Grade Drawings, shall be submitted to the Town for review and approval:

Upon receiving approval of the preliminary Construction Drawings, the Consulting Engineer shall submit one set of the corrected Construction Drawings marked "Issued for Construction".

5.2 Power, Gas, Telephone and Cable TV Alignment Approvals

A copy of the detailed Shallow Utility Plan is to be forwarded to each utility company for approval of their alignments. Following a review of their alignments, each utility

company is required to submit an approval letter for inclusion in the Development Agreement.

6 CHANGES (REVISIONS) TO APPROVED CONSTRUCTION DRAWINGS

The Approved Construction Drawings form an integral part of the Development Agreement between the Developer and The Town.

A new drawing may be submitted if significant changes are being made or, if directed by the Engineer, the as-constructed drawings may be sufficient.

The Engineer must approve any significant changes to the Approved Construction Drawing.

7 AS-CONSTRUCTED SUBMISSIONS

7.1 General Requirements for As-constructed Submissions

The Developer shall submit hard copy and digital as-constructed drawings and information as outlined in this clause.

Digital files of As-constructed Plan View Drawings must be submitted in AutoCAD 2000 DWG format.

.1 As-constructed Submission Timelines

- .1 As-constructed information for each applicable Municipal Improvement shall be submitted within 6 months of the submission date of the applicable C.C.C.

.2 C.C.C. As-constructed Digital Submissions

Submission of as-constructed information at the time of major C.C.C. applications will include, but not be limited to, the following:

- .1 Digital files of As-constructed Drawings,
- .2 Hard Copy of As-constructed Drawings.

The hardcopy drawings should be professionally stamped, signed, and dated to indicate as-constructed information. All original information shall be crossed out and the as-constructed data written adjacent to the original information (a.k.a: red lining).

7.2 Roadways

- .1 Roadway As-constructed Drawings are to be submitted on completion of all concrete work. As-constructed elevations are to be provided at the Lip of

Gutter (L.O.G.)/Edge of Pavement (E.O.P.) at the following locations and shown on the **Plan/Profile** as-constructed drawings (red lining) to confirm the as-constructed centreline grade as shown on the **Plan Drawings**:

- .1 Vertical Points of Intersection (V.P.I.'s). (The as-constructed elevation at a vertical point of intersection on a vertical curve is to be the existing pavement elevation plus or minus mid-ordinate distance (M) to theoretical vertical point of intersection),
- .2 Beginning of Vertical Curves (B.V.C.'s) and End of Vertical Curves (E.V.C.'s),
- .3 Beginning of Horizontal Curves (B.H.C.), Point of Curve to Curve (P.C.C.'s) and End of Horizontal Curves (E.H.C.'s),
- .4 Beginning (B.V.C.), Midpoint (M.P.) and End (E.V.C.) for all curb returns,
- .5 Location and rim elevation of any catch basins.

Grade and elevation changes must be noted if the difference from design to as-constructed is greater than 10 mm.

C.C.C.'s for gravel roads will not be approved until all concrete work is complete with the exception of reinforced lane crossing which may be deferred until just prior to the installation of asphalt.

- .2 Spot elevation checks should be completed following paving to verify grades, V.P.I. elevations and slope.
- .3 Revisions to type of sidewalk and/or curb and gutter installed.
- .4 Revisions to pavement cross-section, including location of filter fabric.
- .5 Revisions to pavement markings.

7.3 Lanes and Public Utility Lots

- .1 Spot elevation checks should be completed following lane construction to verify grades, V.P.I. elevations and slope.

7.4 Utilities

- .1 Revisions to lengths, grades, invert elevations, alignments, and locations of vertical points of intersection for sanitary, storm, and water mains.
- .2 All hydrants, valves, fittings, manholes, catch basins, and other appurtenances shall be noted. Also note rim and invert elevations of manholes and catch basins and flange elevations of hydrants.

- .3 As-constructed invert of water, sanitary, and storm service stubs at property/easement line.
- .4 Location of water, sanitary, storm services, and curb stops dimensioned in two directions.

7.5 Building Grade Plan

- .1 Revise Back of Walk (B.O.W.) and Lane/PUL elevations if variance from design is greater than 10mm.
- .2 Complete a Service Location Report for each serviced lot.

7.6 Subdivision Entrance Signs

- .1 Detailed Construction Drawings of the sign(s) are to be provided. These drawing will be used for the future maintenance and repair of the Entrance Signs.
- .2 The footprint of the Subdivision Entrance Signs is to be shown on all as-constructed plan drawings to identify any conflicts with underground utilities and roadway site triangles.

7.7 Building Grade Certificates/Building Permits

.1 General

Prior to the issuance of a Construction Completion Certificate for service connections (water and sanitary), the Developer shall provide to The Town the relevant Building Grade Certificates for each lot in the Development.

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

.2 Building Grade Information

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

- .1 Water and sanitary services location and inverts,
- .2 Power, telephone, and cable television service location,
- .3 Sidewalk and boulevard width,
- .4 Utility rights of way (easements),
- .5 Lot corner surface elevations,
- .6 Landscape elevation at front and rear of house,

.7 Lot drainage pattern,

.8 Streetlights, hydrants, transformers, telephone and/or cable television pedestals, and any other surface improvements.

This information shall be provided in the form as shown on the sample drawing included in Drawing 4.07 - Building Grade Certificate.

3.0 Engineering Services Guidelines

1 GENERAL

This Section describes the Engineering Services to be provided by a Consulting Engineer relative to the construction, installation, and inspection of Municipal Improvements as listed in a Development Agreement for private development projects and in an Engineering Agreement for Town Projects.

The Consulting Engineer is expected to provide a professional level of inspection services culminating with the signing of the certification statement in the Construction Completion Certificate and Final Acceptance Certificate.

2 CONSULTING ENGINEER/TOWN RELATIONSHIP

2.1 Private Developments

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

The Engineer may, as specified in the Development Agreement, stop the construction and installation of the Work.

Should the Developer for any reason not fulfill the obligations of the Development Agreement, abandon the Project, not complete the works, or elect not to correct the deficiencies identified by the Engineer or the Consulting Engineer, the Consulting Engineer shall not be held responsible to complete the Project. In order to complete the obligations of the Development Agreement, the Town recognizes the advantages of utilizing the same Consulting Engineer and may, at its option, give priority to the said Consulting Engineer where practical.

2.2 Town Developments/Projects

For Town Developments and Projects, there is a direct contractual relationship between the Consulting Engineer and the Town as defined in an Engineering Agreement.

Any directions to the Consulting Engineer shall be as specified in the Engineering Agreement. Any directions to the Contractor will be as specified in the Contract.

3 DOCUMENTS AND SCHEDULES

- .1 The Consulting Engineer, prior to commencement of construction, shall be completely familiar with:
 - .1 The Town of Rocky Mountain House Design Guidelines.
 - .2 The Town of Rocky Mountain House Developer's Handbook.
 - .3 The Development Agreement for the Project.
 - .4 The Engineering Agreement (for Town Projects).
- .2 The Consulting Engineer shall notify the Engineer when and where all work, construction, and maintenance on underground utilities, overland drainage facilities, parks, and other surface improvements are to be performed and shall advise the Engineer of all changes to the Work schedule.
- .3 Notification by the Consulting Engineer shall be by letter, fax (403-845-3198), or e-mail (pfurniss@rockymtnhouse.com) at least 48 hours prior to commencing construction (re-notification is required after 48 hours of construction inactivity), excluding Saturdays, Sundays, and Holidays. The notification shall include the following information:
 - .1 Name of Developer.
 - .2 Subdivision Name and Phase Number.
 - .3 Type of inspection (utility, subgrade, concrete structures, gravel placement, parks development, landscaping, etc.).
 - .4 Start-up date and time.
 - .5 Contractor's name, Superintendent's name, and phone numbers.

4 PRE-CONSTRUCTION AND SITE MEETINGS

- .1 The Consulting Engineer shall schedule and attend a pre-construction site meeting with the Contractor(s) and the Engineer, which meeting shall address work progress, schedule, coordination items, and safety issues as applicable.
- .2 The Consulting Engineer shall schedule regular site meetings with the Contractor and the Engineer as the work is in progress for the purpose of addressing ongoing coordination items as applicable and shall maintain recorded minutes of these meetings.
- .3 The Consulting Engineer shall supply the following documentation to the Engineer in a timely manner:
 - .1 Minutes of the pre-construction site meeting.

- .2 Minutes of the site meetings.
- .3 A copy of the Contractor's proposed schedule.
- .4 Copies of change orders as applicable.

5 DOCUMENTATION

5.1 General

The Consulting Engineer shall prepare Construction Completion Certificates and Final Acceptance Certificates as required and have any maintenance deficiency items dealt with expeditiously.

.1 Private Developments

Construction Completion and Final Acceptance Certificates for private developments are to be submitted as detailed in the Development Agreement. Copies of the Certificates are available from The Town of Rocky Mountain House.

.2 Town Developments/Projects

Completion Certificates and Final Acceptance Certificates for Town developments and Projects are to be submitted. Copies of the Certificates are available from The Town of Rocky Mountain House.

5.2 Reporting of Deficiencies by the Engineer

Any deficiencies observed by the Engineer during construction are to be brought to the attention of the Developer and the Consulting Engineer as they are observed, in writing, as soon as possible. The Consulting Engineer will notify the Engineer with a minimum of 48 hours notice, excepting weekends and holidays, when the deficiency is to be corrected.

5.3 Materials Compliance

All materials supplied and installed shall comply in all respects to The Town of Rocky Mountain House Design Guidelines.

The Contractor will not be permitted to install any material not approved by the Engineer.

5.4 Recommended Testing Frequencies

The following is a summary table of the recommended testing frequencies all construction projects in the Town of Rocky Mountain House.

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

6 CONSTRUCTION INSPECTION

Inspections shall be carried out by the Consulting Engineer to ensure conformance with the Contract Specifications and Drawings.

Inspections are required at key times before and during the Project. The Consulting Engineer is responsible for determining the site supervision and inspection requirements and how these inspections are to be provided.

The Engineer shall be given a minimum of 48 hours notice when requesting a joint inspection with the Consulting Engineer and/or Contractor.

Failure to notify the Engineer may require all work to be exposed for an inspection at the Contractor's expense.

7 POST CONSTRUCTION SERVICES

7.1 Activity Prior To Issuance of a Construction Completion Certificate

- .1 The Consulting Engineer shall inspect the Work with the Contractor, record any deficiencies, and advise the Contractor to repair any deficiencies. After the Contractor has repaired the deficiencies, the Consulting Engineer shall arrange for a joint inspection with the Contractor and the Engineer.
- .2 The Construction Completion Certificate application shall be accompanied by the following documentation:
 - .1 Underground Utilities
 - i) Letter documenting completion of successful water pressure testing, flushing, and disinfections (copy of Bacteriological Water Sample Report to be submitted with Construction Completion Certificate).
 - ii) As-constructed drawing.
 - iii) Copy of video inspection log reporting deficiencies and corrective action taken.
 - .2 Surface Improvements
 - i) As-constructed drawing.
 - ii) A copy of compaction and materials testing results.
 - iii) Documentation of any deficiencies.

7.2 Activity Subsequent to Issuance of a Construction Completion Certificate

The Consulting Engineer shall conduct periodic checks of the subdivision during the maintenance period and note any failures, settlements, or other deficiencies in the Work, as well as respond to any “complaint” calls forwarded by The Town.

7.3 Activity Prior to Issuance of a Final Acceptance Certificate

Prior to the submission of the Final Acceptance Certificate, the Consulting Engineer and the Contractor shall conduct an inspection of the Work, record, and repair all deficiencies.

Once all deficiencies have been corrected, the Consulting Engineer shall request a joint inspection with the Contractor and the Engineer of the Works referred to in the Final Acceptance Certificate.

The Engineer shall prepare a list of the deficiencies, if further deficiencies are noted, and submit the list to the Consulting Engineer.

When the additional deficiencies have been corrected, the Consulting Engineer shall then, within a reasonable period of time, request from the Engineer, a re-inspection for only the inspection of deficient items.

4.0 Servicing Study and Associated Reports

1 GENERAL

As part of the Town's requirements for Outline Plan approval or as part of the information required to form a complete subdivision application on land where no outline plan was required, the Developer must provide a detailed servicing report, which includes servicing drawings, for the full build out of the development area.

2 SERVICING STUDY

The report is intended to establish the site development and servicing requirements for the staged development of the development area/subdivision. The report will ultimately form the basis for detailed design of each phase of development.

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

- .1 Existing conditions (i.e. vegetation, soils groundwater, structures, contaminants, topographic feature, erosion and sediment control measures, etc.),
- .2 Site grading, major drainage routing and detention,
- .3 Description and results of analyses and modelling completed,
- .4 Identification and description of issues/constraints related to capacity, depth, grade, operations, or other unique conditions or features.

The details of individual studies (i.e. geotechnical, noise, traffic, water modelling, sanitary sewer system modelling, storm water management) may be contained in separate reports, but should be coordinated, referenced, and summarized in the Servicing Study Report. Any storm water management reports are preferred to be contained in a separate report for distribution purposes.

Specific requirements for the Geotechnical Report are detailed in Clause 4 of this Section.

Revisions to the Servicing Study must be provided when revisions to approved outline plans are proposed or a proposed plan of subdivision differs from the accepted Servicing Study (i.e. roadway realignment, land use revision). Further Development Agreements will not be entered into until revised Servicing Study drawings and/or reports are submitted and approved.

3 SERVICING STUDY DRAWINGS

3.1 General

The base plans for the Servicing Study should be in the form of a tentative legal plan at a maximum scale of 1:2000 conforming to the approved or proposed outline plan or plan of subdivision. The following preliminary design plans are to be submitted as part of the servicing report:

- .1 Site grading plan,
- .2 Roadway grading plan,
- .3 Water distribution network,
- .4 Sanitary sewer system,
- .5 Major drainage system, including any storm water management features,
- .6 Minor storm sewer system,

Note: Proposed phase boundaries and phasing are to be shown on a separate drawing.

3.2 Site Grading Plan

The purpose of the Site Grading Plan is to provide a preliminary earth balance for the development area, establish the major drainage routing and coordinate the utility and site grading designs with respect to depth of cover and grades. The following information should be shown on one or more drawings:

.1 Existing Contours

Existing elevation contours of the site at 1.0m intervals or less in order to determine drainage patterns.

.2 Preliminary and Final Contours

- .1 Proposed changes in existing contours for each stage of grading.
- .2 A cut/fill plan showing existing and proposed contours.

.3 Natural Features

Locate and identify trees, shrubs, grass, water bodies, streams and other natural features that are to be retained, removed and/or altered.

.4 Limits of Clearing and Grading

Add lines defining the boundary of the area to be disturbed.

3.3 Roadway Grading Plan

The purpose of the Roadway Grading Plan is to confirm the major drainage routing along streets, lanes, and public utility lots and to evaluate the lot grading. The plan should show the following:

- .1 Proposed P.I. elevations,
- .2 Tentative road and lane centre line grades,
- .3 Any proposed subdivision entrance signs should also be shown on this plan.

Detailed roadway design criteria are included in Section 10 of this document.

3.4 Water Distribution System

The purpose of the Water Plan is to establish the water main sizes to ensure that the proposed water system conforms to the Town's network requirements, establish preliminary hydrant locations, and establish any high demand areas (i.e. schools, commercial sites, etc.). The plan should show the following:

- .1 Proposed main sizes,
- .2 Hydrant locations, and
- .3 Location of valves.

The water system design submission should include a copy of the computer modelling analysis.

Detailed water system design criteria are included in Section 5 of this document.

3.5 Sanitary Sewer System

The purpose of the sanitary sewer system plan is to establish the contributory sanitary service area(s) and discharge points to the existing system based on topographic considerations and downstream transmission capacities. This may include existing system analysis in terms of planned and projected flows, and assessment and monitoring of existing system capacities and flows. Future growth areas beyond the limits of the development area must also be considered, and alternatives for service extensions to these areas (i.e. trunk main extension, oversize main through development, etc.) must be determined. The plan should show the following:

- .1 Proposed main sizes,

- .2 Manhole locations,
- .3 Manhole invert elevations,
- .4 Grades between manholes, and
- .5 Proposed manhole depth.

The sanitary sewer system design submission should include a copy of the computer modelling analysis.

Detailed sanitary sewer system design criteria are included in Section 6 of this document.

3.6 Major Drainage System

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

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

The major drainage plan should show the following:

- .1 Major drainage area boundaries,
- .2 Major drainage routes,
- .3 Detention pond locations and shapes (i.e. volume, depth, area, elevations),
- .4 The minor storm sewer system, including manhole locations, catchment areas for the minor system, and
- .5 The plan should also identify any major drainage flows to be intercepted from areas beyond the boundary of the development area and show how this drainage is to be redirected or stored.

The major storm sewer system design submission should include a copy of the computer modelling analysis.

Detailed major drainage design criteria are included in Section 7 of this document.

3.7 Minor Storm Sewer System

Planning and design for the storm sewer system must always address provision of both the minor system of surface drainage, gutters, inlets, and enclosed pipes and the major system. The purpose of the storm sewer system plan is to establish the

contributory storm service area(s) and discharge points for the development area to the existing minor system based on topographic considerations and downstream transmission capacities. This may include analysis of the existing minor system in terms of planned and projected flows, and assessment and monitoring of existing system capacities and flows. Future growth areas beyond the limits of the development area must also be considered, and alternatives for service extensions to these areas (i.e. trunk main extension, oversize main through development, etc.) must be determined.

The plan should show the following:

- .1 Minor storm sewer system, including proposed main sizes,
- .2 Manhole locations,
- .3 Manhole invert elevations,
- .4 Grades between manholes, and
- .5 Proposed manhole depth.

The minor storm sewer system design submission should include a copy of the computer and/or rational method modelling analysis.

Detailed storm sewer system design criteria are included in Section 7 of this document.

3.8 Submission of Servicing Study Report and Drawings

Two complete sets of servicing Drawings shall be submitted to the Town for review and approval:

Unless otherwise specified in the Town's policy on preparing outline plans, two copies of the draft report, including individual studies (i.e. geotechnical, ecological profile, noise, traffic, water modelling, sanitary sewer system modelling, storm water management, erosion and sediment control) shall be submitted to the Town for review and comments.

Following approval of the drawings and the report, submit three copies of the report and drawings to the Engineering Services Department.

4 GEOTECHNICAL REPORT

4.1 General

The Developer shall engage the services of a qualified Professional Engineer to prepare a report prior to commencing detailed subdivision design or as part of the outline plan submission. The report shall evaluate soil characteristics and existing

groundwater conditions and be based on test holes drilled at a maximum spacing of 150 m throughout the development area. The test holes are to be of sufficient depth to indicate soil conditions for utility construction, foundation construction and assessment of groundwater conditions.

4.2 Final Report

Three copies of the report shall be submitted to The Town including the following information:

- .1 Test hole location plan and soil logs for each test hole,
- .2 Results of the tests noted above,
- .3 Water table contour map with seasonably adjusted water table shown at 0.50m intervals,
- .4 Recommendation on suitability of site for the proposed Development,
- .5 Comments on the soil bearing capacity,
- .6 Recommendations with regard to trench excavation and backfill specifications, and road pavement structure requirements.

If required, slope stability and recommended setbacks from escarpments for various types of building foundations shall be submitted in a separate report.

5 ENVIRONMENTAL ASSESSMENT REPORTS

An Environmental Site Assessment (ESA) is required for all sites where environmental issues are of concern.

An ESA is required for any situation where contamination on or adjacent to the subject site poses a current or future environmental concern to the future users/occupants of the proposed development. The level of ESA required will vary depending on circumstance.

6 TRAFFIC IMPACT ASSESSMENTS

6.1 General

The Developer shall engage the services of a qualified Professional Engineer to prepare the traffic impact assessment (TIA). The following information shall be included to any traffic impact assessment to ensure sufficient information is provided to complete a proper review.

6.2 Background Information

The purpose of the background information is to provide an understanding of the proposed development and the location of it relative to the Town's roadway network. The background information shall outline items such as the following, but is not limited to:

.1 Proposed Development

- .1 Development name and/or developer
- .2 Development location
- .3 Type of development
- .4 Size of development
- .5 Staging of the development.

.2 Roadway Network

- .1 Names of all adjacent streets,
- .2 Highway number and control section, if applicable
- .3 Highway classification, if applicable

.3 Study Area

- .1 Key map
- .2 Site plan

6.3 Existing Infrastructure & Conditions

Prior to projecting and analyzing traffic, it is necessary to identify the existing infrastructure and conditions within the study area. It is recommended that a site visit and meeting with the Engineer be conducted as part of any TIA, in order to confirm the study area and any specific items to be analyzed as part of the report. This shall include items such as, but not limited to:

.1 Existing Roadway Conditions

- .1 Pavement width
- .2 Pavement markings
- .3 Right of way width
- .4 Vertical grades

- .5 Horizontal alignment (i.e. curve radii)
- .6 Design and/or posted speed limit
- .7 Location of any speed limit changes
- .8 Existing or proposed accesses in the vicinity
- .9 Existing illumination in the vicinity
- .10 Traffic control type (i.e. two-way stop, four-way stop, etc.)
- .11 Traffic operation signage (i.e. no left turn, no parking, etc.)
- .2 *Existing Intersection Conditions*
 - .1 Intersection configuration shown on a scaled plan
 - .2 Vertical grades of local and/or intersecting roadways
 - .3 Intersection and stopping sight distances
 - .4 Signal timings, if applicable
 - .5 Major developments currently using the intersection
- .3 *Existing Traffic Conditions*
 - .1 Turning movement counts (diagram or table) for AADT, AM Peak and PM Peak
 - .2 Existing AADT on highway, if applicable
 - .3 Historical traffic growth rate on highway, if applicable
 - .4 Annual traffic growth rate at intersections
 - .5 Vehicle composition (% vehicle type)

The Town may have turning movement counts available for intersection located within the study area. If counts are not available for the existing intersection, count locations shall be confirmed with the Town prior to being completed. Traffic counts shall be broken into 15 minute intervals over a long enough period to establish the peak hours. Counts shall not be conducted during times of detours, accidents or inclement weather that could affect the traffic volumes and shall be taken at times when the traffic represents an average day, not on or near holidays or special events.

6.4 Traffic Projections

The following is sample of how to lay out the traffic projections in a logical manner to assist the Town in the review process. Depending on the complexity of the study, more or less traffic projections may be required.

.1 Existing Background Traffic

- .1 AM Peak**
- .2 PM Peak**

.2 Build Year

- .1 Projected Background Traffic**
 - i) AM Peak**
 - ii) PM Peak**
- .2 Project Development Traffic**
 - i) AM Peak**
 - Site generated
 - Pass by and/or internal trips
 - Total trips
 - ii) PM Peak**
 - Site generated
 - Pass by and/or internal trips
 - Total trips
- .3 Combined (Background + Development) Traffic**
 - i) AM Peak**
 - ii) PM Peak**

.3 Staging Years (or Full Build Out Year for smaller developments)

- .1 Projected Background Traffic**
 - i) AM Peak**
 - ii) PM Peak**
- .2 Project Development Traffic**
 - i) AM Peak**
 - Site generated
 - Pass by and/or internal trips
 - Total trips
 - ii) PM Peak**
 - Site generated

- Pass by and/or internal trips
- Total trips

.3 Combined (Background + Development) Traffic

- i) AM Peak
- ii) PM Peak

.4 20 Year Horizon

.1 Projected Background Traffic

- i) AM Peak
- ii) PM Peak

.2 Project Development Traffic

- i) AM Peak
 - Site generated
 - Pass by and/or internal trips
 - Total trips
- ii) PM Peak
 - Site generated
 - Pass by and/or internal trips
 - Total trips

.3 Combined (Background + Development) Traffic

- i) AM Peak
- ii) PM Peak

6.5 Analysis

.1 Capacity Analysis

The TIA shall include a capacity analysis for the various traffic scenarios identified in the document. In cases where the proposed development utilizes an existing intersection, it is necessary to first understand how the existing intersection and adjacent roadway network operates without the development. Where applicable, the TIA shall include capacity analysis for the existing intersections in question.

Impacts shall be evaluated with development for the build year, staging years and 20 year horizon. Once the recommended improvements are identified, the analysis should be conducted to ensure the improvements will result in improved intersection operations.

The capacity analysis shall, in most cases, include the following information for each analysis scenario:

- .1 Delay per vehicle (seconds) by intersection, turning movement and peak period
- .2 Level of service (LOS) by intersection, turning movement and peak period
- .3 Left-turn/right-turn warrants
- .4 LOS on a highway link, if applicable
- .5 Vehicle queuing information, if applicable

.2 Signalization Analysis

The analysis should consider all other possible alternatives prior to recommending signals. If signalization is recommended at a previously unsignalized intersection, supporting documentation will be required illustrating that all options were considered.

In some cases, signals may already exist at an intersection. Analysis should be conducted to ensure that the current signal timings and phases are still valid. If not, new signal timings and turning phases shall be recommended. In cases where the distance between signalized intersections is less than 800m, the analysis must consider upstream / downstream signals.

.3 Pedestrian Analysis

Depending on the type of development and its interaction with the surrounding area, pedestrian movements can become a significant issue. This should be discussed at the initial site visit and meeting with the Engineer. As a result, analysis to determine improvements to pedestrian facilities may be required.

.4 Operations Analysis

Once the traffic analysis is completed and the recommended intersection improvements have been determined, it is necessary to ensure that the design vehicle is capable of safely maneuvering the intersection without interfering with other traffic movements. Intersection plans shall be provided illustrating that the design vehicle can safely maneuver the intersection.

6.6 Conclusions & Recommendations

The TIA should summarize the finding of the various analyses conducted, including potential issues, and clearly outline the recommendations regarding required intersection improvements, pedestrian mitigation, signalization and right of way requirements.

A scaled plan illustrating the recommended horizontal intersection layout shall be provided.

5.0 Water Design Standards

1 GENERAL

The water system consists of the treatment plants, reservoirs, booster stations, trunk water mains, distribution mains, and appurtenances.

Water mains 150 mm - 300 mm will be designated "Distribution Mains".

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 Environmental Protection Services and as amended by these guidelines.

2 DESIGN FACTORS

2.1 Hydraulic Analysis Requirements

The Developer shall perform a hydraulic network analysis using a method acceptable to the Town for all developments to ensure both domestic and fire flow requirements are met. A report outlining the results of the analysis shall be submitted to the Town with the subdivision design drawings.

2.2 Design Parameters

The following parameters shall be used in the design or evaluation of the water distribution system:

.1 Hazen-Williams Coefficient (C)

| | | |
|----|-------------------------------------|-----------|
| .1 | Polyvinyl Chloride (PVC) | 140 |
| .2 | Asbestos Cement (AC) | 130 |
| .3 | Ductile Iron (DI) or Cast Iron (CI) | 80 to 100 |

.2 Distribution Main Sizes

The minimum size of Distribution Mains shall be as follows:

- .1 Residential = 150 mm diameter
- .2 Industrial = 200 mm diameter

Where two hydrants are to be installed on an unlooped Distribution Main the minimum size of the main shall be 200 mm diameter.

.3 Consumption Rates

.1 Residential per capita consumption rates:

- i) Maximum Day Demand: 750 litres (165 imp. gal.) per capita per day.
- ii) Peak Hour Demand: 1500 litres (330 imp. gal.) per capita per day.

.2 Non-residential consumption rates:

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 where Q is in litres per second. In addition, water demand for large developments should be evaluated based on site specific service requirements as well as fire flow requirements.

.4 Design Population

The design population shall be the ultimate population in the area under consideration based on the approved Zoning By-law requirements.

.5 Fire Flow Requirements

Fire flow requirements shall be in accordance with the recommendations of the Fire Underwriters Survey for the type of development being considered. The minimum fire flow used for single family residential subdivisions shall be 4,500 litres/minute (1000 igpm).

.6 Pressure

- .1 Minimum residual line pressure under maximum day plus fire flow conditions shall be 150 kPa at ground level of any point in the system. Minimum residual line pressure under peak hour flow conditions shall be 300 kPa.
- .2 Minor pressure losses through valves and fittings must be accounted for.

.7 Velocity

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

3 DISTRIBUTION MAINS

3.1 General

The standard grid main network required within residential subdivisions is as shown on Drawing 2.01. The grid mains must coincide with those in adjacent subdivisions to maintain the continuity of main sizes between subdivisions. Distribution Mains shall be continuous (looped) wherever possible. The maximum length of main permissible between ties in residential developments is 300 m. No more than 30 dwelling units shall be permitted service on an unlooped (dead end) section of water main, for detached and semi-detached units. Water demands in industrial, commercial, and high-density areas must be analysed to determine the grid and main sizes required.

For initial stages of large residential developments, the Town, at its sole discretion, may defer the second feed requirement, up to a maximum of 100 dwelling units. For proposals beyond 30 dwelling units on an unlooped main, fire flow testing must be conducted, as directed by the Regional Fire Chief, and analysis performed by the Consultant to show if the fire flow and consumption flows can be met for the proposed development. Other limiting factors that will be considered for the approval of more than 30 units on an unlooped water main are length of run, existing pipe size, age, material and condition.

An air release valve or hydrant shall be placed at significant high points in the water main profile to allow for purging of stale water or air.

A hydrant shall be installed at the end of all dead-end water mains to facilitate flushing and disinfection of the main.

3.2 Alignments

Water mains shall be located on the standard alignment shown on Drawing 4.05. Consistent alignments shall be used along the entire length of a street.

3.3 Depth of Cover

Water mains shall be installed with a minimum depth of cover of 2.7m from the road/lane/utility lot surface grade to the top of the main. Where existing conditions dictate that the depth of buries be less than 2.7 m, the main/service is to be insulated as specified in Drawing 1.04.

3.4 Specifications

.1 Water Pipe

- .1 Poly-vinyl Chloride (PVC) type CIOD (Cast Iron Outside Diameter);

- .2 Meeting the specifications of AWWA C900-89 (100-300mm), AWWA C-905 (350-600mm), CAN3-B137.3-M86 latest version thereof;
- .3 Must be CSA approved with a pressure rating of 1035 kPa (class 150)
- .4 The Dimension Ratio (DR) shall be 18;
- .5 Jointing shall be gasketed bell-end and spigot conforming to AWWA C-11/ANSI A21.1 latest version thereof. Elastomeric gaskets shall conform to ASTM F477.

.2 Joint Restraints

- .1 Restraining devices for PVC pipe shall incorporate a series of machined serrations (not “as cast”) on the inside diameter to provide a positive restraint, exact fit, 360 degrees contact pad to pad feature and support of the pipe wall. Restraint devices shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12 for 50 mm through 600 mm sizes;
- .2 Bolts and connecting hardware shall be type 304 stainless steel conforming to ASTM standards;
- .3 All restraining devices for PVC pipe shall have a water working pressure rating equivalent to the full rated pressure of the PVC pipe on which they are installed, with a minimum 2:1 safety factor in any nominal pipe size;
- .4 All restraints must be compatible with 150 mm diameter cast iron pipe.

4 HYDRANTS

4.1 Spacing

The maximum spacing between hydrants, as measured along the centre line of the right of way, shall be 150 m in residential areas and 120 m in multiple family residential, school, and industrial/commercial areas. The distance from the primary entrance of any building to a hydrant shall not be greater than 75 m.

4.2 Approvals

A plan showing all proposed hydrant locations within the Development must be submitted to The Town for approval of locations and spacing prior to finalizing the design of the water distribution system.

4.3 Alignment and Placement

Hydrants should be placed at street intersections where possible to improve their visibility to emergency vehicles, particularly at cul-de-sac entrances. Fire hydrants

shall be located at an alignment of 2 m back of face of curb or 0.5 m back of walk. Where a hydrant is installed at the corner of an intersection, it shall be installed at the beginning or end of the curb return.

4.4 Hydrant Type

Hydrants shall be manufactured by an approved hydrant manufacturer in conformance with current material specifications and drain holes shall not be plugged unless otherwise directed by the Engineer.

4.5 Depth of Bury

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

4.6 Specifications

- .1 Conforming to AWWA C502.80 – Fire hydrants for ordinary waterworks service;
- .2 Hydrants to be supplied with a minimum of one 300 mm intersection extension. The combined length of the lower barrel and the 300 mm shall provide at least a three (3) metre depth of bury for the main;
- .3 150 mm inlet connection with compression type push-on rubber ring to suit the mater main pipe;
- .4 Hydrants shall be supplied with break away type ground level flanges;
- .5 Hydrants shall have two 75 mm hose nozzles having a Major Thread O.D. of 75.87 mm (2.987”), conforming to the Alberta Mutual Aid Thread Standard of eight (8) threads per 25.4 mm and shall open in a counter clockwise direction;
- .6 Hydrants shall have a single 100 mm pumper nozzles having a Major Thread O.D. of 123.80 mm (4.874”), conforming to the WCUS / WCIU Thread Standard of six (6) threads per 25.4 mm and shall open in a counter clockwise direction;
- .7 All nozzle caps and operation nuts shall be square in shape;
- .8 Hydrant barrels are to be painted in Hi-Vis Yellow, Color Code (16-202). Code refers to the “General Paint Brand” and are to be industrial enamel for outside brush applications;
- .9 Nozzle covers are to painted the same color as the hydrant barrel;

- .10 Hydrants shall be equipped with a threaded drain, which shall not be plugged;
- .11 All flange nuts and bolts shall be type 304 stainless steel with hexagonal heads conforming to ASTM standards. Bolts and nuts shall be the size and length recommended by the valve and flange manufacturer.

5 VALVES AND FITTINGS

5.1 Alignment and Placement

Main valves shall be located such that no more than 30 single family lots and one hydrant are involved in a shut down and a maximum of four valves are required to shut down any section of line.

The design standard shall be two valves at a tee and three valves at a cross, unless approved otherwise by the Engineer. A valve and one length of pipe shall be installed at interim limits of construction. See Drawing 2.02 for typical valve and hydrant locations.

5.2 Protection

Where required by the Engineer, or as indicated by soils testing, all cast iron valves and fittings shall be cathodically protected as specified in Section 9.

5.3 Operation of Boundary Valves During Construction

The Consulting Engineer shall clearly identify boundary valves on the engineering design drawings.

5.4 Specifications

.1 Valves

- .1 Cast iron body and bronze mounted with grade of bronze used to be completely resistant to de-zincification by water having a pH of 9.0;
- .2 Resilient seat gate valve type conforming to AWWA C-509;
- .3 Operating pressure shall be 1,200 kPa;
- .4 Push-on rubber ring connectors;
- .5 Non-rising stems, type 304 stainless steel;
- .6 O-ring stem seals;

- .7 50 mm type square operating nut. All exterior nuts, bolts and washers shall be type 304 stainless steel. All bolts and nuts shall have hexagonal heads;
 - .8 Valves shall open in a counter clockwise direction;
 - .9 Internal and external portions of valves shall be coated with an approved epoxy coating, 3M Skotchkote 206N or approved equal in accordance with AWWA C213 coatings in contact with potable water. All coated elements shall carry a label identifying the name of the coating and the coating applicator.
- .2 *Valve Boxes*
- .1 Cast iron body, two section, bituminous coated;
 - .2 Norwood Foundry type A or equivalent adjustable for a 3.0 metre bury;
 - .3 Complete with extension spindle and 50 mm flange nut and cap;
 - .4 Must be of sufficient length to provide a vertical adjustment of +/- 300 mm. Extensions shall be cast iron suitable for use with valve boxes installed.

6 WATER MAIN FLUSHING AND DISINFECTION PROCEDURES

6.1 General

The following procedures will be followed when installing water mains connected to The Town's water distribution system:

- .1 Basic procedures to meet the standards outlined in AWWA C651-86, "Disinfecting Water Mains",
- .2 Consulting Engineer to submit proposed disinfection/flushing procedures to The Town for review with engineering design drawings.
- .3 All water lines to be flushed again after streets are constructed and before issuance of building permits.

6.0 Sanitary Design Standards

1 GENERAL

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

The design of the sanitary sewer system should conform to the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta, as published by Alberta Environmental Protection Services and as amended by these guidelines.

2 DESIGN FLOWS

In determining the sewer design flows, the following parameters shall be used:

Design population (P) shall be the ultimate population in the area being considered based on approved Zoning By-law requirements.

Average Per Capita Flow (Q_a) = $0.38\text{m}^3/\text{day}/\text{person}$

Peak Flow (Q_p) = $Q_a\{1 + 14/[4 + (P/1000)^{0.5}]\}P$

The following allowance for infiltration expressed in litres/mm pipe diameter/km length/day must be included in the design capacity of the pipe:

Polyvinyl Chloride (PVC) = 5

Concrete pipe = 20

Vitrified Clay tile (VCT) = 20

3 SANITARY SEWER MAINS

3.1 General

Sanitary sewers shall be designed for gravity flow unless approved otherwise by the Engineer.

3.2 Minimum Slope

Sanitary mains shall be laid in a straight alignment between manholes at the following minimum grades:

| Pipe Diameter | Minimum Grade |
|---------------|---------------|
| 200 mm | 0.40 % |
| 250 mm | 0.28 % |
| 300 mm | 0.22 % |
| 375 mm | 0.15 % |
| 450 mm | 0.12 % |
| 525 mm | 0.10 % |
| 600 mm | 0.08 % |

The hydraulic capacity of a gravity sanitary sewer shall be based on such factors as projected in-service roughness coefficient, slope, pipe material, and actual in-service flows. Sewers larger than the minimum size required shall be chosen so that the minimum velocity at the peak flow is not less than 0.6m/s for self-cleaning purposes.

3.3 Pipe Material

All 200 mm sanitary sewer pipe shall be PVC SDR 35.

3.4 Pipe Strength

The strength of the pipe shall be sufficient to carry the loads due to trench backfill and due to wheel loads. The strength of pipe shall be calculated on the basis of the external loads, trench conditions, and class of bedding provided. Class B sand bedding is the minimum bedding requirement.

3.5 Curved Sewer

Although it is recommended that sanitary sewers be laid with straight alignments between manholes, curved sewers will be permitted with the following restrictions:

- .1 The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m.
- .2 Manholes shall be located at the beginning and end of the curve, and at intervals of not less than 90 m along the curve unless approved otherwise by the Engineer.
- .3 The curve shall run parallel to the centre line of the right of way.
- .4 The minimum grade for sewers on curves shall be 50% greater than the minimum grades noted in Clause 3.2 of this Section.

3.6 Alignment

Sanitary mains shall be located on the standard alignment shown on Drawing 4.05. A minimum separation of 2.5 m from water mains shall be provided in all instances, unless approved otherwise by the Engineer. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

3.7 Depth of Cover

All sewers shall be designed so that the top of the main is at the minimum depth required to meet the conditions of Section 8, Clause 4; but not shallower than 2.7 m, unless otherwise approved by the Engineer. Where existing conditions dictate that the depth of buries be less than 2.7 m, the main/service is to be insulated as specified in Drawing 1.04.

3.8 Manholes

Manholes shall be installed at the end of each line, at all changes in sewer size, grade, or alignment, at all junctions, and at intervals of no greater than 150 m along the length of the sewer.

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. Where a bend in pipe alignment occurs in a manhole, the invert elevation of the downstream pipe shall be at least 50 mm below that of the lowest upstream pipe.

Sanitary sewers are to be extended 1.5 m past the last house service lead, with the exception of sanitary mains in cul-de-sacs where service leads may be connected directly to the manhole provided that the lead enters the manhole less than 0.60 m above the invert of the main.

The flow channel through manholes shall be made to conform in shape and slope to that of the sewer. The depth of the flow channel should be at least one-half the diameter of the downstream sewer.

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

Standard 1200 mm diameter pre-cast manholes shall be used on mains 600 mm in diameter or less. Pre-cast manhole vaults, or an oversized manhole barrel shall be used on mains 675 mm in diameter or greater. "T-Riser" manholes may be used on mains 1200 mm in diameter and larger, providing there is no deflection in alignment or grade.

Manhole bases may be cast-in-place or pre-cast complete with flow channel, benching, and pipe stubs.

3.9 Oversize

Oversize may be applicable for sanitary mains. Oversize costs will be determined as outlined in the Development Agreement.

7.0 Stormwater Management Drainage Systems

1 STORMWATER DESIGN STANDARDS

1.1 General

The storm sewer system must be designed with consideration for the existing drainage area boundaries established by the Town for each storm trunk system. All pertinent data regarding the subdivision should be discussed with the Engineer prior to design proceeding.

The design of the storm sewer system should conform to the Trappers Creek Study published by UMA Engineering Ltd. in 2002 and the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta, as published by Alberta Environmental Protection Services and as amended by these Guidelines. Detailed stormwater management standards and guidelines are described in the Alberta Environmental Protection publication entitled "Stormwater Management Guidelines for The Province of Alberta".

1.2 Stormwater Management

Stormwater management is the process of controlling of run-off, usually by diverting the water to a detention facility, in order to control the rate and quality of the water released into an existing storm sewer system or stream.

These Guidelines are the basis for stormwater management in all developable land, including land upstream of existing pipe systems.

The main objectives of stormwater management are as follows:

- .1 Ensure that the hydraulic capacities of existing pipe systems and/or watercourses are not exceeded.
- .2 Reduce to acceptable levels (1:100 year probability of occurrence, where reasonably attainable), the potential risk of property damage from flooding within the development and in the existing developments downstream of the proposed development.
- .3 Reduce to acceptable levels (1:5 year probability of occurrence, where reasonably attainable), the inconvenience caused by surface ponding within development areas.

Based on the preceding criteria, stormwater management is to be implemented for all developable land unless approved otherwise by the Engineer.

1.3 Major/Minor System

The storm drainage system shall be designed using a dual drainage concept consisting of a minor system and a major system.

The minor system, comprised of pipes, manholes, catch basins, stormwater storage facilities, and outfall structures, shall convey run-off from snowmelt and rainfall events to an adequate receiving stream, lake or pond without sustaining any surface ponding or excessive surface flows for events up to a 1 in 5 year return period.

The major system comprises the street system, stormwater storage facilities, parkland, and any other routes required to convey run-off during rainfall events up to a 1 in 100 year return period, to the receiving water body. The major system shall be evaluated in a manner sufficient to determine that no flooding that may cause significant property damage (i.e. flooding of buildings) occurs during the 100-year storm event.

In general, post-development release rates must be controlled so they do not exceed pre-development release rates based on a 1:5 year storm. This is achieved by providing storage for the difference between a 1:100 year storm based on the post-development run off coefficients and a 1:5 year storm based on the pre-development run off coefficients over a 24 hour time period. Any stored water is permitted to be released at the pre-development release rate based on a 1:5 year storm. For developments in areas that already contain a minor storm system, an onsite minor storm systems should be installed and tie into the existing system.

See clause 4 of this section for the design details for Stormwater Management Facilities.

1.4 Rainfall Intensity-Duration-Frequency

The following formulas define the Intensity-Duration-Frequency Curves (IDF Curves) developed by Atmospheric Environment Services of Environment Canada for the Town of Rocky Mountain House Airport.

| Extrapolated IDF Formulas (1964 – 1990 Data) | |
|---|-----------------------------------|
| Frequency | Average Intensity (mm/hr.) |
| 2 year | $352.7 / (t + 4.94)^{0.72}$ |
| 5 year | $525.2 / (t + 3.74)^{0.73}$ |
| 10 year | $633.8 / (t + 3.31)^{0.73}$ |
| 25 year | $779.1 / (t + 3.03)^{0.74}$ |
| 50 year | $901.0 / (t + 2.98)^{0.74}$ |
| 100 year | $994.5 / (t + 2.79)^{0.74}$ |

t = storm duration in minutes.

These IDF formulas shall be used for all new storm basins.

1.5 Rational Method Design

The Rational Method of analysis shall be used to determine design flows for piped storm sewer systems of predominantly residential, commercial, and/or industrial land up to 65 ha (160 ac) in area. Alternatively, computer modelling may be used (see Clause 1.6 of this Section). The Rational Method formula is:

$$Q = (CiA)/360$$

Where:

"Q" is the design peak flow rate (m³/sec)

"C" is the run-off coefficient

"i" is the rainfall intensity (mm/hr) corresponding to the time of concentration

"A" is the area of contributing run-off surface (ha)

.1 Run-off Coefficients (C)

Minimum recommended run-off coefficient (C) values to be used in the Rational Method are as follows:

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

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

.2 Storm Duration

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

1.6 Computer Modelling

- .1* Computer models shall be used to determine design flow conditions in sewer systems with drainage areas larger than 65 ha (160 ac). They may be used for smaller systems as an alternative to the Rational Method.
- .2* Computer models shall be used to determine design flows and the sizing of systems that contain non-pipe stormwater management facilities (i.e. detention ponds) or systems that include a significant amount of undeveloped land.
- .3* When large parcels (quarter section or larger) are being developed and will connect to the existing stormwater facilities, the Consulting Engineer shall prepare a stormwater model that simulates both major and minor systems. As

a general rule, this model will have sub-basins no larger than 5 ha. The modelling shall be generated utilizing software that is input/output compatible with XP-SWMM.

The selection of an appropriate computer model shall be based on an understanding of their principles, assumptions, and limitations in relation to the system being designed. Acceptable computer models are USEPA SWMM, OTTSWM, XP-SWMM, EXTRAN, and OTTHYMO. The Town currently maintains their infrastructure modelling utilizing XP-SWMM.

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, and submitted to the Town along with computer model input and output and a design summary report.

The design storm hyetograph shall be developed using the Chicago Method, unless otherwise approved by the Engineer.

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

Historical, continuous rainfall data in one-hour increments, over the past 25 or more years, may be routed through the storm run-off model to provide statistical frequency analysis of various flow and storage characteristics of the catchment in question.

1.7 Service Connections

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

Connections from roof leaders shall not be made to the storm sewer system. Roof drainage from residential housing units, apartments, commercial, and industrial buildings shall discharge to grassed or pervious areas.

1.8 Length of Run

Surface water should not be permitted to run a distance greater than 150 m in streets or 200 m in lanes and swales without interception by a catch basin.

1.9 Back of Lot Drainage

The following will apply to back of lot drainage in laneless subdivisions:

- .1 For back-to-back lots, a concrete swale is to be constructed along the rear property lines within a Town easement to direct the drainage to a street. Concrete swales are to be constructed with continuous grade lines with a minimum 0.8% slope to convey rear lot drainage to a catch basin located in a street or utility right of way.
- .2 For lots backing onto a park or reserve area, a grass swale is to be provided within the park or reserve area adjacent to the rear lot line. Grass swales are to be constructed with continuous grade lines with a minimum 0.8% slope to convey rear lot drainage to a catch basin located in a street or utility right of way.

The flow from rear lot swales should not be allowed to cross a sidewalk in order to prevent ice build-up and dirt accumulation on the sidewalk. A catch basin may be required at back of walk to intercept these flows.

2 STORM SEWER MAINS (MINOR SYSTEM)

2.1 General

Storm sewer mains shall be designed for gravity flow unless approved otherwise by the Engineer.

2.2 Flow Capacity

Sewer hydraulics shall be calculated using Manning's equation. Manning's n value shall be 0.013 for concrete and P.V.C. For other pipes and open channels, the values suggested in "Modern Sewer Design" (AISI, 1980) shall be used, but shall not be less than 0.013.

2.3 Pipe Strength

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

2.4 Depth of Cover

All sewers shall be designed so that the top of the main shall be located at the minimum depth required to meet the conditions of Section 8, Clause 4, but not shallower than 1.5 m, unless otherwise approved by the Engineer. Where existing conditions dictate that the depth of buries be less than 2.7 m, the main/ is to be insulated as specified in Drawing 1.04.

2.5 Minimum Sizes

The minimum size of a storm sewer main shall be 300 mm in diameter.

2.6 Minimum Slopes

Sewer velocities shall not be less than 0.60 m/sec when flowing full. Flow velocities of less than 0.9 m/sec are not recommended. When the flow velocity exceeds 3.0 m/sec, special consideration shall be given to the design of junctions and bends in the system. See Minimum Design Slopes for Storm Sewer (Table 8.1) in Alberta Environmental Protection's publication titled "Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta".

2.7 Curved Sewers

Although it is recommended that storm sewers be laid with straight alignments between manholes, curved sewers will be permitted with the following restrictions:

- .1 The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m.
- .2 Manholes shall be located at the beginning and end of curves, and at intervals not greater than 90 m along the curve unless approved otherwise by the Engineer.
- .3 The curve shall run parallel to the street centre line.
- .4 The minimum grade for sewers on curves shall be 50% greater than the minimum grade required for straight runs of sewer.

2.8 Alignment

Storm sewers shall be located on the standard alignment shown on Drawing 4.05. Consistent alignments shall be used along the entire length of a street.

2.9 Manholes

Manholes shall be installed at the end of each line, at all changes in size, grade, or alignment, at all junctions, and at a spacing of no greater than 150 m along the length of the sewer.

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. Where a bend in pipe alignment occurs in a manhole, the invert elevation of the downstream pipe shall be at least 50 mm below that of the lowest upstream pipe.

Storm sewers for weeping tile connections are to be extended 1.5 m past the last house service lead, with the exception of storm mains in cul-de-sacs where service leads may be connected directly to the end of the line manhole provided that the lead enters the manhole less than 0.60 m above the invert of the main.

The flow channel through manholes shall be made to conform in shape and slope to that of the sewer. The depth of the flow channel should be at least one-half the diameter of the downstream sewer.

Standard 1200 mm diameter precast manhole shall be used on mains 600 mm in diameter or less. Precast manhole vaults or an oversized manhole barrel shall be used on mains of 675 mm in diameter or greater. A "T-Riser" manhole may be used on mains 1200 mm in diameter and larger, providing there is no deflection in alignment or grade.

2.10 Catch Basins and Catch Basin Manholes

.1 General

Catch basins at street intersections shall normally be located at beginning or end of the curb return. Catch basins are not to be located within the limits of a paraplegic ramp. Invert crossings of streets (swales) are not permitted.

.2 Catch Basin Leads

Catch basin leads shall connect directly to a manhole. A minimum lead size of 300mm shall be used for all leads including the following:

Twin catch basin required to drain an area shall consist of a catch basin and a catch basin manhole interconnected by means of 300 mm pipe.

The lead from the catch basin manhole to main line manhole shall be a 300 mm pipe.

Single catch basins require 300 mm leads as well.

All leads shall have a minimum grade of 2.0%.

The length of catch basin leads shall not exceed 30 m. If it is required to extend a lead more than 30 m, a catch basin manhole shall be used.

.3 Design Capacity

For design purposes, catch basin capacities in litres/second are approximately as follows:

| Norwood Model | Sump Condition * | Continuous Slope ** | |
|------------------------|---------------------|---------------------|----------|
| | | Capture | Overflow |
| F-51 (with side inlet) | 190 | 30 | 95 |
| F-51 (grate only) | 155 | 35 | 85 |
| F-33 | 75 | 10 | 30 |
| F-39 | 80 | 15 | 40 |
| F-49 | 105 | 20 | 50 |

* based on 100 mm depth of ponding

** based on 50 mm depth on 1% slope

.4 Types of Catch Basins and Catch Basin Manholes

Catch basins shall be built with a 900 mm barrel. Catch basin manholes shall be built with a 1200 mm barrel. Catch basins and catch basin manholes shall be built with sumps.

The type of inlet assembly to be used for catch basins and catch basin manholes shall be as follows:

- .1 Type K-1 (i.e. Norwood F-51) catch basin assembly is to be used in conjunction with standard curb and gutter, and standard monolithic sidewalk construction,
- .2 Type K-3 (i.e. Norwood F-51) catch basin assembly is to be used in conjunction with lane construction,
- .3 Type K-4 (i.e. Norwood F-33) catch basin is to be used in conjunction with rolled monolithic sidewalk construction,
- .4 Type K-6 (i.e. Norwood F-39) catch basin assemblies may be used to drain landscape areas and swales,

2.11 Culverts

Culvert design should consider flow capacity and back water effects over a range of flows. The design capacity of the culvert requires assessment of both its nominal

design and its performance during the 100-year storm event. For maintenance purposes, the minimum nominal diameter for any culvert is 400mm.

3 MAJOR DRAINAGE SYSTEM

3.1 General

The grading of streets and the layout of the major drainage system shall be assessed, relative to the following guidelines, during the 100-year storm event:

- .1 No building shall be inundated at its ground line.
- .2 Continuity of the overland flow routes between adjacent developments shall be maintained.
- .3 The depth of water at curbside should be less than 500mm for all roadways. Depths greater than 300 mm are not recommended.
- .4 The velocities and depths of flow in the major drainage system shall not exceed the following values:

| Depth of Flow (m) | Maximum Water Velocity (m/s) |
|------------------------------|---|
| 0.80 | 0.5 |
| 0.32 | 1.0 |
| 0.21 | 2.0 |
| 0.09 | 3.0 |

- .5 Trapped low storage should be implemented to offset peak flows where necessary to keep water velocities and depths below those noted above.

The Developer shall recommend a building elevation to the lot purchaser that is above trapped low ponding elevations and designed to drain surface run-off to the street or lane/utility right of way.

4 STORMWATER MANAGEMENT (SWM) FACILITIES

4.1 Design Requirements Common to Stormwater Management Storage Facilities

.1 General

The use of stormwater storage 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. Stormwater

management facilities that are to be maintained by the Town should be “Dry Detention Pond” type, which drain completely between storms.

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.

Detention ponds in residential setting should have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the subdivision.

.2 Geotechnical Considerations

Soils investigations 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.

.3 Minimum Stormwater Quality Standards

The following is an excerpt from the Wastewater and Storm Drainage Regulations published by Alberta Environment:

Storm outfalls without due consideration for water quality will not be allowed. Stormwater management techniques to improve water quality shall be included to effect a minimum of 85% removal of sediments of particle size 75 microns or greater. Additional quality measures shall be required, based on site-specific conditions.

Based on the preceding statement, the Developer shall incorporate stormwater treatment measures (i.e. installation of stormwater treatment units) in the design of any stormwater storage facility.

.4 Signage for Safety

The design of stormwater management facilities shall include adequate provisions for the installation of signage to warn of anticipated water level fluctuations, with demarcation of maximum water levels to be expected for design conditions. Warning signs will be designed by the Developer and approved by the Engineer.

4.2 Dry Detention Ponds

.1 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 100 mm 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/sec. Appropriate fencing and guardrails are to be provided to restrict access and reduce the hazard presented by the structure head and wingwalls.

.2 Design Parameters

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

- .1 Storage capacity for up to the 100-year storm event.
- .2 Detention time to be determined based on downstream capacity, recommended maximum detention time is 24 hours.
- .3 Maximum active retention storage depth of 1.5 m. 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).
- .4 Minimum freeboard of 0.6 m above 1:100 year high water levels.
- .5 Provision of an emergency overland flow route. If an emergency overland route cannot be provided, the minimum freeboard shall be raised to the higher water level generated by the 1:100 year storm under a plugged outlet scenario.
- .6 Maximum interior side slopes of 4:1 to 5:1.
- .7 Length, width and depth dimensions must be acceptable to The Town of Rocky Mountain House Parks Department, particularly when the bottom of the pond is to be used for recreation facilities.
- .8 Minimum slope in the bottom of the pond of 1.0% (2.0% is preferred).
- .9 Low flow bypass for flows from minor events to be provided.
- .10 French drains adjacent to inlet/outlet structures, where slopes are less than 1.0%.

- .11 Address all safety issues (particularly during operation).

4.3 Wet Ponds

The general design criteria for wet ponds are:

- .1 Minimum water surface area of 2.0 ha.
- .2 Maximum side slopes above the active zone of 4:1 to 5:1.
- .3 Maximum interior side slopes in active storage zone of 5:1 to 7:1.
- .4 Detention time of 24 hours.
- .5 Length to width ratio shall be from 4:1 to 5:1.
- .6 Minimum permanent pool depth of 2.0m.
- .7 Maximum active detention storage depth of 2.0m.

5 MISCELLANEOUS DESIGN CONCERNS

5.1 Outfalls

Obverts of outfall pipes shall be above the five-year flood level in the receiving stream. Inverts of outfall pipes shall be above winter ice level. Outfalls shall be located to avoid damage from moving ice during break-up. Drop structures and energy dissipaters shall be used where necessary to prevent erosion. Trash bars shall be installed which will prevent entry or access by children.

