



DESIGN GUIDELINES

MAY 2011

The Design Guidelines Manual provides information regarding Town of Blackfalds Standards governing the subdivision design, servicing standards, the design and construction approval process, and the as-constructed drawing submission requirements. The Infrastructure and Property Services Department's requirements alone do not constitute the only conditions of Development in the Town of Blackfalds. Planning and Development Department, Community Services and other Town Departments should be contacted to determine pertinent Development 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 Guideline 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 (e.g. soft conversions of the imperial line assignments, right of way restrictions, etc.).

This Guideline will be updated from time to time. New Guidelines will be issued from time to time.

The following is an overview of the contents of each Section of this document:

SECTION 1: GENERAL INFORMATION

Definitions, General Development Agreement information, community mailbox request information, Alberta Environmental Protection Act permits and approvals, information regarding Crossing, Proximity, Ground Disturbance and/or Encroachment Agreements, and information regarding subdivision signs.

SECTION 2: CONSTRUCTION DRAWING STANDARDS

Requirements for the preparation