Inlet/outlet structures in detention ponds are to be aesthetically blended into the landscape design, include adequate erosion protection, require low maintenance, and have trash bars to preclude access by children. Outlet velocities should be kept below those noted in Clause 3.1 of this Section.

5.2 Receiving Waters

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. Where erosion control or bank stability work must be done, preservation of watercourse aesthetics and wildlife habitat must be considered.

5.3 Culverts and Bridges

Culverts and Bridge design should consider backwater effects over a range of flows. The design of a hydraulic structure requires assessment of both its nominal design "capacity" and its performance during the 100-year storm event as well as the 100-year ice level and break up.

8.0 Service Connection Standards

1 GENERAL

This Guideline pertains to that portion of the service connection installed from the main to the property/easement line.

2 SERVICE SIZES AND LOCATIONS

Minimum service sizes for single family and duplexes shall be as follows:

| | |
|----------|--------|
| Water | 25 mm |
| Sanitary | 150 mm |
| Storm | 100 mm |

The sanitary service shall have a 150 mm - 100 mm reducer and plug installed at service stub to allow for 100 mm private connections.

Services of a size larger than those indicated will be required where, in the opinion of the Engineer, the lengths of service pipe or other conditions warrant these.

The location of services for residential lots shall be as shown on Drawing 4.01.

The sizes and locations of services to non-residential buildings shall be subject to the approval of the Engineer.

3 SANITARY SEWER CONNECTIONS TO MAIN

Sanitary sewer services to the main may be made as follows:

1. In-line tees, and/or
2. Inserta tees.

“Inserta Tees” shall not be used on mains having a nominal internal diameter of 200mm or less as the protrusion of stub into the main interferes with the operation of camera inspection equipment. Accordingly, all 200 mm sanitary sewer and storm sewer mains shall be PVC SDR 35 Pipe. This will also allow for the use of service saddles for future service connection installation.

4 DEPTH OF BURY

Water services inverts at property/easement line shall be a minimum depth of 2.7 m and a maximum depth of 3.0 m below finished grade.

Sanitary and storm service inverts at property/easement line shall be set at an elevation at least 2.7 m below finished grade and deep enough to be extended below the anticipated building footing elevation. Sanitary and storm inverts at property/easement line should be set at the same elevation and no deeper than 3.5 m if possible.

Where existing conditions dictate that the depth of bury be less than 2.7 m, the main/service is to be insulated as specified in Drawing 1.04.

5 ALIGNMENT

The sanitary, water, and storm services shall be laid in a single trench. When facing the lot being serviced, the water service shall be laid along the centre of the service alignment, the sanitary service 0.30 m to the left of the water service, and the storm service 0.30 m to the right of the water service. The services shall intersect the property line at an angle as near to 90° as possible unless otherwise approved by the Engineer.

The service should extend typically 4.5m past the property line.

To aid in locating the service, temporary markers shall be installed at the end of the service stub.

6 WATER CURB STOP AND SERVICE BOX

The curb stop and standpipe shall be located 0.3 m from the property line, within the road right of way for street serviced areas.

7 RISERS

Vertical risers shall not be used unless otherwise approved by the Engineer. Instead, the service shall be installed on a continuous grade from the main to the service stub at property/easement line. A vertical long radius bend shall be installed immediately prior to the reduction fitting/plug to reduce the pipe slope to approximately 2%. Alternatively, the riser section may be placed at a 45° angle (1:1 slope), with the vertical long radius bend installed in an appropriate location between the main and the property/easement line.

8 BENDS

No horizontal bends shall be allowed on sanitary and storm service connections. A maximum of two vertical bends will be allowed; one at the main and one at the property/easement line.

9.0 Cathodic Protection

1 GENERAL

Cathodic protection shall be installed on all steel, ductile iron or cast iron pipes and fittings in accordance with Section 9.2.

Where new installations connect with existing steel, cast iron or ductile iron pipes, cathodic protection shall be installed to protect that existing infrastructure.

2 DESIGN STANDARDS

2.1 General

New steel pipe shall be cathodically protected with high potential magnesium anodes. Cathodic protection shall be designed by a corrosion protection specialist to provide adequate protection for the pipeline and shall include surface test stations at each buried anode bed.

Connections to existing steel, cast iron and ductile iron pipe shall have at least two 7.7 kg (17 lb) high potential magnesium anodes installed at the point of connection.

Buried Fittings and valves shall be cathodically protected with a 2.3 kg (5 lb) high potential magnesium anodes. Hydrants shall be cathodically protected with a 7.7 kg (17 lb) high potential magnesium anodes.

Exterior bolts for valves, hydrants and couplings shall be stainless steel 304 or approved equivalent.

Test stations shall be installed at the intervals specified by the corrosion protection specialist to provide the desired level of protection for the pipe and at the locations approved by the Engineer.

2.2 Materials

1. High potential magnesium anodes shall have the following chemical composition:

| | | |
|-------|----------------|---------|
| AL | 0.02% | maximum |
| Mn | 0.80% to 1.50% | maximum |
| Fe | 0.03% | maximum |
| Ni | 0.002% | maximum |
| Cu | 0.003% | maximum |
| Zn | 0.02% | maximum |
| Other | 0.001% | maximum |
| Mg | Remainder | |

Perforated galvanized steel core not to exceed 0.15 kg/metre of core.

2. Lead wire to be a maximum of 2 metres long of AWG #10 type RWU, XLPE stranded copper conforming to CAN C22.2, No. 38. Lead wire connection shall be silver soldered (brazed) to the steel core using a suitable filler material and flux.

3. Permeable cloth bag, containing the anode and backfill material is to consist of :

| | |
|----------------------------|-----|
| Ground Hydrated Gypsum | 75% |
| Powdered Wyoming Bentonite | 20% |
| Anhydrous Sodium Sulphate | 5% |

4. The grain size limitations are:

100% passing the 850 x 10⁻⁶ sieve size
50% or more retained by the 150x10⁻⁶ sieve size

5. The mixture shall be firmly packaged around the anode by means of adequate vibration. Backfill material shall be of sufficient quantity to cover all parts of the anode to a minimum thickness of 25 x 10⁻³ m. Anodes packaged in cloth bags shall be shipped in a plastic or heavy paper bag of sufficient thickness to permit normal handling without tearing.

6. Anodes may be packaged in cardboard tubes conforming to the following:

100mm tubes, 3-ply, 4.3 mm (0.017 inch) absorption paper;
150 mm tubes, 3-ply, 4.3 mm (0.017 inch) absorption paper.

7. Cardboard tubes shall come with centering devices to hold the anode in the center of the tube. The size and type of the anode shall be clearly marked on the container and the container shall be shipped in watertight plastic.
8. Anodes shall carry a label identifying the manufacturer, type of anode, metal and backfill composition, and the net weight of the anode.
9. Anodes shall be connected to pipe, fittings and appurtenances with Thermit welds specifically designed for the application, using a minimum 15 gram weld metal on pipes and a 25 gram weld metal on cast fittings, valves and hydrants.

3 INSTALLATION

Cathodic protection is to be installed in accordance with manufacturer's recommendations and to meet Town specifications.

- **Install anodes as follows:**

1. Install the number and size of anodes at the specified locations in accordance with the standard detail drawing;
2. Remove anode from plastic shipping bag, leaving cloth bag or cardboard tube intact. Do not lift anode by lead wire;
3. Place anodes a minimum of 1 metre from the pipe or appurtenance in a horizontal position, at the same elevation and parallel to the installation;
4. Pour a minimum of 10 litres (2 gallons) of water on each 2.3 kg anode and 15 litres (3 gallons) of each 7.7 kg anode to initiate their operation. Alternatively, anodes can be soaked in water for a minimum of 10 minutes;
5. Record manufacturer's information, weight and as-built location of anode.
6. Ensure native material is tamped uniformly around each anode to eliminate voids or air pockets;
7. Wrap the anode lead wire once around the pipe or appurtenance and bury wire level with the pipe or fitting invert.

- **Connect anode to pipe or appurtenance as follows:**

1. Remove a portion of the pipe or appurtenance coating where the anode lead wire is to be connected;
2. Thoroughly clean the area and file metal until a shiny coating, roughened surface is obtained approximately 75 mm square;
3. Remove insulation and crimp copper sleeve over bared wire covering the length to be thermit welded;
4. Thermit weld anode wires to the pipe, using crucible and the appropriate weight of weld material in accordance with manufacturers recommendations;
5. Remove slag off the completed weld and file smooth any sharp edges;
6. Thoroughly coat the weld and adjacent areas where the coating was removed with Polyken 927 primer and cover with 930 tape or approved equal.

- **Test station installation:**

1. Test stations shall be installed in accordance with the standard detail drawing and recommendations of the corrosion protection specialist;

2. Test stations are to be installed at all isolation locations with one lead bonded on each side of the isolator to enable isolation integrity to be verified;
3. Test wires are to be brought to the surface and attached to terminal blocks. Wires and terminal blocks are to be contained within PVC sleeves and protected with weatherproof caps;
4. Steel marker plates are to be labeled *Town of Rocky Mountain House, Cathodic Protection Test Station*, shall be installed on metal angle iron post at each test station except where they are located in paved or concrete surfaces;
5. Where test stations are located in paved or concrete surfaces, they shall be contained in access chambers with steel access covers. Covers shall be set 12mm below the finished surface.

10.0 Roadway Design Standards

1 ROAD AND STREET CLASSIFICATION

Street systems incorporate several types of roadways, each with its own particular design standards. This Section will provide design information for the following road classifications:

- Urban Arterial Roadways
- Residential Collector Streets
- Residential Local Streets
- Semi-urban Roadways
- Industrial Roadways
- Lanes

2 REFERENCE MATERIAL

The following reference materials (current editions) have been used in preparing these Design Guidelines and should be referred to for further detail:

1. Geometric Design Guide for Canadian Roads, TAC
2. Urban supplement to Geometric Design Guide for Canadian Roads, TAC
3. Metric Curve Tables, TAC
4. A Policy on Geometric Design of Highways and Streets, AASHTO
5. Turning Vehicle Templates, TAC
6. Manual of Uniform Traffic Control Devices for Canada, TAC

The TAC Manual and TAC Urban Supplement noted above must be adhered to unless otherwise specified in these Design Guidelines or by the Engineer.

3 DESIGN INFORMATION

In addition to those listed above, the following standards will apply:

3.1 Minimum Grades

.1 Roadways

The minimum longitudinal surface grade for all road classifications is 0.5%. For curved roadways, cul-de-sacs, and expanded bulb corners, centre line grades should be increased to provide a minimum gutter grade of 0.50%. It is desirable to use slightly steeper grade where possible.

.2 Lanes and Public Utility Lots

The minimum longitudinal surface grade for gravel lanes, paved lanes, and public utility lots in new subdivisions is 0.8%. Grades <0.80% are acceptable in older subdivisions where a grade $\geq 0.80\%$ cannot be established due to adjacent development restrictions (i.e. existing concrete or paved driveways, garages, etc.). Grades <0.50% are not to be used unless the lane is paved or they are approved by the Engineer.

3.2 Vertical Curves

Vertical curves shall be provided at points where a grade change takes place in accordance with the following criteria:

Length of Vertical Curve, $L = KA$

Where: "K" is the vertical curve calculation factor, and

"A" is the algebraic difference between grades.

The length of vertical curves shall be calculated according to the TAC Urban Supplement, using the following "K" values:

| Table 10.1 | | | |
|----------------------------------|--------------------------------|----------------------|--------------------|
| Vertical Curve "K" Values | | | |
| Design Speed | Stopping Sight Distance | K Factor | |
| (km/hr) | (m) | Crest Vertical Curve | Sag Vertical Curve |
| 50 | 63 | 7 | 6 |
| 60 | 85 | 13 | 9 |
| 80 | 140 | 36 | 16 |

Note:

- .1 Crest vertical curves are not required if “L” is less than the following values:

| | |
|------------------|--------------------|
| Local Street | $L < 20 \text{ m}$ |
| Collector Street | $L < 30 \text{ m}$ |
| Arterial Street | $L < 40 \text{ m}$ |
- .2 Sag vertical curves are not required for any roadway if L is less than 15 m.
- .3 The mid-ordinate difference in elevation between V.P.I. elevation and pavement design elevation on the vertical curve, “M” is to be calculated and shown on the drawings.

4 CURB, GUTTER, AND SIDEWALKS

4.1 General

Curb and gutter will be required on all roadways. A 0.5 m wide concrete gutter shall be provided on arterial roadways. A 0.25 m gutter width shall be provided on all other road classifications as approved by the Engineer.

Reverse gutter may be used where the road cross slopes away from the curb such as on superelevation and for median curbs.

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

Standard curb and gutter shall be used on arterial roadway medians, urban industrial roadways, adjacent to school and park areas, and along divided sections of residential roadways unless otherwise required by the Engineer. Mountable and semi-mountable curb and gutter shall be used along arterial roadways as outlined in TAC Geometric Design Guide for Canadian Roads.

Requirements for sidewalk along the various road classifications are generally as follows. Specific requirements are subject to review by the Engineer.

4.2 Residential Roadways

A 1.5 m monolithic or separate sidewalk with standard or rolled curb, and 0.25 m gutter is normally required along both sides of residential local roadways.

Sidewalk widths should be increased to 2.5 m (monolithic or separate) on one side of collector roadways if designated as part of the bicycle path system by the Parks Department.

4.3 Industrial Roadways

Sidewalks are generally not required for industrial areas.

5 CURB RAMPS

Curb ramps should be provided at crosswalks to accommodate persons with disabilities. The ramps shall be placed at the midpoint of the curb return at all intersections involving existing, new, or future sidewalk crossings.

Catchbasins shall not be located within the limits of a paraplegic ramp.

6 INTERSECTION SPACING

6.1 Collector and Local Roadways

The minimum distance between opposing intersections along a collector or local roadway in residential or industrial subdivisions is 40m measured from the centre to centre of the respective intersections. However, spacing of less than 80m should be avoided.

6.2 Lanes

The maximum length of a lane before connecting to a street should not exceed 350m. The lane layout should not encourage shortcutting between streets.

6.3 Driveways

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

7 CUL-DE-SACS

The maximum length of a cul-de-sac measured along the road centre line from the property line of the intersection roadway to the end of the bulb shall be 75m where there is no emergency access from the bulb, and 230m where there is an access (i.e. 6m lane or walkway) designed to carry emergency vehicles (SU-9) to a connecting street. Where a lane which can be utilized by emergency vehicles intersects the cul-de-sac, the length of the cul-de-sac may be 75m beyond the lane intersection, but the total cul-de-sac length may not be greater than 230m. No more than 40 dwelling units may be developed on a cul-de-sac.

8 “P” LOOP

The maximum length of a “P” loop measured along the road centre line and including the length of all internal roadways is 850m. The length of the “P” loop entrance road shall not exceed 100m. An emergency access must be provided on “P” loops containing more than 30 dwelling units. No more than 85 dwelling units shall be developed on a “P” loop. If the developer wishes to provide a divided “P” loop entrance roadway it shall be constructed to the divided local roadway cross section.

9 DEAD END LANES

Dead end lanes to be approved by the Engineer. If approved they shall end with a turnaround designed to accommodate a SU-9 vehicle (i.e. Garbage truck).

10 INTERIM ACCESS

Interim secondary access shall be provided for traffic on dead end street serving more than 85 dwelling units, or as approved by the Engineer and Fire Department. A gravel surfaced turnaround suitable for SU-9 vehicles shall be provided at the end of any temporary dead end street or lane.

11 EXPANDED BULB CORNERS

Expanded bulb corners as illustrated in Drawing 6.25 may be used on local streets.

12 ROADWAY CONSTRUCTION

12.1 Pavement Design

The minimum pavement structure permitted for each road classification shall be as outlined in **Table 10.2**:

The pavement structures shown in **Table 10.2** provide for the minimum allowable thickness for asphalt, granular base, and granular subbase. These pavement structures are founded on a prepared subgrade having a California Bearing Ratio (CBR) of at least 4.0 in a soaked condition, that the granular base has a CBR of at least 80, and that granular subbase has a CBR of at least 20. These conditions are considered representative of the typical level of subgrade support for the site during spring thaw when the subgrade soils will exist in a weakened condition. Where soils of lower stability are used, an increase in the pavement structure will be required. Any reduction of the pavement standards must be substantiated by a geotechnical report and approved by the Engineer.

| Table 10.2 Pavement Structure | | | | | |
|--|-------------------------------------|--------------------------------------|---------------------------------|------------------------------------|-------------------------|
| Road Classification | Design Traffic (80 KN axles) | Asphaltic Concrete Depth (mm) | Granular Base Depth (mm) | Granular Subbase Depth (mm) | Total Depth (mm) |
| Arterial | 4×10^6 | 100 | 200 | 350 | 650 |
| Industrial Collector | 2×10^6 | 100 | 200 | 300 | 600 |
| Residential Collector | 1×10^6 | 75 | 150 | 300 | 525 |
| Industrial Local | 8×10^5 | 90 | 150 | 300 | 540 |
| Residential Local | 9×10^4 | 65 | 100 | 250 | 415 |
| Paved Lanes | 1×10^3 | 50 | 200 | - | 250 |
| Gravel Lanes | 5×10^2 | - | 250 | - | 250 |

12.2 Subgrade Preparation and Improvement

Based on experience, the level of subgrade support available after site grading and intermixing of surficial soils is expected to be equivalent to a soaked CBR value in the order of 2 to 5. Subgrade support at this level will be slightly below the design levels. In areas where the water levels are close to the existing surface grades, there will be the potential for groundwater to be pumped up into the subgrade soils by surface vibrations from construction traffic. This rise in groundwater and subgrade moisture content will be accompanied by a significant loss of strength in the subgrade soils.

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

A geotechnical firm should be contacted to determine acceptable depths of granular subbase required to provide the required support.

Construction procedures should be designed to minimize disturbance to the sensitive subgrades and to protect the integrity of the granular working mats. If the subgrade has failed during construction, the weakened material may have to be subcut and replaced with an approved fill material on top of a filter fabric.

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

13 ASPHALT PLACEMENT

The maximum depth of a single lift of asphalt shall be 75 mm. The minimum initial depth of asphalt shall be 50 mm. The minimum depth of successive lifts shall be 40 mm.

14 STANDARD ROAD CROSS SECTIONS

Standard roadway cross-section drawings are included in Drawings 6.04 to 6.11.

15 PAVEMENT MARKING AND TRAFFIC CONTROL SIGNS

Pavement marking and traffic control signs shall conform to the Manual of Uniform Traffic Control Devices.

16 LANDSCAPING

16.1 Arterial Roadways

Level One Landscaping of medians and boulevards arterial roadway rights of way will normally be completed at the time of roadway construction. The adjacent Developer shall supplement the Level One Landscaping by providing Level Two Landscaping as required by the Town.

The boulevard from back-of-walk/streetlight alignment to the curb shall be graded to drain to the curb at 2.0%. A berm shall be constructed from the back-of-walk/streetlight alignment to the edge of the right of way. Berms shall have maximum side slopes of 3.5:1 and be constructed to the specified height.

No drainage should be allowed to run from the right of way onto private property. If private property abuts the right of way, a swale should be provided within the boulevard to intercept drainage from the right of way and convey it to the storm sewer system.

16.2 Collector and Local Roadways

The Developer will be responsible for Level One Landscaping of boulevards and medians on collector and local roadways that are not directly adjacent to the frontage or flankage of a residential or industrial lot.

The Developer will also be required to provide collector roadway boulevard tree planting for designated roadways.

Level Two Landscaping may be provided in the medians of divided collector and local roadways.

The boulevard from the back-of-walk/curb to the edge of the right of way shall be graded to provide positive drainage to the street. The minimum boulevard cross slope shall be 2.0%.

16.3 Medians

In general, the surface treatment for medians shall be as follows:

.1 Arterial Roadways

- .1 The median shall be capped with concrete where the median width is 3.0 m or less.
- .2 The median shall be finished to Level One Landscaping standards where the median width is greater than 3.0 m.
- .3 No trees shall be planted in an arterial roadway median area where the median width is less than 6.0 m.

.2 Divided Collector and Local Roadways

- .1 The median shall be capped with concrete or paving stone if the median width is 3.0 m or less.
- .2 The median shall be capped with concrete, paving stone, or finished to Level One Landscaping standards where the median width is greater than 3.0 m.
- .3 No trees shall be planted in collector and/or local roadway median areas where the median width is less than 5.0 m.

11.0 Landscaping Standards

1 GENERAL

The Developer responsible for the design and development of the Neighbourhood Park Site(s), School Site, and Detention Ponds, all remaining public open space (i.e. parkettes, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms), including all amenities falling within these open spaces (i.e. plantings, walkways, furniture, playgrounds, buildings, structures) as specified in the Development Agreement.

The areas to be landscaped are identified in the following documents:

- .1 Approved Outline Plan,
- .2 Servicing Study,
- .3 Development Agreement.

Detailed landscape drawings shall be prepared for each phase of Development in accordance with the conceptual landscape plans prepared as part of the approved Outline Plan. The plans shall incorporate design information for the following landscape features:

- .1 *Level One Landscaping,*
- .2 *Level Two Landscaping,*
- .3 *Level Three Landscaping,*
- .4 *Level Four Landscaping,*
- .5 *Collector Roadway Tree Planting,*
- .6 *Development of the all municipal reserves (open space), and/or*
- .7 *Detention Ponds*

2 LEVEL ONE LANDSCAPING

The Developer is required to provide Level One Landscaping for all public open space areas (i.e. parkettes, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms, walkways), etc., as specified by the Parks Department.

The Developer shall provide Level One Landscaping for all boulevards located between the curb and separate sidewalk. The property owner shall landscape the boulevard area located between the back of walk and the property line.

3 LEVEL TWO LANDSCAPING

3.1 General

- .1 The Developer is required to provide Level Two Landscaping for all public open space areas, ornamental parks, playgrounds, natural parks, boulevards, utility lots, walkways, buffer areas, roadway berms, medians, and/or utility lots, as specified by the Engineer.

3.2 Planting Guidelines

- .1 Deep rooting trees, such as poplars and willows, shall not be planted within 8 m of any utility line, road, or lane.
- .2 Shallow rooting trees or shrubs may be planted over deep utility lines (i.e. water, sanitary, or storm), but must be set back at least 1.5 m from shallow utilities (i.e. gas, power, telephone, or cable television); measured horizontally from the centre of the tree to the nearest utility alignment.
- .3 Trees and shrubs shall be set back at least 5 m from hydrants, valves, service valves, manholes, catch basins, transformers, pedestals, or other surface utility equipment.
- .4 Trees and shrubs shall be set back at least 2.5 m from the edge of any collector road (boulevard or median), local road (boulevard or median), or lane.
- .5 Trees and shrubs shall be set back at least 3.0 m from the edge of any arterial roadway (boulevard or median).
- .6 Hedge plants shall be spaced 1.0 m apart.

- .7 The offset shall be measured horizontally from the centre of the tree to the face of curb for roads, or to the edge of gravel/pavement for lanes.
- .8 For trees and shrubs planted in the medians and boulevards, an excavation to the following dimensions is required to accommodate the root zone/planting area:
 - .1 Trees: 2.0 m wide x 2.0 m long x 1.5 m deep
 - .2 Shrubs: 1.0 m wide x 1.0 m long x 250 mm deep

The excavated areas shall be backfilled with topsoil and prepared for tree and shrub planting.

3.3 Berms

Berms shall have a side slope not steeper than 3.5:1, have a horizontal crest not less than 0.75 m wide, and be graded to the approved grades and cross sections. The bottom of all berms shall transition into adjacent elevations. A typical berm cross section is outlined on Drawing 6.16.

4 LEVEL THREE LANDSCAPING

4.1 General

The Developer is required to supply and install Level Three facilities and amenities in various locations throughout the Development, as identified in the approved Outline Plan. Some of the standard Level Three Landscaping facilities and/or amenities to be provided are as follows:

- .1 Post and cable fences
- .2 Bollards
- .3 Paved, gravel, and/or shale trails
- .4 Site furnishings (i.e. garbage receptacles, benches, etc.)
- .5 Tot lots and playschool play structures, and/or
- .6 Trail signage.

4.2 Post and Cable

Post and cable fences are to be provided at the following locations:

- .1 Separating a public roadway from a lane or Public Utility Lot.
- .2 Separating a lane from a park or other open space.
- .3 At other location specified by the Engineer and/or the Parks Department.

4.3 Bollards

Bollards are to be placed on Public Utility Lots to allow for pedestrian and/or emergency vehicle access. The front yard bollards should be located at the building setback while the rear yard bollards should be located on the easement line unless approved otherwise.

4.4 Site Furnishings

Details for park furniture shall be approved by the Director of Recreation, Parks and Culture & FCSS.

4.5 Trails

The minimum width for walkways within a 6.0m residential PUL/MR lot shall be 1.5 m wide and constructed of asphalt or concrete.

4.6 Tot Lots

- .1 In addition to the playground facilities to be provided in the Neighbourhood Park site(s), the Developer may have designated other sites within the development as Tot Lots. The Developer shall provide the following for these Tot Lots:
 - .1 A site grading plan showing any berms, etc. for the parcel.
 - .2 Level One and Level Two landscaping for the parcel.
 - .3 The following Level Three landscaping facilities and amenities:
 - .4 A CSA compliant play structure base complete with treated timber/plastic surround.

- .5 A CSA compliant composite play structure including swings.
- .6 One pedestal park bench.
- .7 One pedestal picnic table.
- .8 Two garbage receptacles.
- .9 Loose aggregate (gravel or shale) trails 1.5 m wide.
- .2 Playground apparatus shall be obtained from a bona fide Canadian playground manufacturer with the specific playground model approved by the Engineer.

5 LANDSCAPE DRAWING REQUIREMENTS

5.1 Concept Plan

Concept plan for all municipal reserves, berms, parks, arterial road boulevards, utility lots and buffers shall be submitted at a scale of 1:500. The plans shall indicate:

1. Existing vegetation, topography, encumbrances and utilities;
2. Adjacent land uses and roads;
3. Proposed layout of park, school and recreation facilities including playgrounds, baseball diamonds, sports fields, buildings, pathways, rinks, tennis courts, etc.;
4. Conceptual tree and shrub planting.

5.2 Detailed Construction Drawings

Detailed plans shall be prepared for construction at a scale of 1:500 indicating:

1. Detailed design of baseball diamonds and sportsfields;
2. Detailed grading plan showing drainage patterns, the tie-in grading on adjacent lands uses and existing site elevations;
3. Existing vegetation retained;

4. Existing and proposed utilities and easements including storm sewer and catchbasins for site drainage;
5. Detailed design of park furniture and playgrounds structures indicating manufacturer and model number, log, boundaries and sand areas;
6. Detailed design and specification for the parking lot and hard surface play areas / tennis courts;
7. Detailed design and specifications for all trails.

5.3 Planting Plans

Planting plans at a scale of 1:500 shall be submitted indicating:

1. Specific site location for all proposed plantings;
2. Size (height and calliper), botanical name and specie name of all plants material, indicating on a planting list and referenced to the specific plant location;
3. Locations of all utility lines, services and easements.

1.0 Trench Excavation & Backfill

- 1.01 Requirements Utility Trench Backfill Class B Bedding
- 1.02 Caged Trench Backfill Requirements for Pipe Installation Under Roads
- 1.03 Class B Trench Bedding Details
- 1.04 Trench Insulation Detail
- 1.05 Pipe Crossing Using Sandbags / Granular Fill

2.0 Water Distribution System

- 2.01 Basic Water Main Grid
- 2.02 Typical Valve and Hydrant Locations
- 2.03 Water Main Horizontal Thrust Blocks
- 2.04 Water Main Vertical Bend Thrust Blocks
- 2.05 Norwood Type 'A' Sliding Type Valve Box Assembly
- 2.06 Standard Hydrant Detail
- 2.07 Valve Anchor Detail
- 2.08 Anode Locations and Installation
- 2.09 Air Relief Valve and Flushing Chamber

3.0 Stormwater Management

- 3.01 Statistical Curves for Rainfall Intensity – Duration – Frequency
- 3.02 Dry Stormwater Storage Facility
- 3.03 Wet Pond Cross Section
- 3.04 Typical Trapped Low Storage Area
- 3.05 Inlet/Outlet Structure Apron
- 3.06 Manhole Inlet / Outlet Pipe Design Considerations

4.0 Service Connections

- 4.01 Front Yard Service Locations
- 4.02 Residential Service Installation
- 4.03 Residential Service Installation Cross Section
- 4.04 Typical Lot Service Requirements
- 4.05 Front Service Locations
- 4.06 Lot Grading
- 4.07 New Residential Building Grade Certificate
- 4.08 Parks Water Service
- 4.09 Service Box Details for 25mm Diameter Service Valves

5.0 Manholes & Catchbasins

- 5.01 Standard 1200mm Dia. Precast Manhole Assembly
- 5.02 Sewer Benching Details
- 5.03 Precast Prebenched Bases for 1200mm Dia. Manhole Assembly
- 5.04 Service Connection Details for Sanitary Manholes in Cul-de-Sac
- 5.05 1-S Precast Manhole Assembly
- 5.06 Large 1500 – 3000mm Dia. Manhole Assembly
- 5.07 External Drop Manhole
- 5.08 Interior Drop Sanitary Manhole
- 5.09 Precast Slab Tops for 1200mm Dia. Manholes
- 5.10 Sanitary and Storm Manhole Adjusting Collar
- 5.11 Manhole Safety Platform
- 5.12 Precast Catch Basin Assembly
- 5.13 Twin Catch Basin/Catch Basin Manhole Assembly
- 5.14 Type K-1 Catch Basin and Catch Basin Manhole Top Section
- 5.15 Type K-3 Catch Basin and Catch Basin Manhole Top Section
- 5.16 Type K-4 Catch Basin and Catch Basin Manhole Top Section
- 5.17 Type K-6 Catch Basin and Catch Basin Manhole Top Section
- 5.18 Rip-Rap Culvert End Treatment
- 5.19 F-51 Catch Basin Grate
- 5.20 F-51 Catch Basin Frame
- 5.21 F-33 Catch Basin Grate
- 5.22 F-33 Catch Basin Frame
- 5.23 Sanitary and Sewer Manhole Frames
- 5.24 Sanitary Manhole Cover
- 5.25 Storm Manhole Cover

6.0 Roadway Design

- 6.01 Street Classifications
- 6.02 Roadway Geometric Design Standards
- 6.03 Roadway Design Standards
- 6.04 Divided / Undivided Collector Roadway
- 6.05 Undivided / Divided Residential Local Roadway
- 6.06 Undivided Residential Local Roadway (Mutli-Family)
- 6.07 Rural & Urban Undivided Industrial Collector Roadway
- 6.08 Rural & Urban Undivided Industrial Local Roadway and Typical Rural Roadway
- 6.09 Commercial Roadway
- 6.10 Semi-urban Roadway
- 6.11 Gravel Lanes and P.U.L. Detail
- 6.12 Residential Roadway Pavement Structure Cross Section
- 6.13 Industrial Roadway Pavement Structure Cross Section

TOWN OF ROCKY MOUNTAIN HOUSE DESIGN GUIDELINES

DESIGN GUIDELINE DRAWINGS

- 6.14 Gravel/Paved Lane Pavement Structure Cross Section
- 6.15 Parking Lot Pavement Structure Cross Section
- 6.16 Berm Cross Section
- 6.17 WB Design Vehicles
- 6.18 WB Vehicle Compound Curve Turn Design
- 6.19 Intersection Centre Line Control Radii
- 6.20 Intersection Grade Adjustment
- 6.21 Divided to Undivided Roadway Transition
- 6.22 Collector and Local Roadway Centre Island
- 6.23 15/10 Local Residential Cul-de-Sac
- 6.24 22/12.5 Local Industrial Cul-de-Sacs
- 6.25 Local Residential Expanded Bulb Corner
- 6.26 Industrial Roadway Corner Alternatives & Expanded Bulb Corner
- 6.27 Lane Turn-Arounds
- 6.28 Typical Section for Replacing Unsuitable Subgrade
- 6.29 Pavement Removal and Replacement Adjacent to a Curb

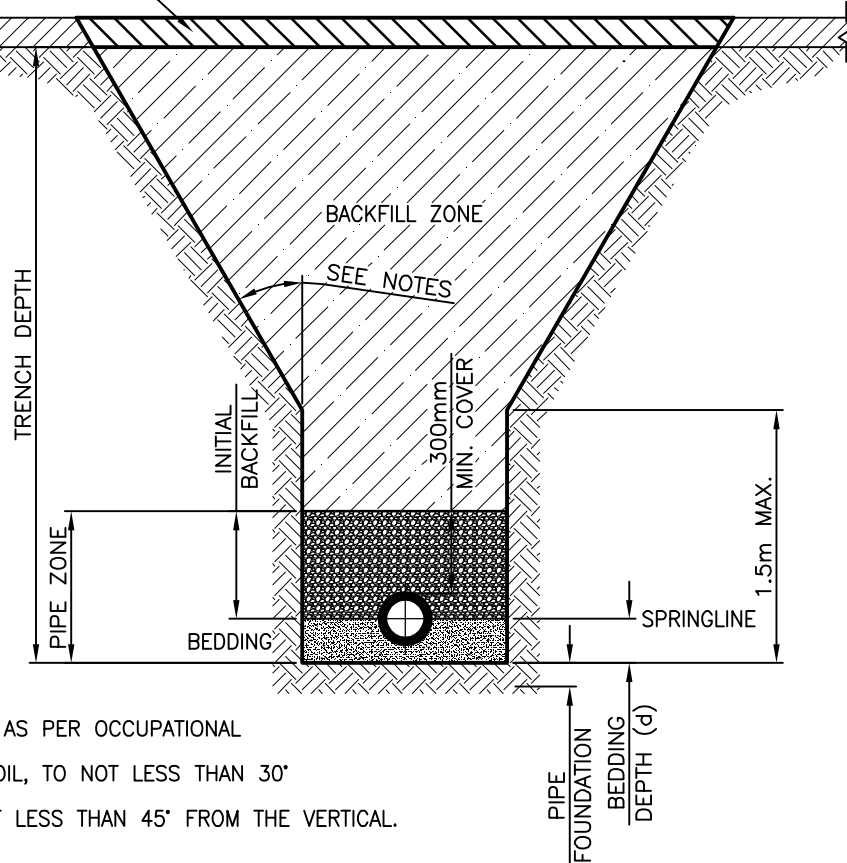
7.0 Concrete Work

- 7.01 1.5 m Rolled Monolithic Sidewalk
- 7.02 1.5 m Standard Monolithic Sidewalk
- 7.03 1.5 – 3.0 m Separate Sidewalk with Separate Curb and Gutter
- 7.04 250 mm & 500mm Standard Curb and Gutter
- 7.05 250mm Rolled Curb & Gutter
- 7.06 Pinned Concrete Curb
- 7.07 Curb and Gutter Widening for F-33 and K-1 Catch Basin Installation
- 7.08 Typical Monolithic and Separate Lane/Driveway Crossing
- 7.09 Residential Paraplegic Ramp
- 7.10 Handformed and Extruded Separate Sidewalk Base Detail
- 7.11 Concrete Dowelling Detail for Sidewalk Replacement
- 7.12 Handformed Concrete Swale
- 7.13 Asphalt Curb

8.0 Landscaping Design

- 8.01 Fixed and Knockdown Bollards
- 8.02 Post and Cable Fence

RESTORE SURFACE TO MATCH
ORIGINAL WHERE REQUIRED



NOTES:

TRENCH EXCAVATION

- TRENCH TO BE SLOPED AS PER OCCUPATIONAL HEALTH & SAFETY ACT.
- IN HARD & COMPACT SOIL, TO NOT LESS THAN 30° FROM THE VERTICAL.
- IN OTHER SOILS TO NOT LESS THAN 45° FROM THE VERTICAL.

BACKFILL ZONE

- COMPACTION DENSITY SHALL BE MINIMUM 95% OF MAXIMUM DRY DENSITY OF THE STANDARD PROCTOR REPRESENTING THE SOIL PLACED.
- USE SUITABLE SITE MATERIAL OR IMPORTED MATERIAL FOR BACKFILL.
- MATERIAL SHALL BE PLACED IN A MAXIMUM OF 300mm LAYERS.

PIPE ZONE

INITIAL BACKFILL

- COMPACTION DENSITY SHALL BE A MINIMUM 100% OF MAXIMUM DRY DENSITY OF THE STANDARD PROCTOR REPRESENTING THE SOIL PLACED.
- USE MATERIAL SHOWN IN DRAWING "1-03".
- PLACE IN 150mm LAYERS AND COMPACT BOTH SIDES SIMULTANEOUSLY.

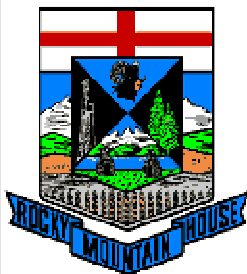
PIPE BEDDING

- COMPACTION DENSITY SHALL BE A MINIMUM 100% OF MAXIMUM DRY DENSITY OF THE STANDARD PROCTOR REPRESENTING THE SOIL PLACED.
- USE MATERIAL SHOWN IN DRAWING "1-03" UNLESS PIPE FOUNDATION IS UNSUITABLE.
- IF UNSUITABLE PIPE FOUNDATION IS ENCOUNTERED, USE 40mm SCREENED ROCK FOR THE BEDDING TO A MINIMUM DEPTH OF 400mm BELOW THE PIPE AND UP TO THE SPRINGLINE OF THE PIPE. USE FILTER FABRIC TO SEPARATE SUBGRADE MATERIAL AND BEDDING MATERIAL.

| TRENCH WIDTH | |
|--|---------------------------|
| FLEXIBLE (PVC) PIPE AS PER PVC HANDBOOK | |
| NOMINAL PIPE DIA. (mm) | MIN. TRENCH WIDTH (mm) |
| 200 | 700 |
| 300 | 800 |
| 400 | 900 |
| 500 | 950 |
| 600 & larger | O.D. x 1.5 |
| MAX. TRENCH WIDTH (mm) | |
| 350 & larger | O.D. x 2.5 |
| RIGID (CONCRETE) PIPE AS PER CONCRETE HANDBOOK | |
| MINIMUM TRENCH WIDTH = O.D. + 600mm | |
| MAXIMUM TRENCH WIDTH AS SPECIFIED BY THE ENGINEER. | |
| (USED TO CALCULATE D 0.01 & TO SPECIFY CLASS OF PIPE) | |
| O.D. = OUTSIDE DIAMETER (mm) | |

File Name: 1-01-TRENCHING.dwg

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| No. | - | Revision | - |



TOWN OF ROCKY MOUNTAIN HOUSE

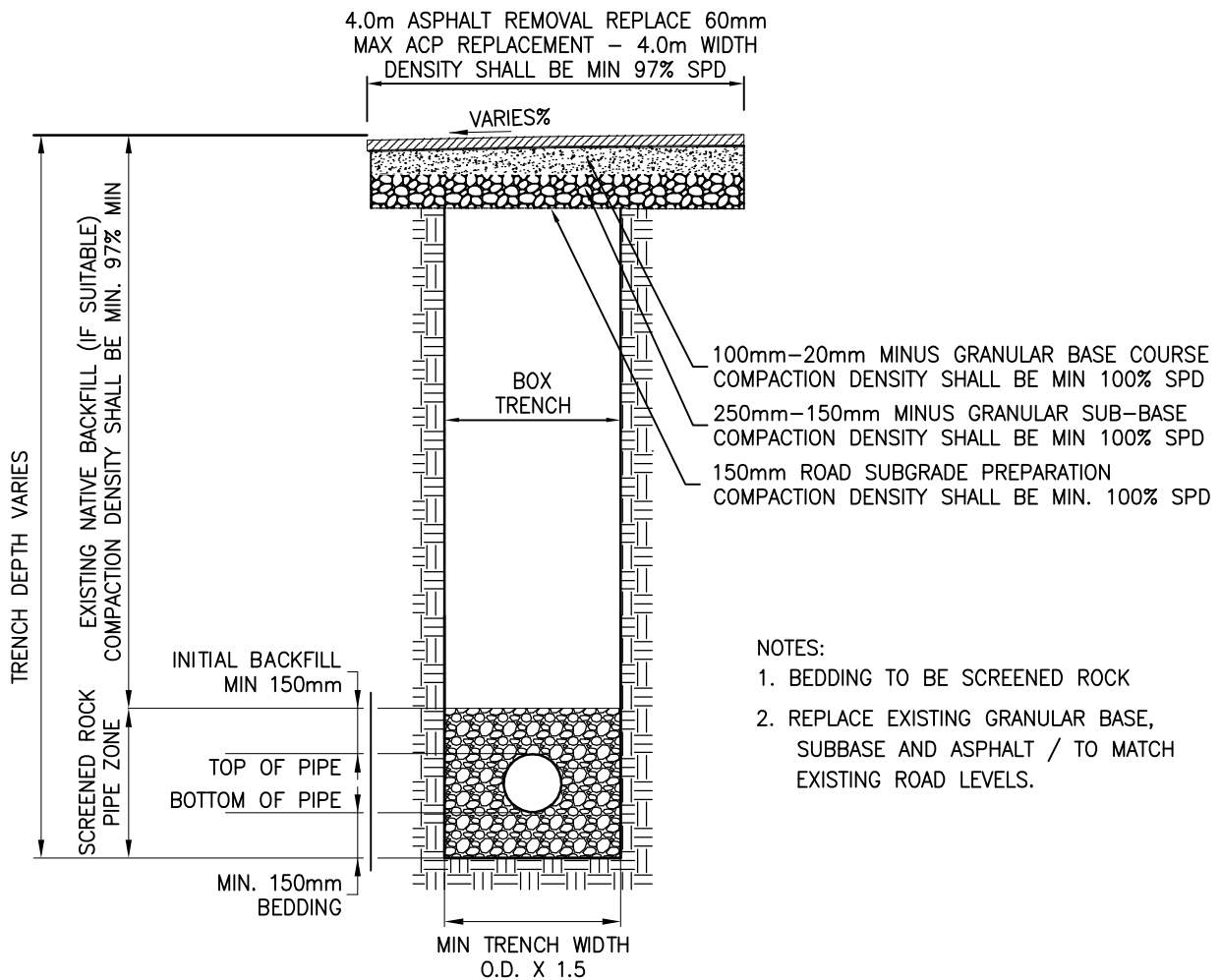
DESIGN GUIDELINE DRAWINGS Trench Excavation and Backfill

REQUIREMENTS UTILITY TRENCH BACKFILL CLASS B BEDDING

DRAWING NO.

1-01

REVISION NO.

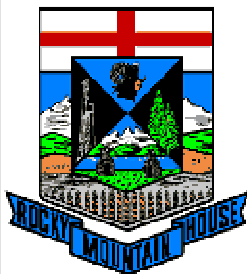


NOTES:

1. BEDDING TO BE SCREENED ROCK
2. REPLACE EXISTING GRANULAR BASE, SUBBASE AND ASPHALT / TO MATCH EXISTING ROAD LEVELS.

File Name: 1-02-CAGED TRENCH UNDER ROAD.dwg

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| Rev. By: | - | Rev. Date: | - |
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TOWN OF ROCKY MOUNTAIN HOUSE

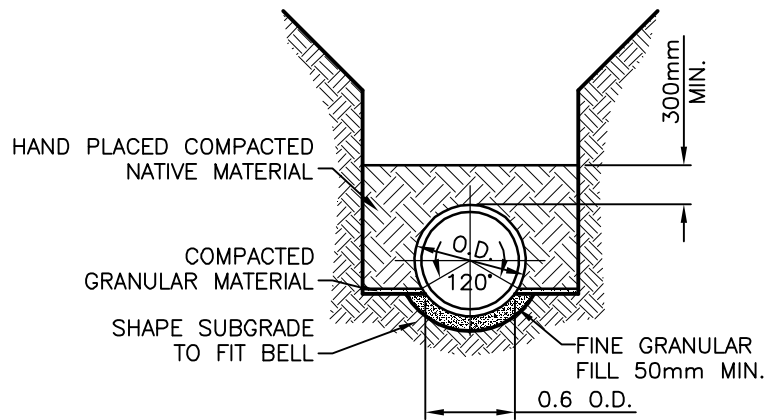
DESIGN GUIDELINE DRAWINGS
Trench Excavation and Backfill

CAGED TRENCH BACKFILL
REQUIREMENTS FOR PIPE
INSTALLATION UNDER ROADS

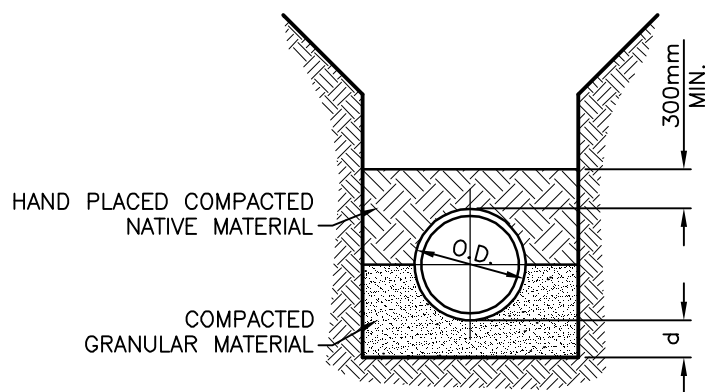
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1-02

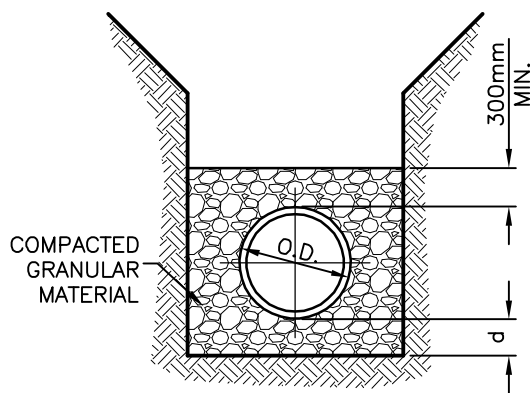
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SHAPED SUBGRADE WITH GRANULAR FOUNDATION



GRANULAR FOUNDATION



GRANULAR SURROUND

NOTES:

- SUBGRADE SHOULD BE EXCAVATED OR OVER EXCAVATED SO A UNIFORM FOUNDATION MAY BE PROVIDED, FREE OF PROTRUDING ROCKS.
- NO AREAS WITH UNSUITABLE SOIL CONDITIONS. SPECIAL BEDDING AND PIPE FOUNDATION DESIGNS ARE REQUIRED. FROM THE VERTICAL.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

LEGEND:

- W - TRENCH WIDTH FOR CONCRETE PIPE
 - MINIMUM - O.D. + 450mm
 - MAXIMUM - O.D. + 750mm

O.D. - OUTSIDE PIPE DIAMETER

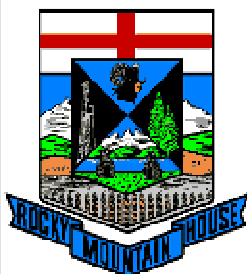
I.D. - INSIDE DIAMETER

I.D. - INSIDE DIAMETER

| DEPTH OF MATERIAL BELOW PIPE | |
|------------------------------|------------------------------|
| Pipe Diameter D (mm) | Bedding Distance d (min.) |
| 675 or SMALLER | 75 |
| 750 to 1500 | 100 |
| 1650 or LARGER | 150 |

File Name: 1-03-CLASS B BEDDING.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

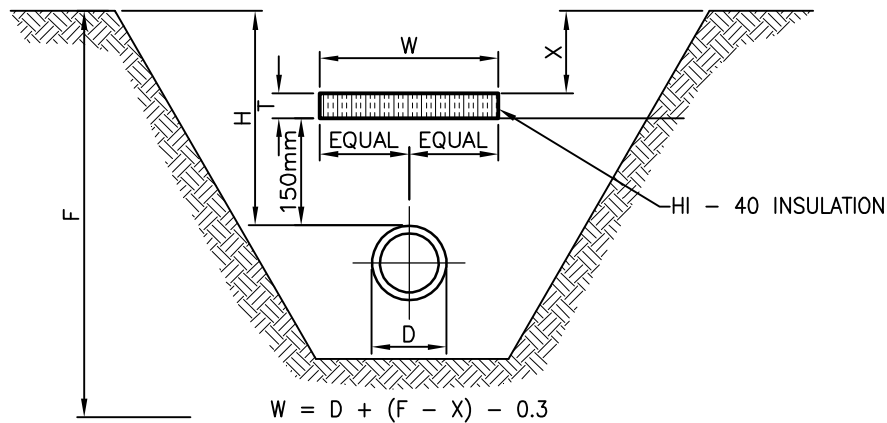
DESIGN GUIDELINE DRAWINGS
Trench Excavation and Backfill

**CLASS B TRENCH
BEDDING DETAILS**

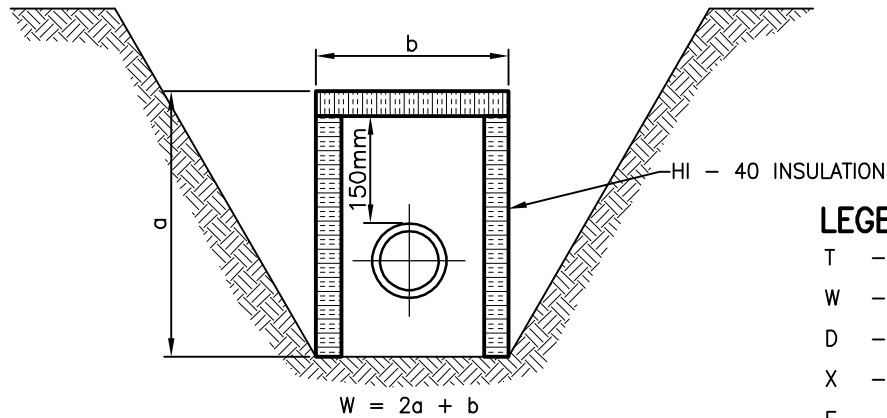
DRAWING NO.

1-03

REVISION NO.



HORIZONTAL LAYER



INVERTED U

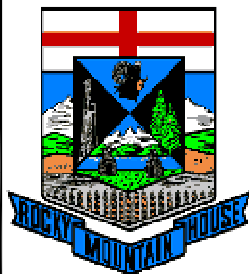
LEGEND:

- T – INSULATION THICKNESS (mm)
- W – INSULATION WIDTH (m)
- D – PIPE OUTSIDE DIAMETER (M)
- X – INSULATION DEPTH (m)
- F – ESTIMATED FROST DEPTH (2.70m)

| DEPTH FROM FINISHED GRADE TO THE TOP OF INSULATION "X" (METERS) | | | 0 to 1 | 1 to 1.25 | 1.25 to 1.50 | 1.50 to 1.80 | 1.80 to 2.10 | 2.10 to 2.40 | 2.40 to 2.70 | 2.70 to 3.00 | GREATER THAN 3.00 |
|---|-----------------------------|--------|--------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|-------------------|
| INSULATION THICKNESS "T" (mm) | MAINS IN LANES OR EASEMENTS | GRAVEL | N/A | 125 | 100 | 75 | 50 | 25 | 0 | 0 | 0 |
| | | CLAY | N/A | 100 | 75 | 50 | 25 | 0 | 0 | 0 | 0 |
| | MAINS IN STREETS | GRAVEL | N/A | 150 | 125 | 100 | 75 | 50 | 25 | 0 | 0 |
| | | CLAY | N/A | 125 | 100 | 75 | 50 | 25 | 0 | 0 | 0 |
| | DEAD END MAINS IN STREETS | GRAVEL | N/A | 175 | 150 | 125 | 100 | 75 | 50 | 25 | 0 |
| | | CLAY | N/A | 150 | 125 | 100 | 75 | 50 | 25 | 0 | 0 |
| | DEAD END MAINS IN LANES | GRAVEL | N/A | 150 | 125 | 100 | 75 | 50 | 25 | 0 | 0 |
| | | CLAY | N/A | 125 | 100 | 75 | 50 | 25 | 0 | 0 | 0 |

File Name: 1-04-TRENCH INSULATION.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

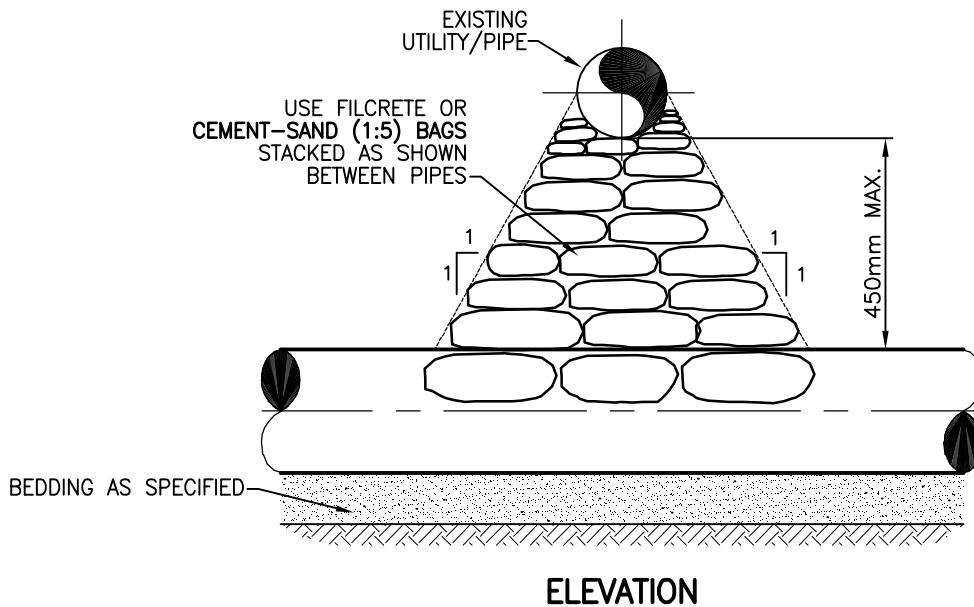
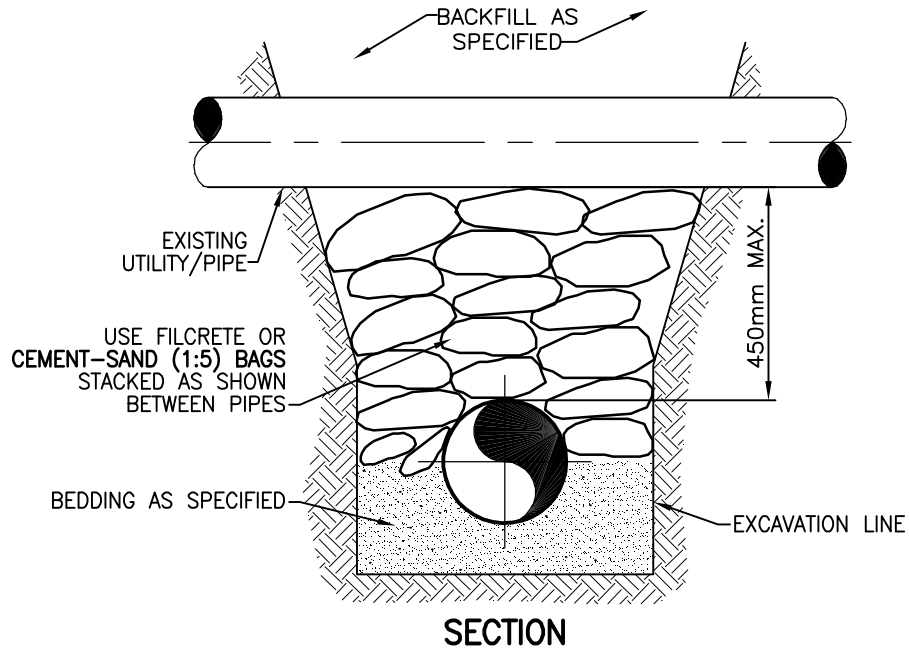
DESIGN GUIDELINE DRAWINGS Trench Excavation and Backfill

TRENCH INSULATION DETAIL

DRAWING NO.

1-04

REVISION NO.

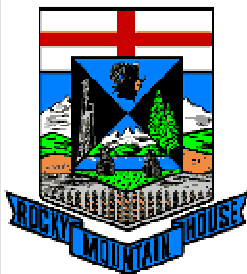


NOTES:

- FOR SEPERATIONS GREATER THAN 450mm USE IMPORTED GRANULAR FILL, COMPACTED TO 98% S.P.D.
- WASHED ROCK MAY BE USED IN LIEu OF SAND BAGS

File Name: 1-05-PIPE CROSSING WITH SANDBAGS.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

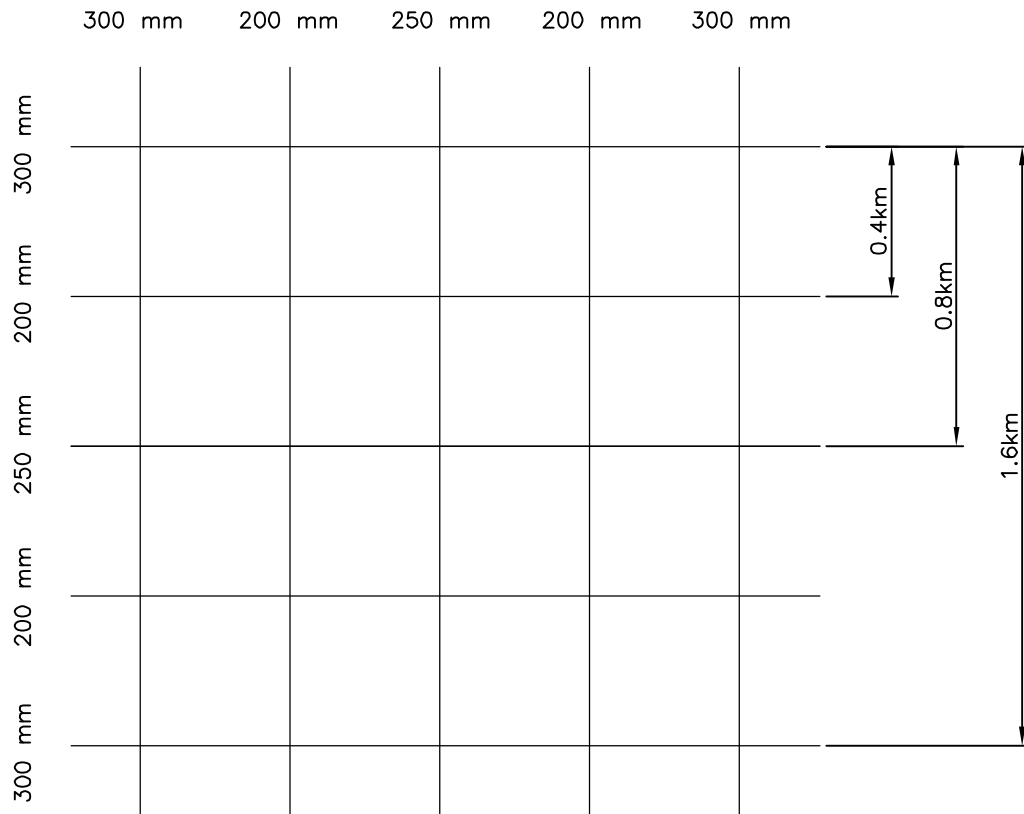
DESIGN GUIDELINE DRAWINGS
Trench Excavation and Backfill

**PIPE CROSSING USING
SANDBAGS/GRANULAR FILL**

DRAWING NO.

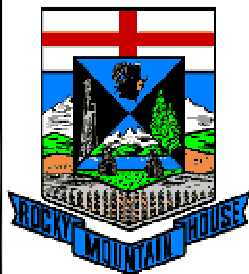
1-05

REVISION NO.



File Name: 2-01-BASIC WATER MAIN GRID.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS Water Design

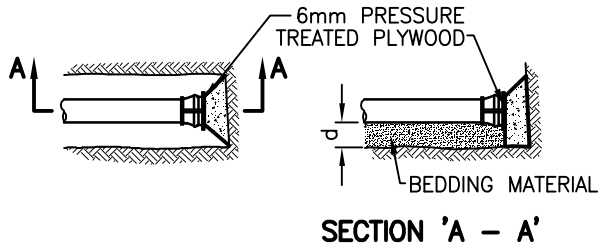
BASIC WATER MAIN GRID

DRAWING NO.

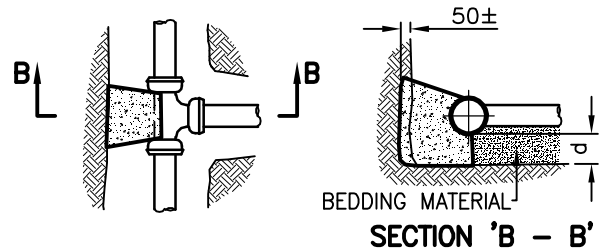
2-01

REVISION NO.

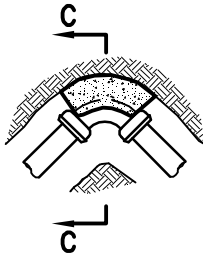
1. DEAD END MAIN



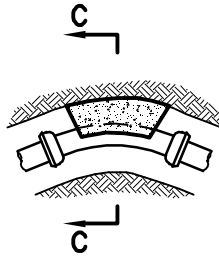
2. TEE



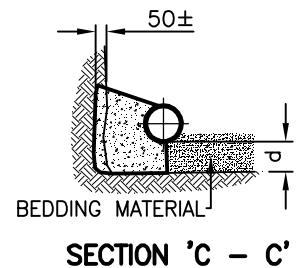
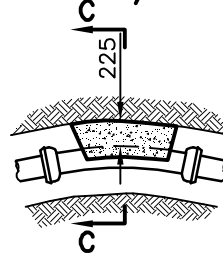
3. 90 DEGREE BEND



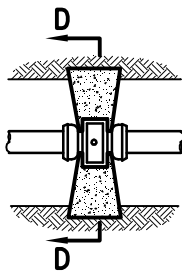
4. 45 DEGREE BEND



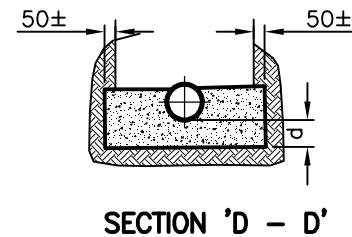
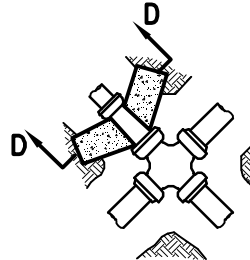
5. 22 1/2 DEGREE BEND & 11 1/4 DEGREE BEND



6. VALVE



7. REDUCER



HORIZONTAL THRUST BLOCK BEARING AREA

MINIMUM CONCRETE AREA IN CONTACT WITH UNDISTURBED SOIL (sq. m)

| FITTING | SIZE OF MAIN (mm) | | | | | | |
|---------------------|-------------------|------|------|------|------|------|------|
| | 150 | 200 | 250 | 300 | 350 | 400 | 500 |
| Dead End Main & Tee | 0.35 | 0.62 | 0.97 | 1.40 | 1.91 | 2.49 | 3.90 |
| 11 1/4 Degree Bend | 0.07 | 0.12 | 0.20 | 0.28 | 0.38 | 0.50 | 0.78 |
| 22 1/2 Degree Bend | 0.14 | 0.24 | 0.38 | 0.55 | 0.75 | 0.97 | 1.52 |
| 45 Degree Bend | 0.27 | 0.48 | 0.75 | 1.07 | 1.46 | 1.91 | 2.98 |
| 90 Degree Bend | 0.50 | 0.88 | 1.38 | 1.98 | 2.70 | 3.53 | 5.51 |
| Valve & Reducer | 0.35 | 0.62 | 0.97 | 1.40 | 1.91 | 2.49 | 3.90 |

NOTES:

- BEARING AREA CALCULATED USING THE FOLLOWING:
 - (a) HYDRAULIC PRESSURE 1380 kPa..
 - (b) SOIL BEARING CAPACITY 72 kPa..
- CONCRETE STRENGTH TO BE 20 MPa @ 28 DAYS.
- CONCRETE TO BE CLEAR OF BELLS & PIPE.
- PLACE 6 ml POLYETHYLENE BETWEEN CONCRETE AND PIPE.
- SEE DWG. 1-03 FOR "d" DEPTH.
- BOLD LINE REPRESENTS THE BEARING SURFACE.

File Name: 2-03-HOR-THRUST BLK.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

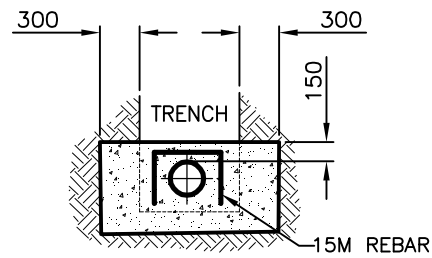
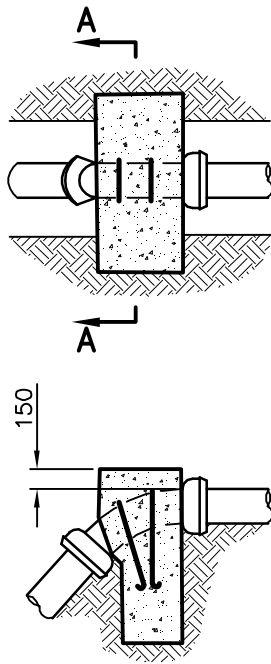
DESIGN GUIDELINE DRAWINGS Water Design

WATER MAIN HORIZONTAL BEND THRUST BLOCKS

DRAWING NO.

2-03

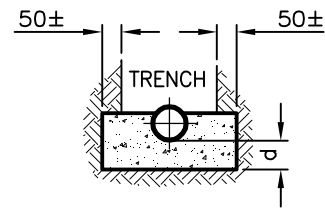
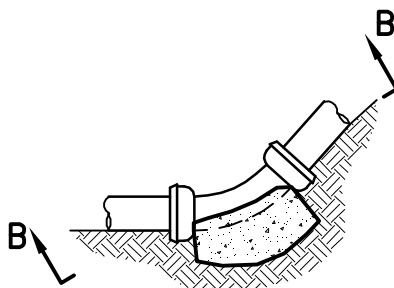
REVISION NO.



SECTION A-A

| VERTICAL DEAD WEIGHT THRUST BLOCK | | | | | | | |
|--------------------------------------|-------------------|-----|-----|-----|-----|-----|-----|
| VOLUME OF CONCRETE (m ³) | | | | | | | |
| FITTING | SIZE OF MAIN (mm) | | | | | | |
| | 150 | 200 | 250 | 300 | 350 | 400 | 500 |
| 11 1/4 Degree Bend | 0.2 | 0.4 | 0.6 | 0.9 | 1.2 | 1.6 | 2.4 |
| 22 1/2 Degree Bend | 0.4 | 0.8 | 1.2 | 1.7 | 2.3 | | |
| 45 Degree Bend | 0.8 | 1.5 | 2.3 | | | | |
| 90 Degree Bend | | | | | | | |

■ SPECIFIC DESIGN REQ'D. BY ENGINEER



SECTION B-B

| THRUST BLOCK BEARING AREA | | | | | | | |
|--|-------------------|------|------|------|------|------|------|
| MINIMUM CONCRETE AREA IN CONTACT WITH UNDISTURBED SOIL (sq. m) | | | | | | | |
| FITTING | SIZE OF MAIN (mm) | | | | | | |
| | 150 | 200 | 250 | 300 | 350 | 400 | 500 |
| 11 1/4 Degree Bend | 0.07 | 0.12 | 0.20 | 0.28 | 0.38 | 0.50 | 0.78 |
| 22 1/2 Degree Bend | 0.14 | 0.24 | 0.38 | 0.55 | 0.75 | | |
| 45 Degree Bend | 0.27 | 0.48 | 0.75 | | | | |
| 90 Degree Bend | | | | | | | |

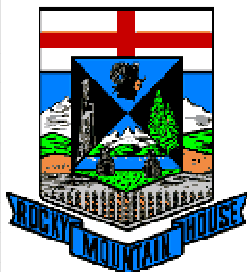
■ SPECIFIC DESIGN REQ'D. BY ENGINEER

NOTES:

- BEARING AREA CALCULATED USING THE FOLLOWING:
 - (a) HYDRAULIC PRESSURE 1380 kPa.
 - (b) SOIL BEARING CAPACITY 72 kPa.
- CONCRETE STRENGTH TO BE 20 MPa @ 28 DAYS.
- CONCRETE TO BE CLEAR OF BELLS & PIPE.
- PLACE 6 ml POLYETHYLENE BETWEEN CONCRETE AND PIPE.
- SEE DWG. 1-03 FOR "d" DEPTH.
- BOLD LINE REPRESENTS THE BEARING SURFACE.

File Name: 2-04-VERT THRUST BLK.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

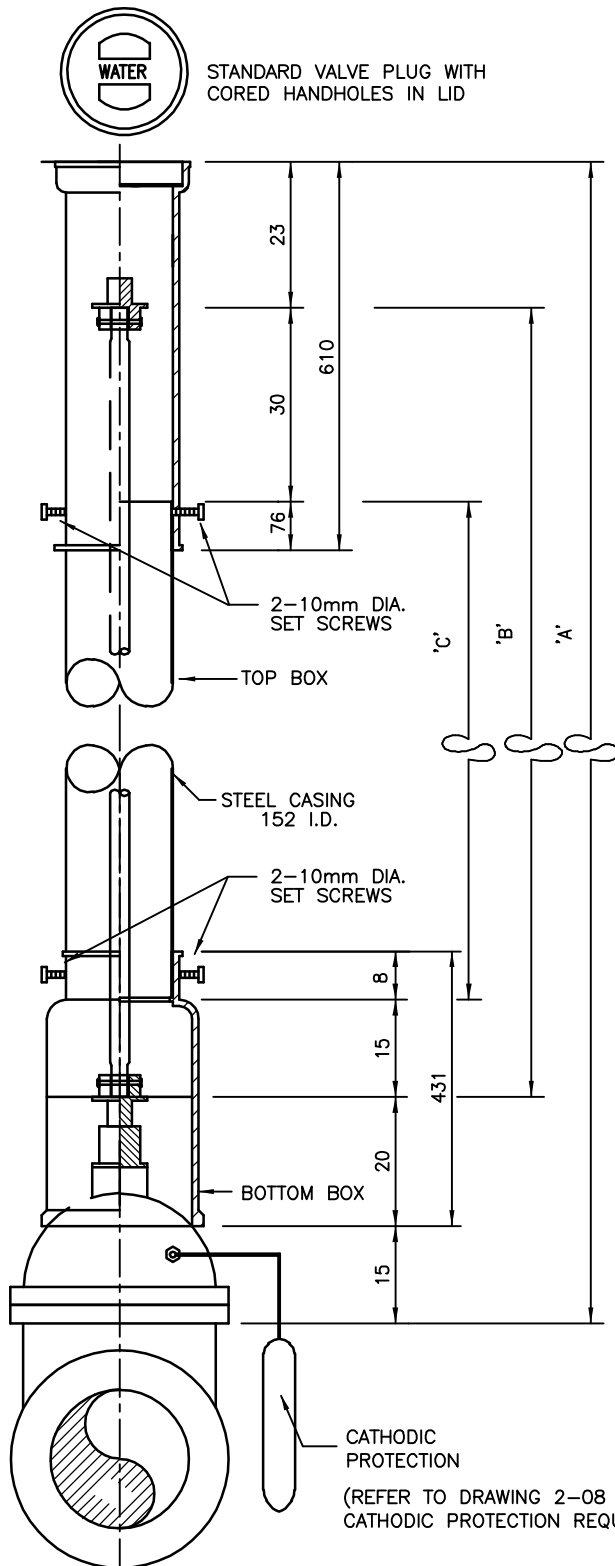
DESIGN GUIDELINE DRAWINGS Water Design

WATER MAIN VERTICAL BEND THRUST BLOCKS

DRAWING NO.

2-04

REVISION NO.



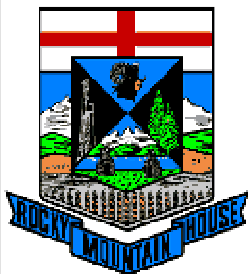
| A | B | C |
|--------|--------|--------|
| BURY | ROD | CASING |
| 8'-0" | 6'-3" | 4'-9" |
| 8'-6" | 6'-9" | 5'-3" |
| 9'-0" | 7'-3" | 5'-9" |
| 9'-6" | 7'-9" | 6'-3" |
| 10'-0" | 8'-3" | 6'-9" |
| 10'-6" | 8'-9" | 7'-3" |
| 11'-0" | 9'-3" | 7'-9" |
| 11'-6" | 9'-9" | 8'-3" |
| 12'-0" | 10'-3" | 8'-9" |

FOR VALVES LARGER
THAN 200#, BOTTOM
BOX DIMENSIONS
TO MATCH VALVE SIZE

File Name: 2-06-NORWOOD TYPE A SLIDING TYPE VALVE BOX.dwg

Rev. By: - Rev. Date: -

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Trench Excavation and Backfill

NORWOOD TYPE 'A'
SLIDING TYPE VALVE BOX

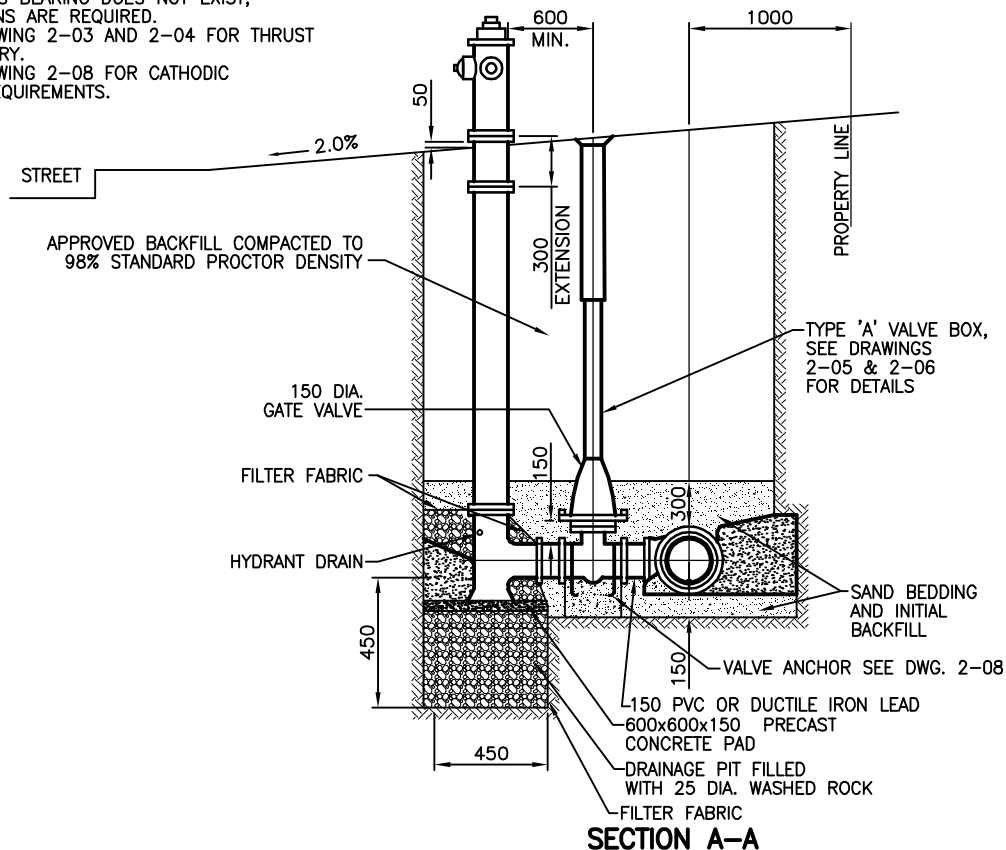
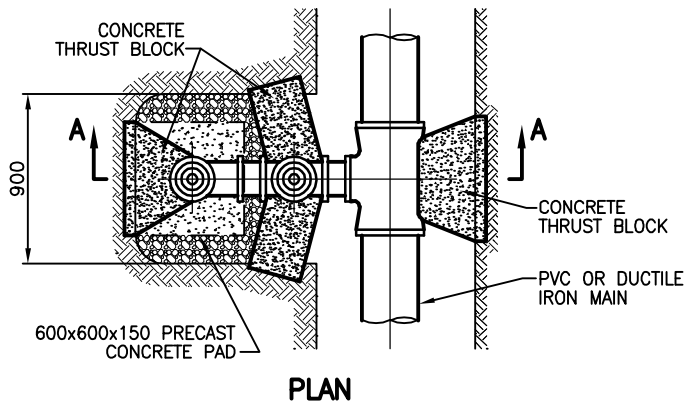
DRAWING NO.

2-05

REVISION NO.

NOTES:

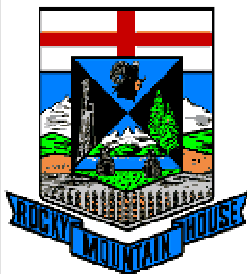
- THE HYDRANT SHALL BE PLACED ON A PRECAST 600x600x150 REINFORCED SULPHATE RESISTANT CONCRETE PAD WITH 100x100, W16.5xW16.5 WIRE MESH REINFORCEMENT.
- A PIT FOR DRAINAGE 900 WIDEx450 LONGx450 DEEP SHALL BE DUG AT THE FOOT OF THE HYDRANT AND FILLED WITH 25mm DIA. WASHED ROCK.
- THE SPACE AROUND THE BARREL AND 150 ABOVE THE HYDRANT DRAIN SHALL ALSO BE FILLED WITH WASHED ROCK.
- FILTER FABRIC SHALL BE WRAPPED AROUND THE WASHED ROCK TO PREVENT THE VOIDS FROM BEING FILLED WITH CLAY OR SAND.
- CONCRETE SHALL BE POURED CLEAR OF ALL FLANGES, JOINTS AND HYDRANT DRAIN.
- THRUST BLOCKS SHALL BE POURED AGAINST GROUND WITH A MINIMUM SOIL BEARING OF 72kPa. IF THIS BEARING DOES NOT EXIST, SPECIAL DESIGNS ARE REQUIRED.
- REFER TO DRAWING 2-03 AND 2-04 FOR THRUST BLOCK GEOMETRY.
- REFER TO DRAWING 2-08 FOR CATHODIC PROTECTION REQUIREMENTS.



- NOTE: 1. THE OUTSIDE OF THE HYDRANT ABOVE THE FINISHED GROUND LINE SHALL BE COATED WITH TWO COATS OF PAINT OF A DURABLE AND WEATHERPROOF COMPOSITION, COLOR AS FOLLOWS: HIGH VISIBILITY YELLOW, COLOR COAT 16-20
2. THE HYDRANT SHALL BE PLACED ON A CONCRETE PAD 460mm x 460mm x 150mm AS SHOWN.
3. THE END OF THE DITCH AT THE REAR OF THE HYDRANT SHALL BE FILLED WITH CONCRETE TO THE LEVEL OF THE TOP OF PIPE, AND CLEAR OF HYDRANT'S DRAIN HOLE TO ANCHOR THE HYDRANT. A PIT FOR DRAINAGE, 760mm WIDE, 1000mm LONG, & 600mm DEEP SHALL BE DUG AT THE FOOT OF THE HYDRANT AND FILLED WITH STONES, MINIMUM SIZE 50mm DIA. AS SPECIFIED. THE SPACE ABOUT THE BARREL & 150mm ABOVE DRIP HOLE SHALL ALSO BE FILLED.
4. A 0.15mm POLYETHYLENE SHEET SHALL BE PLACED OVER THE TOP OF THE STONES TO PREVENT THE SPACES BETWEEN THE STONES FROM BEING FILLED WITH CLAY.
5. THE EXTERIOR OF THE HYDRANT'S BARREL BELOW THE GRADE FLANGE & INCLUDING ANY SPLIT RING & SLIP-BREAK AWAY FLANGE SHALL BE COATED IN ACCORDANCE WITH THE SPECIFICATIONS.

File Name: 2-06--STANDARD HYDRANT DETAIL.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

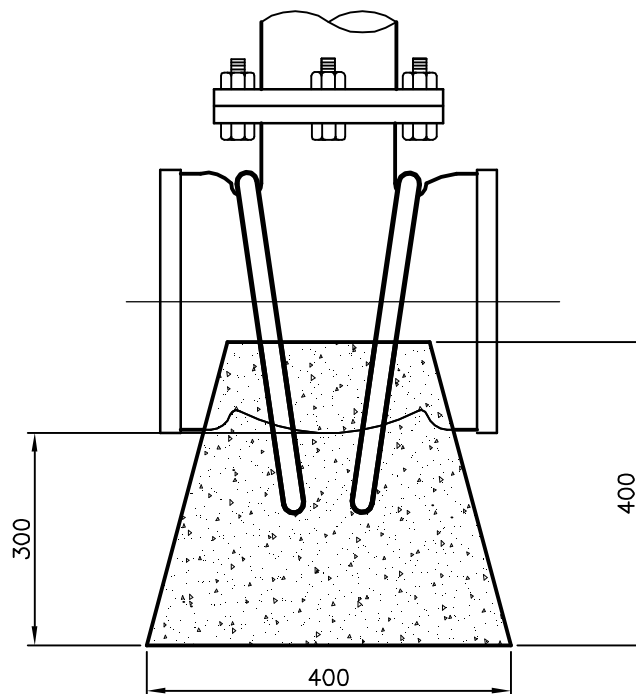
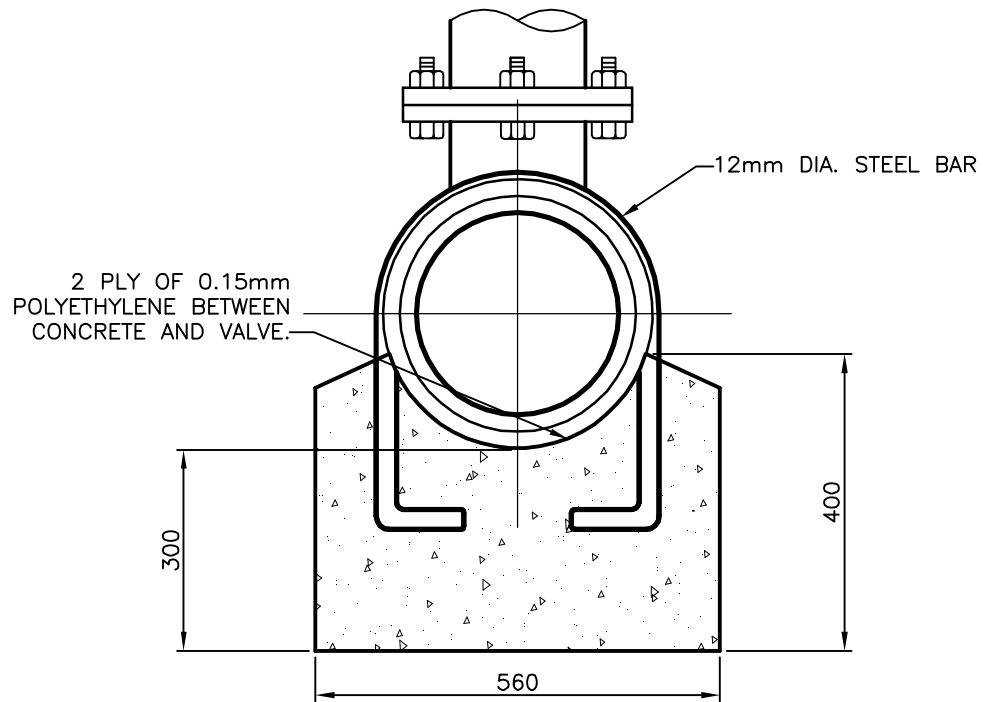
DESIGN GUIDELINE DRAWINGS Water Mains

STANDARD HYDRANT DETAIL

DRAWING NO.

2-06

REVISION NO.

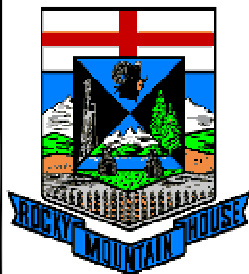


NOTE:

- CONCRETE SHALL BE 20 MPa AT 28 DAYS, AND TYPE 50, SULFATE RESISTANT.
- REFER TO DRAWING 2-08 FOR CATHODIC PROTECTION REQUIREMENTS.

File Name: 2-07-VALVE ANCHOR DETAIL.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

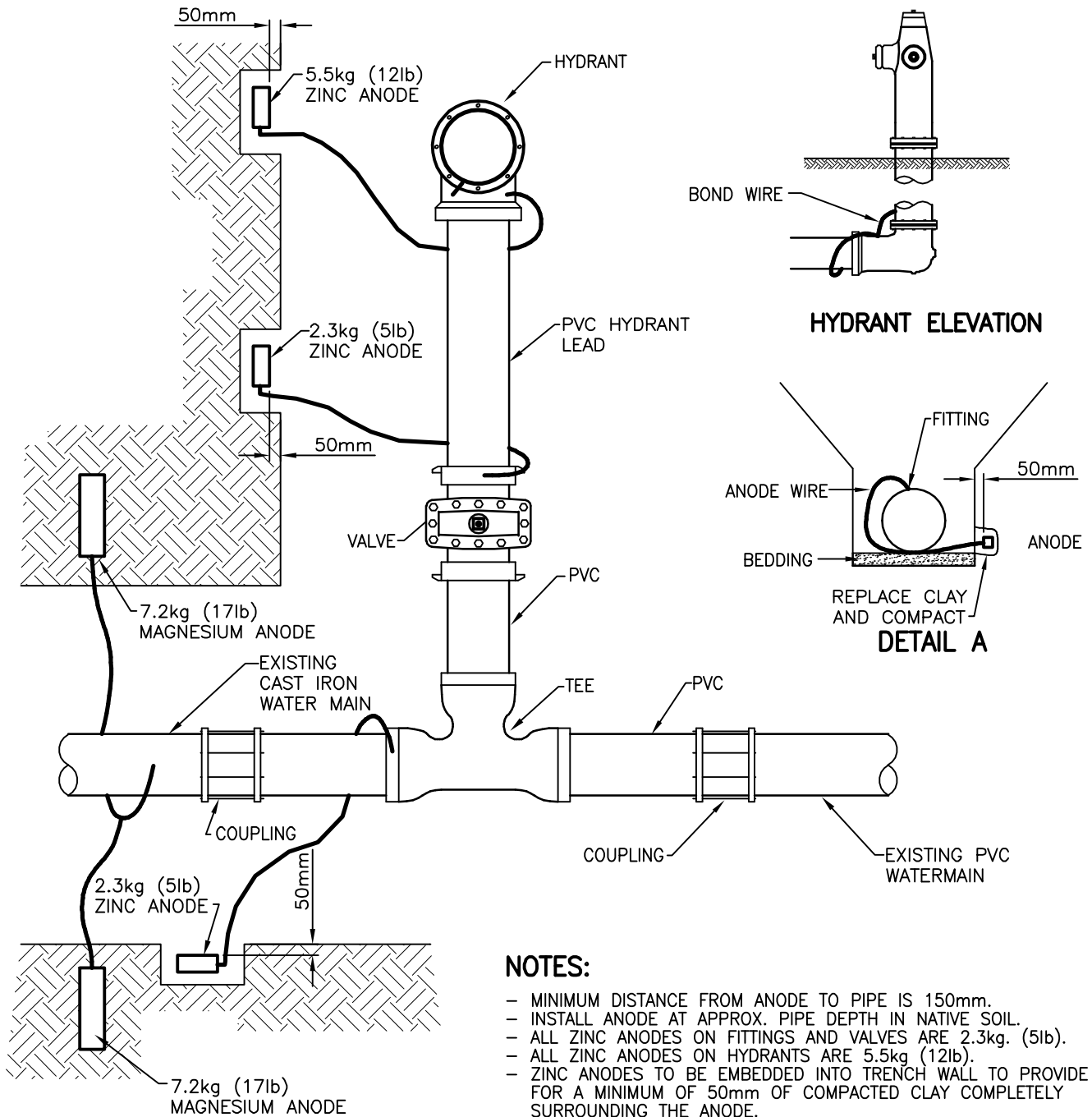
DESIGN GUIDELINE DRAWINGS
Water Mains

VALVE ANCHOR DETAIL

DRAWING NO.

2-07

REVISION NO.



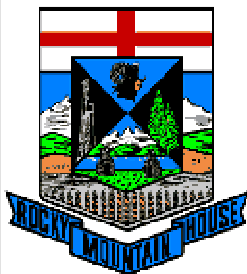
NOTES:

- MINIMUM DISTANCE FROM ANODE TO PIPE IS 150mm.
- INSTALL ANODE AT APPROX. PIPE DEPTH IN NATIVE SOIL.
- ALL ZINC ANODES ON FITTINGS AND VALVES ARE 2.3kg. (5lb).
- ALL ZINC ANODES ON HYDRANTS ARE 5.5kg (12lb).
- ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm OF COMPACTED CLAY COMPLETELY SURROUNDING THE ANODE.
- ANODES TO BE AT LEAST 300mm CLEAR OF THRUST BLOCKS.

File Name: 2-08-ANODE LOCATION & INSTALLATION.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

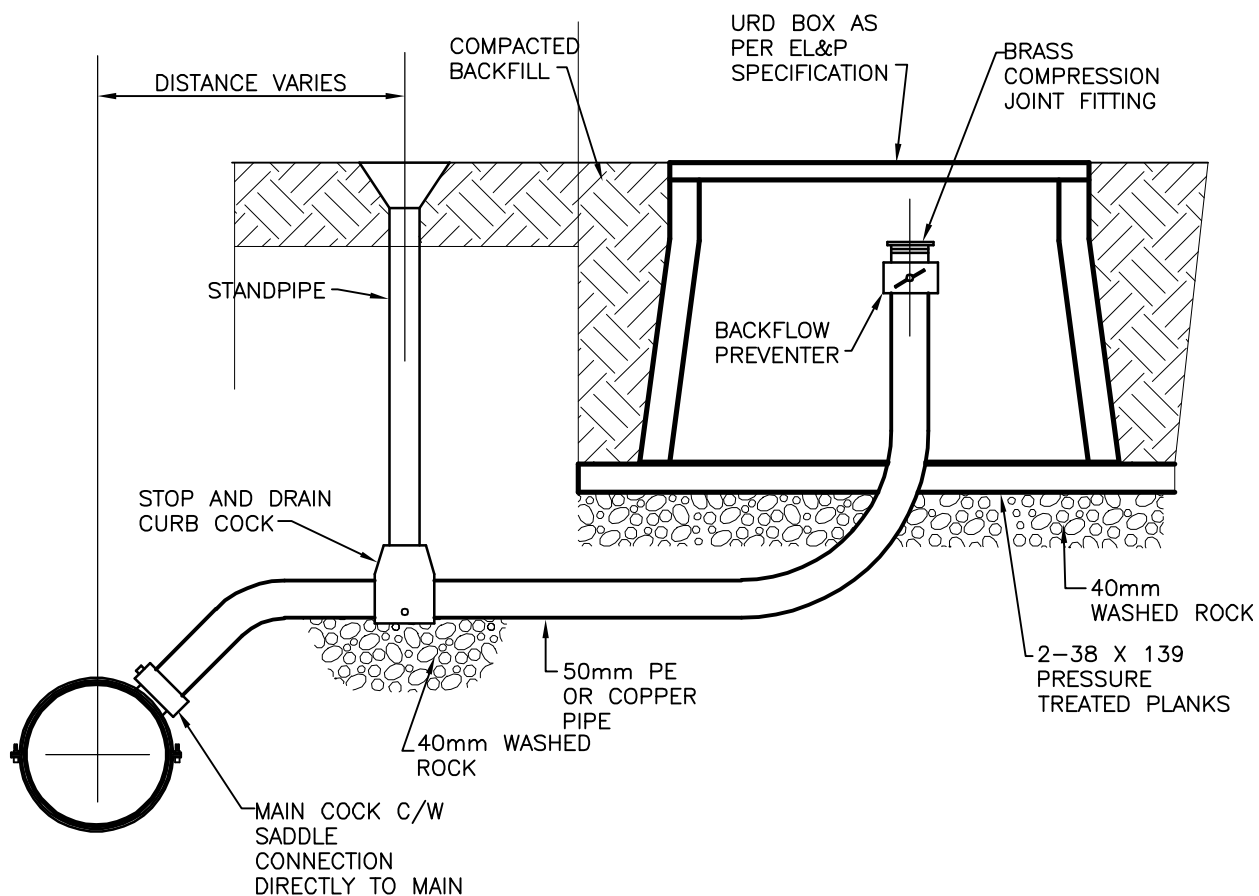
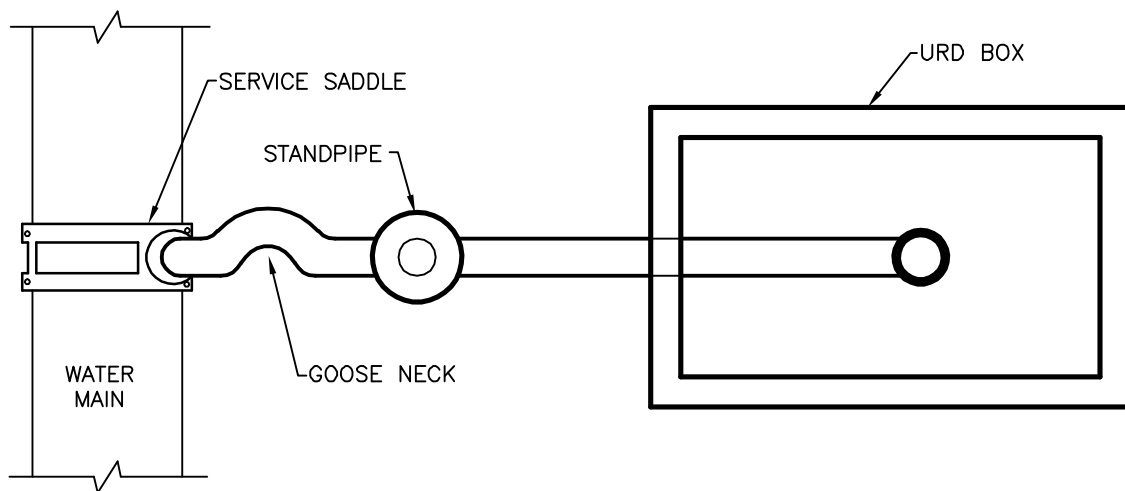
DESIGN GUIDELINE DRAWINGS
Water Design

ANODE LOCATION
AND INSTALLATION

DRAWING NO.

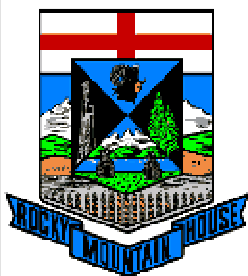
2-08

REVISION NO.



File Name: 2-09-AIR RELIEF VALVE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

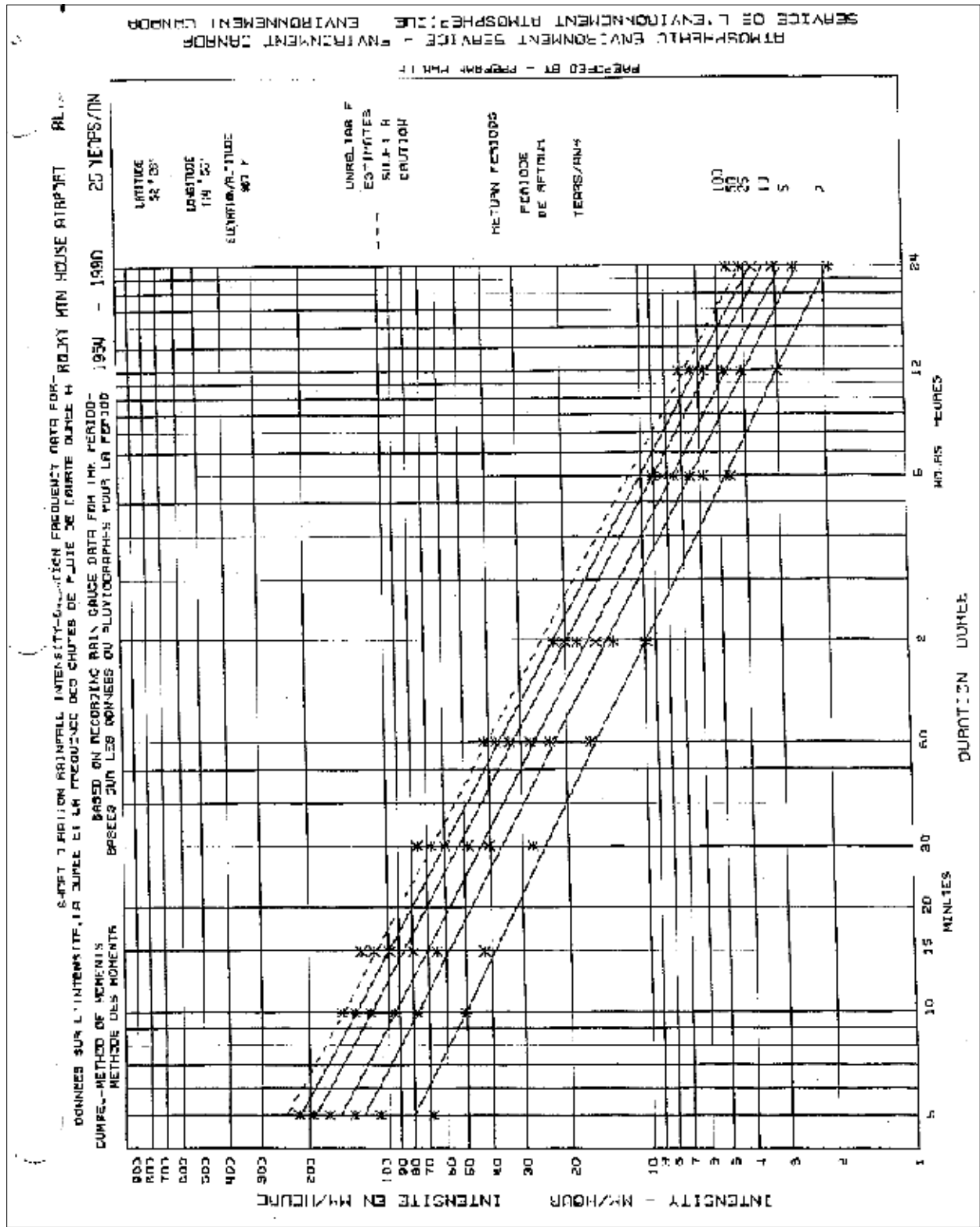
DESIGN GUIDELINE DRAWINGS Water Mains

AIR RELIEF VALVE & FLUSHING CHAMBER

DRAWING NO.

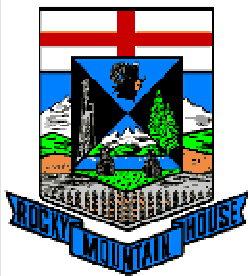
2-09

REVISION NO.



File Name: 3-01-STATISTICAL I-C-D CURVES FOR RAINFALL.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

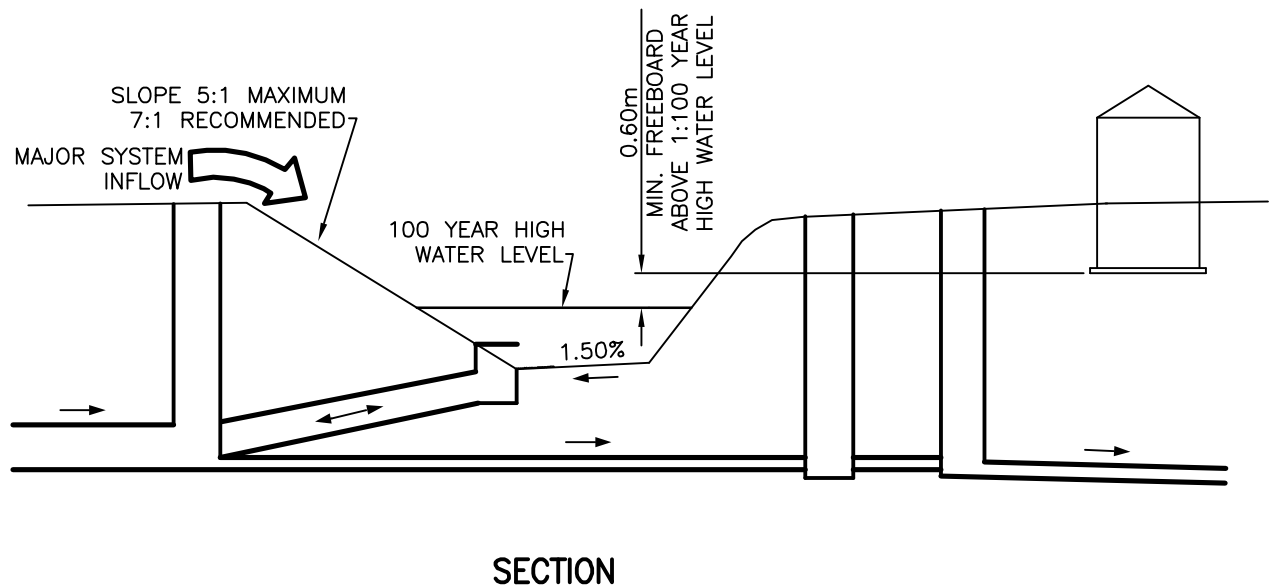
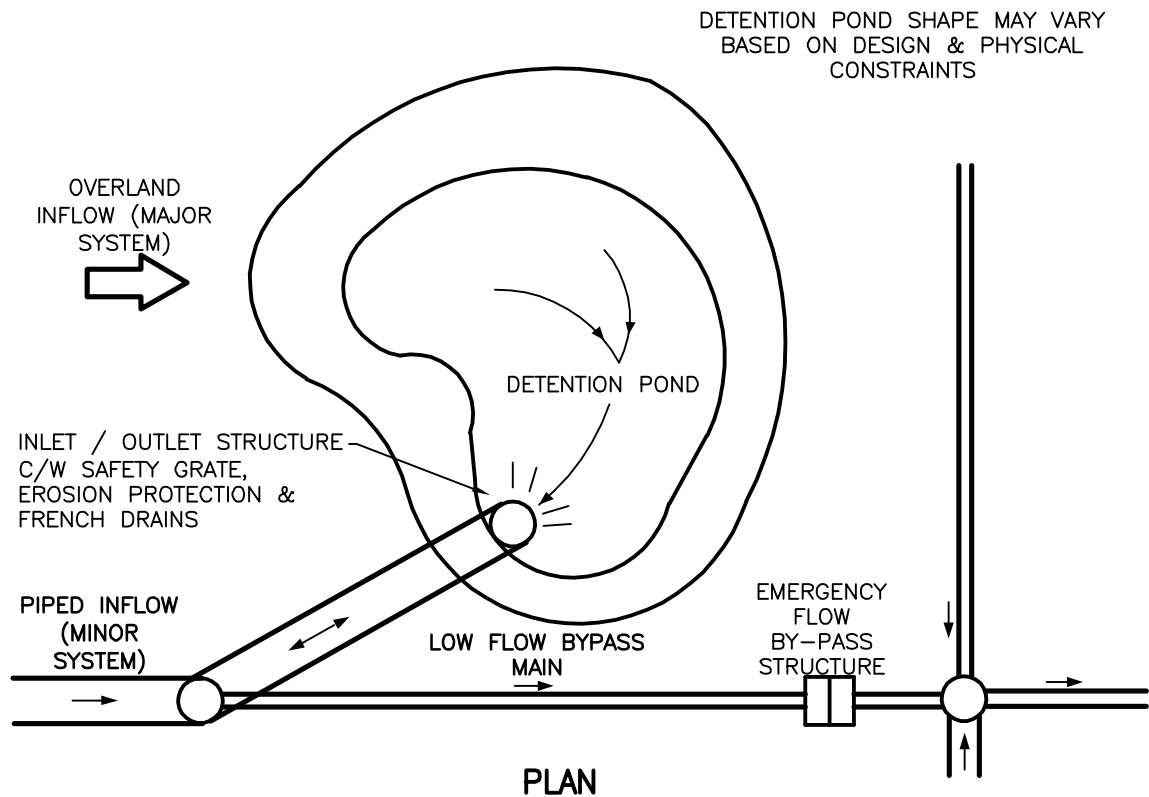
DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

STATISTICAL CURVES FOR
RAINFALL INTENSITY-
DURATION-FREQUENCY

DRAWING NO.

3-01

REVISION NO.



File Name: 3-02-DRY STORMWATER STORAGE FACILITY.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

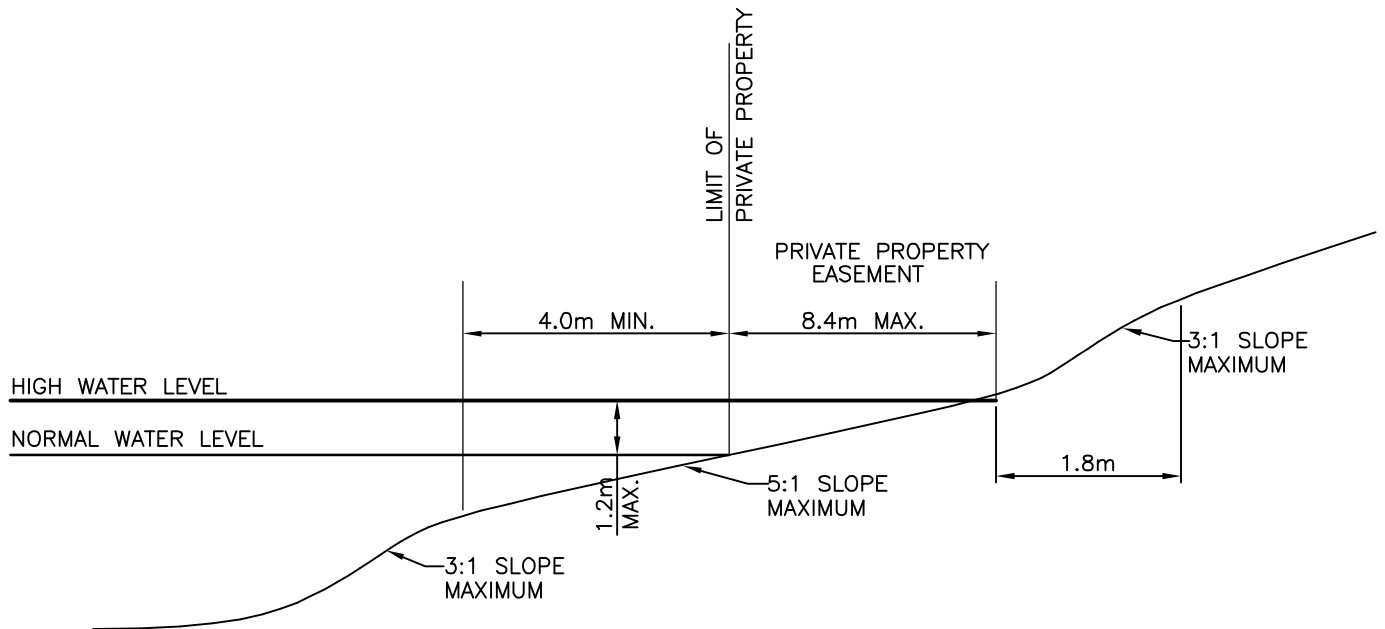
DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

DRY STORMWATER STORAGE FACILITY

DRAWING NO.

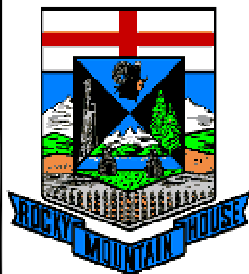
3-02

REVISION NO.



File Name: 3-07-WET POND CROSS SECTION.dwg

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| Rev. By: | - | Rev. Date: | - |
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| No. | Revision | | |



TOWN OF ROCKY MOUNTAIN HOUSE

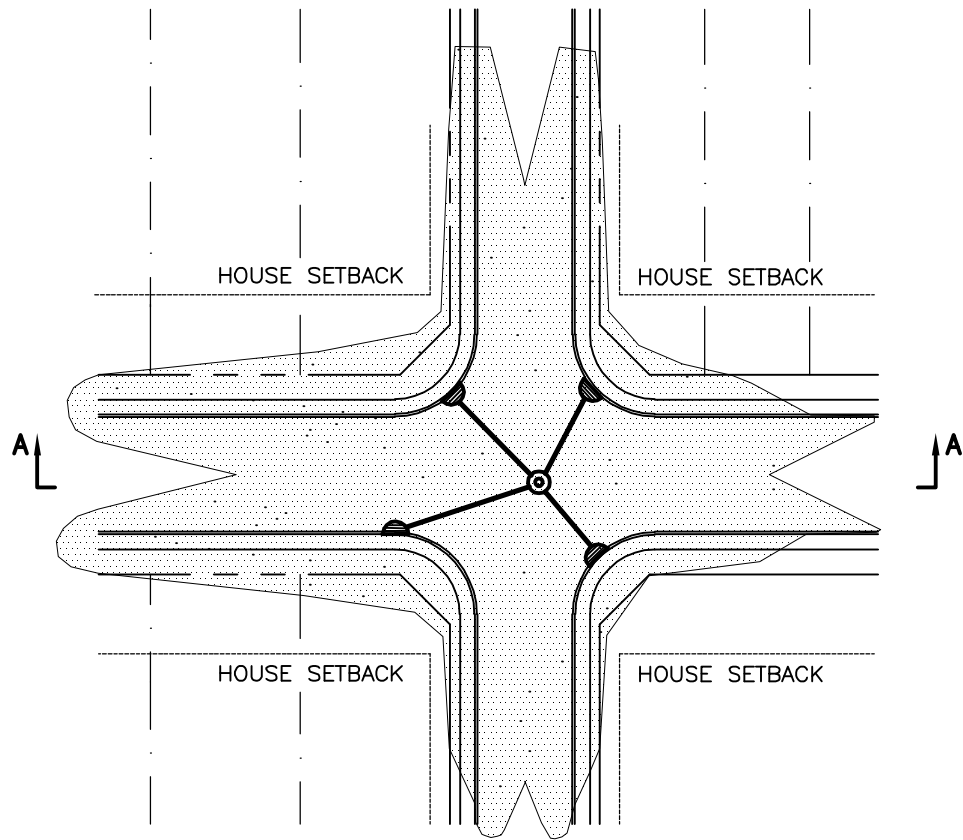
DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

WET POND CROSS SECTION

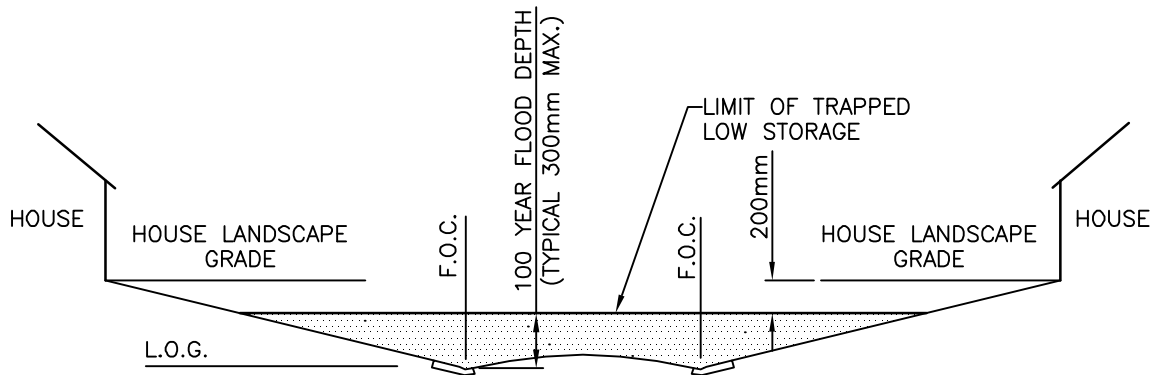
DRAWING NO.

3-03

REVISION NO.



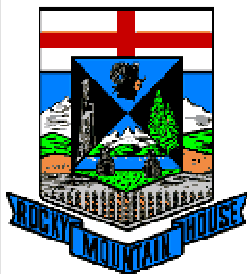
PLAN



SECTION A-A

File Name: 3-03-TRAPPED LOW STORAGE AREA.dwg

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| Rev. By: | - | Rev. Date: | - |
| No. | - | Revision | - |



TOWN OF ROCKY MOUNTAIN HOUSE

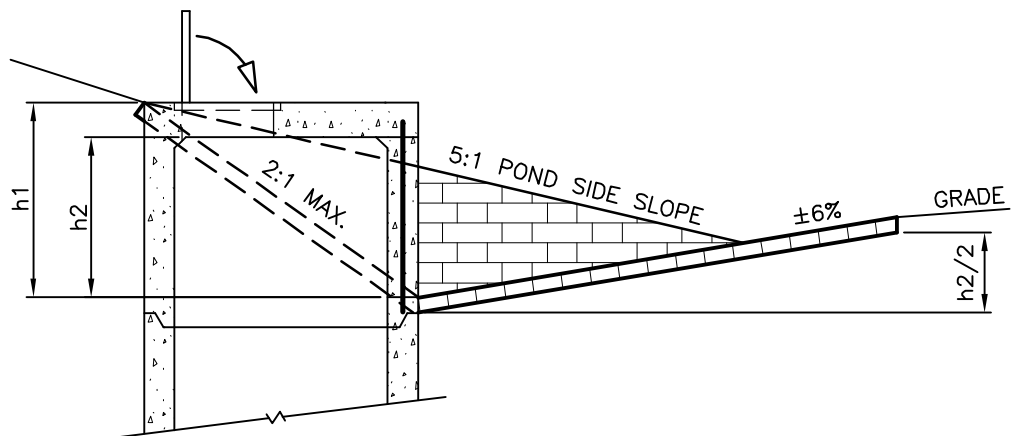
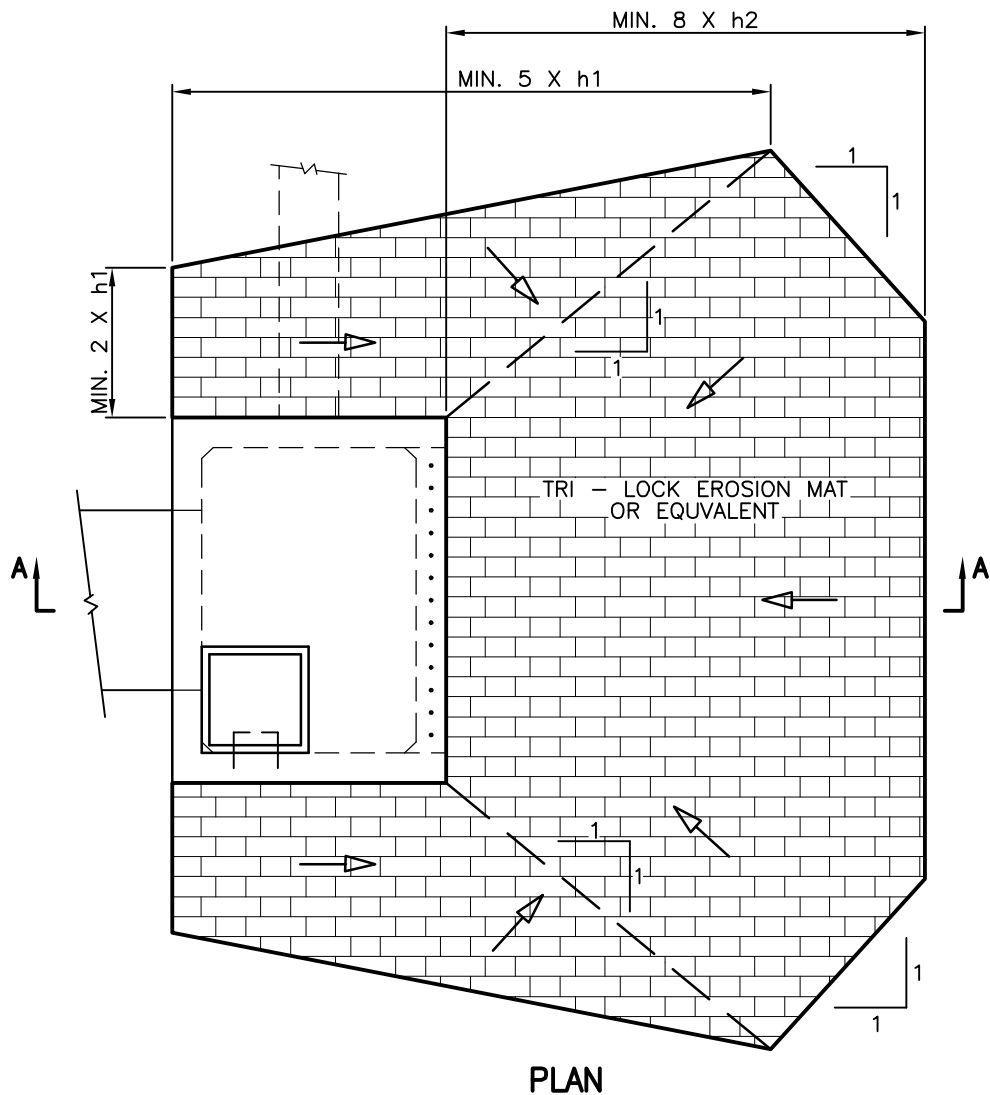
DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

TYPICAL TRAPPED LOW STORAGE AREA

DRAWING NO.

3-04

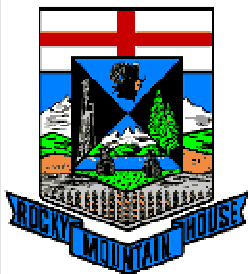
REVISION NO.



File Name: 3-04-INLET_OUTLET STRUCTURE APRON.dwg

Rev. By: - Rev. Date: -

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TOWN OF ROCKY MOUNTAIN HOUSE

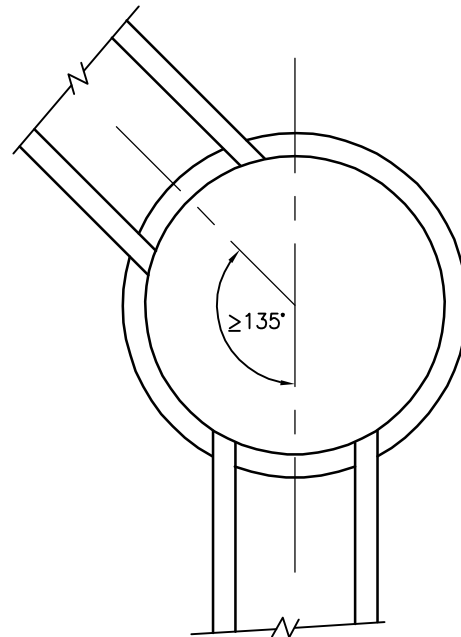
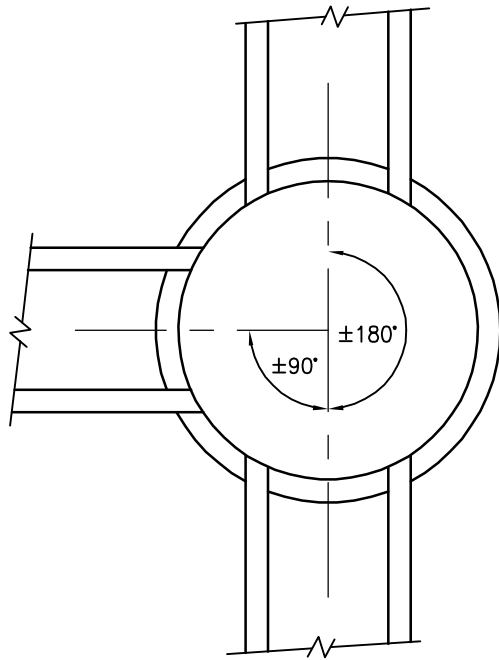
DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

INLET / OUTLET
STRUCTURE APRON

DRAWING NO.

3-05

REVISION NO.



| MANHOLE NOMINAL INSIDE DIAMETER | INLET / OUTLET PIPE SIZE | | |
|---------------------------------------|-----------------------------------|----------------------|--|
| | DEFLECTION ANGLE | | |
| | ±90° | ≥135° | ±180° |
| 1200 | 600mm CONC. (765mm MAX.O.D.) | 675mm CONC. | 750mm CONC. (765mm PVC) (940mm MAX.O.D.) |
| 1500 | 750mm CONC. (940mm MAX.O.D.) | 750 & 900mm CONC. | 900mm CONC. (1120mm MAX.O.D.) |
| 1800 | 900mm CONC. (1120mm MAX.O.D.) | 1050mm CONC. | 1200mm CONC. (1475mm MAX.O.D.) |
| 2100 | 1050mm CONC. (1335mm MAX.O.D.) | | 1500mm CONC. (1828mm MAX.O.D.) |
| 2400 | 1200mm CONC. (1475mm MAX.O.D.) | | 1800mm CONC. (2184mm MAX.O.D.) |
| 3000 | 1500mm CONC. (1828mm MAX.O.D.) | | 2100mm CONC. (2540mm MAX.O.D.) |

File Name: 3-06-MH INLET OUTLET PIPE DESIGN CONSID.dwg

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| Rev. By: | - | Rev. Date: | - |
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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

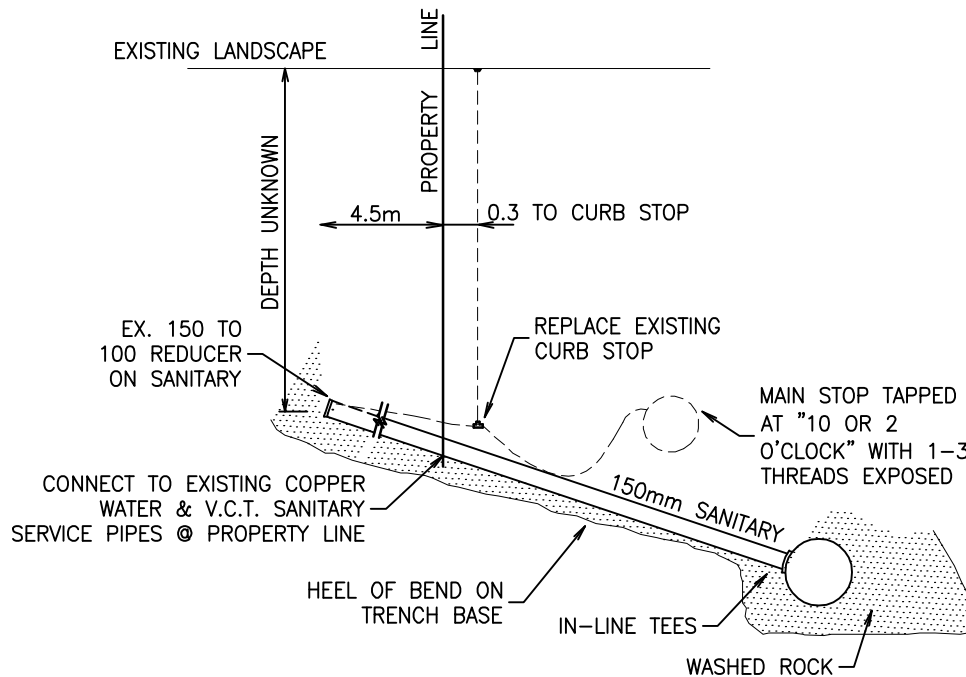
MANHOLE INLET / OUTLET PIPE DESIGN CONSIDERATIONS

DRAWING NO.

3-06

REVISION NO.

REVISION NO.

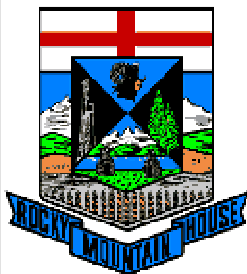


NOTES:

- MIN. SEWER GRADE 2.0%.
- 300mm GOOSENECK IN WATER SERVICE REQUIRED AT EACH SEWER CROSSING.
- WATER SERVICE SHALL BE ONE CONTINUOUS PIECE FROM CORPORATION COCK TO CURB STOP.
- WHERE MAINS ARE DEEP, CONSTRUCT SERVICE AT APPROX. 45° GRADE UNTIL 2-5% CAN BE MAINTAINED TO STUB, INSTALL LONG RADIUS BEND AT GRADE TRANSITION.
- MAIN STOP TAPS SHALL BE A MINIMUM OF 600mm APART & NO LESS THAN 300mm TO A COUPLING OR COLLAR.
- MARKER AT END OF SERVICE TO EXTEND TO LOWEST INVERT.
- CAPS TO BE INSERTED AT ENDS OF ALL SERVICE STUBS
- WHEN FACING PROPERTY THE SANITARY SERVICE SHALL BE TO THE RIGHT OF THE WATER SERVICE
- ADJACENT SERVICES SHALL BE NO CLOSER THAN 1.0m AND BE TO THE RIGHT OF THE WATER SERVICE WHEN VIEWING THE TRENCH FROM THE LOT.

File Name: 4-03-SERVICE CROSS SECTIONS.dwg

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| Rev. By: | - | Rev. Date: | - |
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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

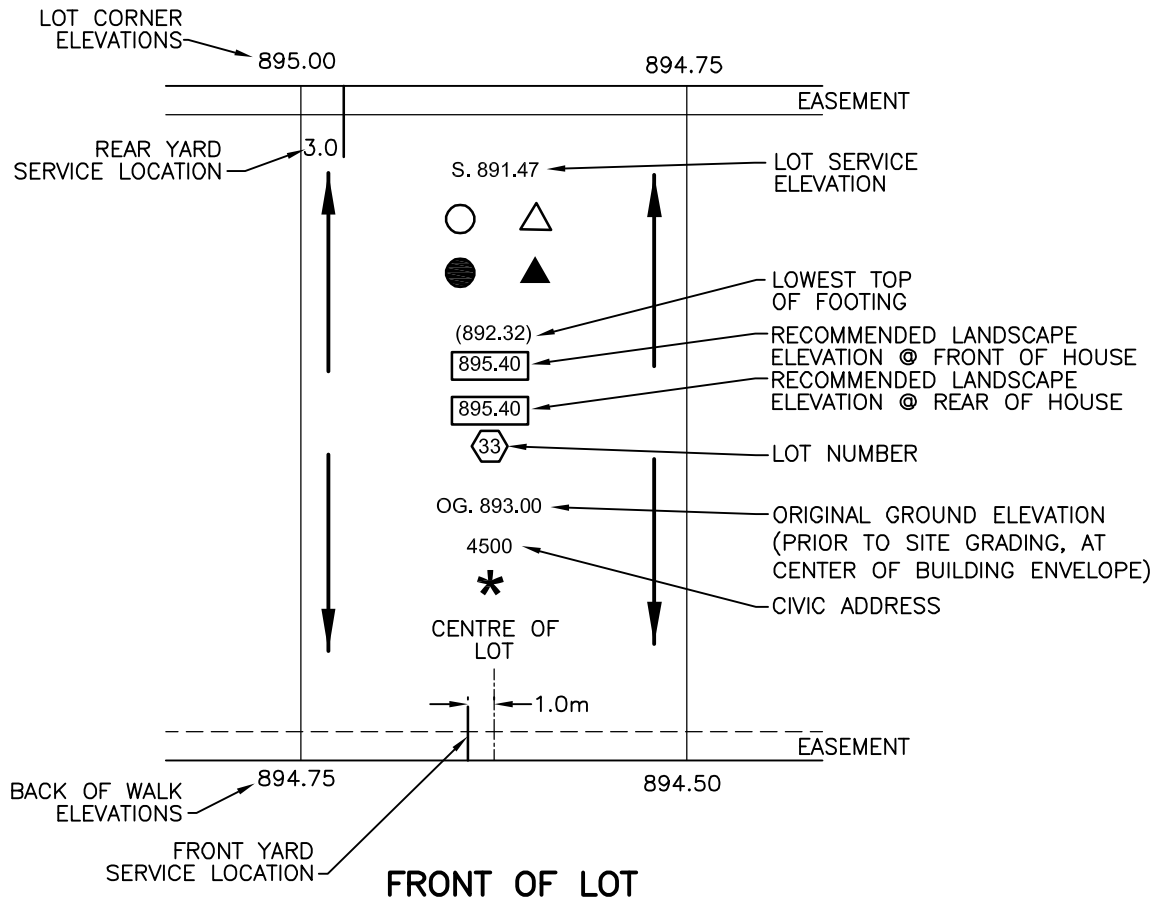
RESIDENTIAL SERVICE INSTALLATION CROSS SECTION

DRAWING NO.







4-03

REVISION NO.

BACK OF LOT



LEGEND

- | | |
|---|--|
|  | SINGLE WATER & SANITARY SERVICE |
|  | DUAL WATER & SANITARY SERVICE |
|  | SINGLE WATER, SANITARY & STORM SERVICE |
|  | DUAL WATER, SANITARY & STORM SERVICE |
|  | DRAINAGE PATTERN |
|  | DEPTH OF FILL EXCEEDS 1.2m (BEARING CERTIFICATE REQUIRED) |

NOTES:

- EASEMENT WIDTHS VARY
- SERVICE LOCATION DIMENSIONS VARY. SEE DRAWING 4-01.

File Name: 4-04-LOT SERVICE REQUIREMENTS.dwg

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| Rev. By: - | Rev. Date: - |
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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS

Service Connections

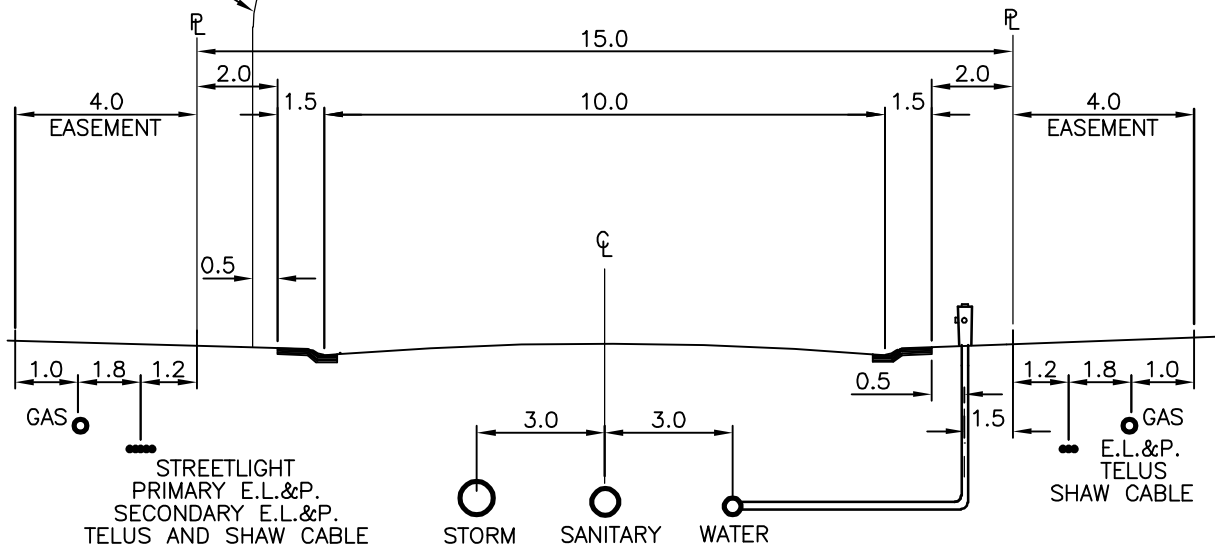
TYPICAL LOT SERVICE REQUIREMENTS

DRAWING NO.

4-04

REVISION NO.

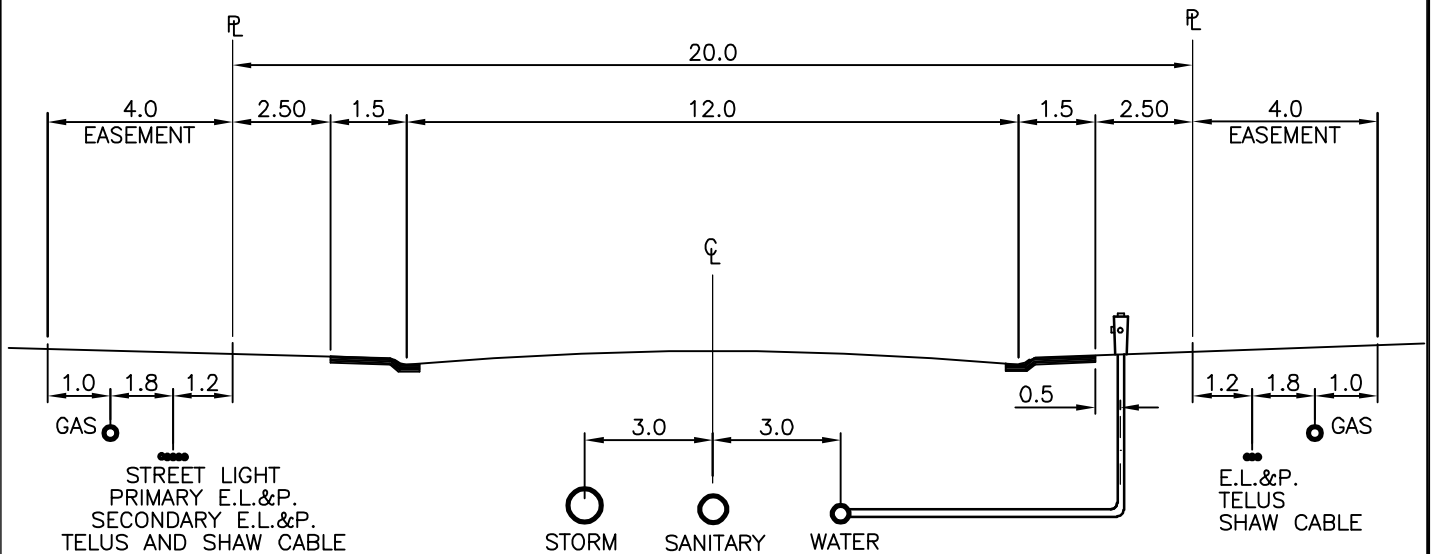
TYPICAL STREET
LIGHT LOCATION



NOTE:

— DEFLECT CABLE ALIGNMENTS AT HYDRANT

RESIDENTIAL LOCAL ROAD



RESIDENTIAL COLLECTOR ROAD

File Name: 4-05-FRONT SERVICE LOCATIONS.dwg

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|----------|---|------------|---|
| Rev. By: | — | Rev. Date: | — |
| No. | — | Revision | — |



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

FRONT SERVICE LOCATIONS

DRAWING NO.

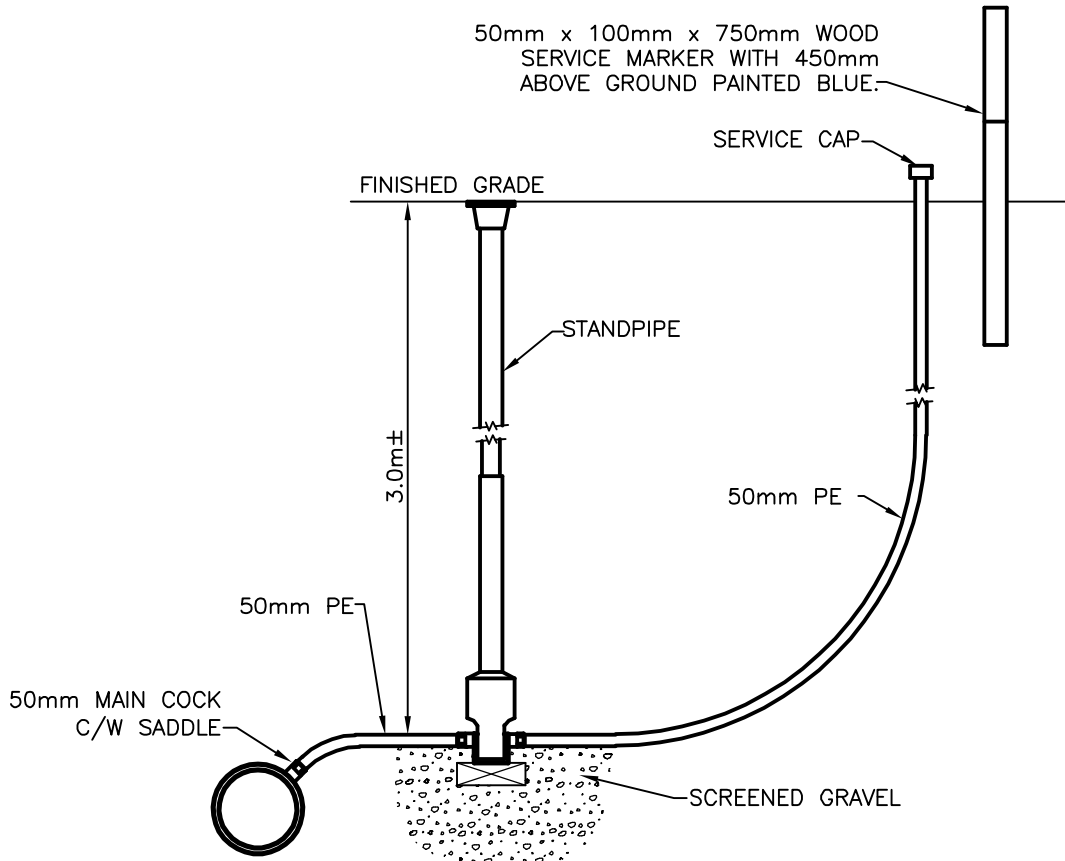
4-05

REVISION NO.

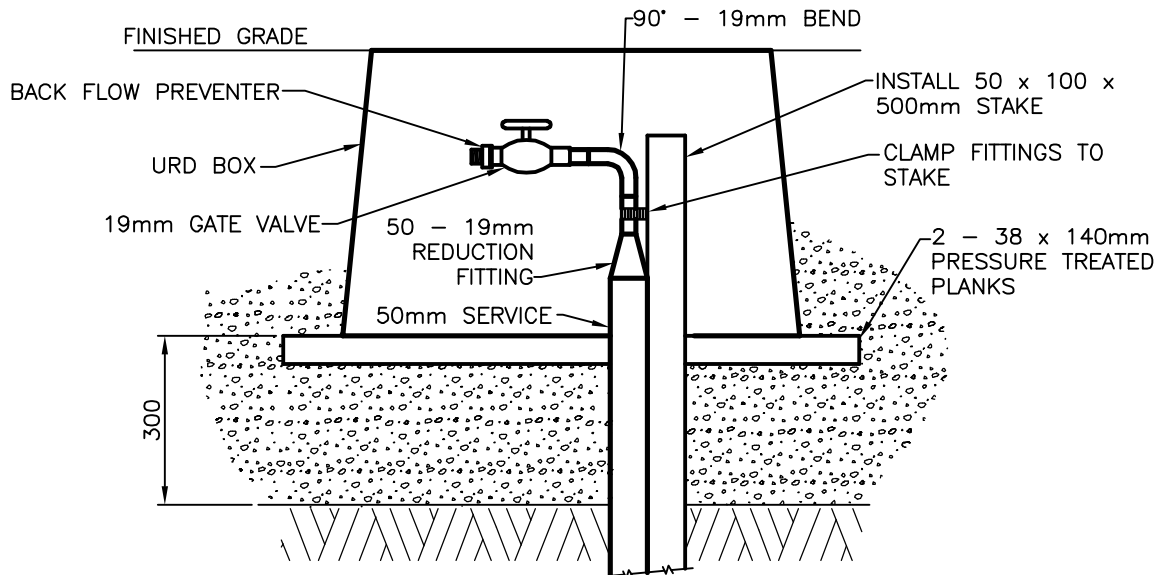


REVISION NO.

REVISION NO.



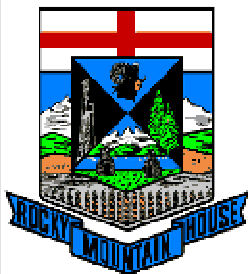
PARKS SERVICE – STAGE 1



PARKS SERVICE – STAGE 2

File Name: 4-08-PARKS WATER SERVICE.dwg

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| Rev. By: | - | Rev. Date: | - |
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TOWN OF ROCKY MOUNTAIN HOUSE

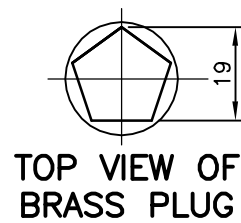
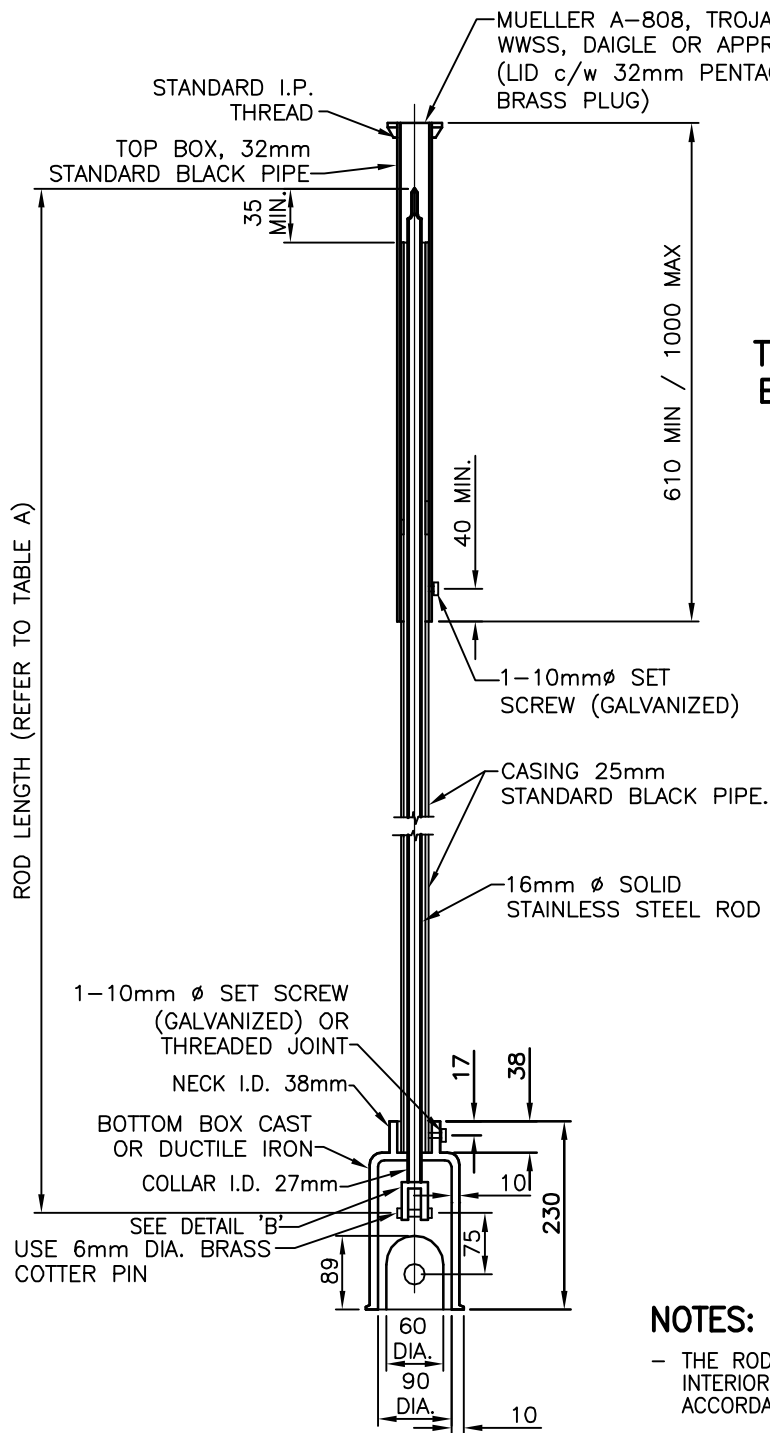
DESIGN GUIDELINE DRAWINGS
Service Connections

PARKS WATER SERVICE

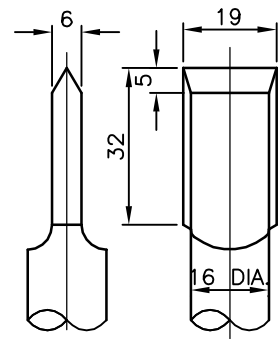
DRAWING NO.

4-08

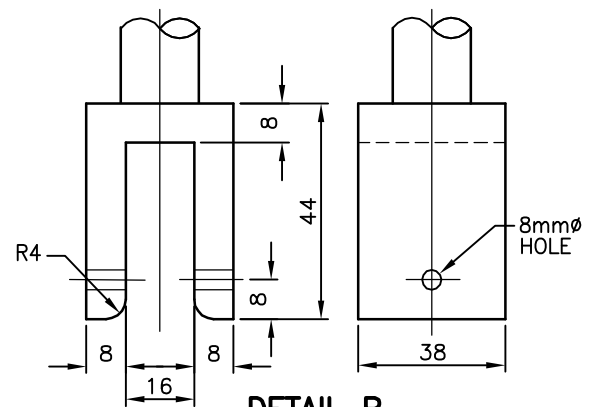
REVISION NO.



TOP VIEW OF
BRASS PLUG



DETAIL A



DETAIL B

| DEPTH OF COVER | ROD LENGTH | CASING LENGTH |
|----------------|------------|---------------|
| 2.4m | 2.15m | 2.00m |
| 2.7m | 2.45m | 2.30m |
| 3.0m | 2.75m | 2.60m |
| 3.3m | 3.05m | 2.90m |

TABLE 'A'

NOTES:

- THE ROD, THE EXTERIOR OF THE CASING AND THE EXTERIOR AND INTERIOR OF THE BOTTOM BOX SHALL BE FACTORY COATED IN ACCORDANCE WITH THESE SPECIFICATIONS.

File Name: 4-09-SERV BOX 19_25 SERV VALVE.dwg

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| Rev. By: - | Rev. Date: - |
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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

SERVICE BOX DETAIL FOR 25mm SERVICE VALVES

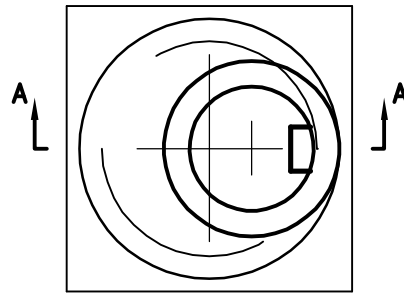
DRAWING NO.

4-09

REVISION NO.

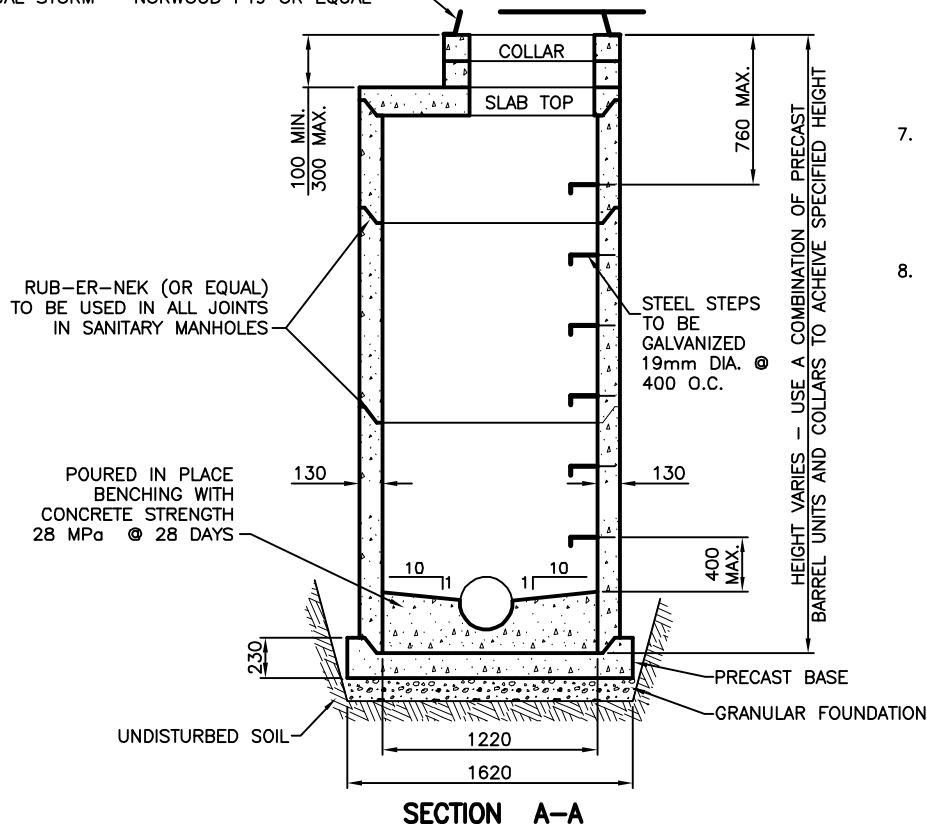
NOTES:

1. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
2. CAST IN PLACED CONCRETE TO BE 25 MPa AT 28 DAYS.
3. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
4. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
5. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. PRE-BENCHED MANHOLE BASES MUST BE USED WHEREEVER POSSIBLE WITH PRECORED CONNECTION HOLES AND WATER TIGHT DURASEAL OR GLOC JOINTS OR APPROVED EQUAL.
7. IF PRECAST CONCRETE BASES ARE UNAVOIDABLE, THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
8. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN NOT BE ACHIEVED.

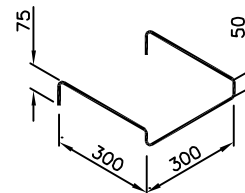


PLAN

FRAME & COVER SANITARY – NORWOOD F39 OR
EQUAL STORM – NORWOOD F49 OR EQUAL



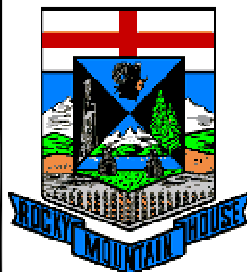
SECTION A-A



20 DIA. GALVANIZED IRON
MANHOLE SAFETY STEP

File Name: 5-01-1200mm MANHOLE.dwg

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| Rev. By: - | Rev. Date: - |
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TOWN OF ROCKY MOUNTAIN HOUSE

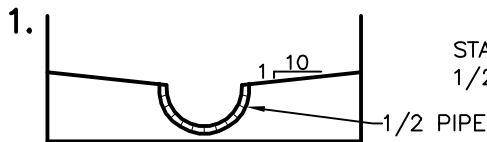
DESIGN GUIDELINES DRAWINGS Manholes and Catch Basins

STANDARD 1200mm Ø PRECAST MANHOLE ASSEMBLY

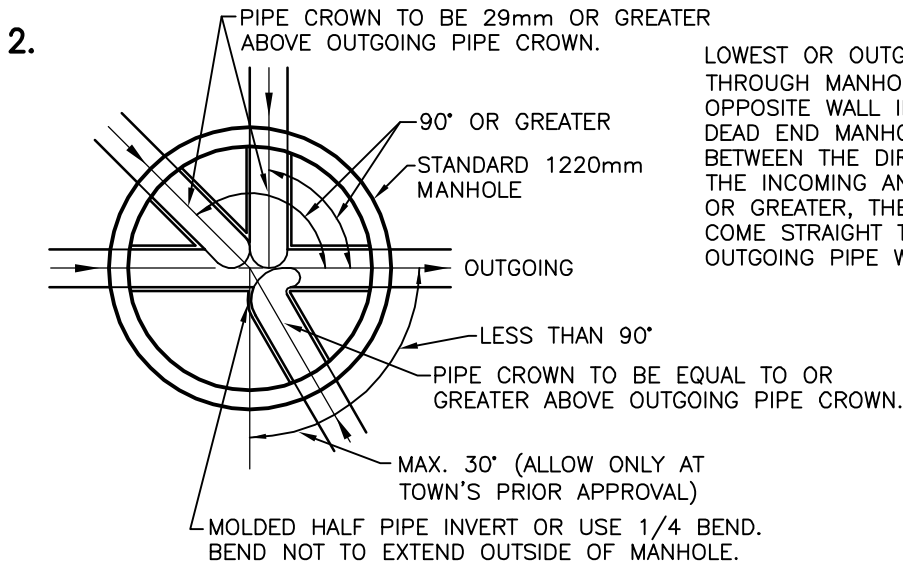
DRAWING NO.

5-01

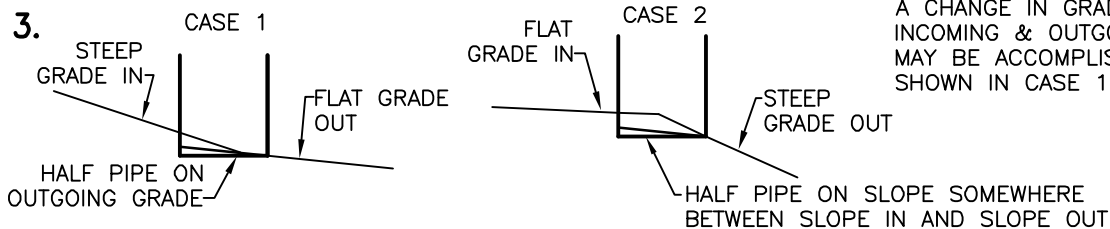
REVISION NO.



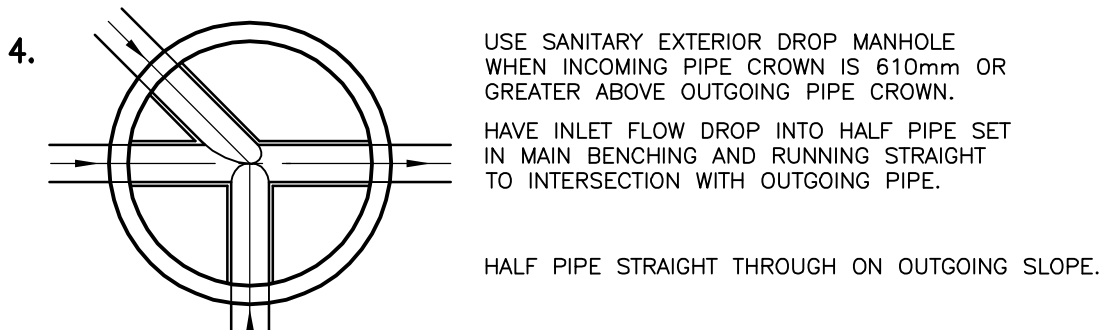
STANDARD SIDE SLOPE OF BENCHING 10:1 FROM
1/2 WAY UP PIPE IN ALL CASES.



LOWEST OR OUTGOING PIPE TO GO STRAIGHT
THROUGH MANHOLE WITH 1/2 PIPE TO
OPPOSITE WALL IN ALL CASES INCLUDING
DEAD END MANHOLE. WHERE THE ANGLE
BETWEEN THE DIRECTION OF THE FLOW IN
THE INCOMING AND OUTGOING PIPES IS 90°
OR GREATER, THE INCOMING PIPE MUST
COME STRAIGHT TO INTERSECT WITH THE
OUTGOING PIPE WITH A HALF PIPE



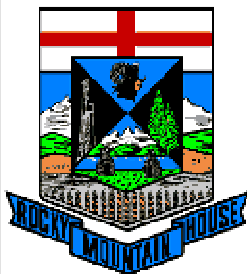
A CHANGE IN GRADE BETWEEN
INCOMING & OUTGOING PIPES
MAY BE ACCOMPLISHED AS SHOWN IN CASE 1 & 2.



5. **NOTE:** FOR STORM SEWER MANHOLES. ITEMS 1,2,& 3 ABOVE APPLY EXCEPT THAT 1/2
PIPES MAY NOT BE REQUIRED TO FORM THE FLOW CHANNELS IN THE MANHOLE FLOOR.

File Name: 5-02-SEWER BENCHING DETAILS.dwg

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| Rev. By: | - | Rev. Date: | - |
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TOWN OF ROCKY MOUNTAIN HOUSE

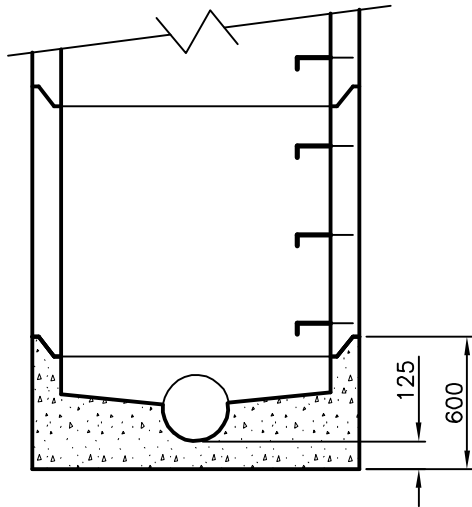
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

SEWER BENCHING
DETAILS

DRAWING NO.

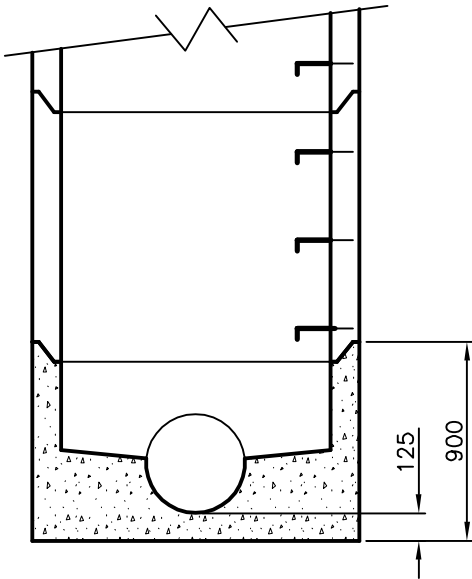
5-02

REVISION NO.



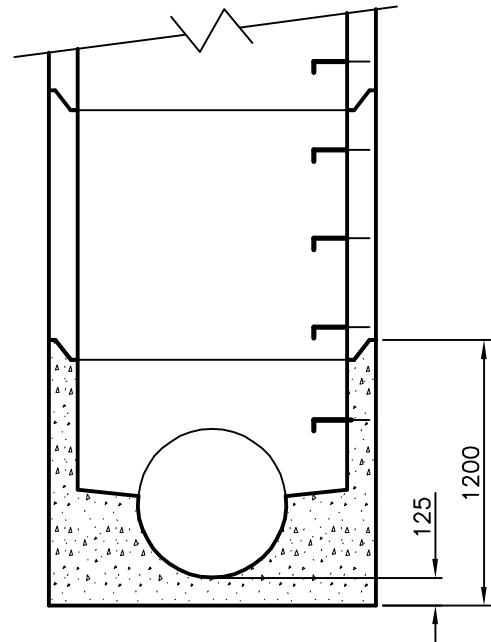
FOR ALL TYPES OF P.V.C. PIPE
SIZES 150mm to 300mm

600 PREBENCH



FOR ALL TYPES OF PIPE
SIZES 375mm to 450mm

900 PREBENCH

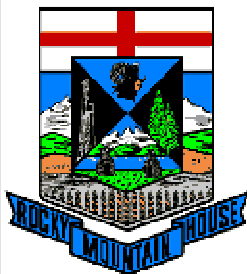


FOR ALL TYPES OF PIPE
SIZES 525mm to 675mm

1200 PREBENCH

File Name: 5-03-1200mm PRECAST MANHOLE BASE.dwg

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| Rev. By: | - | Rev. Date: | - |
| No. | - | Revision | - |



TOWN OF ROCKY MOUNTAIN HOUSE

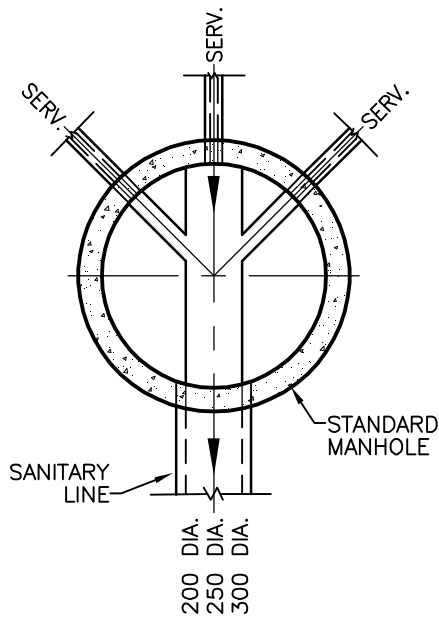
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

**PRECAST PREBENCHED
BASE FOR 1200mm Ø
MANHOLE ASSEMBLY**

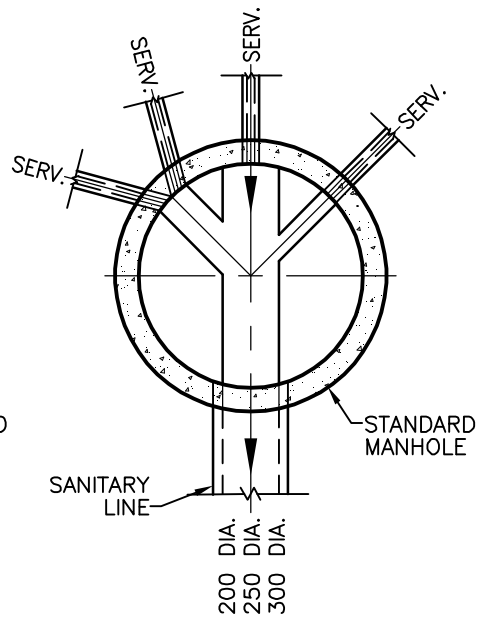
DRAWING NO.

5-03

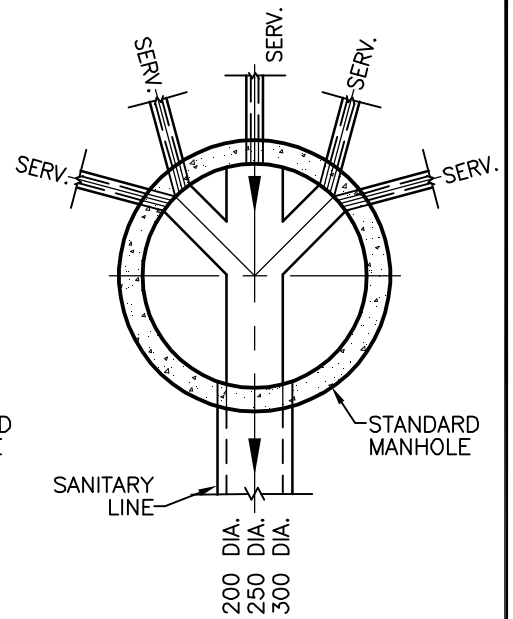
REVISION NO.



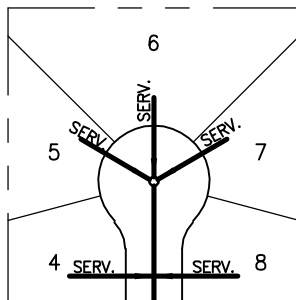
ALTERNATE 1



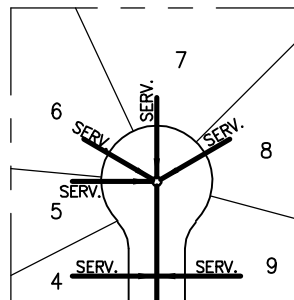
ALTERNATE 2



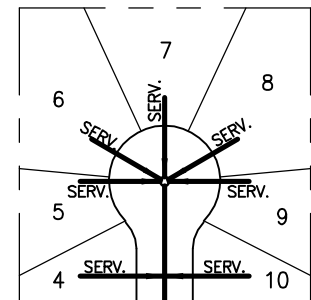
TYPICAL



ALTERNATE 1



ALTERNATE 2



TYPICAL

NOTES:

- IN THE CASE OF MORE THAN 5 CONNECTIONS INTO A MANHOLE, A DETAILED DRAWING SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL.
- SANITARY MAIN TO GO STRAIGHT THROUGH MANHOLE WITH HALF PIPE TO OPPOSITE WALL
- MAXIMUM HEIGHT OF INLET 300mm ABOVE INVERT OF OUTLET
- HALF PIPE BENCHING TO ACCOMMODATE BRANCH CONNECTIONS
- SERVICE CONNECTIONS INTO BARREL TO BE MACHINE CORED

File Name: 5-04-SAN SERVICE CONN IN CUL-DE-SAC.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

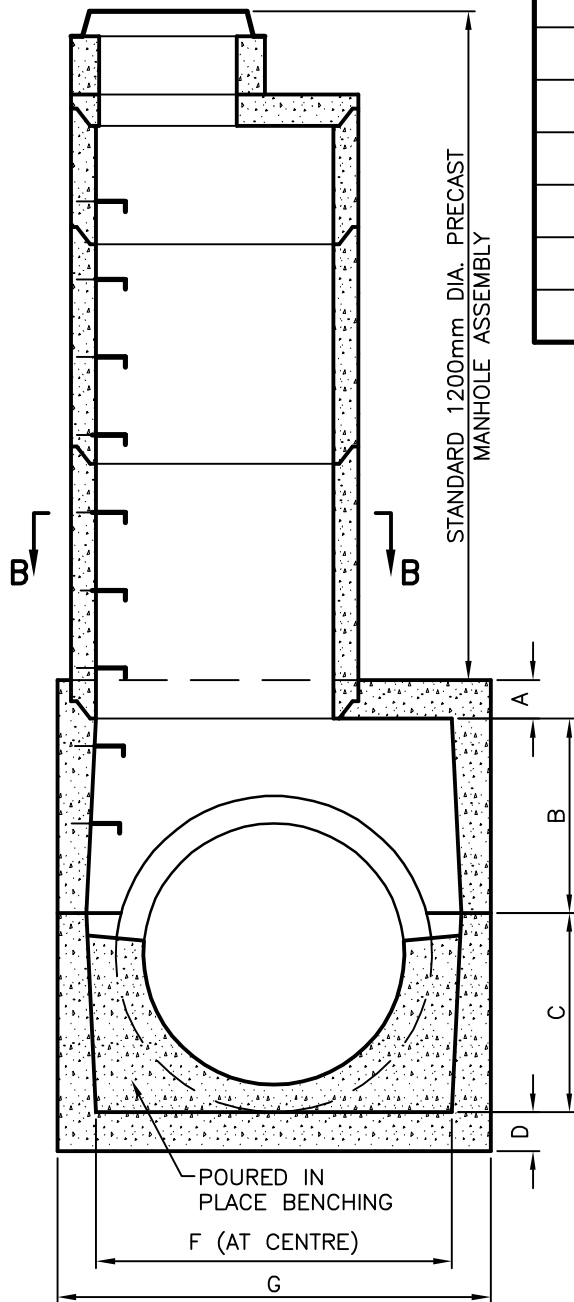
DESIGN GUIDELINES DRAWINGS Manholes and Catch Basins

SERVICE CONNECTION DETAILS FOR SANITARY MANHOLES IN CUL-DE-SAC

DRAWING NO.

5-04

REVISION NO.

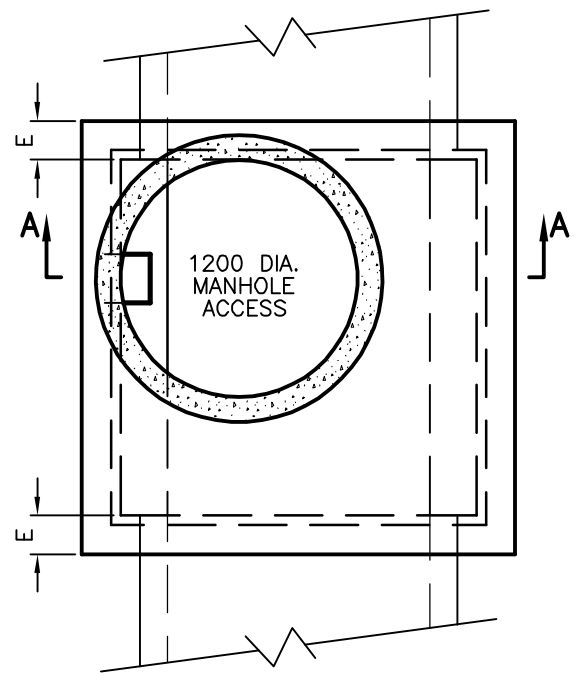


SECTION A-A

| DIMENSION (mm) | | | | | |
|----------------|---------|---------|---------|---------|---------|
| LOCATION | 1.2x1.2 | 1.5x1.5 | 1.8x1.8 | 2.4x2.4 | 2.8x2.8 |
| A | 175 | 175 | 200 | 250 | 250 |
| B | 1010 | 1010 | 1000 | 1200 | 1400 |
| C | 1010 | 1010 | 1025 | 1200 | 1400 |
| D | 200 | 200 | 200 | 250 | 250 |
| E | 190 | 190 | 200 | 275 | 275 |
| F | 1200 | 1500 | 1930 | 2400 | 2800 |
| G | 1500 | 1800 | 2230 | 2860 | 3260 |

NOTES:

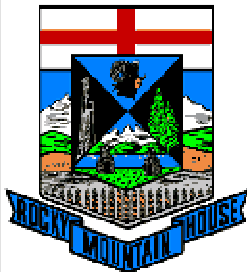
- FOR LEFARGE PRECAST VAULT OR EQUAL.
- DIMENSIONS SHOWN PROVIDED BY LEFARGE



SECTION B-B

File Name: 5-05-1S PRECAST MANHOLE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

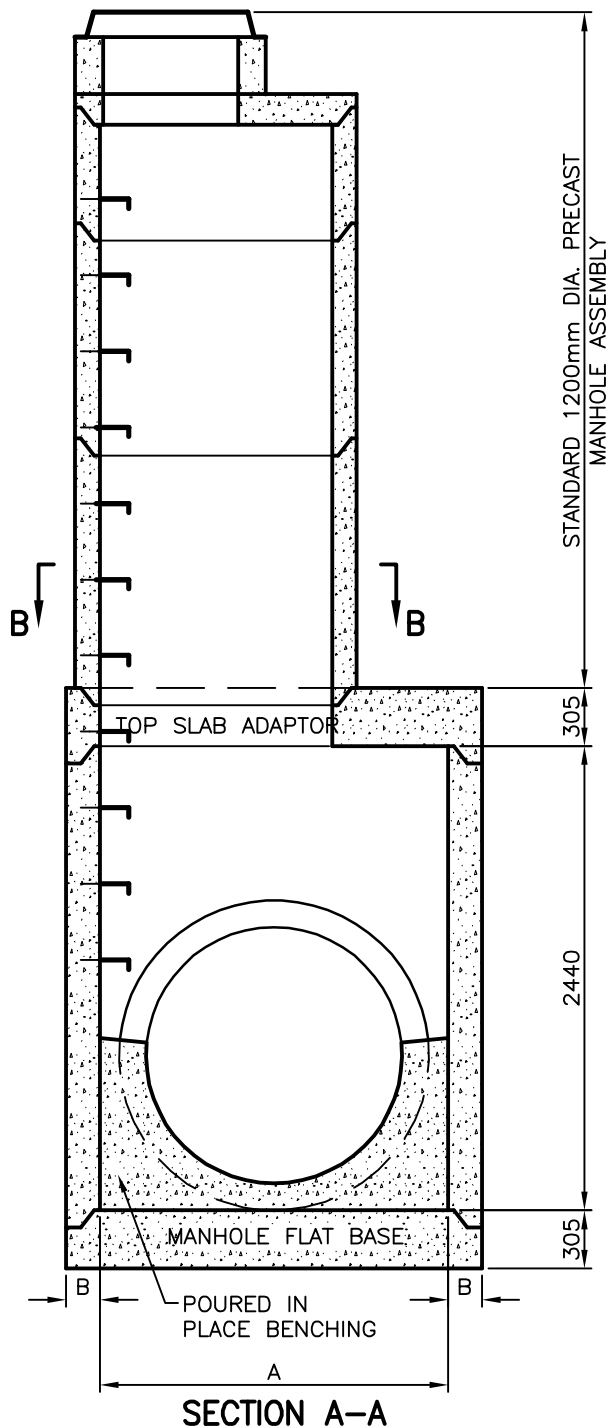
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

1-S PRECAST
MANHOLE ASSEMBLY

DRAWING NO.

5-05

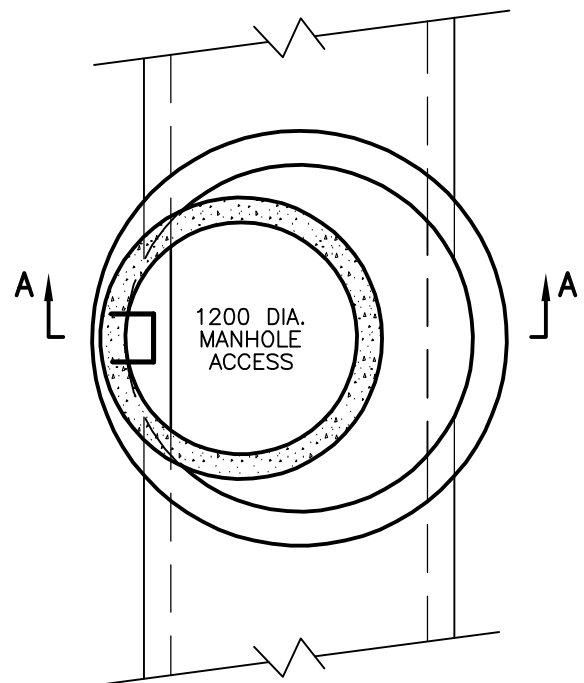
REVISION NO.



| DIMENSIONS (mm) | |
|-----------------|----------------|
| A | B |
| INSIDE DIAMETER | WALL THICKNESS |
| 1372 | 140 |
| 1524 | 155 |
| 1676 | 165 |
| 1829 | 178 |
| 2134 | 203 |
| 2438 | 229 |
| 3048 | 254 |

NOTES:

- FOR LEFARGE PRECAST VAULT OR EQUAL.
- DIMENSIONS SHOWN PROVIDED BY LEFARGE



SECTION A-A

SECTION B-B

File Name: 5-06-1500-3000mm MANHOLE.dwg

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| Rev. By: | - | Rev. Date: | - |
| No. | - | Revision | - |



TOWN OF ROCKY MOUNTAIN HOUSE

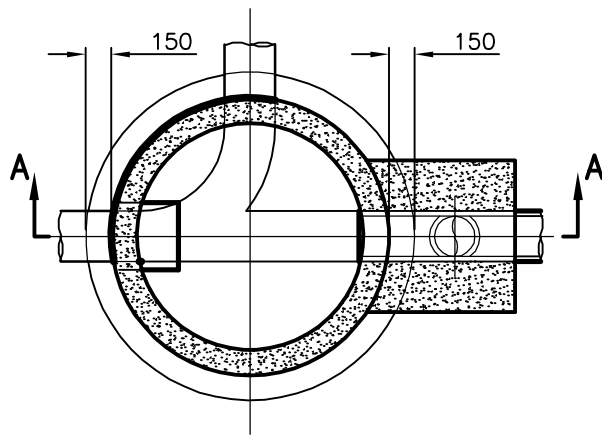
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

LARGE 1500-3000mm Ø
MANHOLE ASSEMBLY

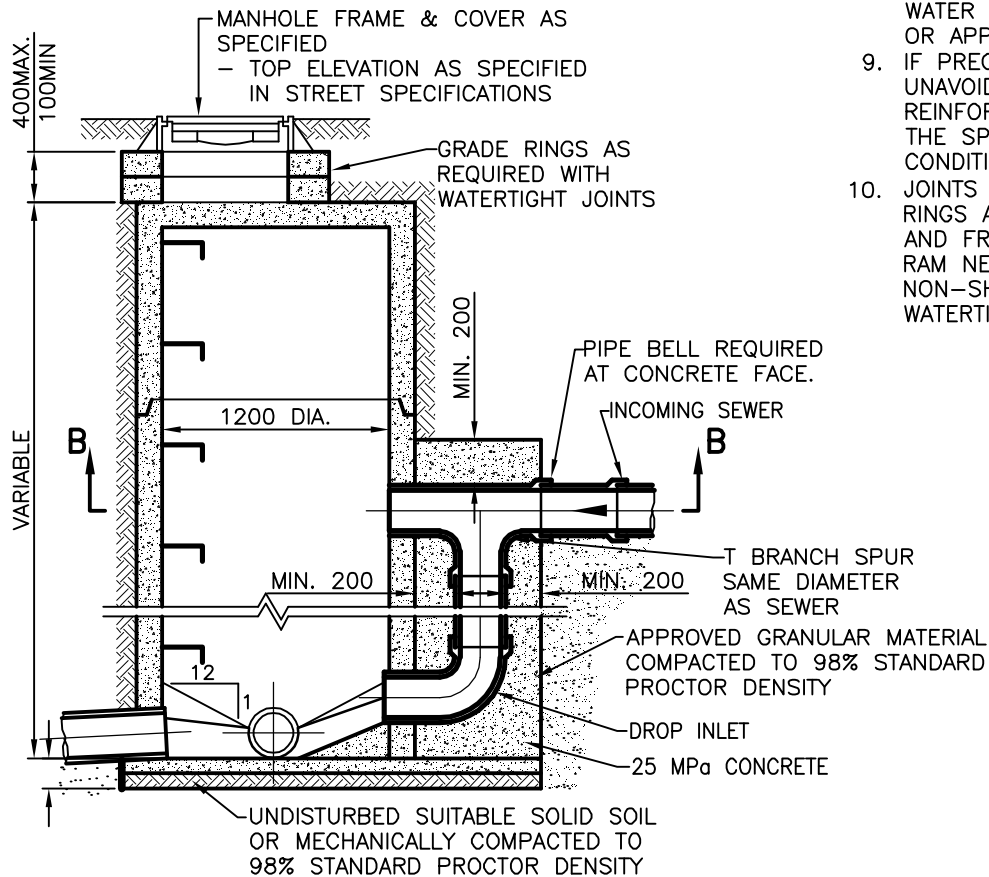
DRAWING NO.

5-06

REVISION NO.



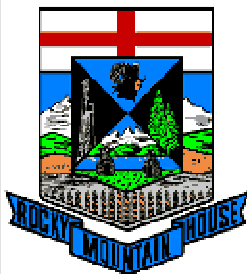
SECTION B-B



SECTION A-A

File Name: 5-07-EXTERIOR DROP MANHOLE.dwg

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| Rev. By: | - | Rev. Date: | - |
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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINES DRAWINGS Manholes and Catch Basins

EXTERNAL DROP MANHOLE

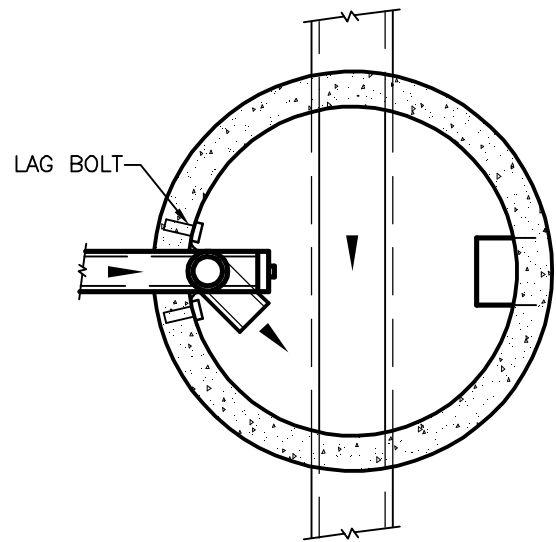
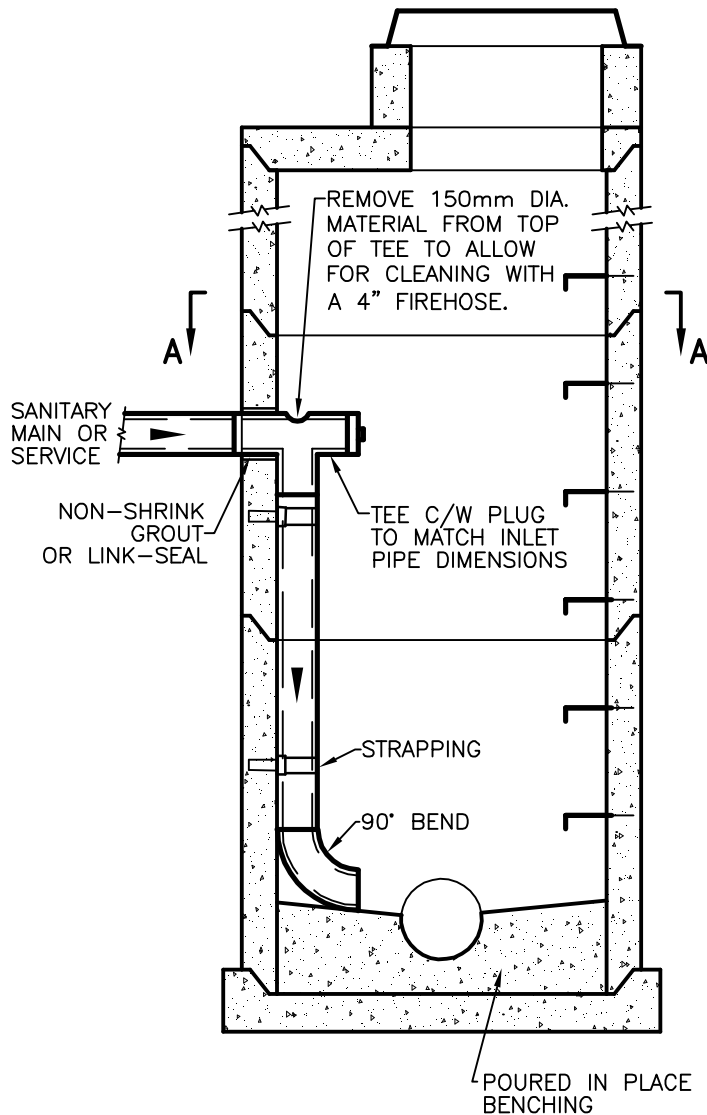
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5-07

REVISION NO.

NOTES:

1. STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
2. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
3. CAST IN PLACED CONCRETE TO BE 25 MPa AT 28 DAYS.
4. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELLING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
8. PRE-BENCHED MANHOLE BASES MUST BE USED WHEREEVER POSSIBLE WITH PRECORED CONNECTION HOLES AND WATER TIGHT DURASEAL OR G-LOC JOINTS OR APPROVED EQUAL.
9. IF PRECAST CONCRETE BASES ARE UNAVOIDABLE, THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
10. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.



SECTION A-A

NOTES:

- LAG BOLTS AND STRAPPING ARE TO BE INSTALLED IMMEDIATELY BELOW THE TEE
- AND A CONTINUAL 1000mm VERTICAL SPACING TO THE BASE.
- DIAMETER SIZE AND TYPE OF VERTICAL PIPE TO MATCH INLET PIPE.

File Name: 5-08-INTERIOR DROP MANHOLE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

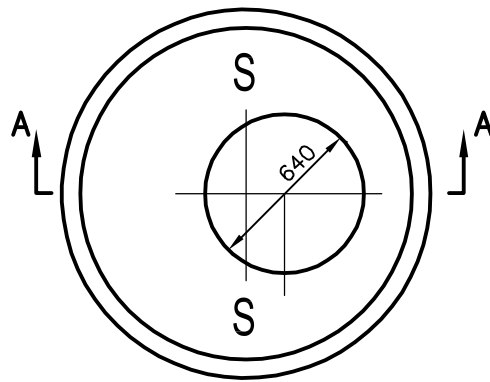
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

INTERNAL DROP
MANHOLE

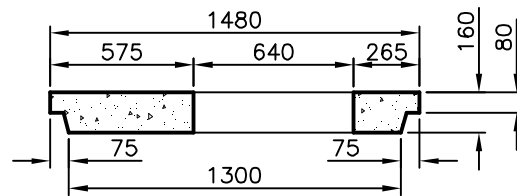
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5-08

REVISION NO.



PLAN

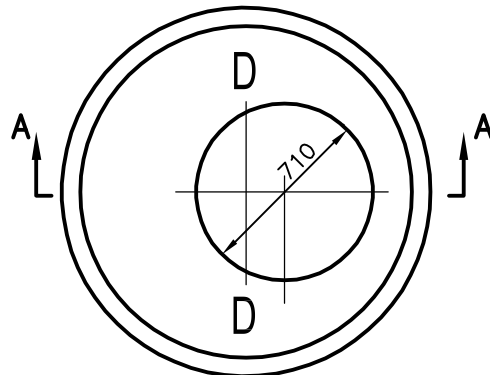


SECTION

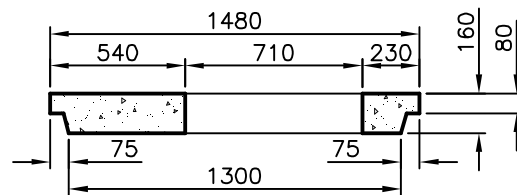
SANITARY MANHOLE

NOTES:

IMPRINT "S" ON SANITARY SLAB
TOP AND "D" ON STORM SLAB TOP.



PLAN

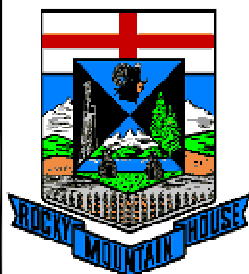


SECTION

STORM MANHOLE

File Name: 5-09-1200mm PRECAST SLAB TOP.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

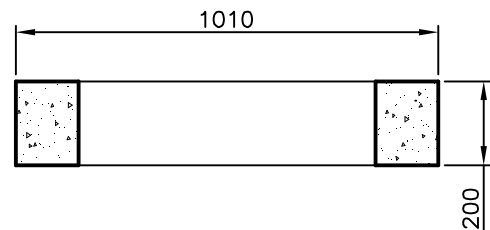
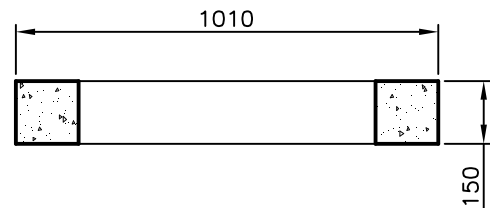
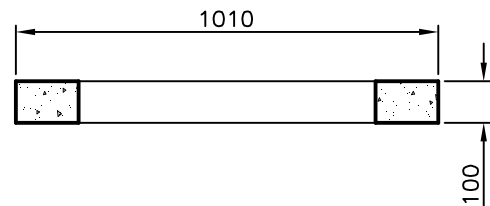
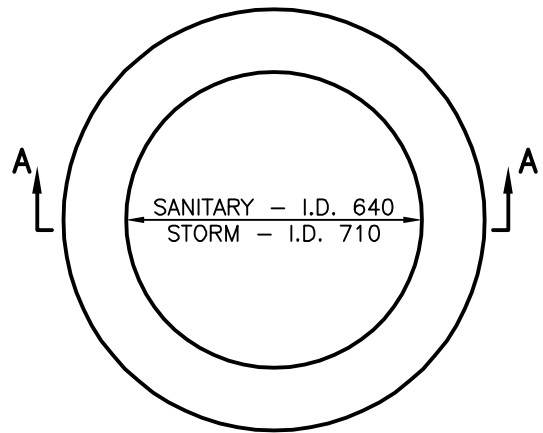
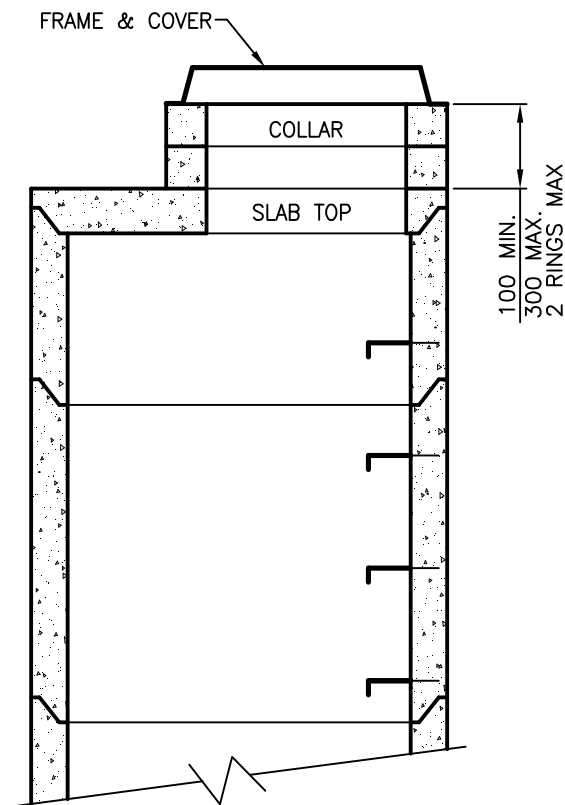
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

PRECAST SLAB TOPS
FOR 1200mm Ø MANHOLES

DRAWING NO.

5-09

REVISION NO.



NOTES:

IMPRINT "S" ON SANITARY COLLARS
AND "D" ON STORM COLLARS

SECTIONS A-A

File Name: 5-10-MANHOLE ADJUSTING COLLAR.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

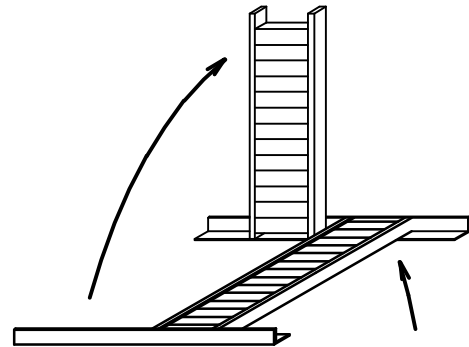
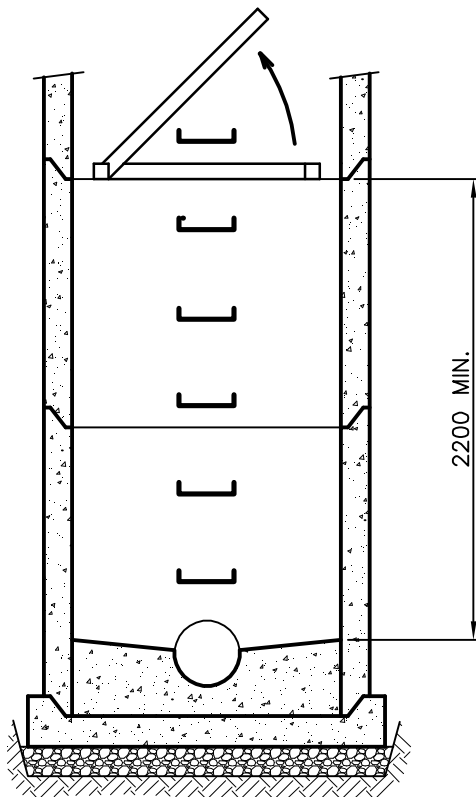
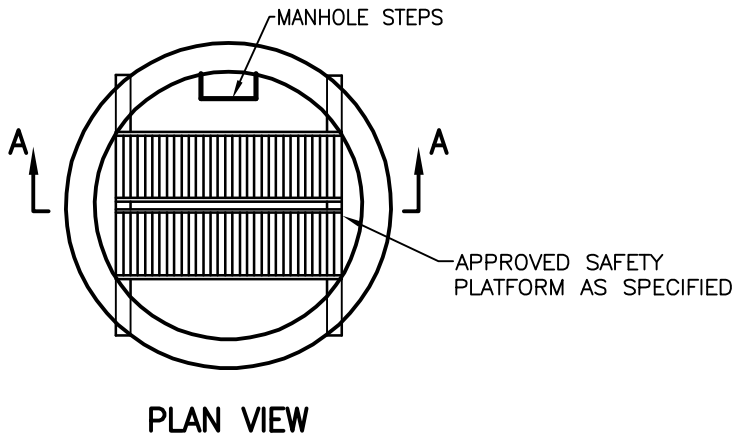
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

SANITARY AND STORM MANHOLE ADJUSTING COLLAR

DRAWING NO.

5-10

REVISION NO.

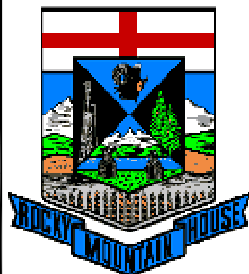


NOTES:

- TO BE INSTALLED ON MANHOLES GREATER THAN 6.0 m DEEP.
- MAXIMUM SPACING BETWEEN PLATFORMS TO BE 6.0 m.
- TO BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

File Name: 5-11-MANHOLE SAFETY PLATFORM.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

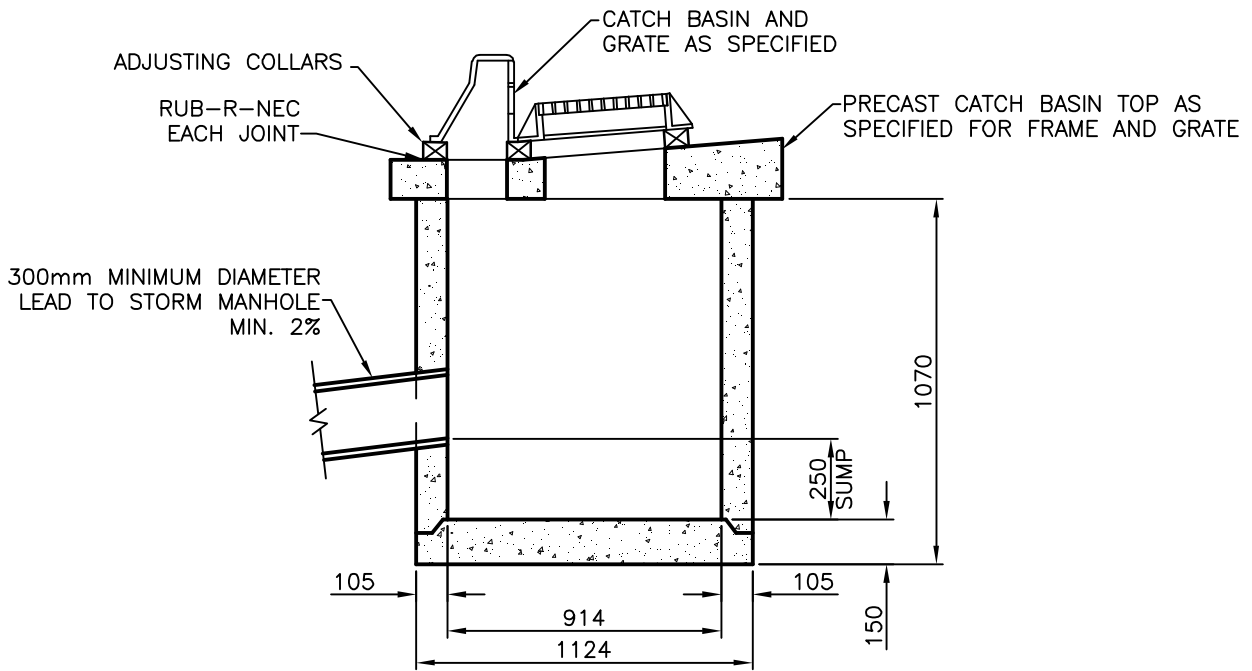
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

MANHOLE SAFETY
PLATFORM

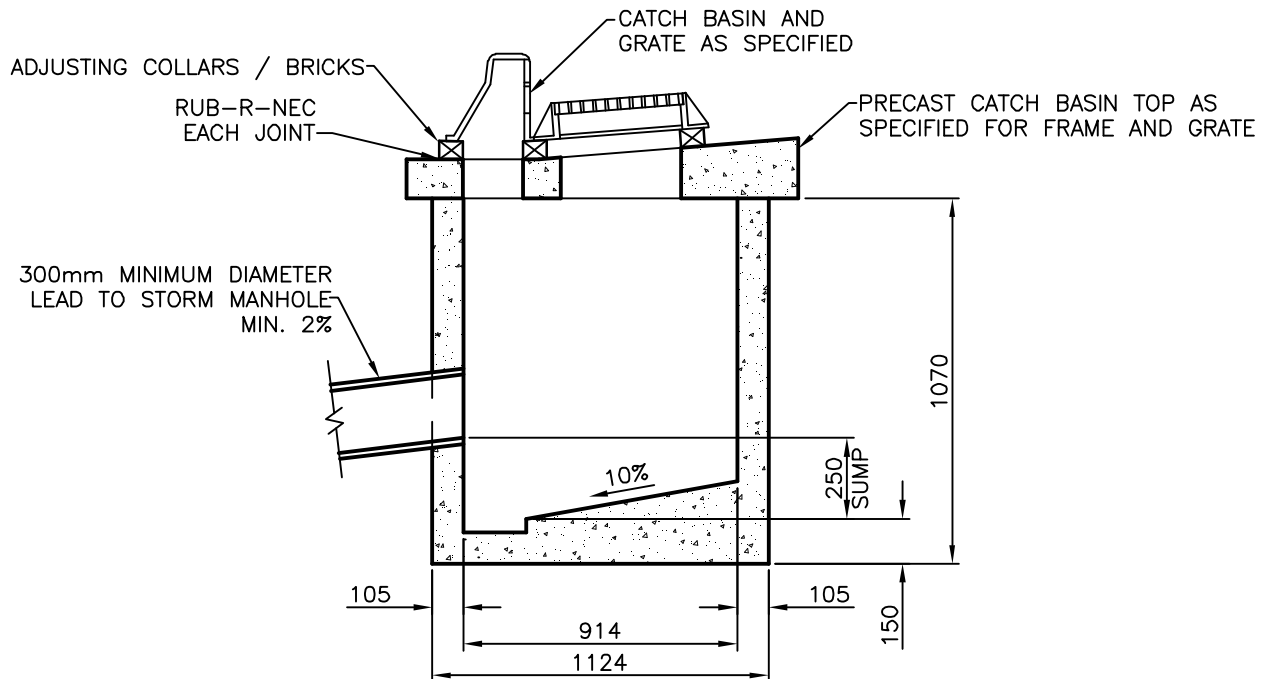
DRAWING NO.

5-11

REVISION NO.



SEPARATE BASE CATCHBASIN

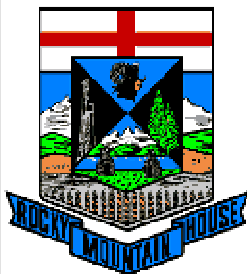


MONOLITHIC BASE CATCHBASIN

NOTE: PRECAST CATCH BASIN
BARRELS TO CONFORM TO ASTM
C-478 (LATEST EDITION)

File Name: 5-12-PRECAST CATCH BASIN.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

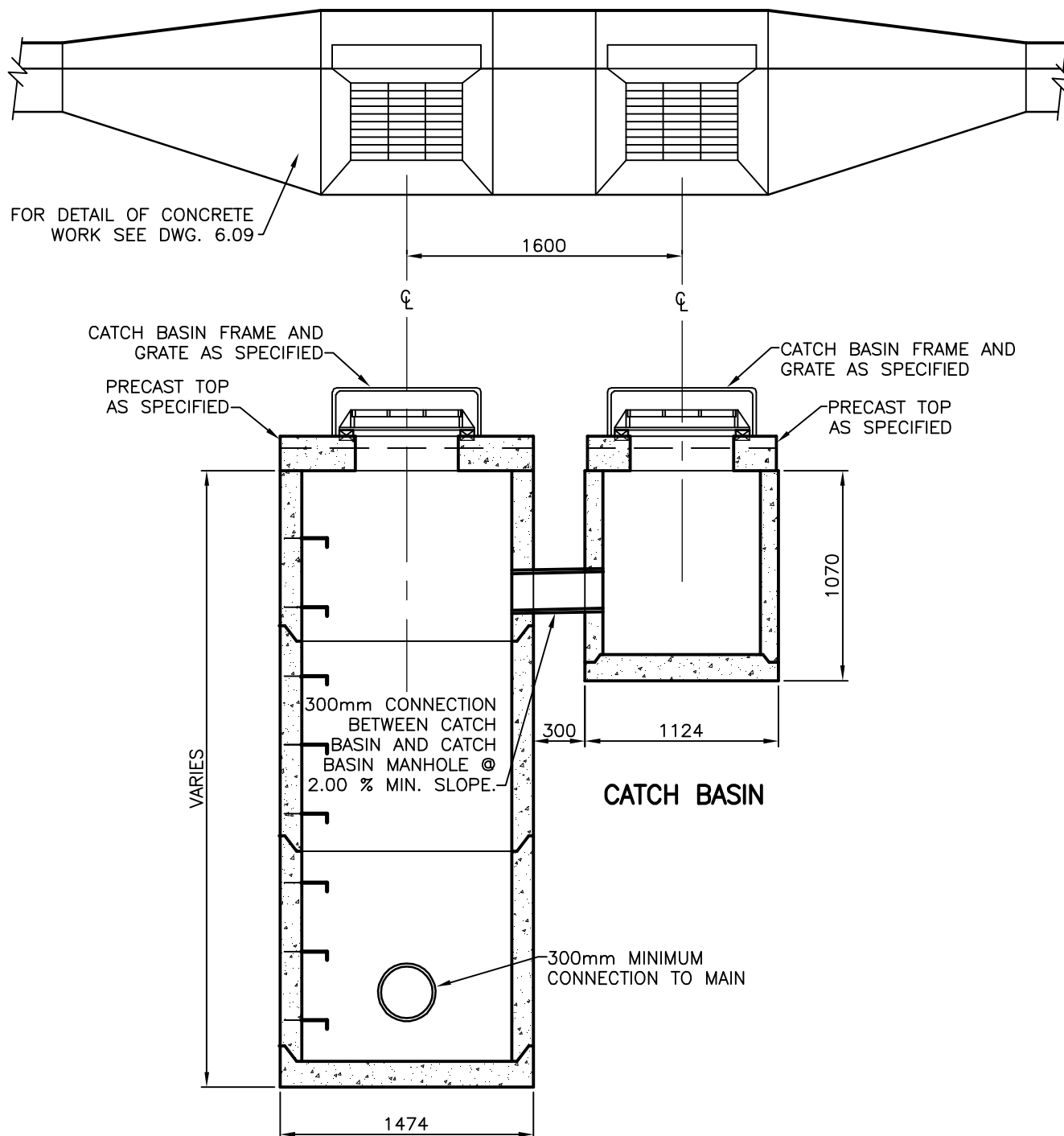
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

PRECAST CATCHBASIN
ASSEMBLY

DRAWING NO.

5-12

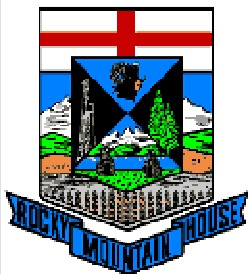
REVISION NO.



CATCH BASIN MANHOLE

File Name: 5-13-TWIN CB AND CBMH.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

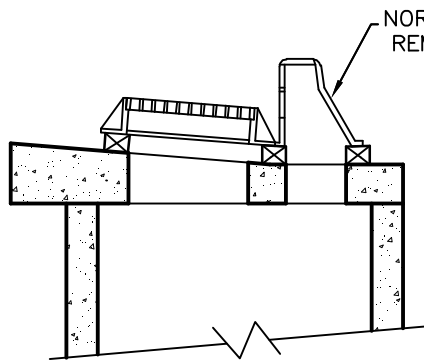
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

**TWIN CATCH BASIN /
CATCH BASIN MANHOLE
ASSEMBLY**

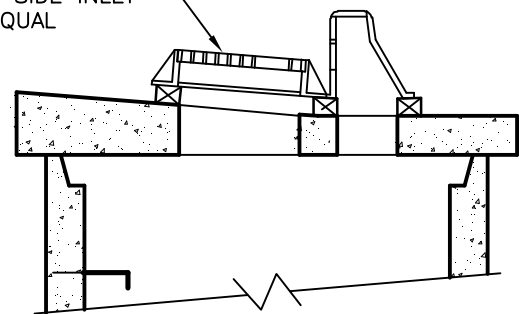
DRAWING NO.

5-13

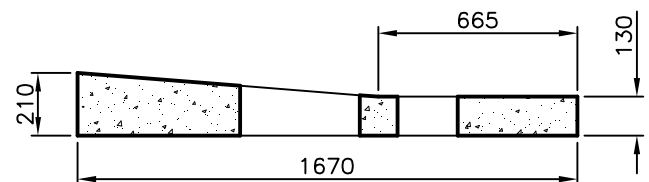
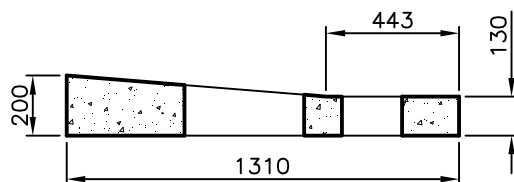
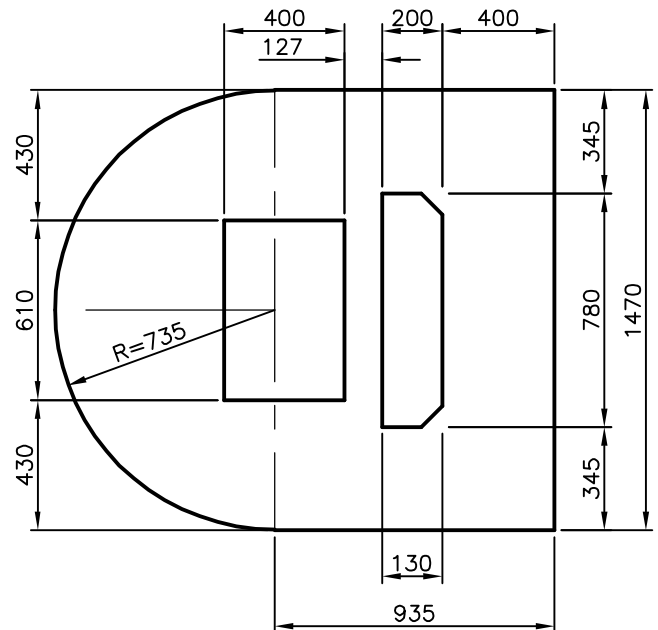
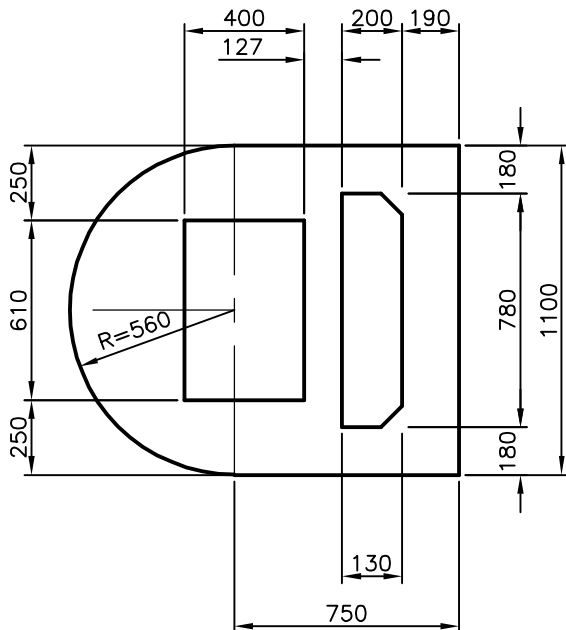
REVISION NO.



K1 CATCH BASIN



K1 CATCH BASIN MANHOLE



**PRECAST K-1 TOP FOR NF-51 CB
FRAME, GRATE, AND SIDE INLET**

**PRECAST K-1 TOP FOR NF-51 CBMH
FRAME, GRATE, AND SIDE INLET**

File Name: 5-14-TYPE K-1 CB AND CBMH.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

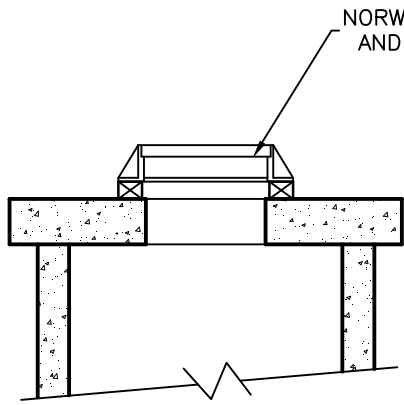
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

**TYPE K-1 CATCH BASIN
AND CATCH BASIN
MANHOLE TOP SECTION**

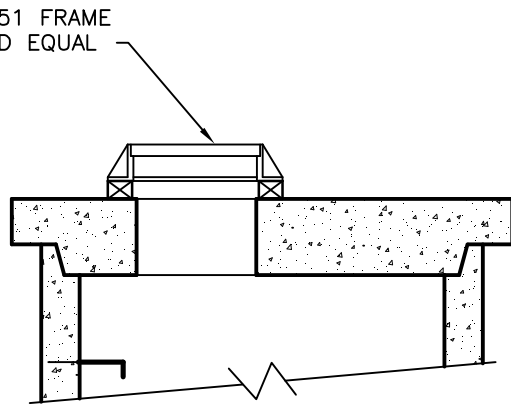
DRAWING NO.

5-14

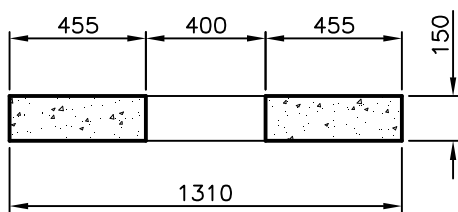
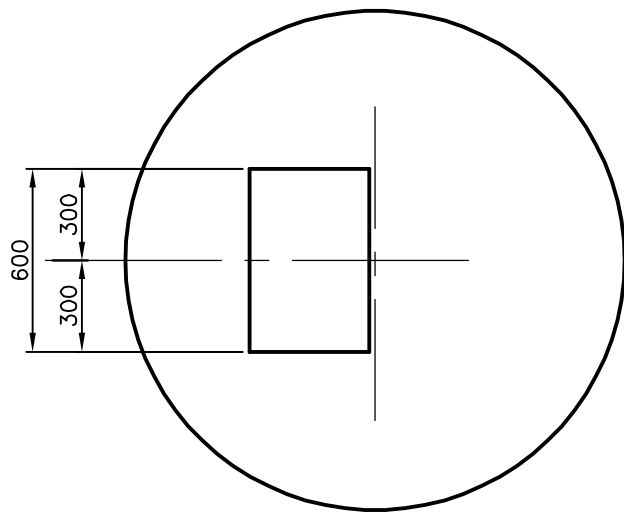
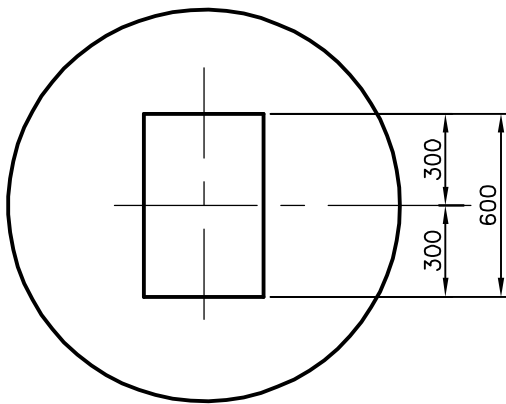
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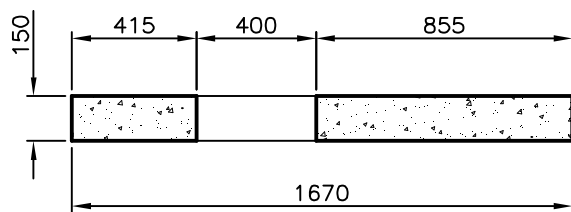
K-3 CATCH BASIN



K-3 CATCH BASIN MANHOLE



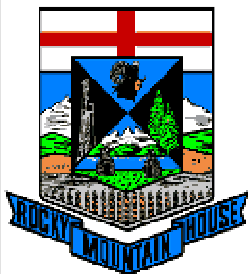
**PRECAST K-3 CATCH BASIN TOP
FOR NF-51 CB FRAME AND GRATE**



**PRECAST K-3 CATCH BASIN MANHOLE
TOP FOR NF-51 CB FRAME AND GRATE**

File Name: 5-15-TYPE K-3 CB AND CBMH TOP SECTION.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

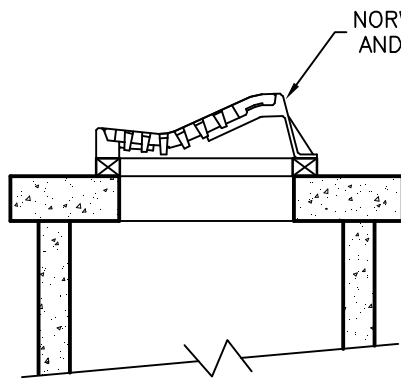
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

**TYPE K-3 CATCH BASIN
AND CATCH BASIN
MANHOLE TOP SECTION**

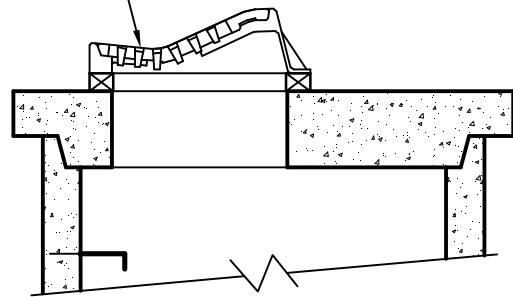
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5-15

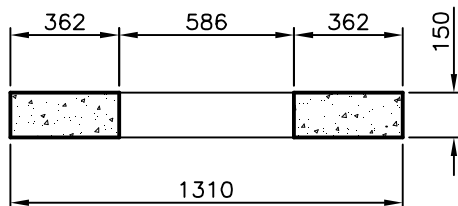
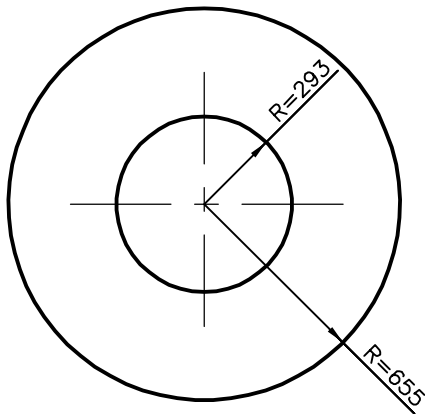
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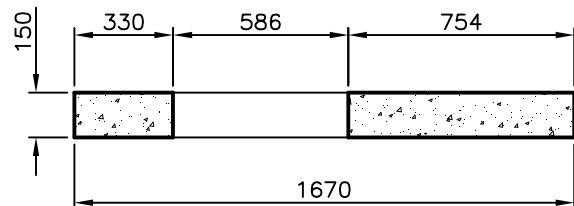
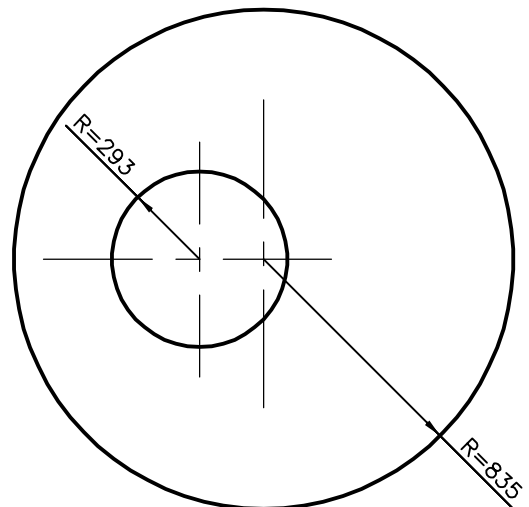
K-4 CATCH BASIN



K-4 CATCH BASIN MANHOLE



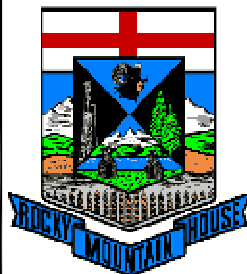
PRECAST K-4 CATCH BASIN TOP
FOR NF33 CB FRAME AND GRATE



PRECAST K-4 CATCH BASIN MANHOLE
TOP FOR NF33 CBMH FRAME AND GRATE

File Name: 5-16-TYPE K-4 CB AND CBMH TOP SECTION.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

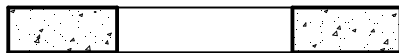
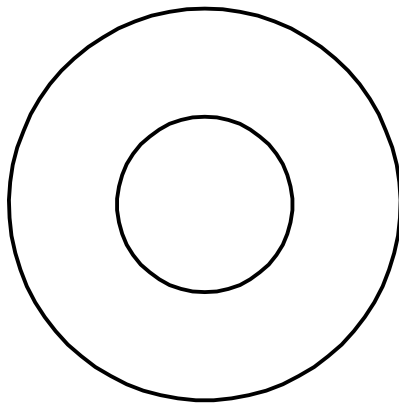
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

TYPE K-4 CATCH BASIN
AND CATCH BASIN
MANHOLE TOP SECTION

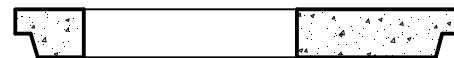
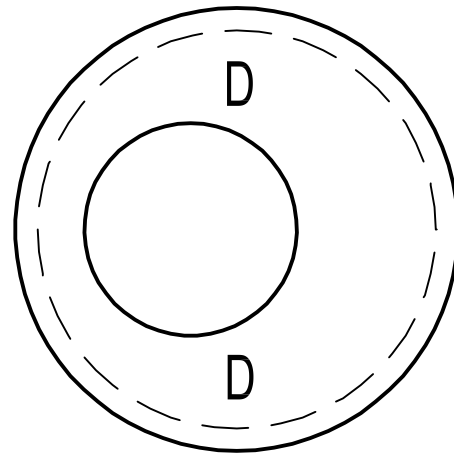
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5-16

REVISION NO.



**PRECAST K-6 CATCH BASIN
TOP FOR NF49 FRAME AND
GRATE (AS PER DWG. 5.16)**



**PRECAST K-6 STORM MANHOLE
TOP FOR NF49 FRAME AND
GRATE (AS PER DWG. 5.09)**

[illegible]

DESIGN GUIDELINES DRAWINGS

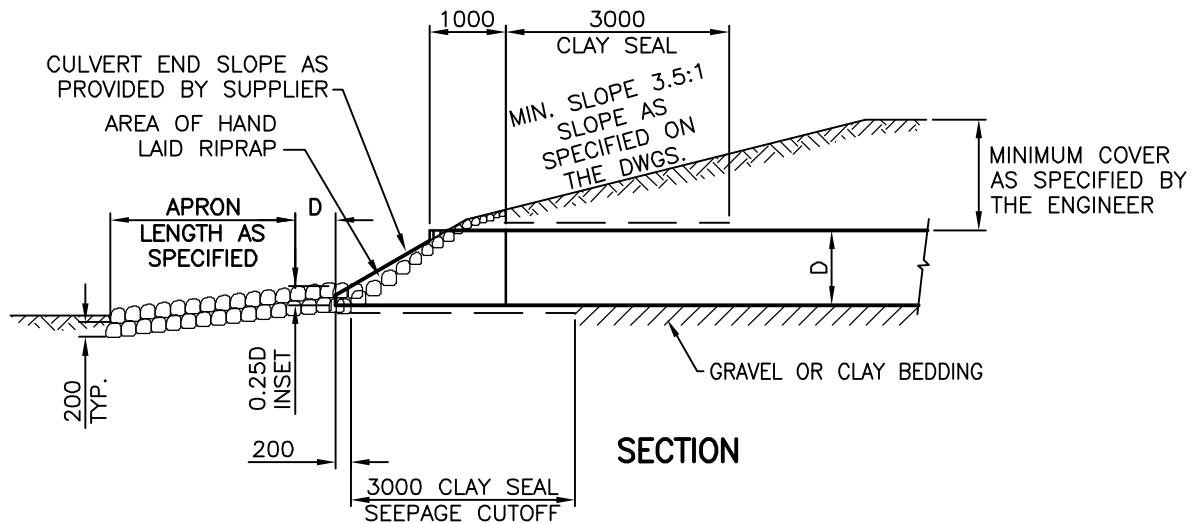
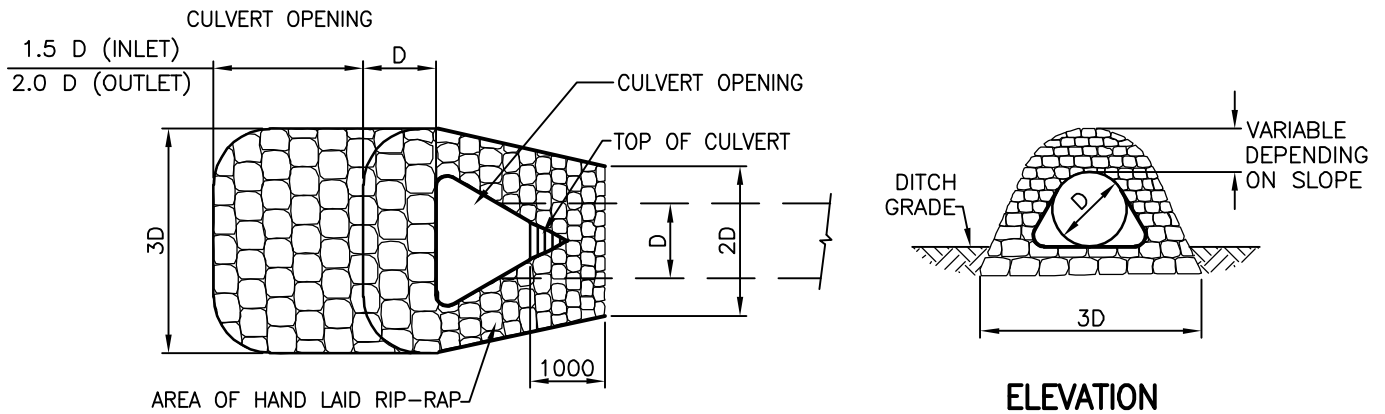
Manholes and Catch Basins

TYPE K-6 CATCH BASIN AND CATCH BASIN MANHOLE TOP SECTION

DRAWING NO.

5-17

REVISION NO.



NOTES:

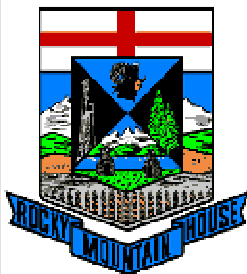
- PLACE ROCKS AND BOULDERS AS SPECIFIED
- A CLAY SEAL IS TO BE PLACED AT BOTH ENDS OF THE CULVERT FOR A LENGTH OF 2.0M TO CUT OFF SEEPAGE. THE CLAY SEAL SHALL EXTEND FROM THE BOTTOM OF THE EXCAVATION TO 300mm ABOVE THE CROWN OF THE PIPE, & FOR THE FULL WIDTH OF THE EXCAVATION.
- WHERE APRONS ARE REQUIRED DUE TO HIGH VELOCITY FLOW OR EROSION PRONE SOIL, TYPICALLY THE MINIMUM INLET APRON IS 1.5 X DIAMETER LONG WHILE THE MINIMUM OUTLET APRON (WHERE WATER VELOCITY IS HIGHER) IS 2.0M LONG.

ESTIMATED RIP-RAP SURFACE AREAS (BASED ON A 4:1 SIDESLOPE)

| PIPE DIAMETER (mm) | AREA OF ONE END EXCLUDING APRON (sq. m) | AREA OF ONE END INCLUDING INLET APRON (sq. m) | AREA OF ONE END INCLUDING OUTLET APRON (sq. m) |
|--------------------|---|---|--|
| 400 | 1 | 1.5 | 2 |
| 500 | 2 | 3 | 4 |
| 600 | 3 | 5 | 6 |
| 700 | 4 | 6 | 7 |
| 800 | 5 | 8 | 9 |
| 900 | 6 | 10 | 11 |
| 1000 | 7 | 12 | 13 |
| 1100 | 9 | 14 | 16 |
| 1200 | 10 | 16 | 19 |
| 1400 | 13 | 22 | 25 |

File Name: 5-18-CULVERT RIP-RAP.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINES DRAWINGS Manholes and Catch Basins

RIP-RAP CULVERT END TREATMENT

DRAWING NO.

5-18

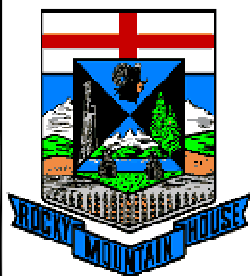
REVISION NO.



- NORWOOD F-51 GRATE OR EQUAL
- CAST STEEL TO CONFORM TO GRADE 60-90
A.S.T.M. A48 CLASS 20 OR DUCTILE IRON TO
CONFORM TO A.S.T.M. A455
- MASS 24KG $\pm 5\%$
- HOT DIPPED IN ASPHALT

File Name: 5-19-F-51 CATCH BASIN GRATE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINES DRAWINGS

Manholes and Catch Basins

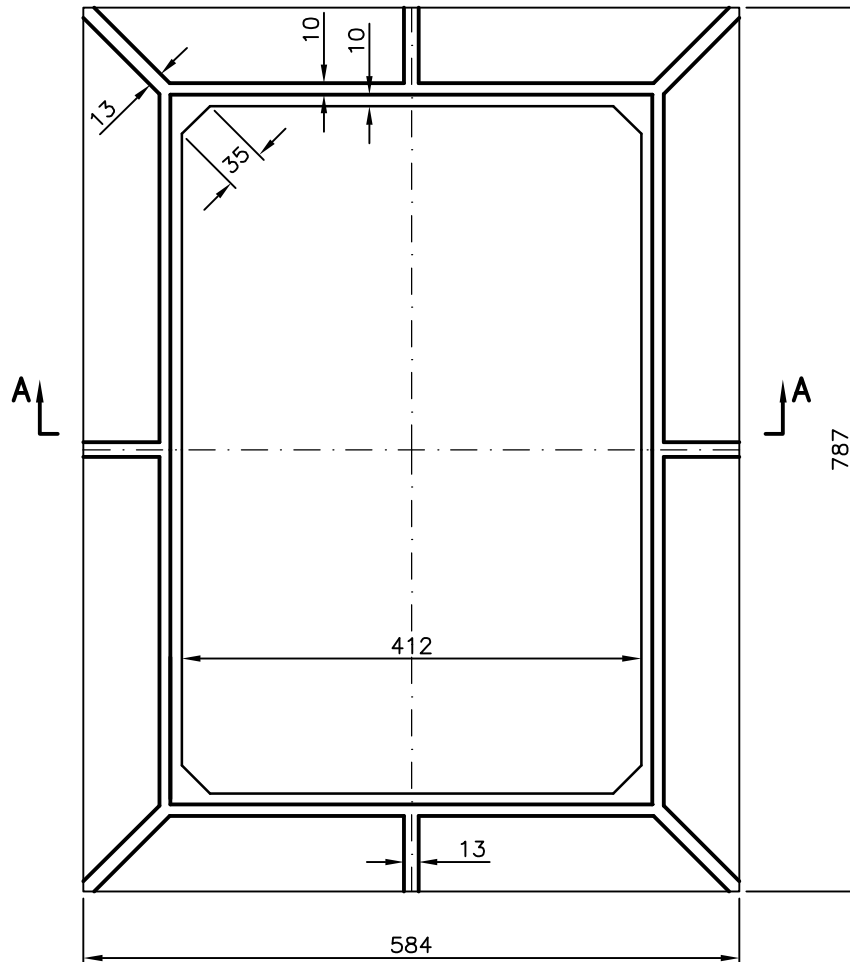
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F-51 CATCH BASIN GRATE

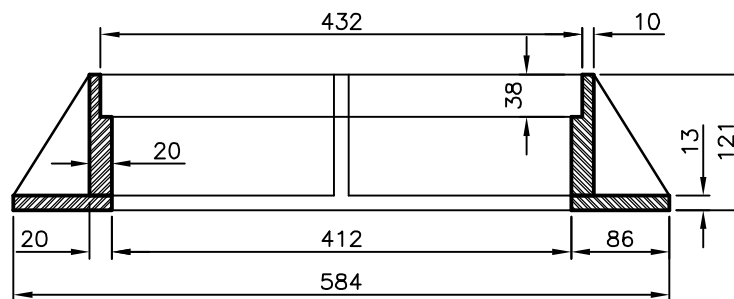
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PLAN



SECTION A-A

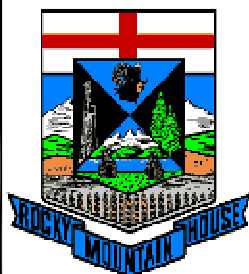
MATERIAL SPECIFICATIONS:

- NORWOOD F-51 - FRAME OR EQUAL
- HOT DIPPED IN ASPHALT
- GREY CAST IRON TO CONFORM TO ASTM A48 CLASS 20
- MASS = 57KG

File Name: 5-20-F-51 CATCH BASIN FRAME.dwg

Rev. By: - Rev. Date: -

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| No. | Revision |



TOWN OF ROCKY MOUNTAIN HOUSE

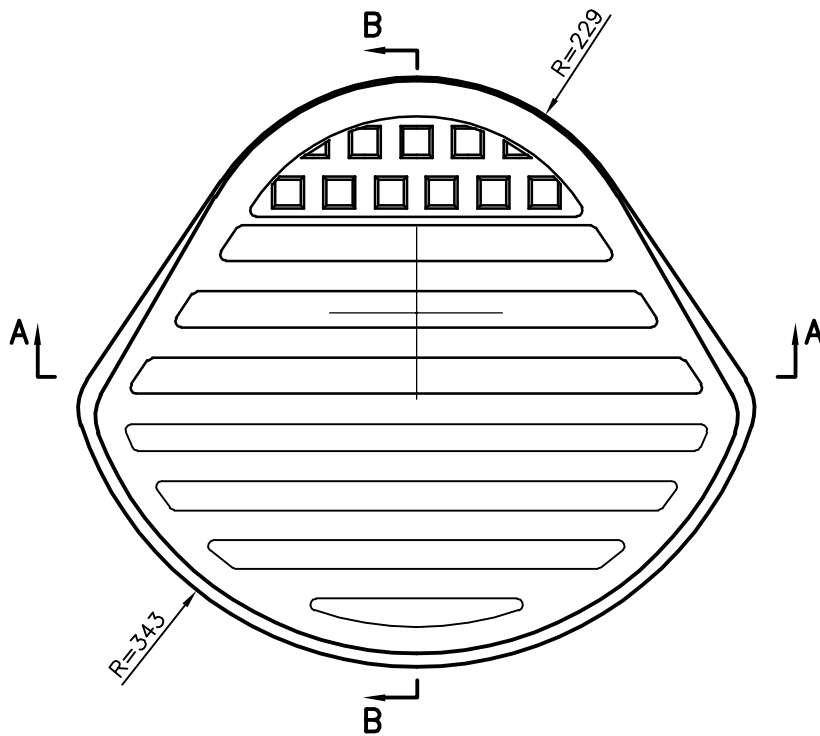
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

F-51 CATCH BASIN FRAME

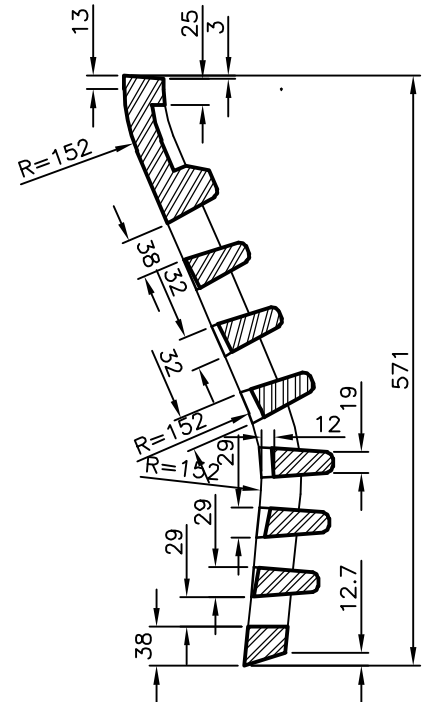
DRAWING NO.

5-20

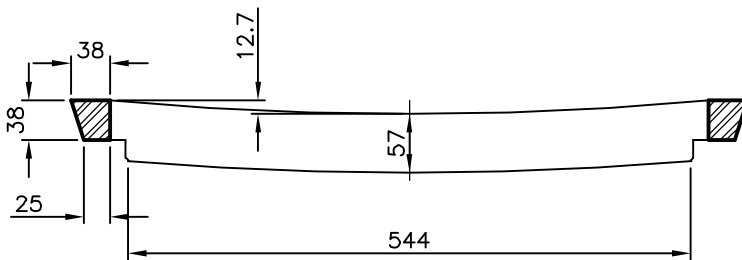
REVISION NO.



PLAN



SECTION B-B



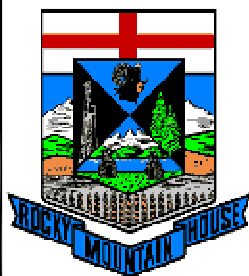
SECTION A-A

MATERIAL SPECIFICATIONS:

- NORWOOD F33 OR EQUAL
- CAST STEEL TO CONFORM TO GRADE 60-90
- A.S.T.M. A48 CLASS 20 OR DUCTILE IRON TO CONFORM TO A.S.T.M. A455
- HOT DIPPED IN ASPHALT

File Name: 5-21-F-33 CB GRATE.dwg

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| Rev. By: | - | Rev. Date: | - |
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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINES DRAWINGS

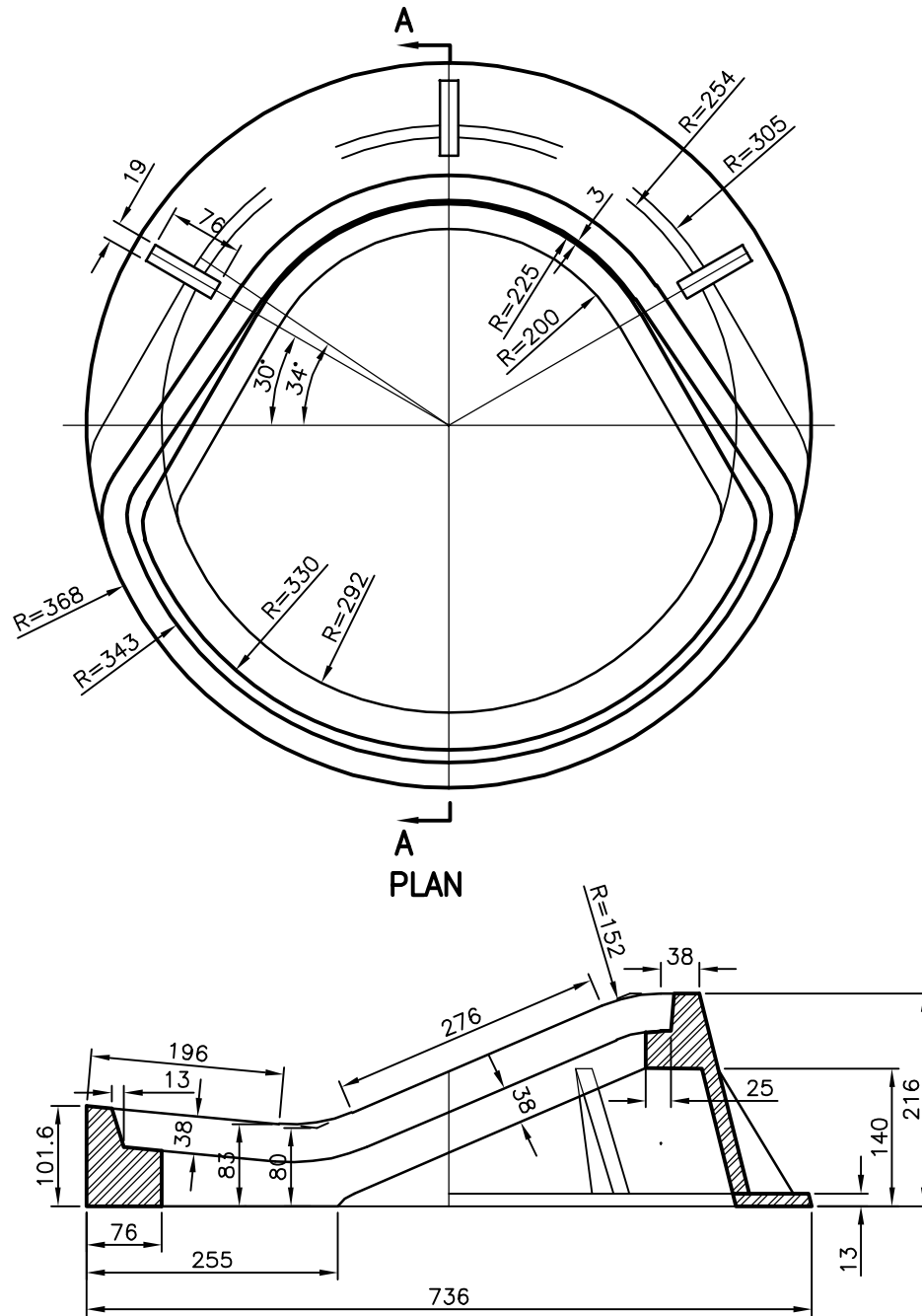
Manholes and Catch Basins

F-33 CATCH BASIN GRATE

DRAWING NO.

5-21

REVISION NO.



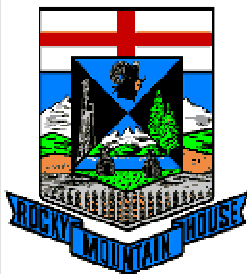
SECTION A-A

MATERIAL SPECIFICATIONS:

- GREY CAST IRON TO CONFORM TO CLASS 20 ASTM A48 (LATEST EDITION)
- MASS = 98KG

File Name: 522-F-33 CB FRAME.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

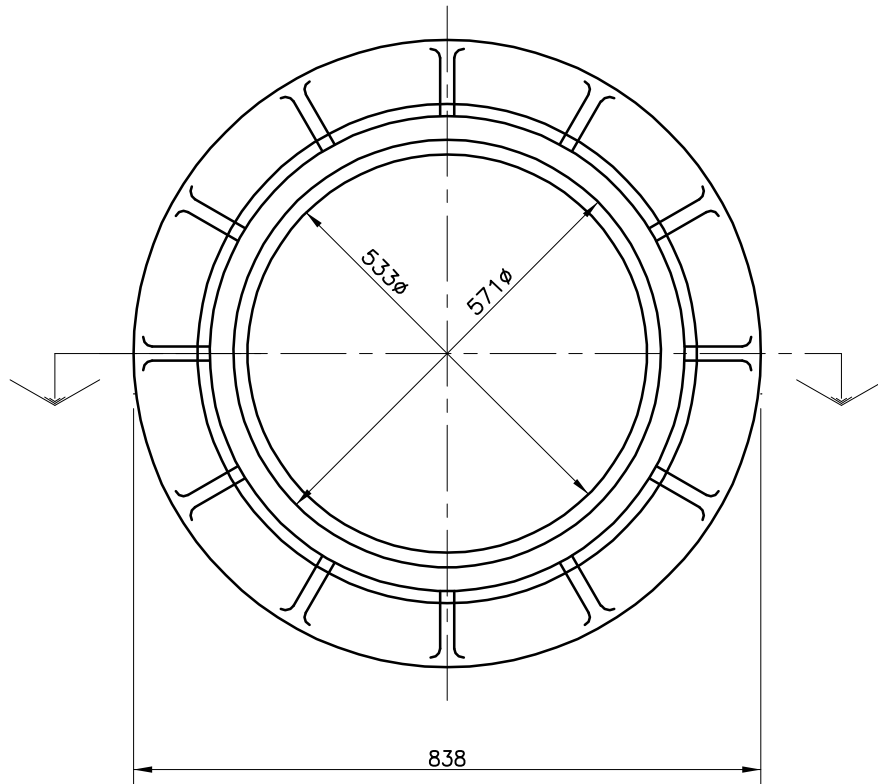
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

F-33 CATCH BASIN FRAME

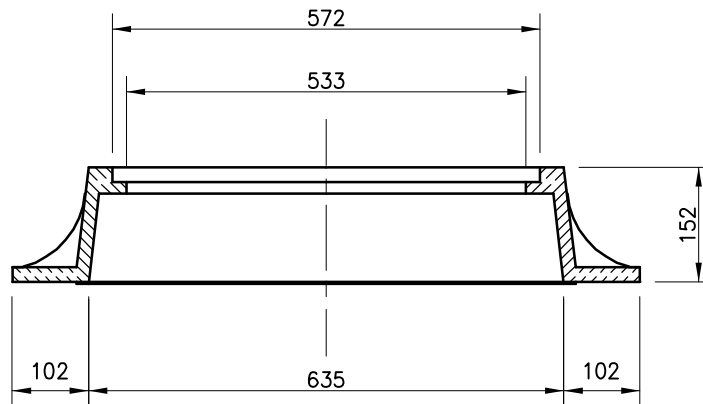
DRAWING NO.

5-22

REVISION NO.



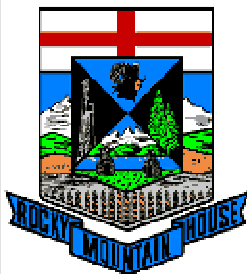
PLAN



SECTION C-C

File Name: 5-23-SANITARY AND STORM MH FRAME.dwg

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| Rev. By: | - | Rev. Date: | - |
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| No. | - | Revision | |



TOWN OF ROCKY MOUNTAIN HOUSE

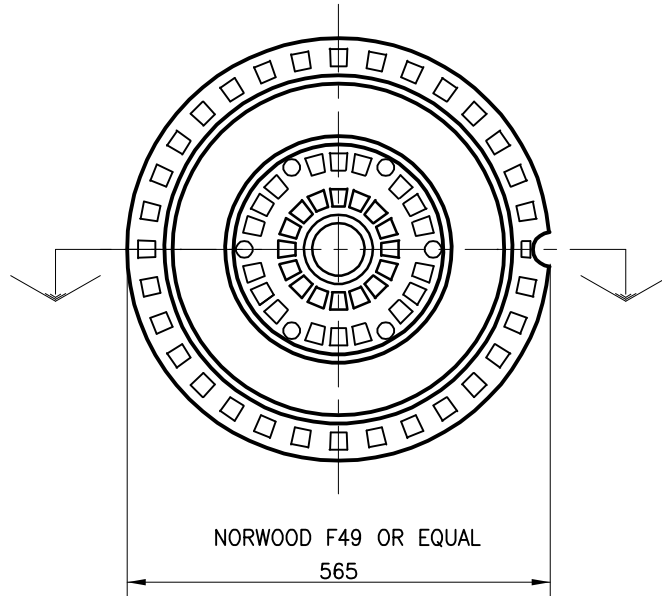
DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

**SANITARY AND STORM
MANHOLE FRAMES**

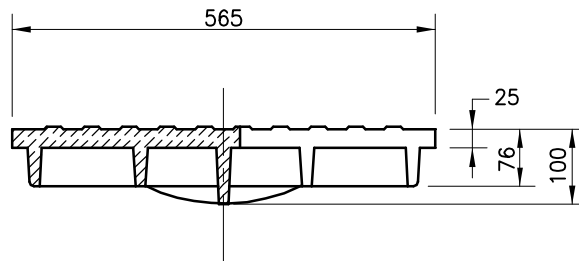
DRAWING NO.

5-23

REVISION NO.



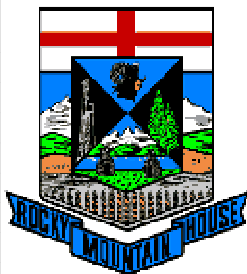
PLAN



SECTION

File Name: 5-25-STORM MAHOLE COVER.dwg

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| Rev. By: | - | Rev. Date: | - |
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| No. | - | Revision | |



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINES DRAWINGS
Manholes and Catch Basins

STORM MANHOLE COVER






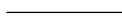



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5-25

REVISION NO.

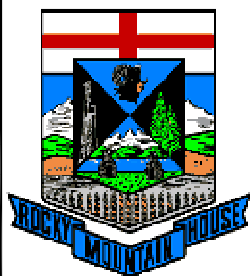


LEGEND

-  FREEWAY
-  EXPRESSWAY
-  MAJOR ARTERIAL
-  MINOR ARTERIAL
-  COLLECTOR
-  LOCAL
-  PUBLIC LANE
-  SIGNALIZED INTERSECTION
-  CUL-DE-SAC

File Name: 6-01-STREET CLASSIFICATIONS.dwg

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| Rev. By: | - | Rev. Date: | - |
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| - | - | No. | Revision |



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS Roadway Design

STREET CLASSIFICATIONS

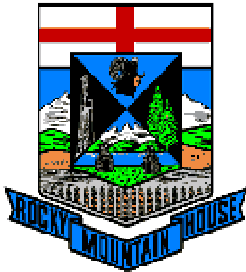
DRAWING NO.

6-01

REVISION NO.

| ROADWAY DESIGNATION | DESIGN ELEMENTS | | | | | | | | |
|-----------------------------|---------------------------|----------------------------|--------------------|--|---|---------------------------------|-------------------|---------------|-------|
| | TAC DESIGN CLASSIFICATION | DAILY SERVICE VOLUME (vpd) | RIGHT OF WAY WIDTH | HORIZONTAL ALIGNMENT MINIMUM RADIUS OF CURVATURE | MINIMUM ANGLE OF INTERSECTION (degrees) | INTERSECTIONS | | | |
| | | | | | | PROPERTY LINE CORNER CUTOFF (m) | | | |
| | | | | | | ARTERIAL ROADWAY | COLLECTOR ROADWAY | LOCAL ROADWAY | LANES |
| Major Divided Arterial | UAD 80 | >20,000 | 60.00 | 250m | 75 | 30X30 | 10X10 | N/A | N/A |
| Minor Divided Arterial | UAD 80 | 20,000 | 36.00 | 250m | 75 | 30X30 | 10X10 | N/A | N/A |
| Minor Undivided Arterial | UAU 80 | 20,000 | 30.00 | 250m | 75 | 30X30 | 10X10 | N/A | N/A |
| Primary Divided Collector | UCD 60 | <10,000 | 30.00 | 185m NC 135m RC | 75 | 10X10 | 5X5 | 5X5 | 0 |
| Primary Undivided Collector | UCU 60 | <10,000 | 25.00 | 185m NC 135m RC | 75 | 10X10 | 5X5 | 5X5 | 0 |
| Residential Local | ULU 50 | 1,000 | 18.00 | 115m | 75 | N/A | 5X5 | 5X5 | 0 |
| COLLECTOR | UCU 60 | 5,000 | 22.00 | 185m | 75 | 10X10 | 10X10 | 10X10 | 0 |
| Industrial Collector | UCU 60 | 10,000 | 18.00 | 185m | 75 | 10X10 | 10X10 | 10X10 | 0 |
| Industrial Major | UCU 60 | 20,000 | 25.00 | 185m | 75 | 10X10 | 10X10 | 10X10 | 0 |
| Frontage (Service) Road | ULU 50 | <3,000 | 20.00 | 115m | 75 | N/A | 10X10 | 10X10 | 0 |
| Lanes | N/A | <500 | 6.00 | Not Permitted | 75 | N/A | 0 | 0 | 5X5 |

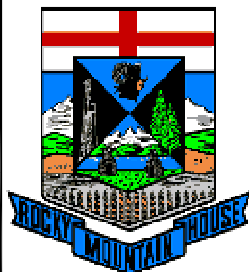
File Name: 6-02-ROADWAY GEOMETRIC DESIGN STANDARDS.dwg

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| Rev. By: — | Rev. Date: — |  | TOWN OF ROCKY MOUNTAIN HOUSE | |
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| | | | DESIGN GUIDELINE DRAWINGS Roadway Design ROADWAY GEOMETRIC DESIGN STANDARDS | |
| | | | | |
| | | | DRAWING NO. | 6-02 |
| No. — | Revision | | REVISION NO. | |

| ROADWAY DESIGNATION | DESIGN ELEMENTS | | | | | | | | | |
|--------------------------------|------------------------------|--|--------------------------|--|--------------------|-----------------------------|-------------------|---------------------------------|------------------------|------------------|
| | TAC DESIGN CLASSIFICATION | HORIZONTAL ALIGNMENT | | MINIMUM K FOR VERTICAL CURVES | VERTICAL ALIGNMENT | | | INTERSECTIONS | | |
| | | RATE OF SUPERELEVATION (As per TAC) | | | ROAD GRADIENTS (%) | | | CORNER RADII (m) | | |
| | | DESIRABLE RATE (m/m) | MAXIMUM RATE (m/m) | | MAXIMUM GRADE | DESIRED MAXIMUM GRADE | MINIMUM GRADES | ARTERIAL ROADWAY | COLLECTOR ROADWAY | LOCAL ROADWAY |
| Major Divided Arterial | UAD 80 | 0.04 | 0.06 | Crest and Sag K as per TAC Geometric Design for Canadian Roads (1999 Edition) and Section9 Clause 3.3 | 6.00 | 3.00 | 0.50 | See Drawings 4-23 4-24 | 15.00 | N / A |
| Minor Divided Arterial | UAD 80 | 0.04 | 0.06 | | 6.00 | 5.00 | 0.50 | | 15.00 | N / A |
| Minor Undivided Arterial | UAU 80 | 0.04 | 0.06 | | 6.00 | 5.00 | 0.50 | | 15.00 | N / A |
| Divided Primary Collector | UCD 60 | Normal Crown 0.02 | Reverse Crown 0.02 | | 9.00 | 6.00 | 0.50 | 15.00 | 8.00 | 8.00 |
| Undivided Primary Collector | UCU 60 | Normal Crown 0.02 | Reverse Crown 0.02 | | 9.00 | 6.00 | 0.50 | 15.00 | 8.00 | 8.00 |
| Residential Local | ULU 50 | Normal Crown 0.02 | | | 9.00 | 6.00 | 0.50 | N / A | 8.00 | 8.00 |
| Industrial Collector | UCU 60 | Normal Crown 0.02 | | | 6.00 | 6.00 | 0.50 | See Drawing 4-24 | | |
| Collector | UCU 60 | Normal Crown 0.02 | | | 8.60 | 6.00 | 0.50 | | | |
| Industrial Major | UCU 60 | Normal Crown 0.02 | | | 6.00 | 6.00 | 0.50 | N / A | See Drawing 4-24 | |
| Frontage (Service) Road | ULU 50 | Normal Crown 0.02 | | | 6.00 | 6.00 | 0.50 | N / A | | |
| Gravel Lanes | 20 | N / A | | | 9.00 | 6.00 | 0.80 | N / A | N / A | N / A |
| Paved Lanes | 20 | N / A | | | 9.00 | 6.00 | 0.50 | N / A | N / A | N / A |

File Name: 6-03-ROADWAY DESIGN STANDARDS.dwg

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| Rev. By: - | Rev. Date: - |
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TOWN OF ROCKY MOUNTAIN HOUSE

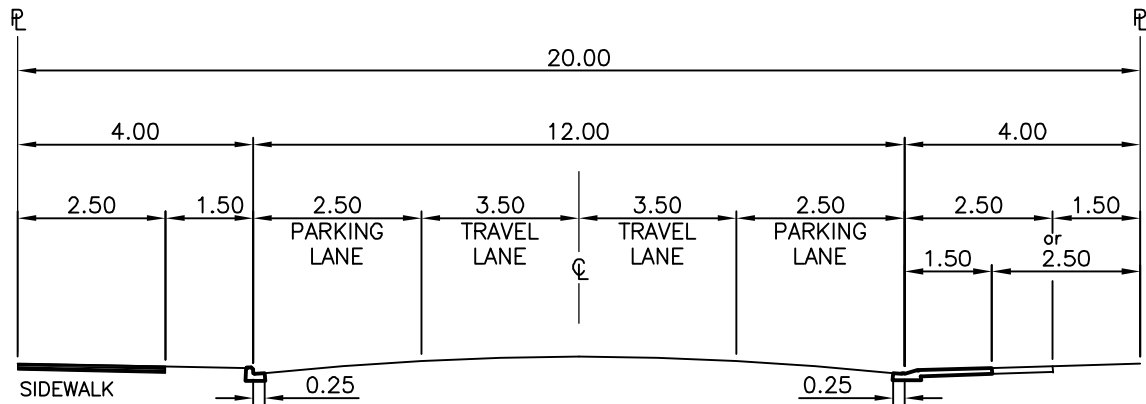
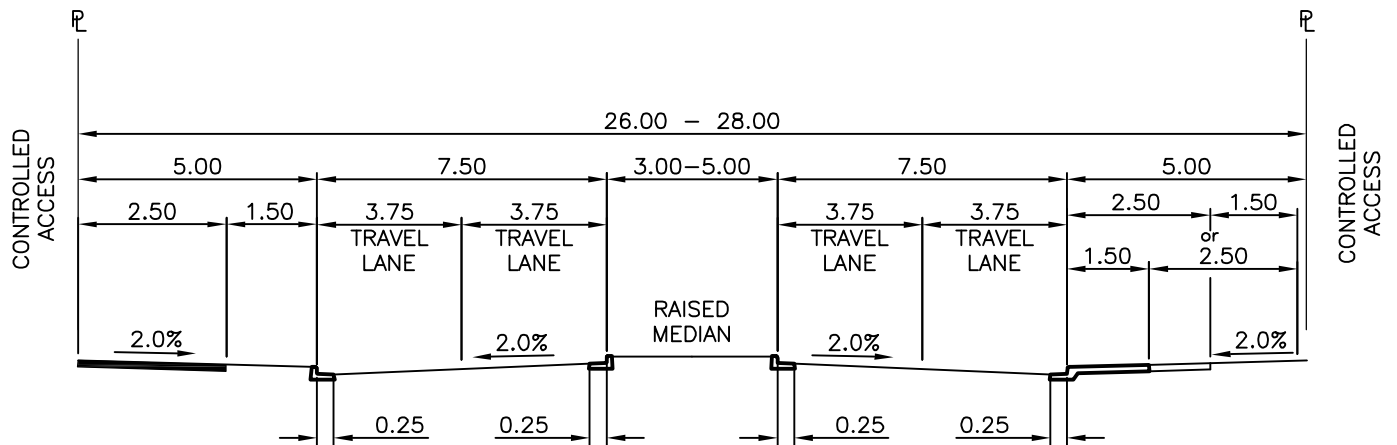
DESIGN GUIDELINE DRAWINGS Roadway Design

ROADWAY DESIGN STANDARDS

DRAWING NO.

6-03

REVISION NO.

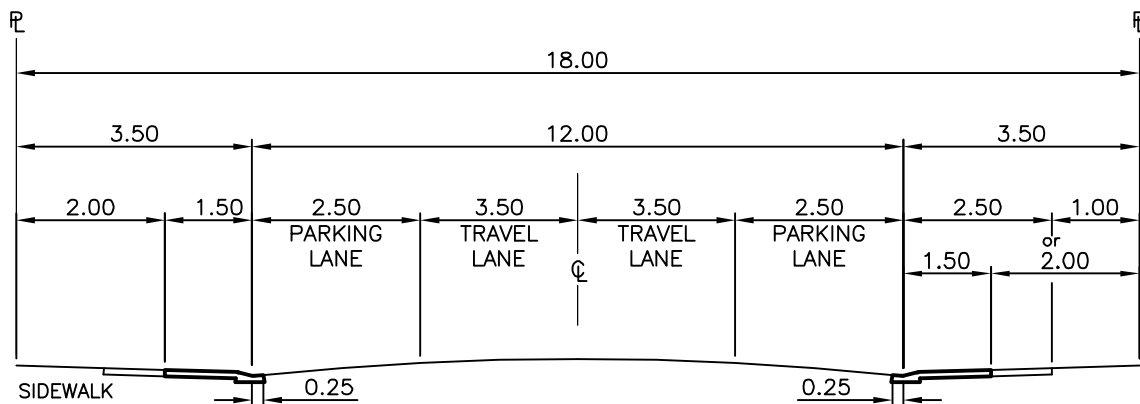
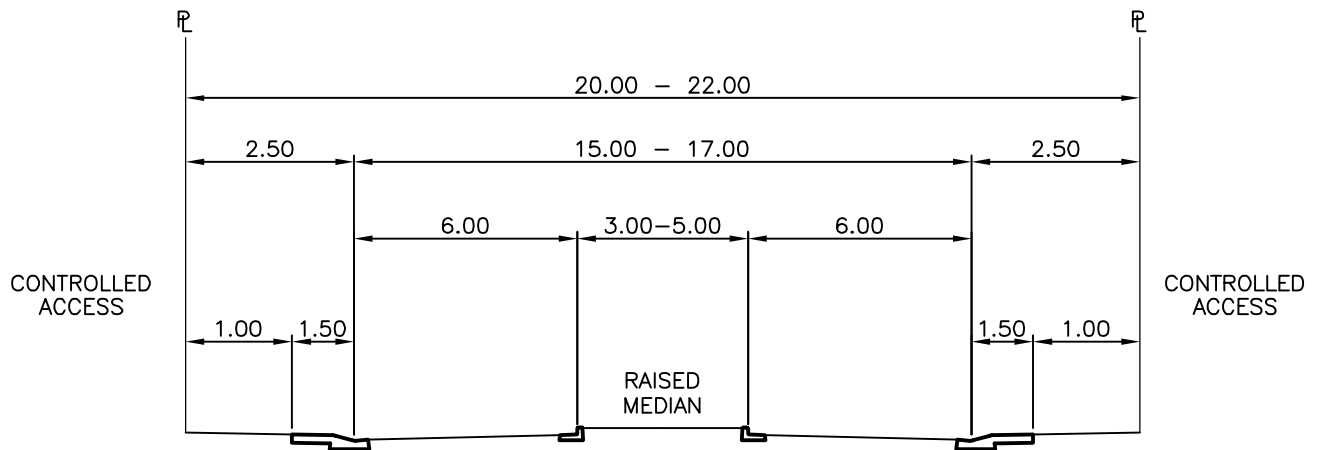
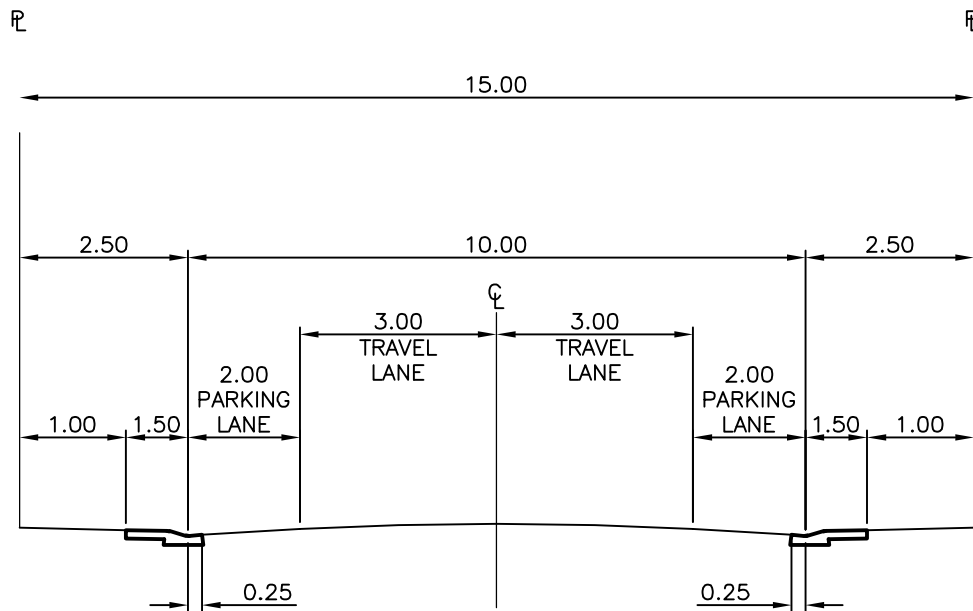


File Name: 6-04-DIVIDED & UNDIVIDED RESIDENTIAL COLLECTOR ROADWAY.dwg

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| TOWN OF ROCKY MOUNTAIN HOUSE | |
| DESIGN GUIDELINE DRAWINGS | |
| Roadway Design | |
| DIVIDED & UNDIVIDED | |
| RESIDENTIAL COLLECTOR | |
| ROADWAY | |
| DRAWING NO. | 6-04 |
| REVISION NO. | |



File Name: 6-05-DIVIDED & UNDIVIDED RESIDENTIAL LOCAL ROADWAY.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

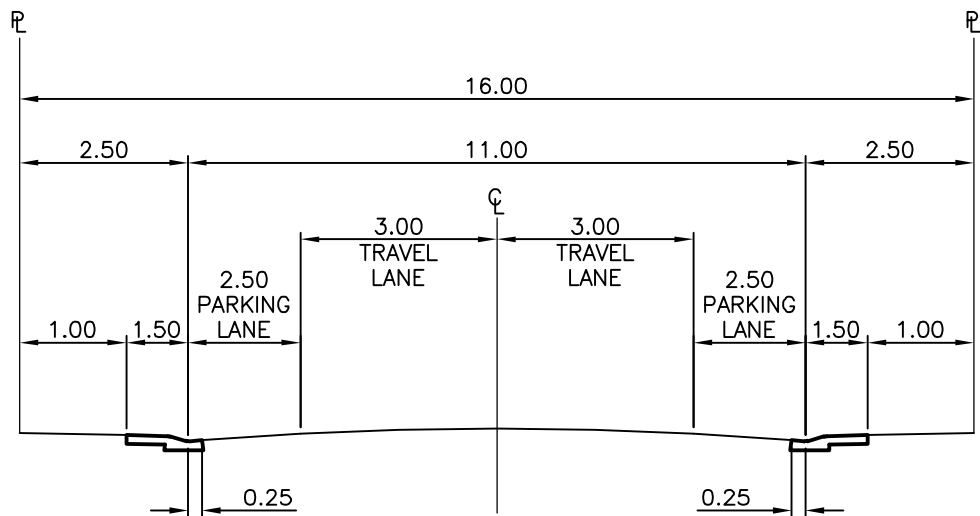
DESIGN GUIDELINE DRAWINGS
Roadway Design

UNDIVIDED & DIVIDED
RESIDENTIAL LOCAL
ROADWAY

DRAWING NO.

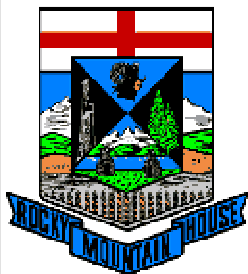
6-05

REVISION NO.



File Name: 6-06-UNDIVIDED RESIDENTIAL LOCAL ROADWAY_MULTI FAMILY.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

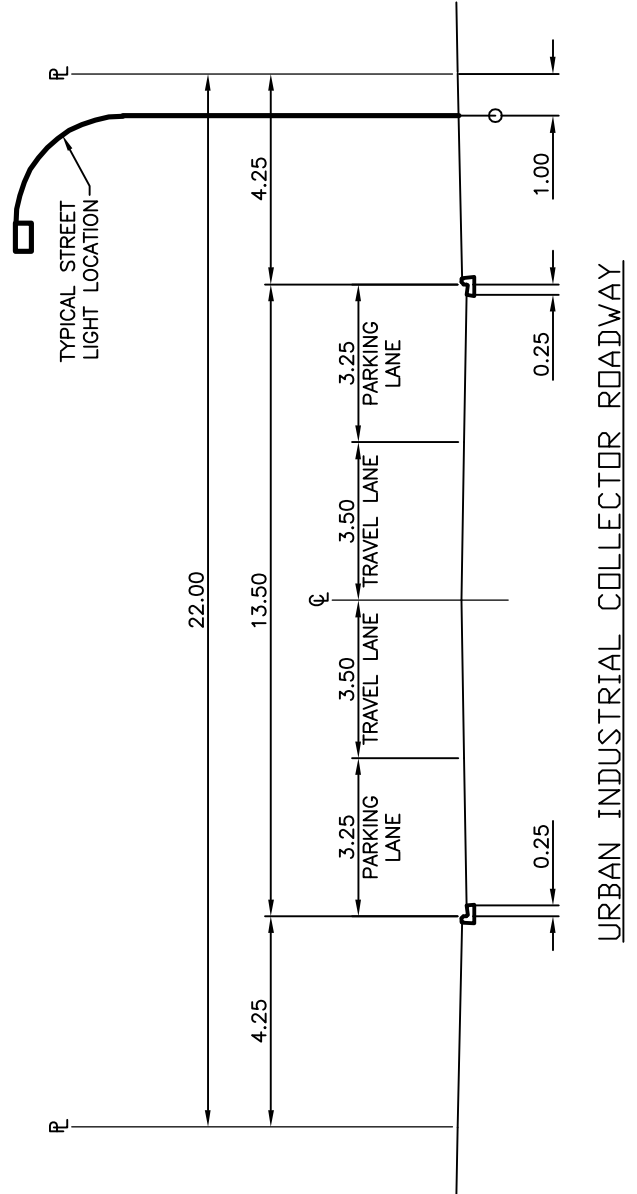
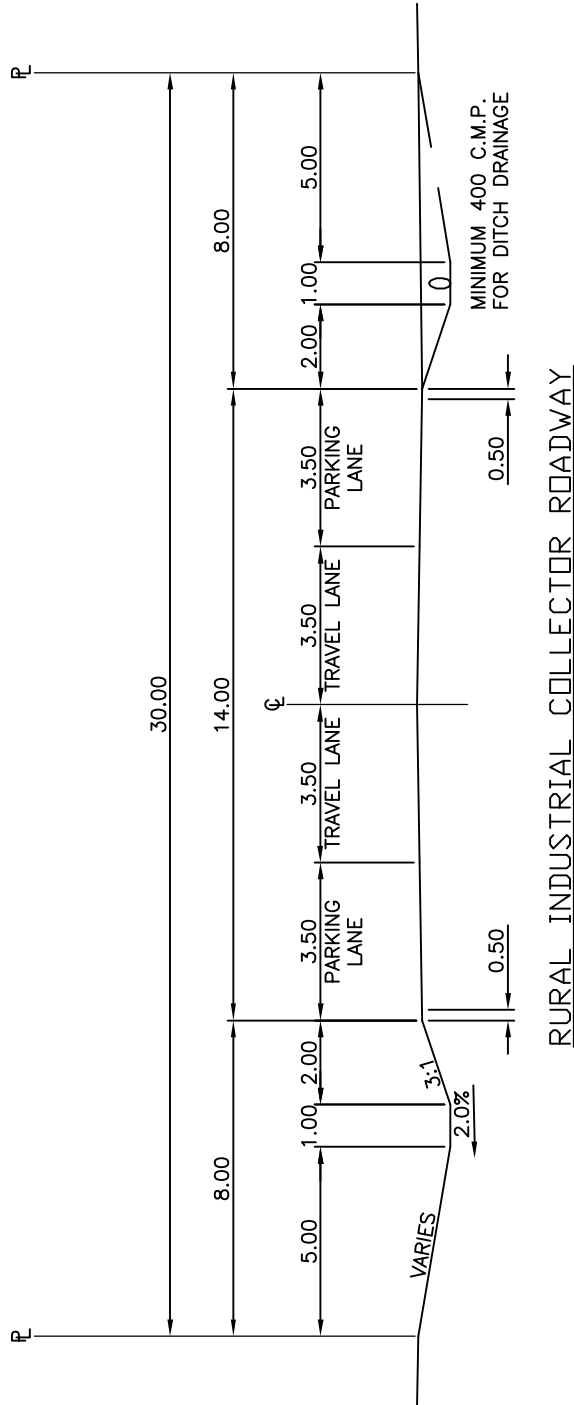
DESIGN GUIDELINE DRAWINGS
Roadway Design

UNDIVIDED RESIDENTIAL
LOCAL ROADWAY
(MULTI FAMILY)

DRAWING NO.

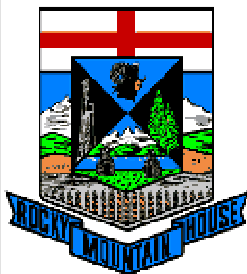
6-06

REVISION NO.



File Name: 6-07-RURAL & URBAN UNDIVIDED INDUSTRIAL COLLECTOR ROADWAY.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

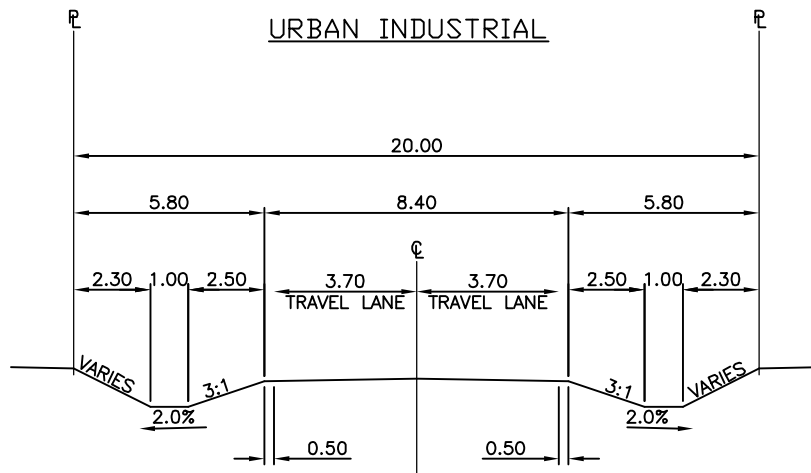
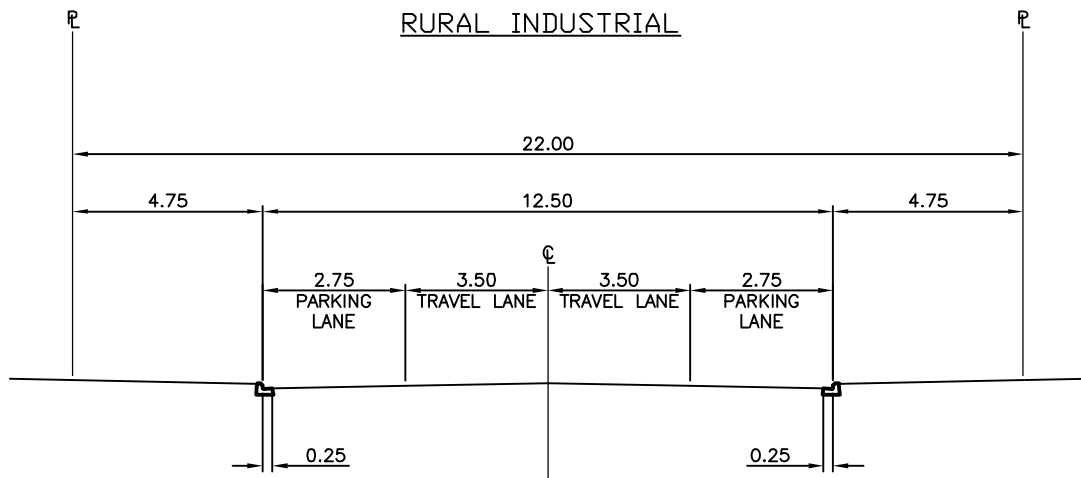
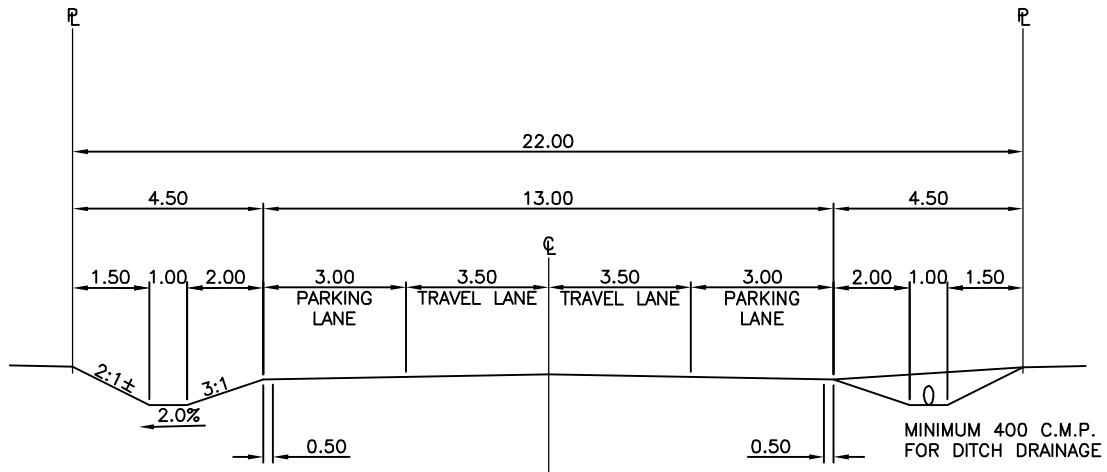
DESIGN GUIDELINE DRAWINGS
Roadway Design

RURAL & URBAN
UNDIVIDED INDUSTRIAL
COLLECTOR ROADWAY

DRAWING NO.

6-07

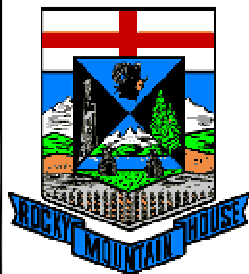
REVISION NO.



RURAL ROADWAY

File Name: 6-08-RURAL & URBAN INDUSTRIAL LOCAL ROADWAY.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

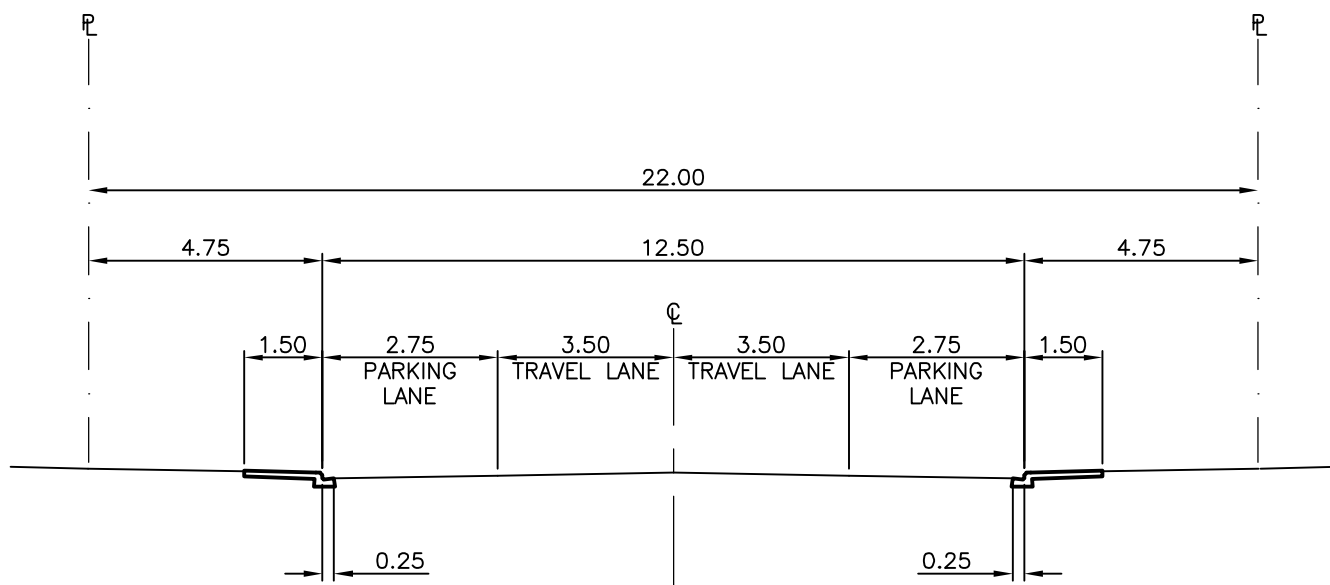
DESIGN GUIDELINE DRAWINGS Roadway Design

RURAL & URBAN INDUSTRIAL LOCAL ROADWAY & TYPICAL RURAL ROADWAY

DRAWING NO.

6-08

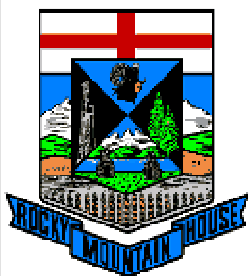
REVISION NO.



COMMERCIAL ROADWAY

File Name: 6-09-COMMERCIAL ROADWAY.dwg

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| No. | Revision | | |



TOWN OF ROCKY MOUNTAIN HOUSE

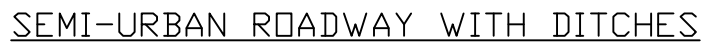
DESIGN GUIDELINE DRAWINGS
Roadway Design

COMMERCIAL ROADWAY

DRAWING NO.

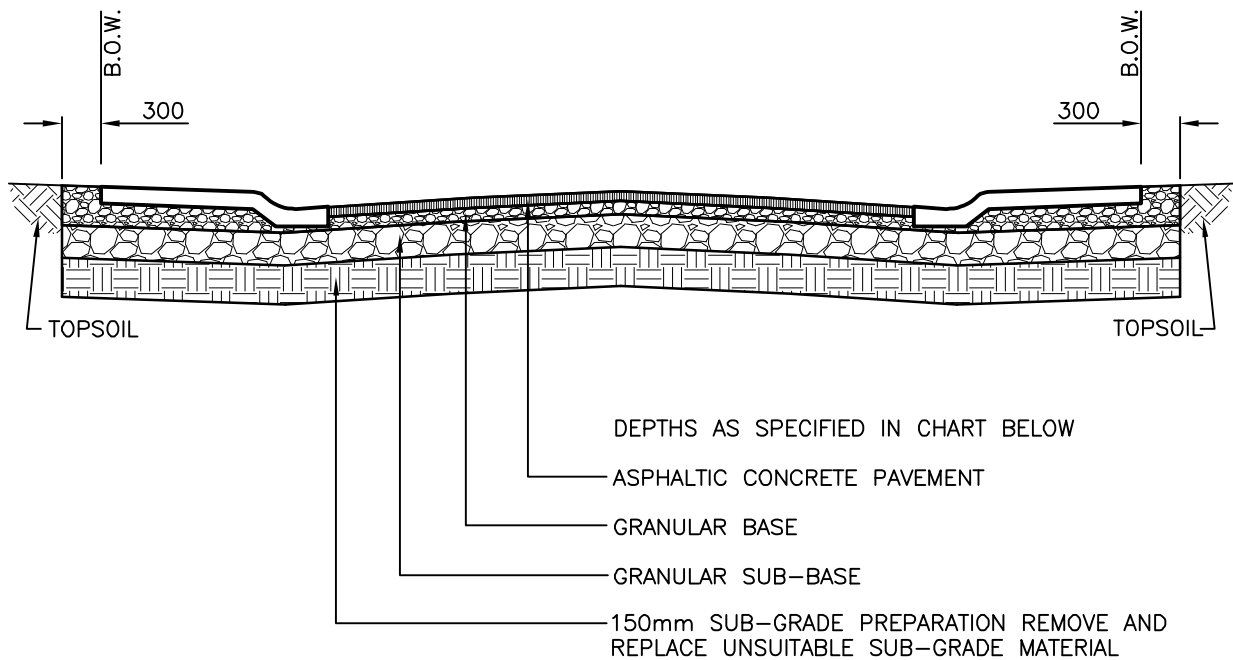
6-09

REVISION NO.



1. THIS ROAD CROSS SECTION MAYBE CONSIDERED IN RESIDENTIAL AREAS WHERE THE LOT AREA IS EQUAL TO OR EXCEEDS 0.5 ACRES.

REVISION NO.



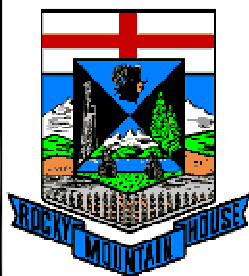
STANDARD RESIDENTIAL LOCAL AND COLLECTOR ROADWAY

| MINIMUM DESIGN PAVEMENT STRUCTURE | | | | |
|-----------------------------------|----------------------------------|--------------------|------------------------|------------------|
| ROAD CLASSIFICATION | ASPHALTIC CONCRETE PAVEMENT (mm) | GRANULAR BASE (mm) | GRANULAR SUB-BASE (mm) | TOTAL DEPTH (mm) |
| RESIDENTIAL LOCAL | 65 | 100 | 250 | 415 |
| COLLECTOR | 75 | 150 | 300 | 525 |

NOTE:
ROAD STRUCTURE TO BE BASED ON GEOTECHNICAL REPORT RECOMMENDATIONS.

File Name: 6-12-RESIDENTIAL PAVEMENT STRUCTURE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

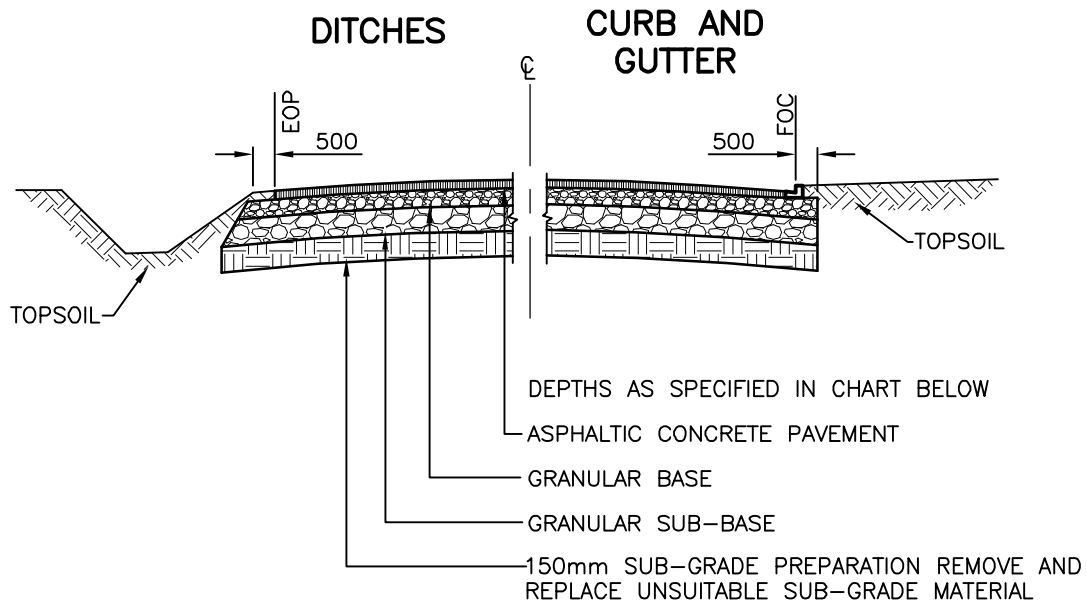
DESIGN GUIDELINE DRAWINGS
Roadway Design

RESIDENTIAL ROADWAY PAVEMENT STRUCTURE CROSS-SECTION

DRAWING NO.

6-12

REVISION NO.



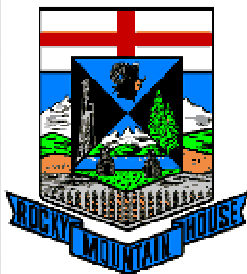
INDUSTRIAL LOCAL / COLLECTOR ROADWAY

| DESIGN PAVEMENT STRUCTURE | | | | |
|---------------------------|----------------------------------|--------------------|------------------------|------------------|
| ROAD CLASSIFICATION | ASPHALTIC CONCRETE PAVEMENT (mm) | GRANULAR BASE (mm) | GRANULAR SUB-BASE (mm) | TOTAL DEPTH (mm) |
| INDUSTRIAL LOCAL | 90 | 150 | 300 | 540 |
| INDUSTRIAL COLLECTOR | 100 | 200 | 300 | 600 |

NOTE:
ROAD STRUCTURE TO BE BASED ON GEOTECHNICAL REPORT RECOMMENDATIONS.

File Name: 6-13-INDUSTRIAL PAVEMENT STRUCTURE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

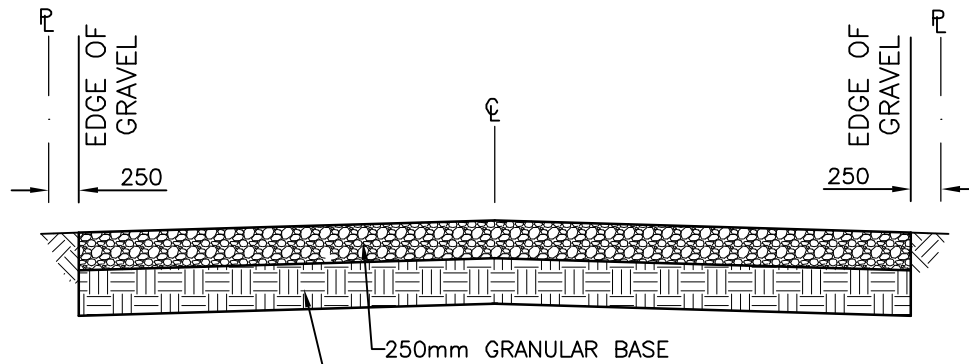
DESIGN GUIDELINE DRAWINGS
Roadway Design

INDUSTRIAL ROADWAY PAVEMENT STRUCTURE CROSS-SECTION

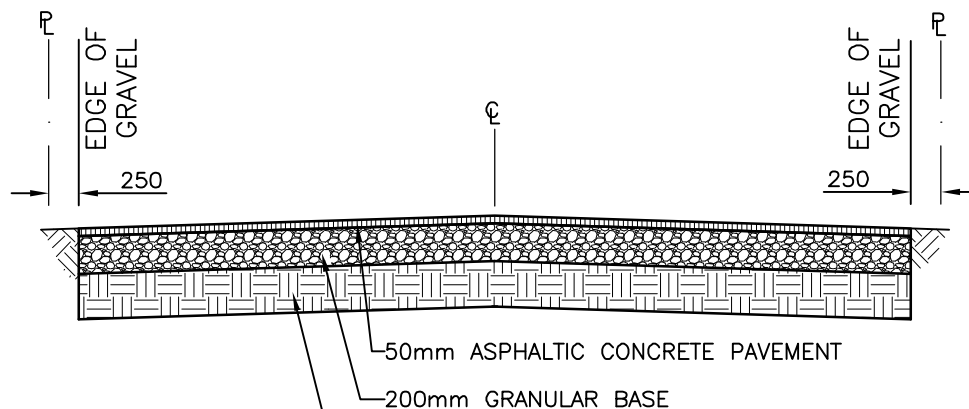
DRAWING NO.

6-13

REVISION NO.



GRAVEL LANE

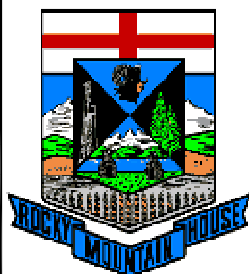


PAVED LANE

| DESIGN PAVEMENT STRUCTURE | | | | |
|---------------------------|----------------------------------|--------------------|------------------------|------------------|
| ROAD CLASSIFICATION | ASPHALTIC CONCRETE PAVEMENT (mm) | GRANULAR BASE (mm) | GRANULAR SUB-BASE (mm) | TOTAL DEPTH (mm) |
| GRAVEL LANES | -- | 250 | -- | 250 |
| PAVED LANES | 50 | 200 | -- | 250 |

File Name: 6-14-GRAVEL & PAVED LANE STRUCTURE.dwg

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| No. -- | Revision |



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS Roadway Design

GRAVEL / PAVED LANE PAVEMENT STRUCTURE CROSS-SECTION

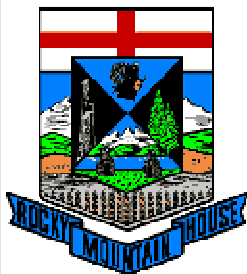
DRAWING NO.

6-14

REVISION NO.

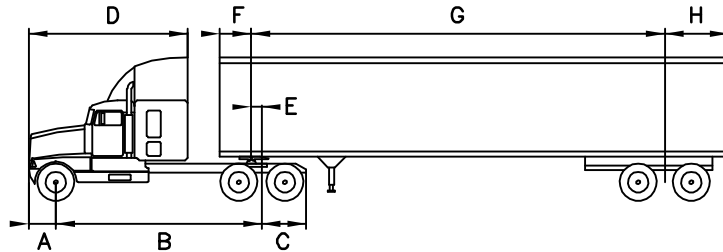


BERM TAPER DETAIL

[illegible]

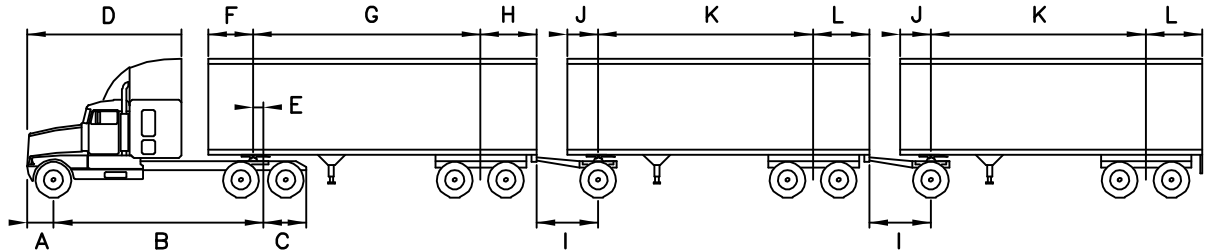
REVISION NO.

WB-15, 17 & 20



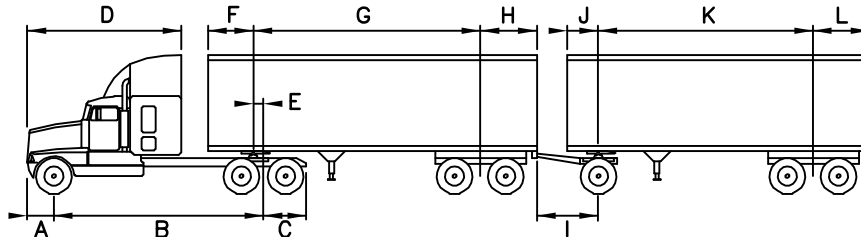
Tractor Width : 2.60
Trailer Width : 2.60
Tractor Track : 2.60
Trailer Track : 2.60
Steering Angle : 26.22
Tractor/Trailer Angle : 48.24

WB-29



Tractor Width : 2.60
Trailer Width : 2.60
Tractor Track : 2.60
Trailer Track : 2.60
Steering Angle : 17.17
Tractor/Trailer Angle : 28.08
Trailer1/Trailer2 Angle : 45.56
Trailer2/Trailer3 Angle : 48.94

WB-35



Tractor Width : 2.60
Trailer Width : 2.60
Tractor Track : 2.60
Trailer Track : 2.60
Steering Angle : 21.01
Tractor/Trailer Angle : 46.18
Trailer/Trailer Angle : 66.23

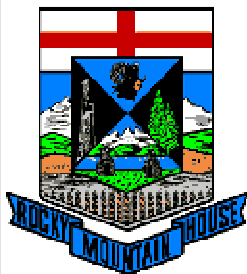
| DESCRIPTION | T.A.C. DESIGN VEHICLES | | | | |
|--------------------------------------|------------------------|-------|-------|-------|-------|
| | WB-15 | WB-17 | WB-20 | WB-29 | WB-35 |
| TRACTOR | | | | | |
| A Tractor Front | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| B Tractor Wheelbase | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| C Tractor Rear | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| D Cab Length | 3.5 | 3.5 | 3.0 | 3.0 | 3.0 |
| E Axle to Kingpin | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| FIRST TRAILER | | | | | |
| F Trailer Front | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| G Pin to Trailer Axle | 9.1 | 11.5 | 14.3 | 6.3 | 12.2 |
| H Trailer Rear | 1.5 | 1.5 | 1.5 | 1.0 | 1.0 |
| SECOND AND / OR THIRD TRAILER | | | | | |
| I Towbar | N/A | N/A | N/A | 1.8 | 2.4 |
| J Trailer Front | N/A | N/A | N/A | 0.9 | 1.2 |
| K Pin to Trailer Axle | N/A | N/A | N/A | 6.6 | 12.2 |
| L Trailer Rear | N/A | N/A | N/A | 1.0 | 1.2 |

NOTES:

- THE NOTED DIMENSIONS FOR THE VARIOUS DESIGN VEHICLES, ARE BASED ON FIELD DIMENSIONS OBTAINED FROM THE TWO MAJOR TRUCKING FIRMS OPERATING IN RED DEER.

File Name: 6-17-WB DESIGN VEHICLES.dwg

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| Rev. By: - | Rev. Date: - |
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TOWN OF ROCKY MOUNTAIN HOUSE

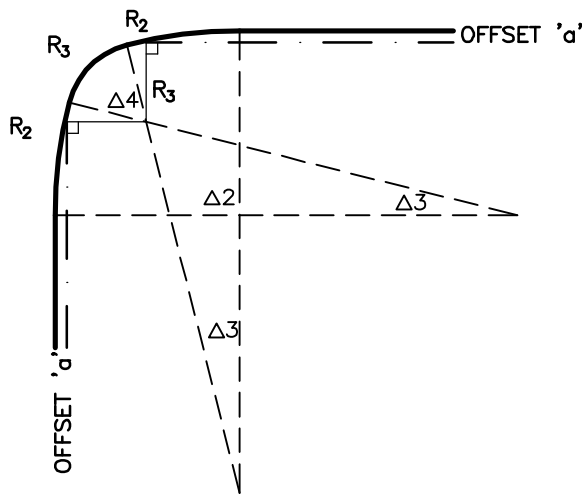
DESIGN GUIDELINE DRAWINGS
Roadway Design

WB DESIGN VEHICLES

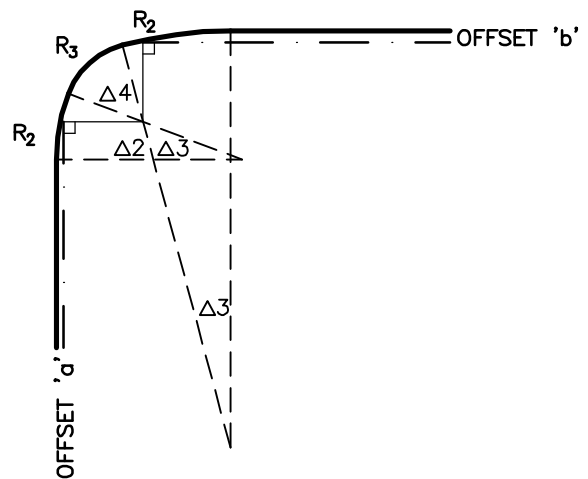
DRAWING NO.

6-17

REVISION NO.



**3 – CENTRED SYMETRICAL
COMPOUND CURVE**



**3 – CENTRED ASYMETRICAL
COMPOUND CURVE**

NOTE:

- $\Delta 3$ AND $\Delta 4$ TO BE CALCULATED
USING R_2 , R_3 AND OFFSET DISTANCE

| MINIMUM DESIGN FOR TURNS AT INTERSECTIONS Reference : A Policy on Geometric Design of Highways and Streets (AASHTO 1994 Metric Edition) | | | | | | | | | | |
|--|----------------------------|---|-------|-------|---------------------------------|--|-------|-------|----------------------------------|------|
| Design Vehicle (see Dwg 5.22) | Angle of Turn (degrees) | 3 – Centered Symetrical Compound Curve | | | | 3 – Centered Asymetrical Compound Curve | | | | |
| | | Minimum Curve Radii (meters) | | | Symetric Off-set (meters) | Minimum Curve Radii (meters) | | | Asymetric Off-set (meters) | |
| | | R_2 | R_3 | R_2 | a | R_2 | R_3 | R_2 | a | b |
| WB-15 | $75^\circ \pm 7' 30''$ | 46 | 15 | 46 | 1.83 | 46 | 15 | 69 | 0.61 | 3.05 |
| | $90^\circ \pm 7' 30''$ | 55 | 18 | 55 | 1.83 | 37 | 12 | 61 | 0.61 | 3.05 |
| | $105^\circ \pm 7' 30''$ | 55 | 14 | 55 | 2.44 | 46 | 12 | 64 | 0.61 | 3.05 |
| WB-17 | $75^\circ \pm 7' 30''$ | 61 | 21 | 61 | 2.13 | 37 | 18 | 61 | 0.61 | 3.05 |
| | $90^\circ \pm 7' 30''$ | 61 | 20 | 61 | 2.13 | 30 | 17 | 79 | 0.61 | 3.05 |
| | $105^\circ \pm 7' 30''$ | 73 | 15 | 73 | 2.44 | 30 | 14 | 152 | 1.22 | 3.05 |
| WB-20 | $75^\circ \pm 7' 30''$ | 134 | 23 | 134 | 4.57 | 43 | 30 | 165 | 1.52 | 3.66 |
| | $90^\circ \pm 7' 30''$ | 122 | 21 | 122 | 3.05 | 49 | 21 | 110 | 1.83 | 3.05 |
| | $105^\circ \pm 7' 30''$ | 158 | 15 | 158 | 4.57 | 110 | 23 | 183 | 1.22 | 3.20 |
| WB-29 | $75^\circ \pm 7' 30''$ | 76 | 24 | 76 | 1.40 | 30 | 24 | 91 | 0.50 | 1.50 |
| | $90^\circ \pm 7' 30''$ | 76 | 21 | 76 | 1.40 | 61 | 21 | 91 | 0.30 | 1.50 |
| | $105^\circ \pm 7' 30''$ | 76 | 18 | 76 | 1.50 | 30 | 18 | 91 | 0.50 | 1.80 |
| WB-35 | $75^\circ \pm 7' 30''$ | 213 | 38 | 213 | 2.00 | 46 | 34 | 168 | 0.50 | 3.50 |
| | $90^\circ \pm 7' 30''$ | 213 | 34 | 213 | 2.00 | 46 | 29 | 168 | 0.60 | 3.50 |
| | $105^\circ \pm 7' 30''$ | 213 | 29 | 213 | 2.40 | 46 | 24 | 152 | 0.90 | 4.60 |

File Name: 6-18-WB COMPOUND CURVE TURN DESIGN.dwg

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| Rev. By: – | Rev. Date: – |
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TOWN OF ROCKY MOUNTAIN HOUSE

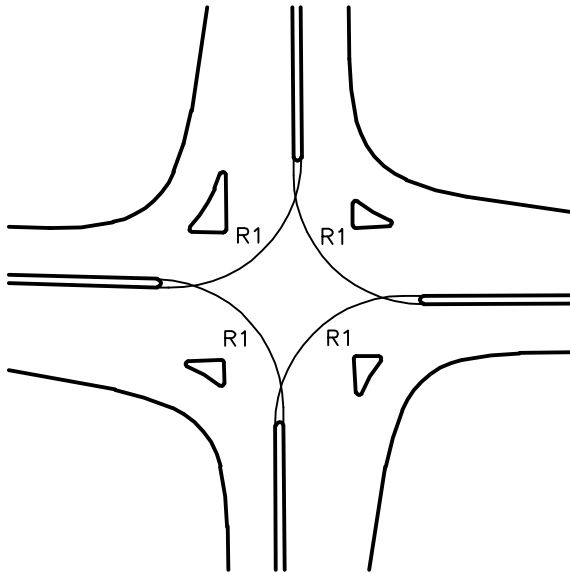
DESIGN GUIDELINE DRAWINGS
Roadway Design

**WB VEHICLE COMPOUND
CURVE TURN DESIGN**

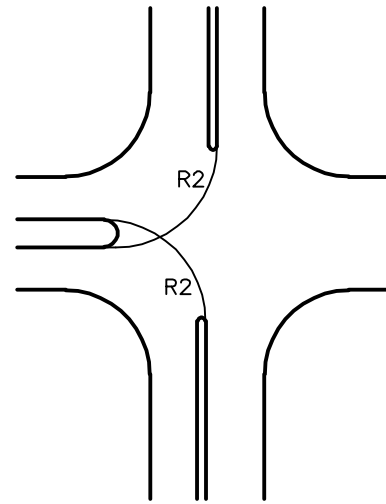
DRAWING NO.

6-18

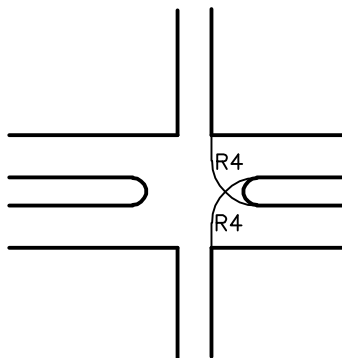
REVISION NO.



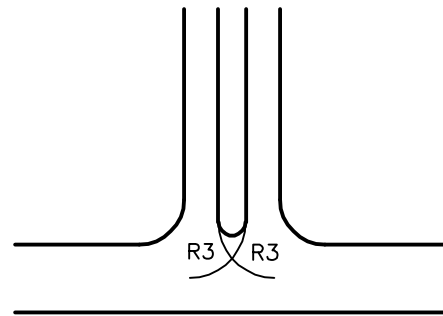
ARTERIAL TO ARTERIAL



ARTERIAL TO COLLECTOR



DIVIDED COLLECTOR OR
LOCAL TO LANE OR DRIVEWAY



COLLECTOR OR LOCAL TO
COLLECTOR OR LOCAL

TURNING RADII

| | | |
|---------------------------|----|-----|
| ARTERIAL TO ARTERIAL | R1 | 22m |
| ARTERIAL TO COLLECTOR | R2 | 18m |
| COLLECTOR TO COLLECTOR | R3 | 15m |
| COLLECTOR TO LOCAL | R3 | 12m |
| LOCAL TO LOCAL | R3 | 10m |
| COLLECTOR / LOCAL TO LANE | R4 | 8m |

File Name: 6-19-INTERSECTION CENTER LINE RADII.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

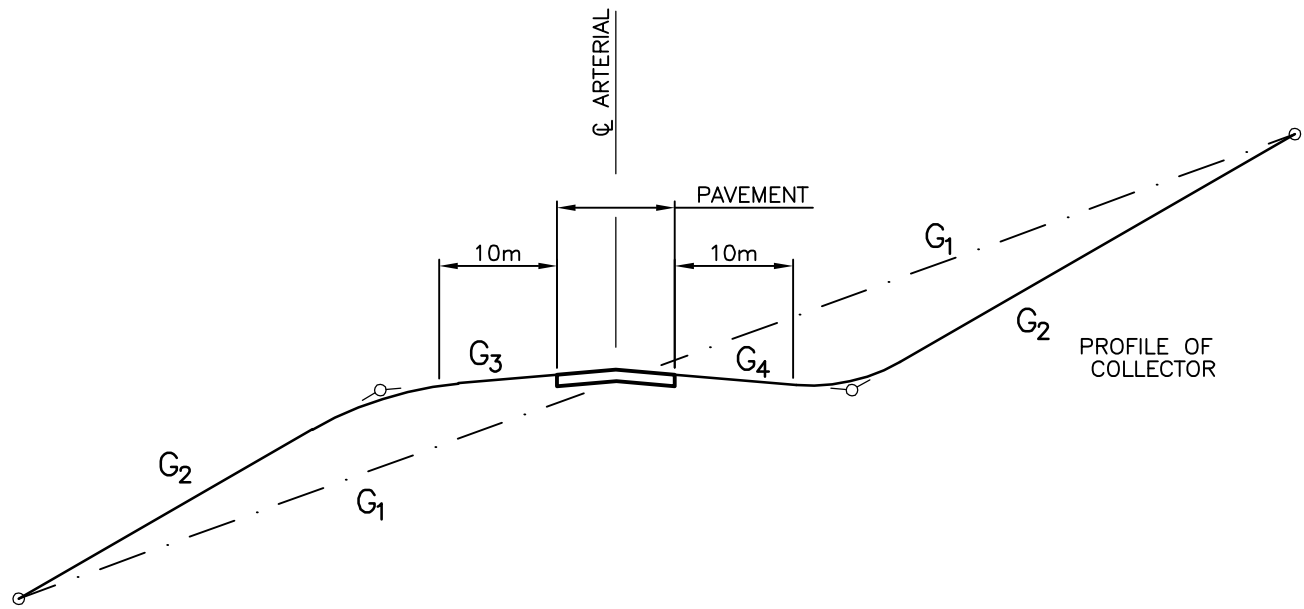
DESIGN GUIDELINE DRAWINGS
Roadway Design

INTERSECTION CENTRE LINE CONTROL RADII

DRAWING NO.

6-19

REVISION NO.



NOTES:

G_1 ORIGINAL GRADE OF MINOR ROAD

G_2 GRADE INTRODUCED TO ADJUST GRADE AT INTERSECTION

G_3 AND G_4 GRADE ON COLLECTOR CONFORMS TO CROSS SLOPE ON ARTERIAL ROADWAY (EG. 0.5% TO 5.0%, NORMAL CROWN TO SUPERELEVATION).

File Name: 6-20-INTERSECTION GRADE ADJUSTMENT.dwg

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| No. | Revision | | |



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Roadway Design

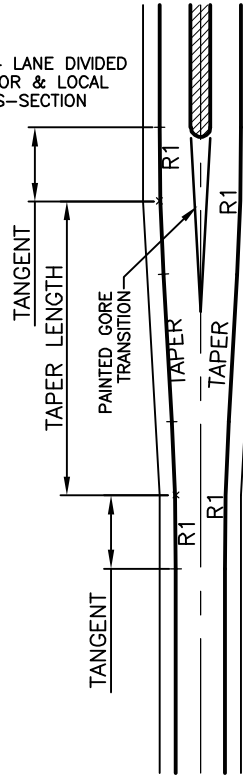
INTERSECTION GRADE
ADJUSTMENT

DRAWING NO.

6-20

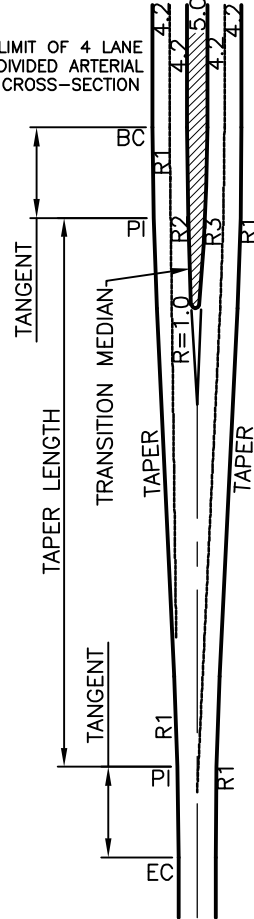
REVISION NO.

LIMIT OF 4 LANE DIVIDED COLLECTOR & LOCAL CROSS-SECTION



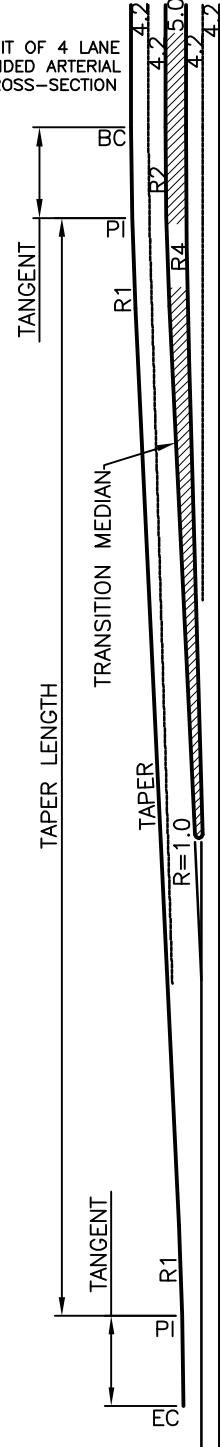
LOCAL / COLLECTOR CENTRELINE TRANSITION

LIMIT OF 4 LANE DIVIDED ARTERIAL CROSS-SECTION



ARTERIAL CENTRELINE TRANSITION

LIMIT OF 4 LANE DIVIDED ARTERIAL CROSS-SECTION



ARTERIAL OFFSET TRANSITION

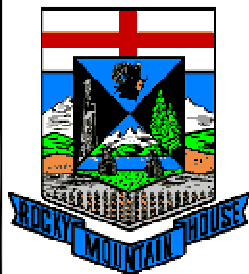
OVERALL APPROACH OR DEPARTURE TAPER LENGTHS

| ROADWAY | DESIGN SPEED KM/H | TAPER RATIO | TRANSITION RADII (m) | | | |
|-----------|-------------------|-------------|----------------------|--------|-----|------|
| | | | R1 | R2 | R3 | R4 |
| LOCAL | 50 | 15:1 | 500 | --- | --- | --- |
| COLLECTOR | 60 | 18:1 | 700 | --- | --- | --- |
| ARTERIAL | 70 | 21:1 | 930 | 921.6 | 475 | 2000 |
| ARTERIAL | 80 | 24:1 | 1200 | 1191.6 | 475 | 2000 |

ON 70 km/hr DESIGN SPEED.
ROADWAY TRANSITIONS ARE BASED
ON INFORMATION SHOWN FOR ARTERIAL

File Name: 6-21-DIVIDED TO UNDIVIDED TRANSITION.dwg

Rev. By: - Rev. Date: -



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS Roadway Design

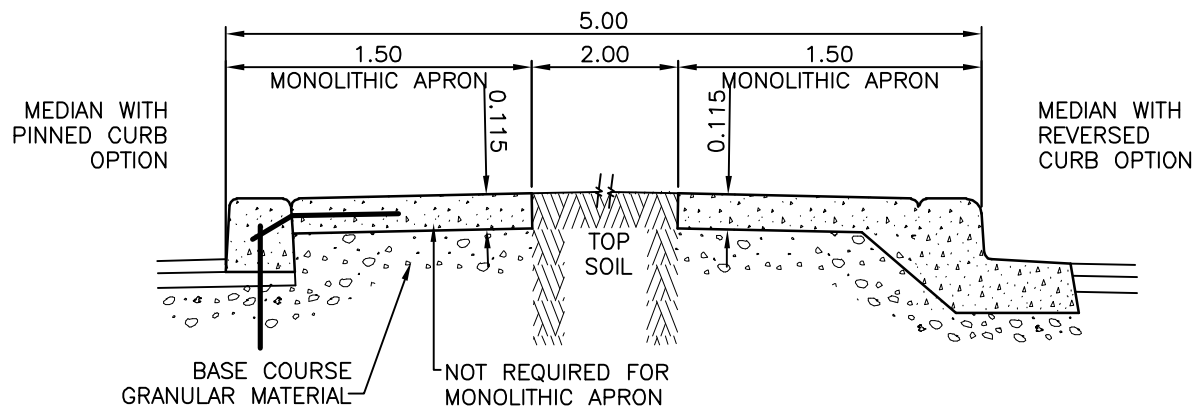
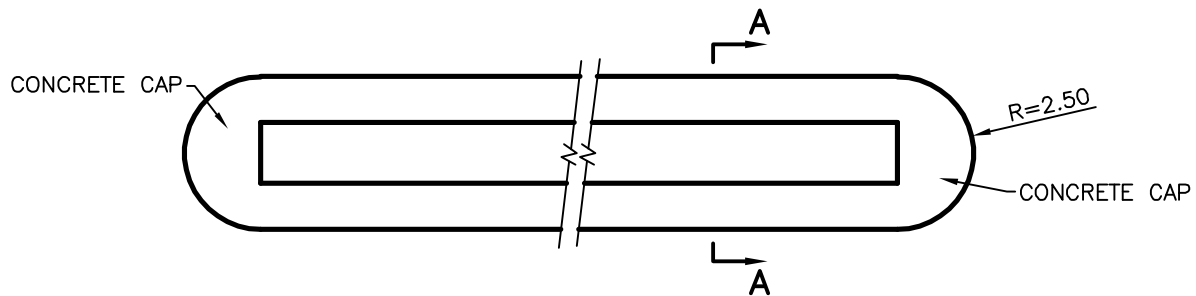
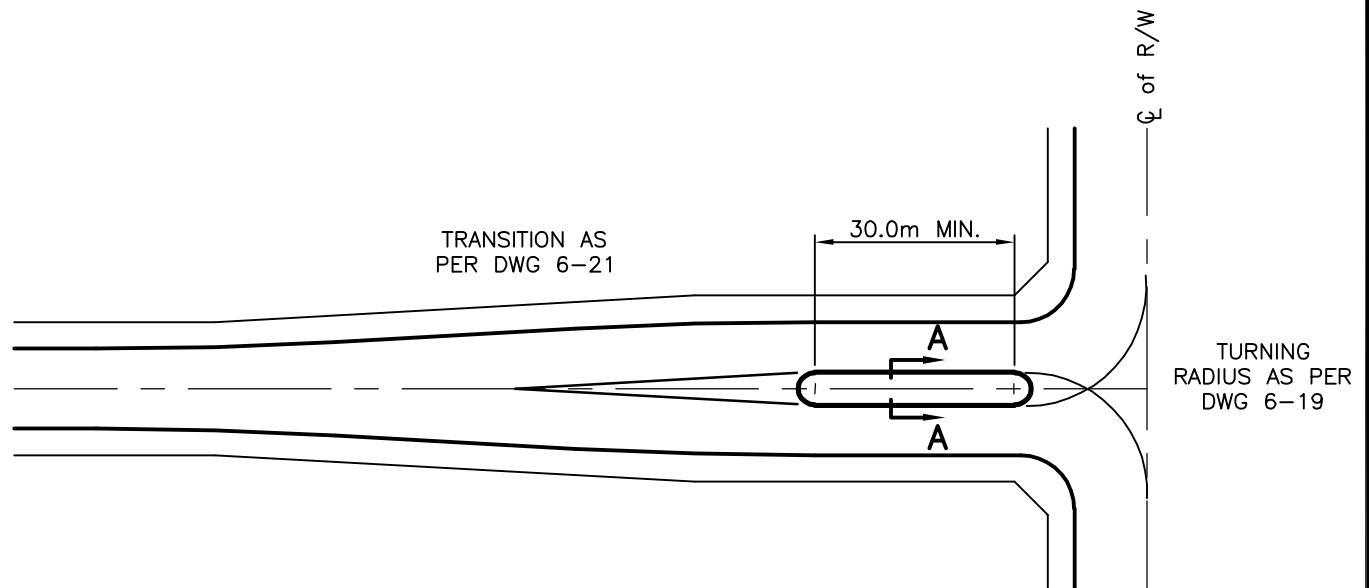
DIVIDED TO UNDIVIDED ROADWAY TRANSITION

DRAWING NO.

6-21

REVISION NO.

No. Revision



NOTE:

- PATTERNED CONCRETE OR PAVING STONES FOR APRON ARE PERMITTED

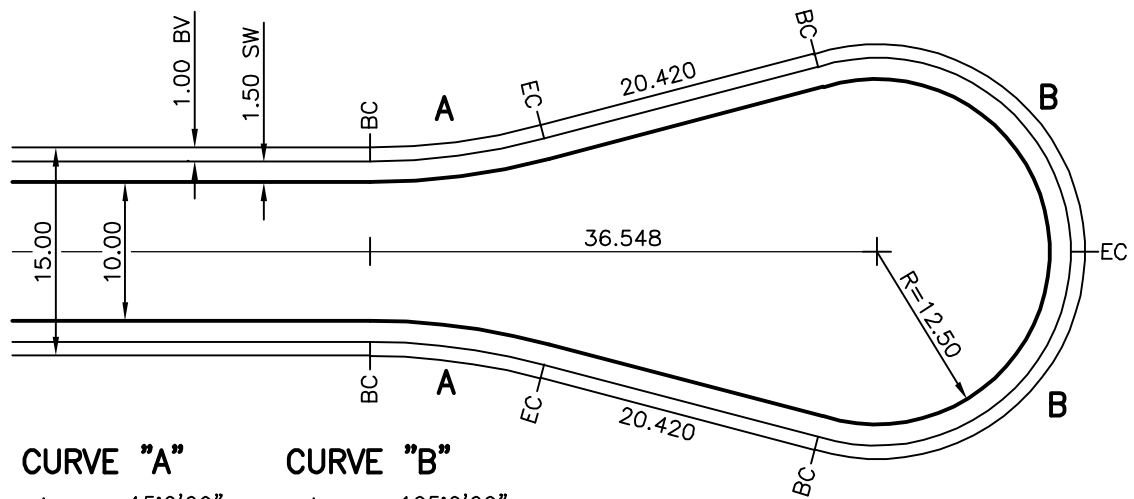
SECTION A-A

File Name: 6-22-COLLECTOR AND LOCAL CENTER ISLAND.dwg

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| TOWN OF ROCKY MOUNTAIN HOUSE | |
| DESIGN GUIDELINE DRAWINGS | |
| Roadway Design | |
| COLLECTOR AND LOCAL ROADWAY CENTER ISLAND | |
| DRAWING NO. | 6-22 |
| REVISION NO. | |

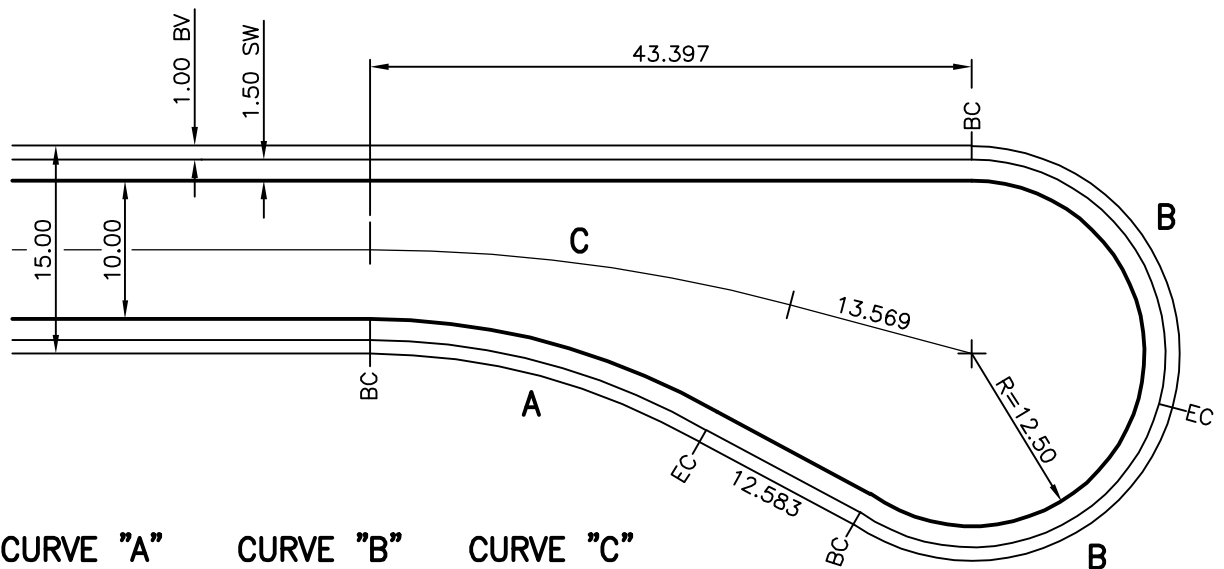


CURVE "A"

$\Delta = 15'0'00''$
 $R = 50.000$
 $ARC = 13.090$
 $TAN = 6.583$
 (at property line)

CURVE "B"

$\Delta = 105'0'00''$
 $R = 15.000$
 $ARC = 27.489$
 $TAN = 19.548$
 (at property line)



CURVE "A"

$\Delta = 30'0'00''$
 $R = 50.000$
 $ARC = 26.180$
 $TAN = 13.398$
 (at property line)

CURVE "B"

$\Delta = 105'0'00''$
 $R = 15.000$
 $ARC = 27.489$
 $TAN = 19.548$
 (at property line)

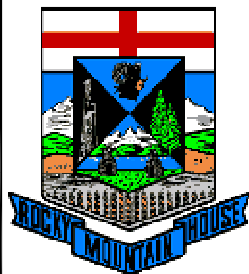
CURVE "C"

$\Delta = 15'0'00''$
 $R = 117.033$
 $ARC = 30.640$
 $TAN = 15.408$

File Name: 6-23-LOCAL RESIDENTIAL CUL-DE-SAC.dwg

Rev. By: -

Rev. Date: -



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
 Roadway Design

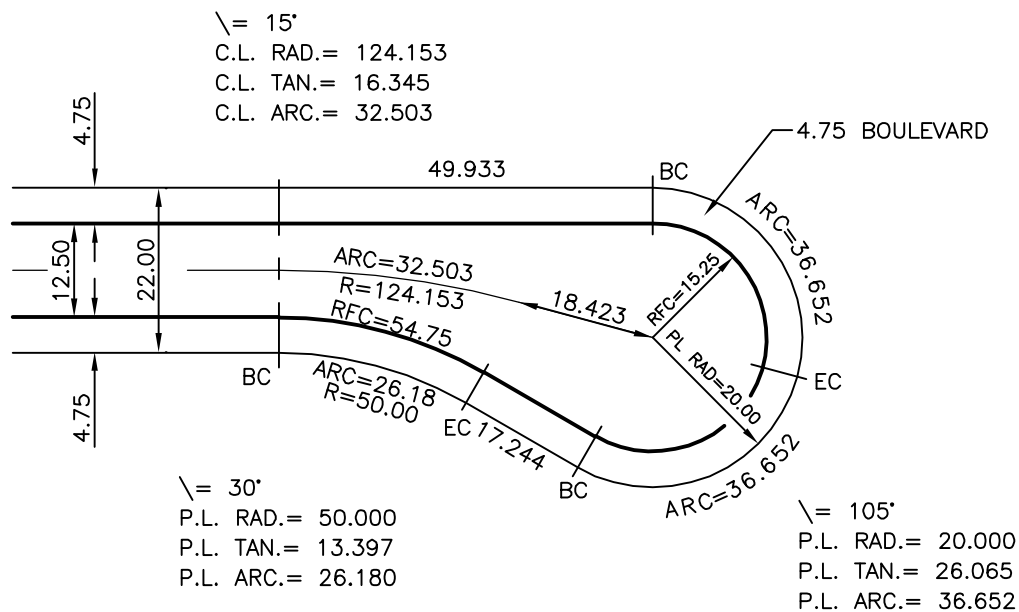
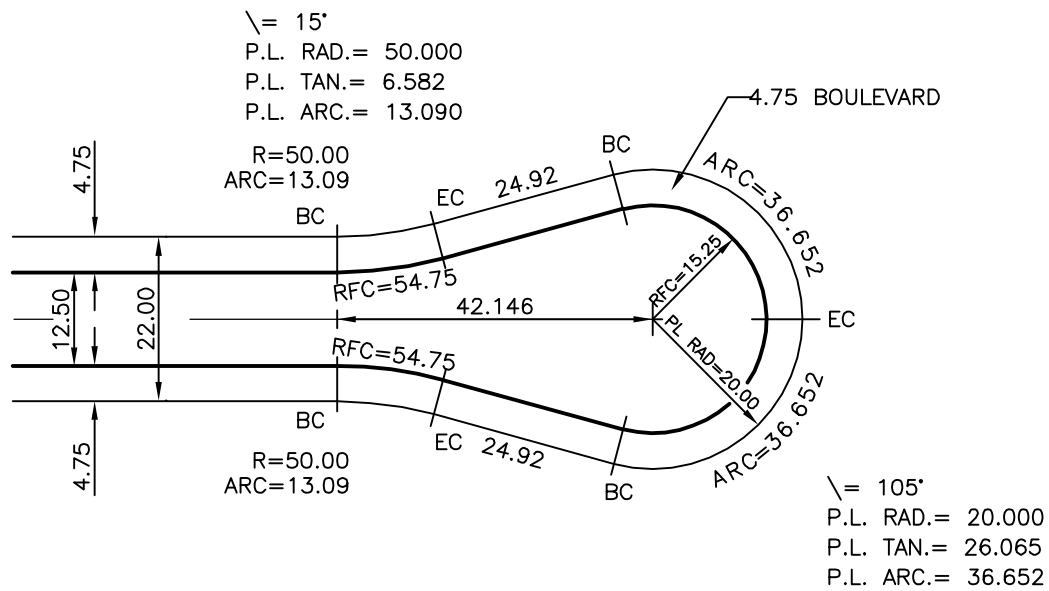
15/10 LOCAL RESIDENTIAL
 CUL - DE - SAC

DRAWING NO.

6-23

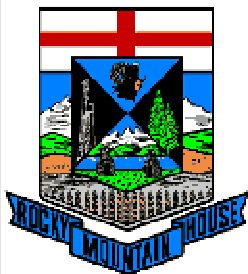
REVISION NO.

No. Revision



File Name: 6-24-LOCAL INDUSTRIAL CUL-DE-SAC.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

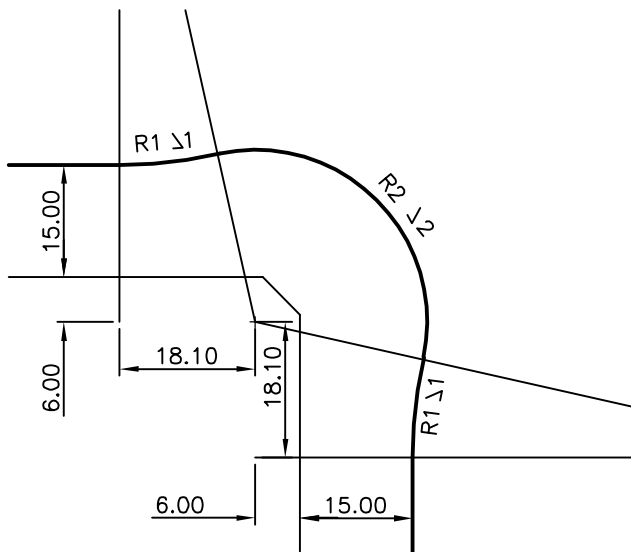
DESIGN GUIDELINE DRAWINGS Roadway Design

20/12.5 INDUSTRIAL ROAD
CUL - DE - SAC

DRAWING NO.

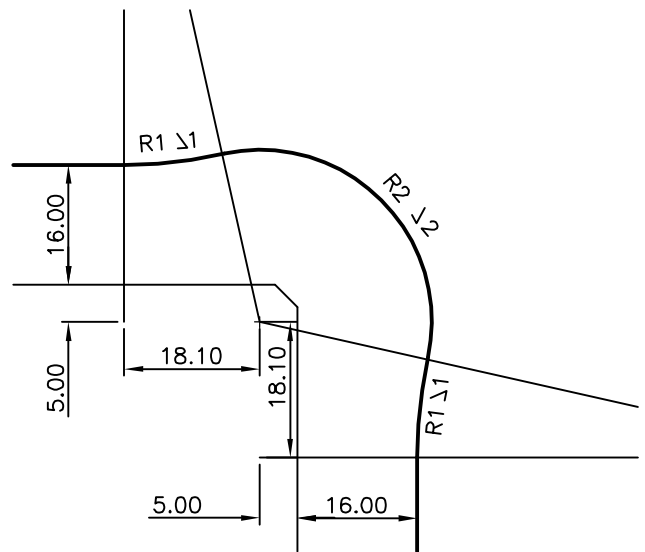
6-24

REVISION NO.



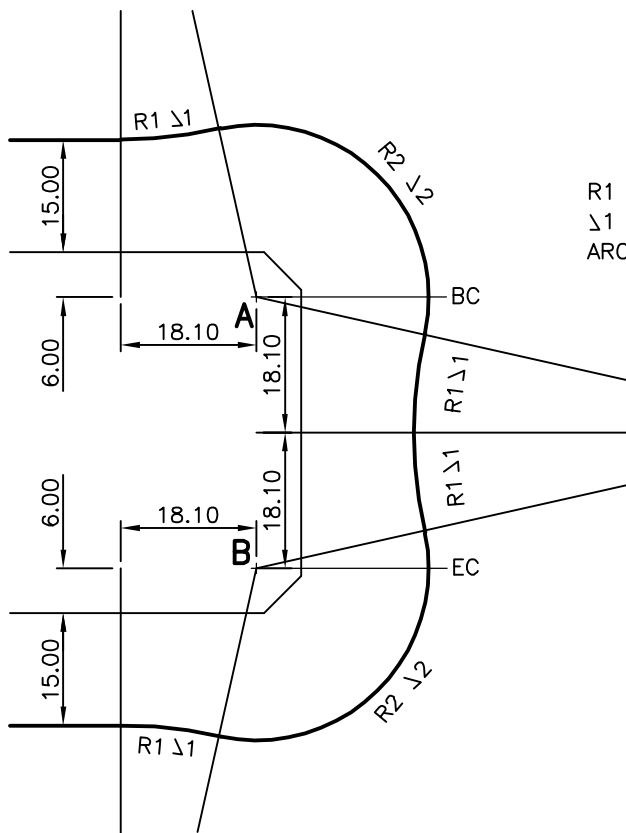
R1 = 60.00m
 $\Delta 1 = 12^\circ 36' 12''$
 ARC = 13.198

15 / 10 LOCAL ROADWAY



R2 = 23.00m
 $\Delta 2 = \text{VARIES}$
 ARC = VARIES

16 / 11 LOCAL ROADWAY



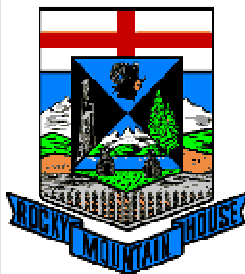
R1 = 60.00m
 $\Delta 1 = 12^\circ 36' 12''$
 ARC = 13.198

NOTES:

- IF DISTANCE BETWEEN A & B IS LESS THAN 36.2m, REPLACE 60m RADIUS CURVES WITH A TANGENT FROM B.C. TO E.C., WITH THE RIGHT-OF-WAY WIDTH INCREASING TO 17.0m (FOR 15/10 ROADWAY) OR 18.0m (FOR 16/10 ROADWAY)

File Name: 6-25-RESIDENTIAL EXPANDED BULB CORNER.dwg

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| No. | - | Revision | - |



TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
 Roadway Design

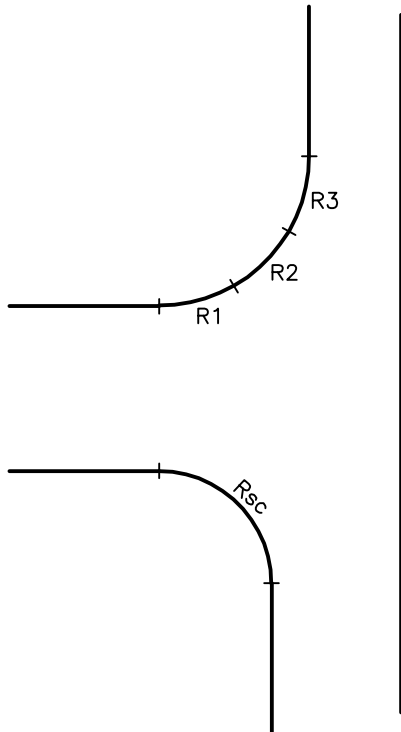
LOCAL ROADWAY
 EXPANDED BULB CORNER
 ALTERNATIVES

DRAWING NO.

6-25

REVISION NO.

3 CENTERED COMPOUND CURVE



| ANGLE OF TURN Δ | CURVE RADII R1 - R2 - R3 | SYMMETRICAL OFFSET |
|---------------------------|-----------------------------|-----------------------|
|---------------------------|-----------------------------|-----------------------|

1. COLLECTOR TO COLLECTOR (WB-15)

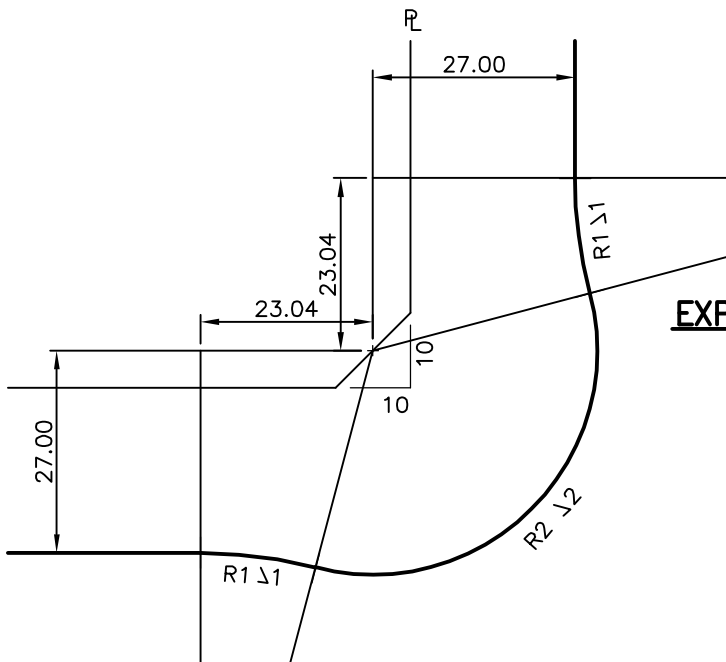
| | | |
|---------------|--------------|------|
| 75° ± 7' 30' | 50 - 15 - 50 | 1.83 |
| 90° ± 7' 30' | 55 - 15 - 55 | 2.13 |
| 105° ± 7' 30' | 60 - 15 - 55 | 2.44 |

2. a. COLLECTOR TO LOCAL - (SU-9) b. LOCAL TO LOCAL

| | | |
|---------------|--------------|------|
| 75° ± 7' 30' | 40 - 15 - 40 | 0.65 |
| 90° ± 7' 30' | 40 - 12 - 40 | 0.65 |
| 105° ± 7' 30' | 30 - 11 - 30 | 0.92 |

SIMPLY CURVE RADIUS (Rsc)

| | |
|---------------------------|------|
| 1. COLLECTOR TO COLLECTOR | 18.0 |
| 2. a. COLLECTOR TO LOCAL | 15.0 |
| b. LOCAL TO LOCAL | 15.0 |



EXPANDED CORNER FOR INDUSTRIAL LOCAL

CURVE DATA

R1 = 60.00m
 $\Delta 1 = 14' 50' 96''$

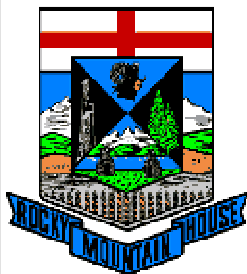
R2 = 30.00m
 $\Delta 2 = \text{VARIES}$

NOTE:

— ROAD RIGHT OF WAY WIDTH VARIES

File Name: 6-26-INDUSTRIAL ROADWAY CORNER ALTERNATES.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

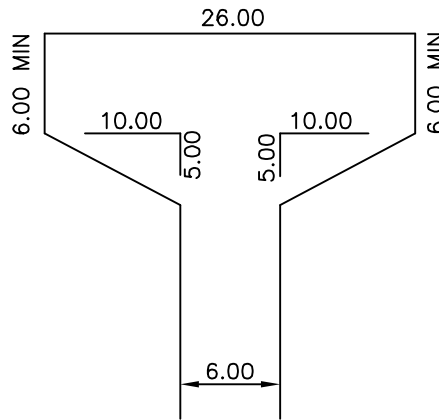
DESIGN GUIDELINE DRAWINGS Roadway Design

INDUSTRIAL ROADWAY CORNER ALTERNATES & EXPANDED BULB CORNER

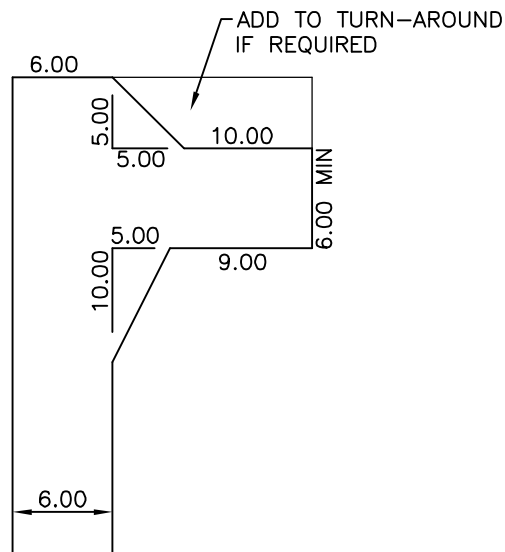
DRAWING NO.

6-26

REVISION NO.



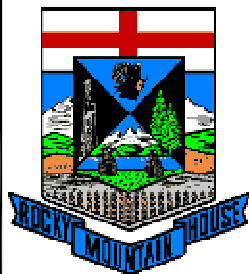
" T " TYPE



BRANCH TYPE

File Name: 6-27-LANE TURN AROUNDS.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

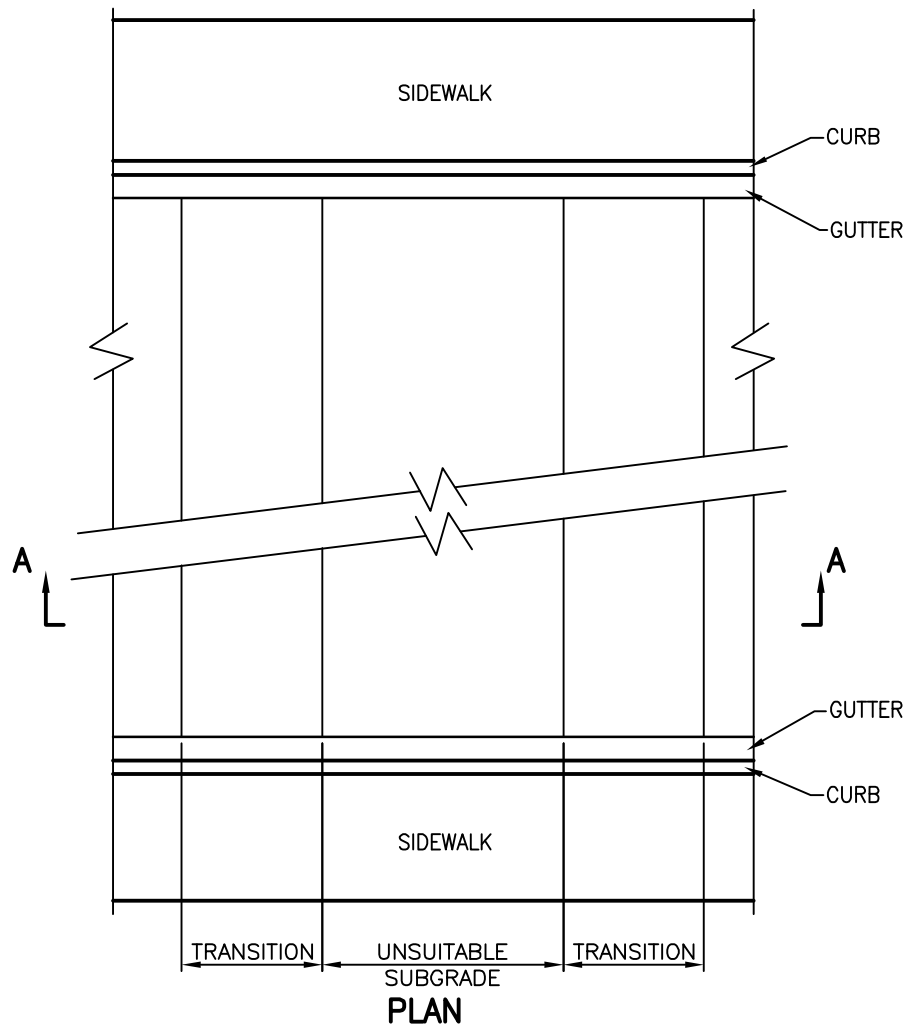
DESIGN GUIDELINE DRAWINGS
Roadway Design

LANE TURN AROUNDS

DRAWING NO.

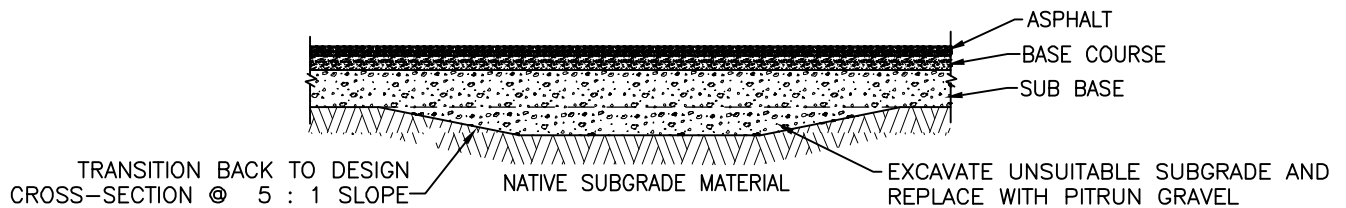
6-27

REVISION NO.



NOTES:

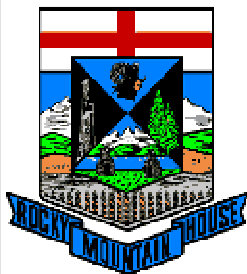
- EXCAVATE FROM LIP OF GUTTER TO LIP OF GUTTER
- IF UNSUITABLE SUBGRADE IS ENCOUNTERED.
- VERTICAL CUT AT LIP OF GUTTER.



SECTION A-A

File Name: 6-28-UNSUITABLE SUBGRADE REPLACEMENT.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

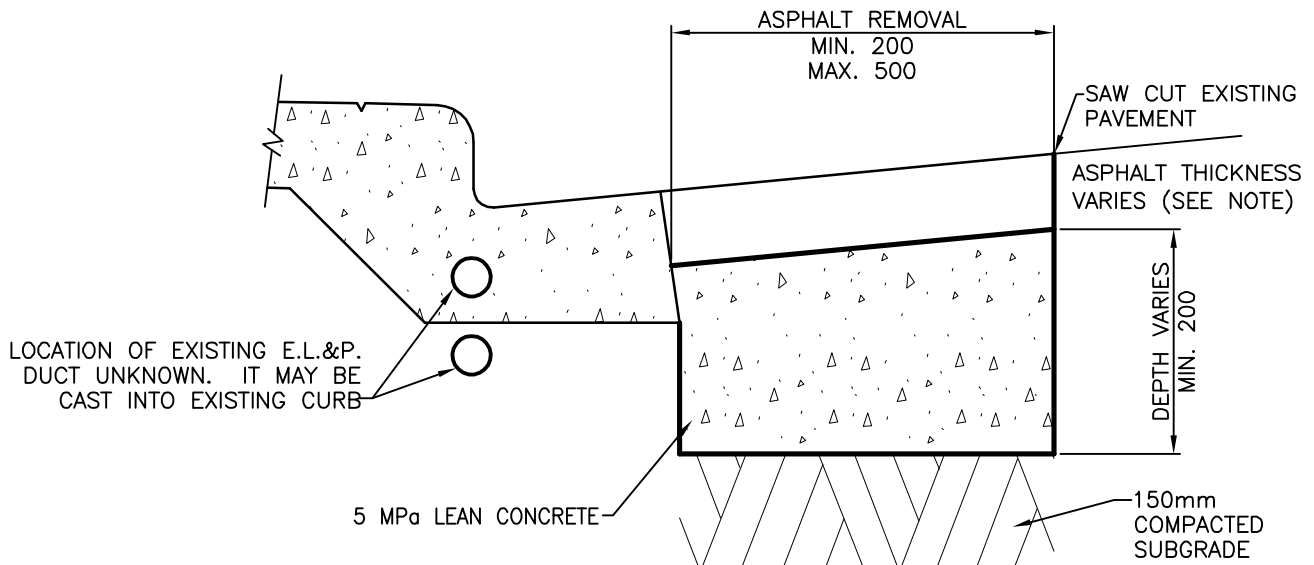
DESIGN GUIDELINE DRAWINGS
Roadway Design

TYPICAL SECTION
FOR REPLACING
UNSUITABLE SUBGRADE

DRAWING NO.

6-28

REVISION NO.

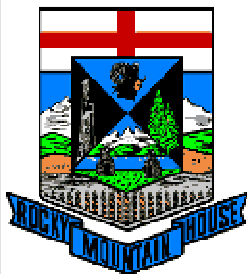


NOTES:

- REMOVE ASPHALT, BASE COURSE AND RE-COMPACT SUBGRADE.
- BACKFILL AREA BETWEEN LIP OF GUTTER AND EDGE OF ASPHALT WITH LEAN CONCRETE SLURRY MIX.
- PLACE SLURRY MIX TO MATCH UNDERSIDE OF THE EXISTING ASPHALT OR TO A MAXIMUM DEPTH OF 75mm BELOW THE LIP OF GUTTER.

File Name: 6-29-ASPALT REPLACEMENT ADJACENT TO C&G.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

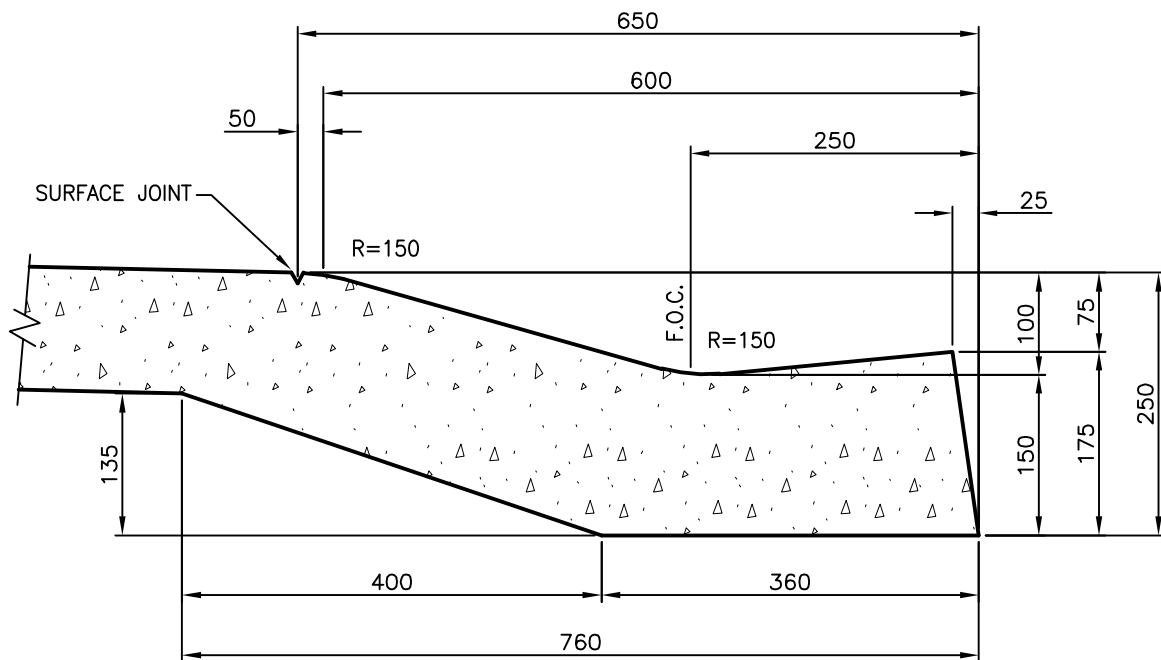
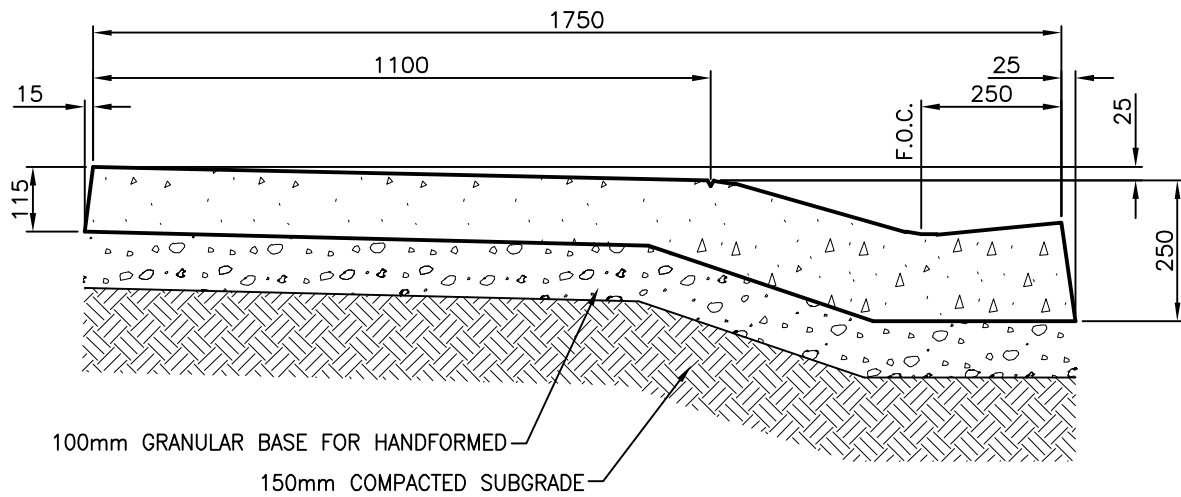
DESIGN GUIDELINE DRAWINGS
Roadway Design

PAVEMENT REMOVAL AND
REPLACEMENT ADJACENT
TO EXISTING CURB

DRAWING NO.

6-29

REVISION NO.



NOTES:

- 27.5 MPa CONCRETE
- REINFORCE WITH 10M AT 300mm ON CENTER WHERE SPECIFIED
- GRANULAR BASE REFERS TO 16mm CRUSHED GRAVEL OR APPROVED EQUAL
- BATTER NOT REQUIRED FOR HANDFORMED

File Name: 7-01-1.5m ROLLED MONOWALK.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

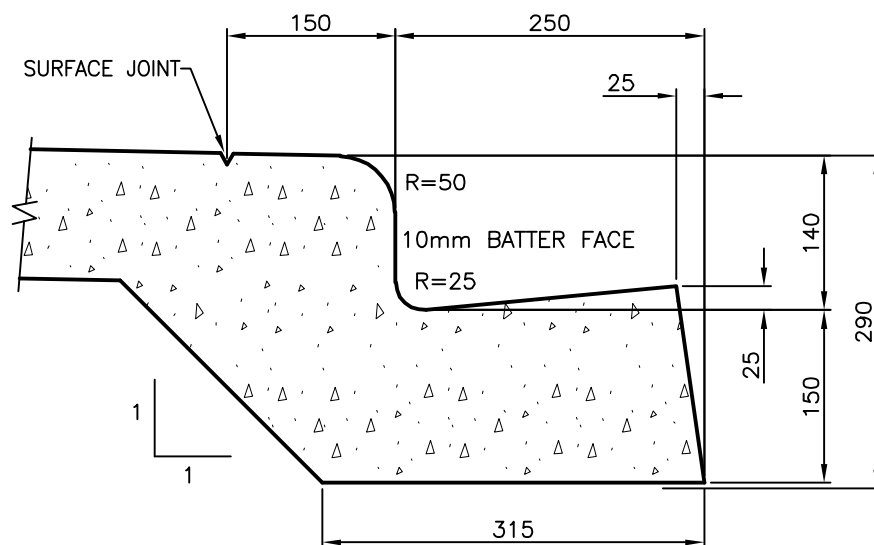
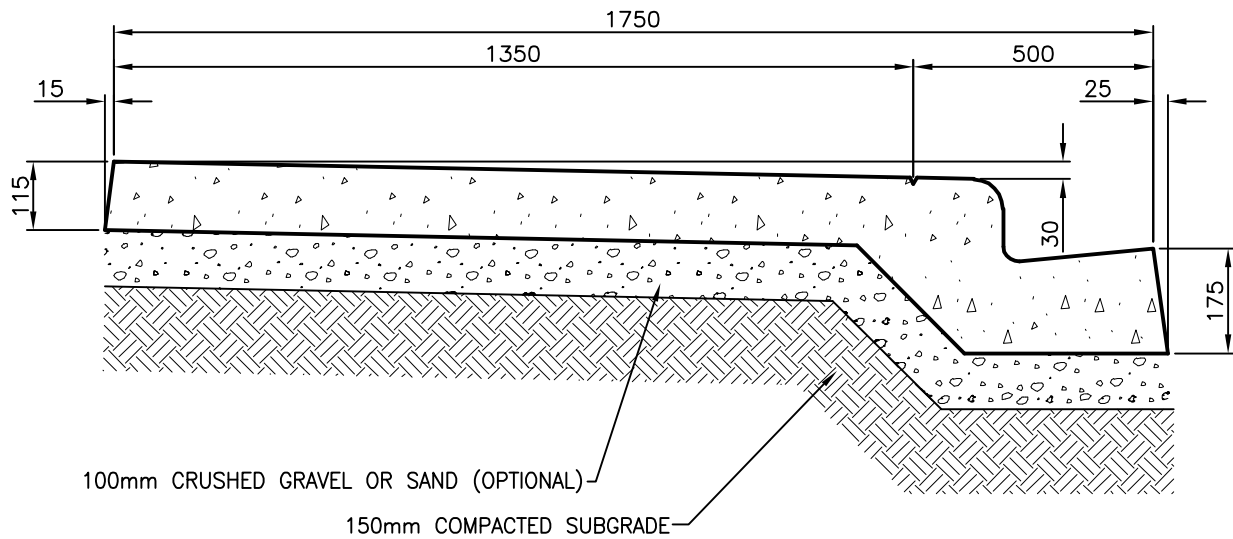
DESIGN GUIDELINES DRAWINGS CONCRETE WORK

1.5m ROLLED MONOLITHIC SIDEWALK

DRAWING NO.

7-01

REVISION NO.

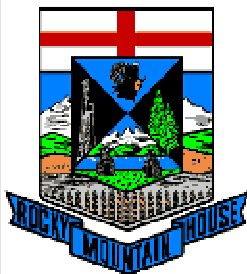


NOTE:

- 27.5 MPa CONCRETE
- ALL DIMENSIONS NOMINAL
- BATTER NOT REQUIRED FOR HANDFORMED

File Name: 7-02-1.5m STANDARD MONOWALK.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

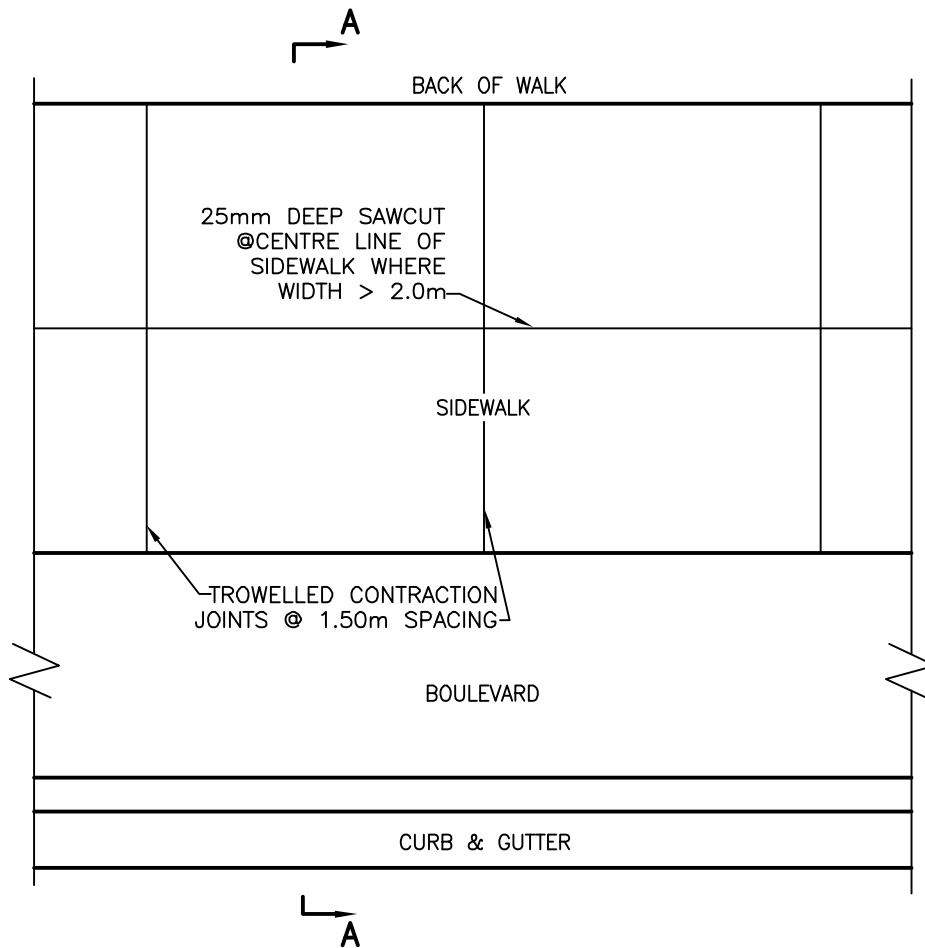
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

**1.5m STANDARD
MONOLITHIC SIDEWALK**

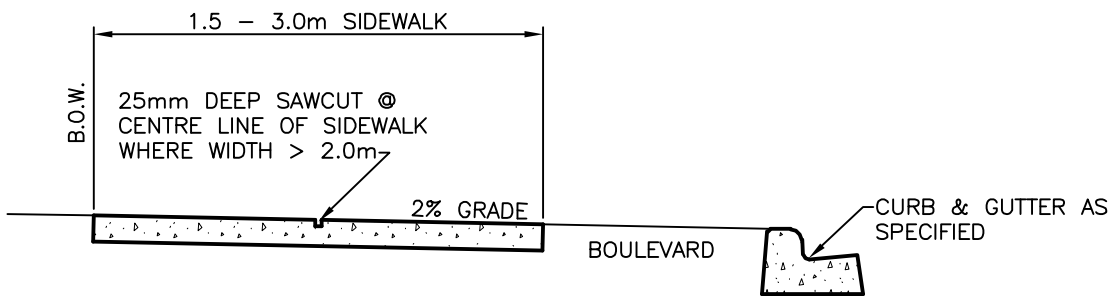
DRAWING NO.

7-02

REVISION NO.



PLAN



SECTION A-A

File Name: 7-03-SEPARATE SIDEWALK.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

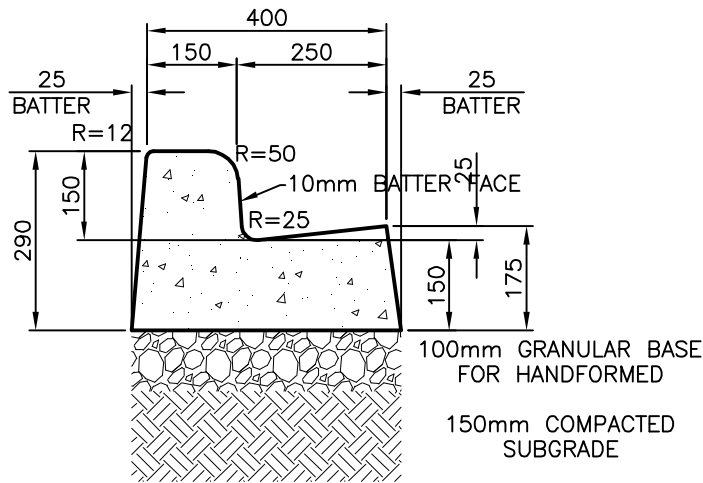
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

1.5-3.0m SEPARATE
SIDEWALK WITH SEAPARATE
CURB AND GUTTER

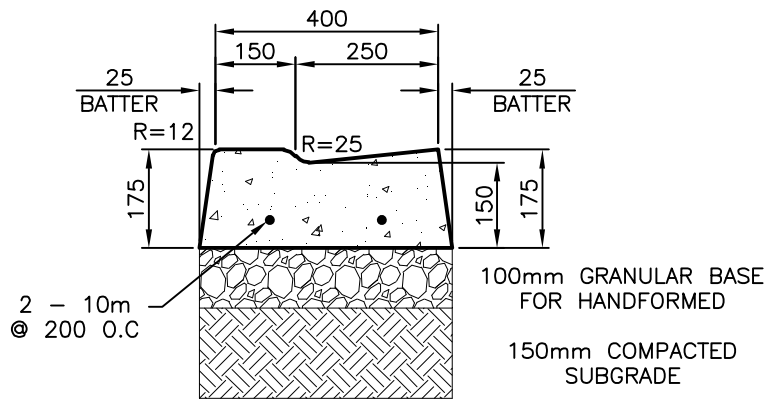
DRAWING NO.

7-03

REVISION NO.



EXTRUDED STANDARD CURB & GUTTER



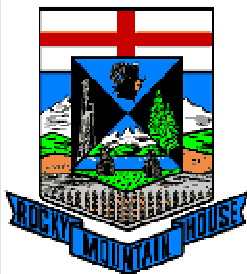
EXTRUDED STANDARD CURB & GUTTER CROSSINGS

NOTES:

- 27.5 MPa CONCRETE
- BACK OF CURB & GUTTER TO BE BACKFILLED WITH APPROVED MATERIAL COMPACTED TO 150mm BELOW TOP OF CURB
- LANE CROSSINGS TO BE REINFORCED
- GRANULAR BASE REFERS TO 16mm CRUSHED GRAVEL OR APPROVED EQUAL
- BATTER NOT REQUIRED FOR HANDFORMED

File Name: 7-04-250_500 STANDARD C&G.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

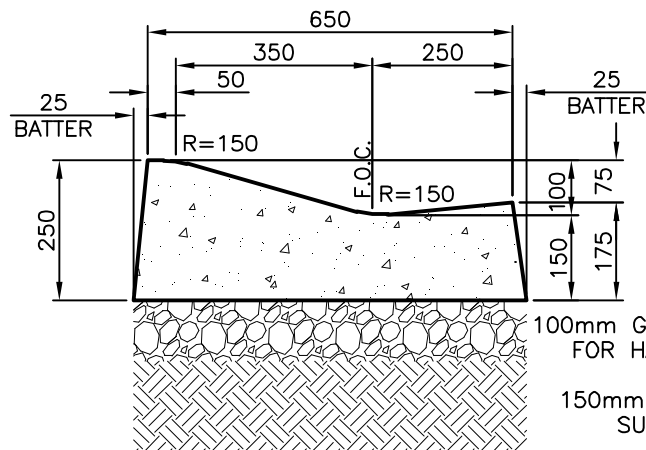
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

250/500mm STANDARD
CURB & GUTTER &
REINFORCED CROSSINGS

DRAWING NO.

7-04

REVISION NO.



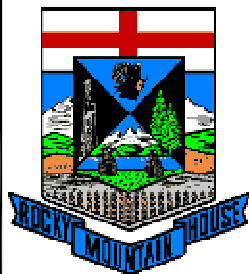
250 ROLLED CURB AND GUTTER

NOTES:

- 27.5 MPa CONCRETE
- BACK OF CURB & GUTTER TO BE BACKFILLED WITH APPROVED MATERIAL COMPACTED TO 150mm BELOW TOP OF CURB
- GRANULAR BASE REFERS TO 16mm CRUSHED GRAVEL OR APPROVED EQUAL
- BATTER NOT REQUIRED FOR HANDFORMED

File Name: 7-05-250 ROLLED C&G.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

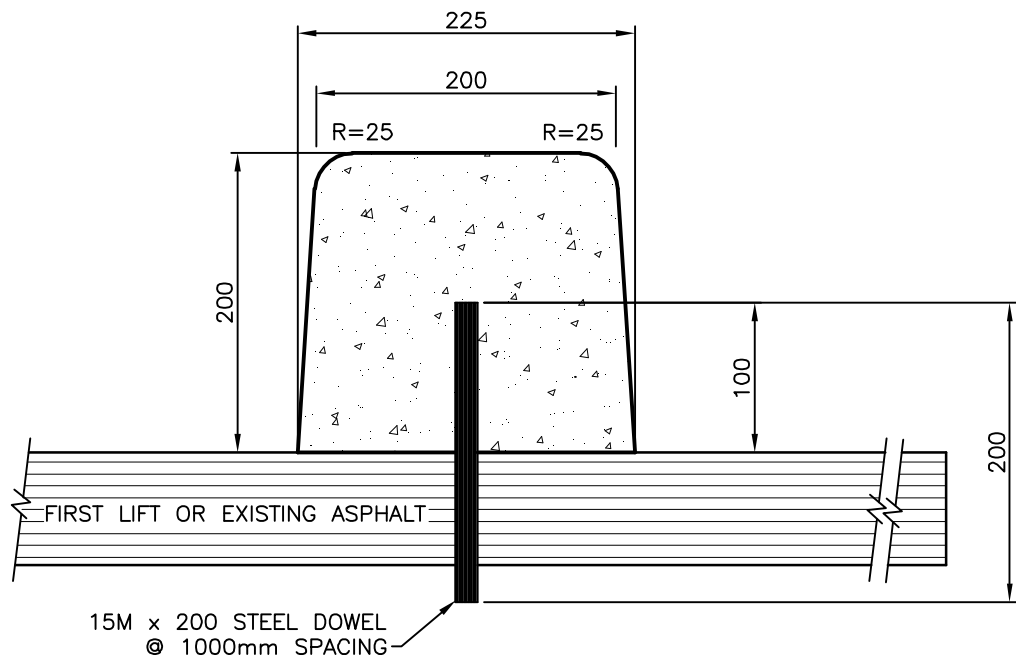
DESIGN GUIDELINES DRAWINGS CONCRETE WORK

250mm ROLLED CURB & GUTTER

DRAWING NO.

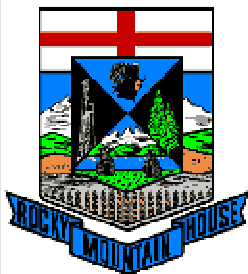
7-05

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File Name: 7-06-PINNED CURB.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

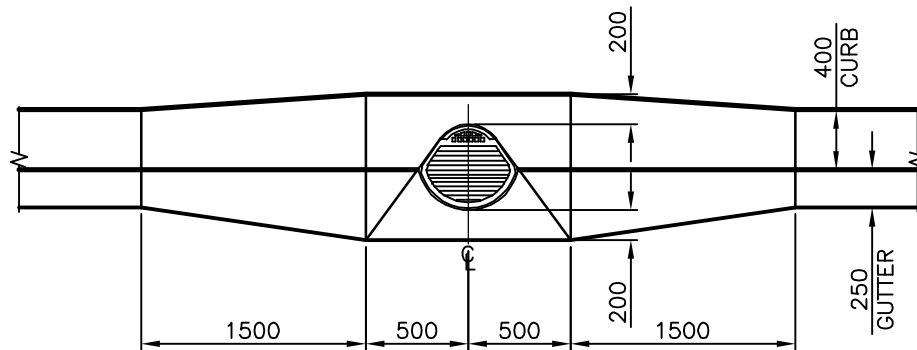
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

PINNED CONCRETE CURB

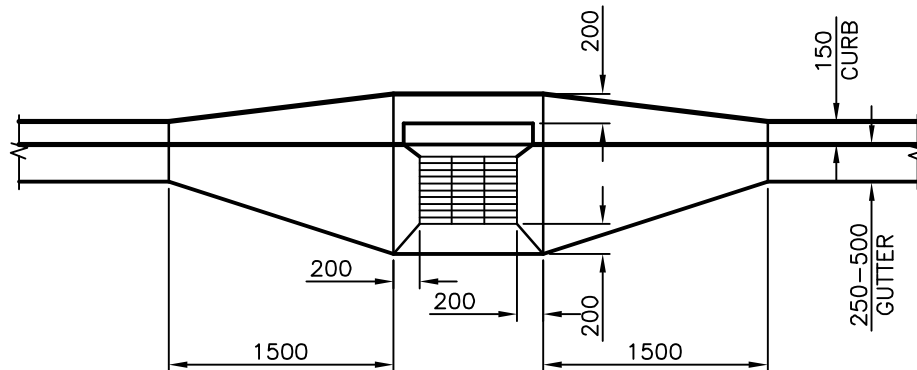
DRAWING NO.

7-06

REVISION NO.



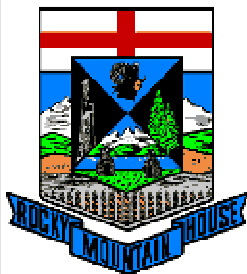
F - 33 CATCH BASIN / ROLLED CURB AND GUTTER



K - 1 CATCH BASIN / STANDARD CURB AND GUTTER

File Name: 7-07-1.5m ROLLED MONOWALK.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

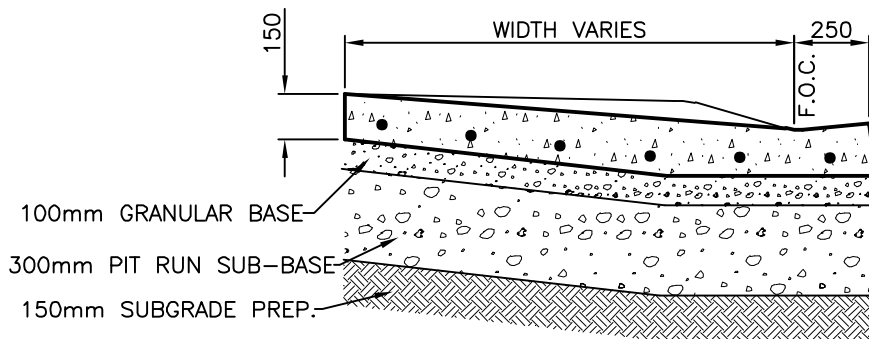
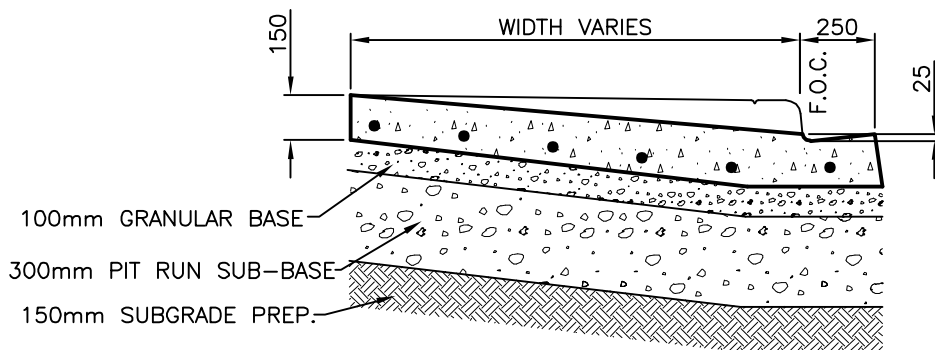
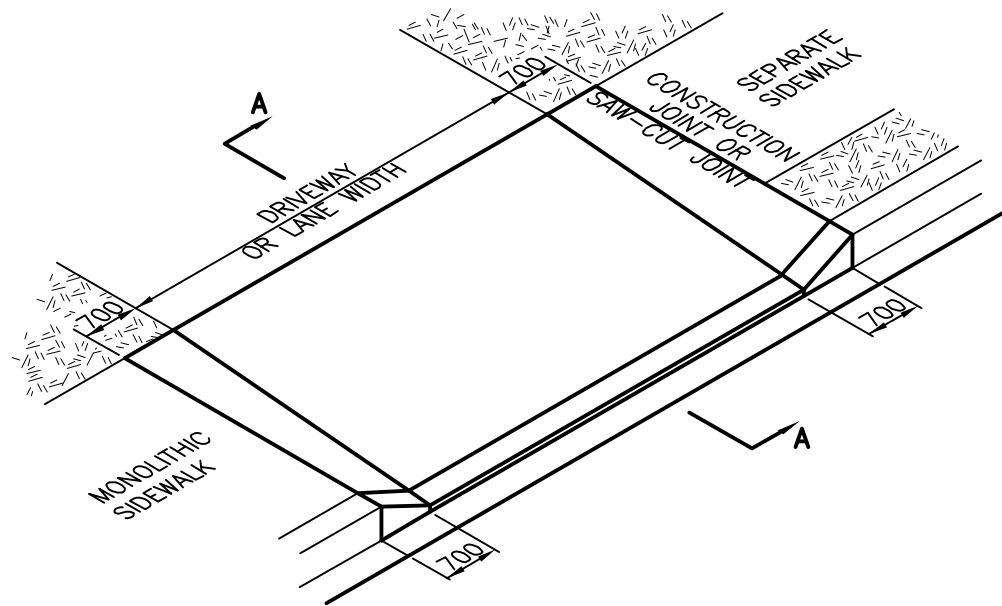
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

CURB AND GUTTER WIDENING
FOR F-33, K-1
CATCH BASIN INSTALLATION

DRAWING NO.

7-07

REVISION NO.

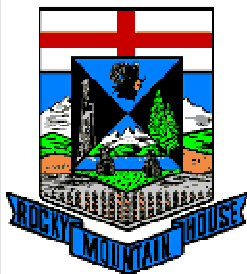


NOTES:

- 27.5 MPa CONCRETE
- ALL DIMENSIONS NOMINAL
- REINFORCING STEEL TO BE 10M @ 300mm O.C.
- ALL LANE AND DRIVEWAY CROSSINGS ARE TO BE REINFORCED
- PRIVATE DRIVEWAYS ARE NOT REINFORCED
- GRANULAR BASE REFERS TO 16mm CRUSHED GRAVEL OR APPROVED EQUAL

File Name: 7-08-TYP MONOWALK CROSSING.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

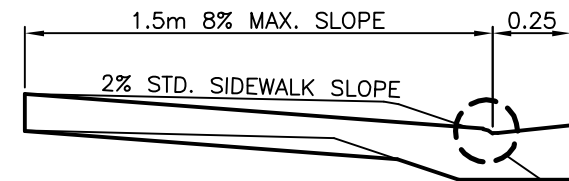
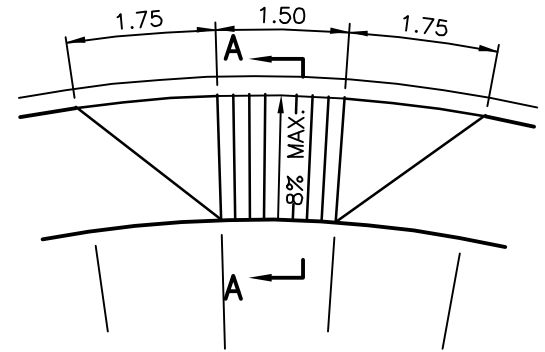
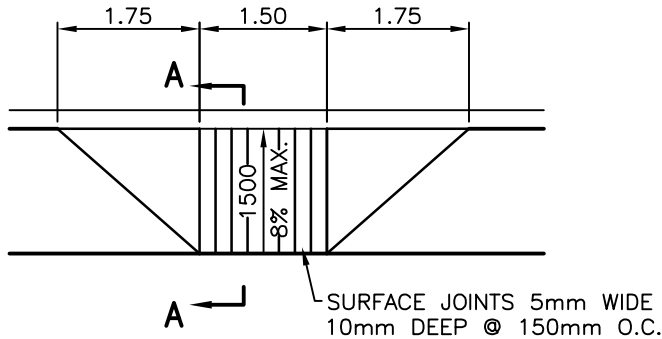
DESIGN GUIDELINES DRAWINGS CONCRETE WORK

TYPICAL MONOLITHIC SIDEWALK CROSSINGS

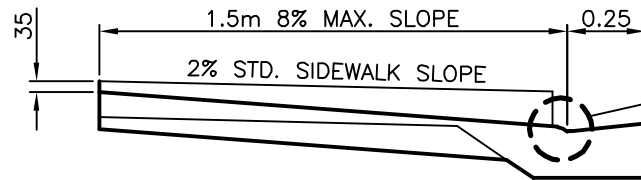
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7-08

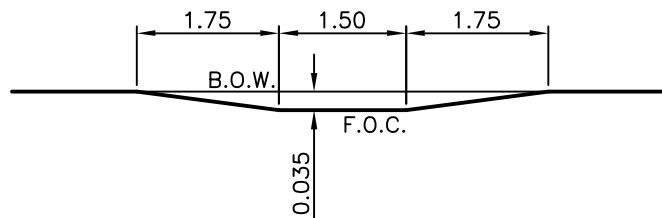
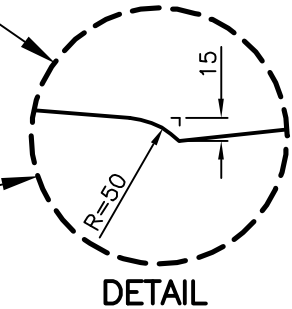
REVISION NO.



SECTION A-A
ROLLED MONOLITHIC SIDEWALK



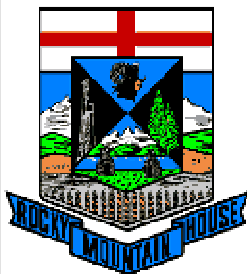
SECTION A-A
STANDARD MONOLITHIC SIDEWALK



BACK OF WALK PROFILE STANDARD
MONOLITHIC SIDEWALK

File Name: 7-09-MONOWALK PARAPLEGIC RAMP.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

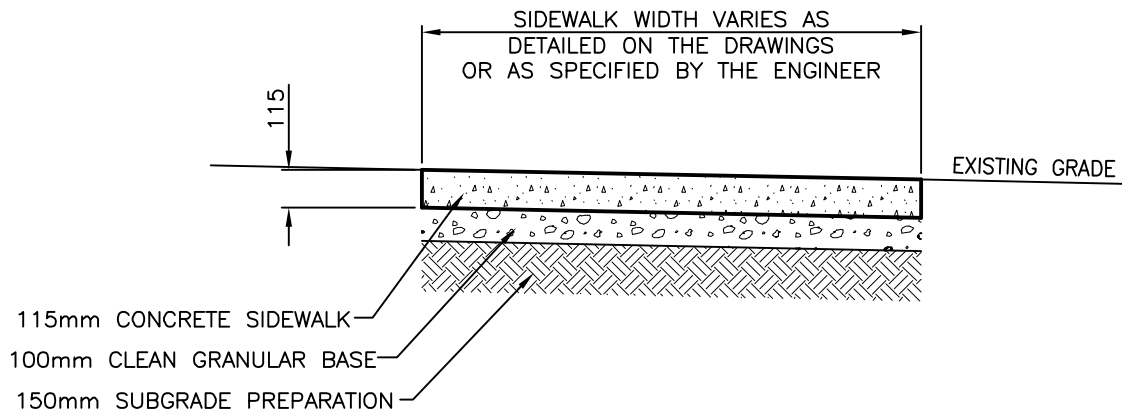
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

RESIDENTIAL
PARAPLEGIC
RAMP

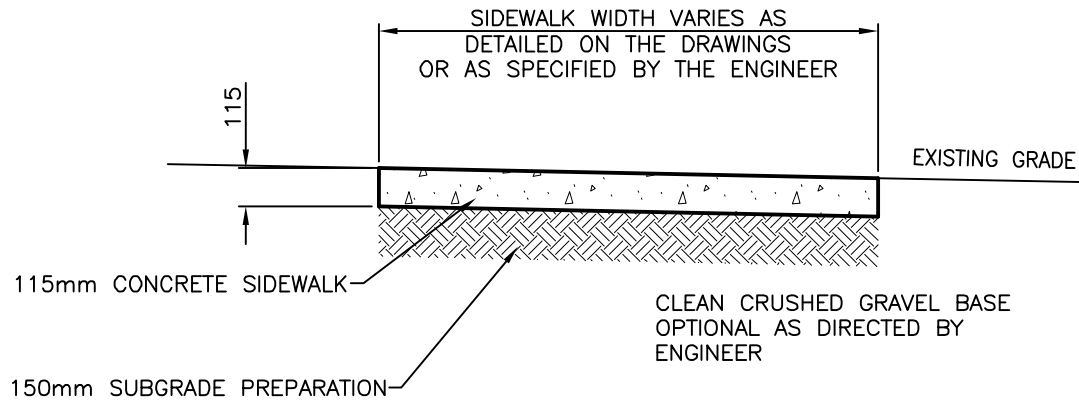
DRAWING NO.

7-09

REVISION NO.



HANDFORMED SEPERATE SIDEWALK



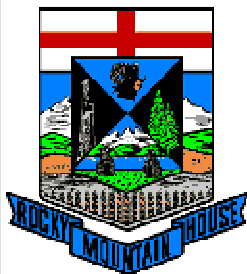
EXTRUDED SEPERATE SIDEWALK

NOTES:

- CONCRETE TO BE 27.5 MPa
- FOR COMMERCIAL SIDEWALK CROSSINGS, SLAB THICKNESS TO BE 150mm
- ALL DIMENSIONS NOMINAL

File Name: 7-10-HANDFORMED & EXTRUDED SIDEWALK.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

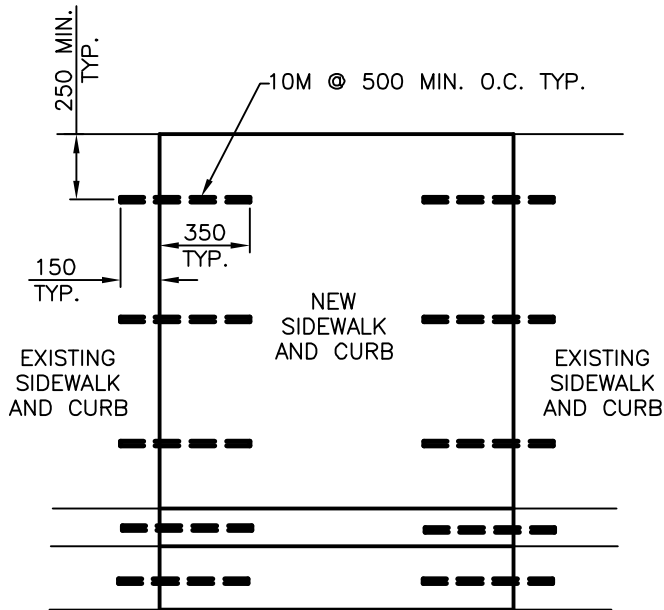
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

HANDFORMED &
EXTRUDED
SEPERATE SIDEWALK

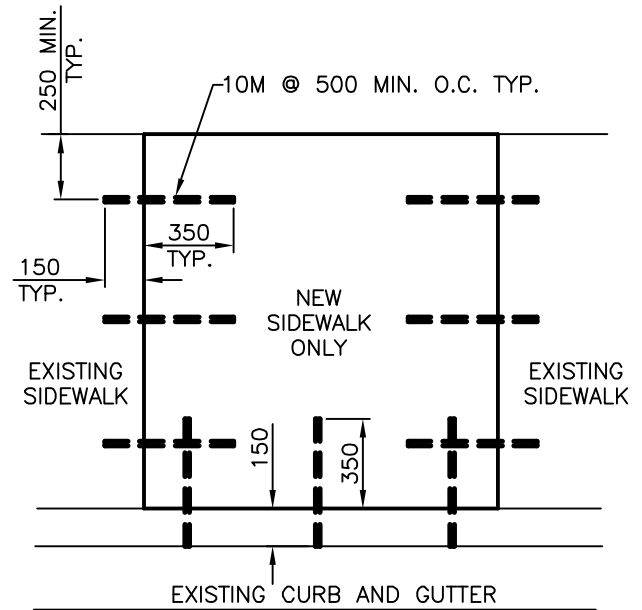
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7-10

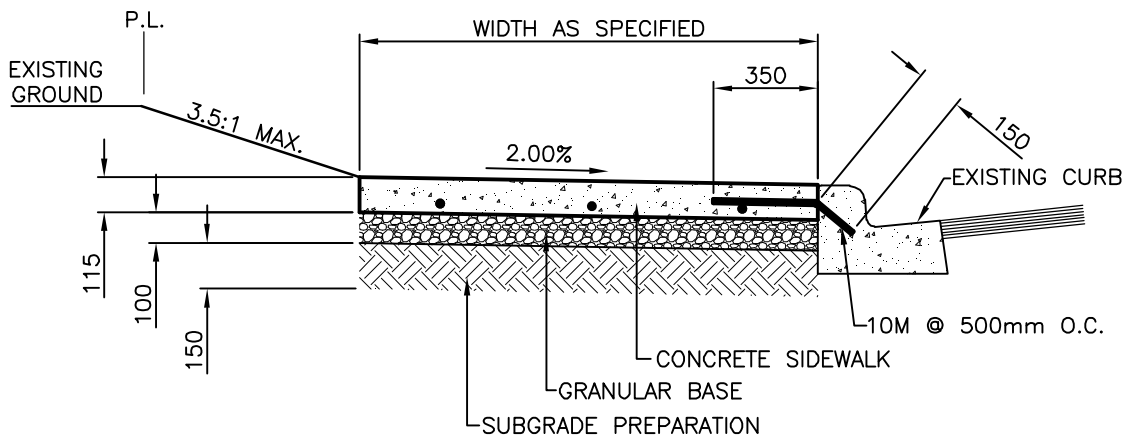
REVISION NO.



**SIDEWALK AND
CURB - GUTTER TIE-IN**



**SIDEWALK TIE-IN ONLY
(SIDEWALK FLAGGING)**



NOTES:

- CONCRETE TO BE 27.5 MPa.
- CONCRETE THICKNESS TO BE 150mm FOR COMMERCIAL SIDEWALK CROSSING.
- 50mm MINIMUM CONCRETE COVER OVER OR UNDER REINFORCING.
- REINFORCEMENT FOR CURB FLAGGING TO BE 10M @ 500mm O.C. TYP. DOWELLED 250mm INTO EXISTING SIDEWALK WITH 150mm CAST INTO NEW CURB.

File Name: 7-11-DOWELLING DETAIL FOR SIDEWALK REPLACEMENT.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

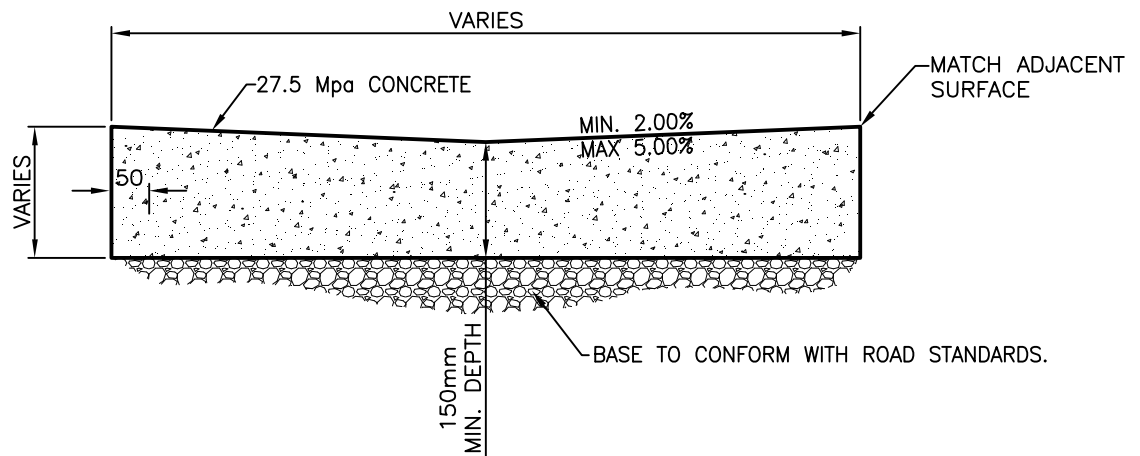
**DESIGN GUIDELINES DRAWINGS
CONCRETE WORK**

**CONCRETE DOWELLING
DETAIL FOR SIDEWALK
REPLACEMENT**

DRAWING NO.

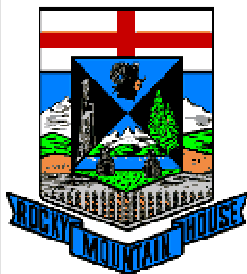
7-11

REVISION NO.



File Name: 7-12-CONCRETE SWALE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

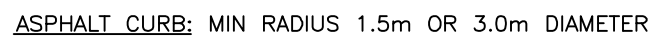
DESIGN GUIDELINES DRAWINGS
CONCRETE WORK

HANDFORMED CONCRETE SWALE

DRAWING NO.

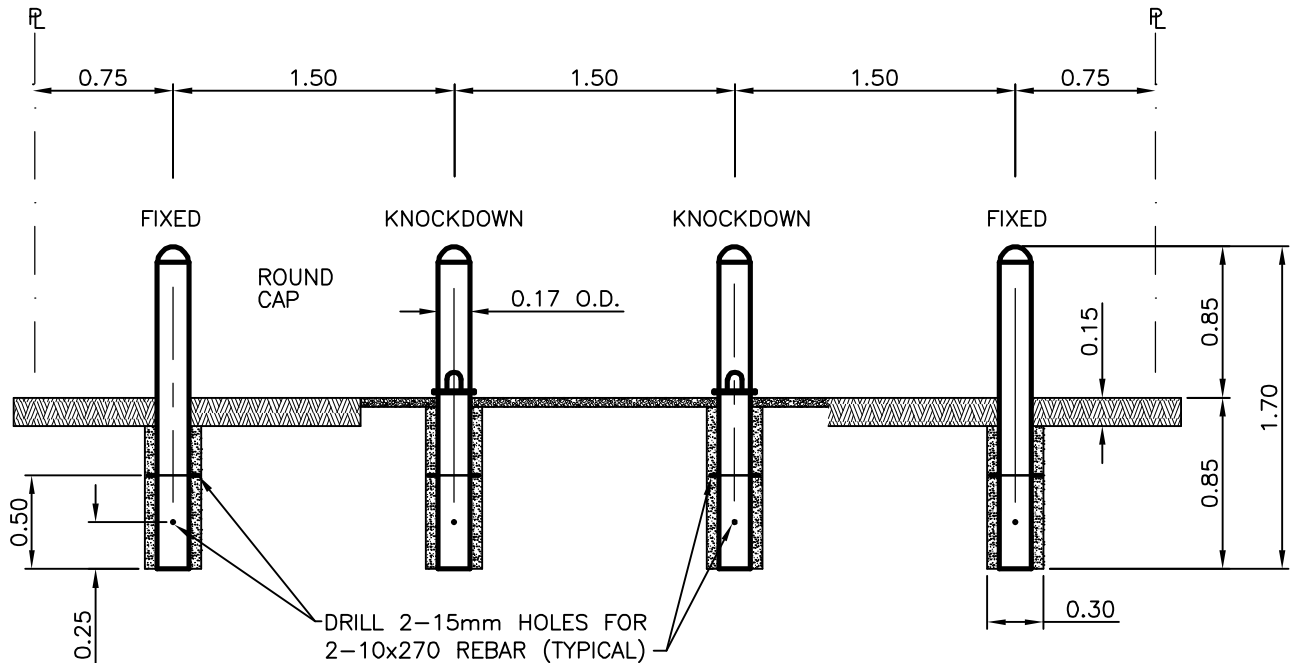
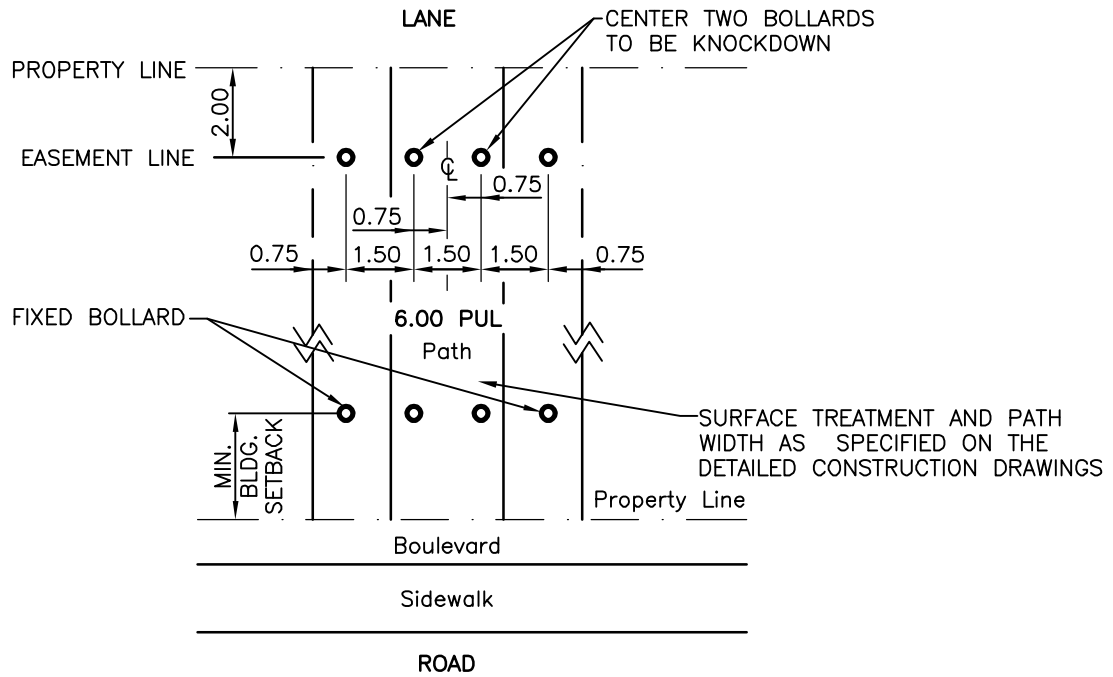
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REVISION NO.



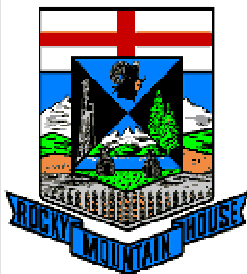
- MINIMUM RADIUS FOR ASPHALT CURB PAVER IS 1.0m. IF SMALLER RADIUS REQUIRED ESU SQUARE CORNERS

[illegible]



File Name: 8-01-FIXED AND KNOCKDOWN BOLLARDS.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Landscaping Design

FIXED AND KNOCKDOWN BOLLARDS

DRAWING NO.

8-01

REVISION NO.

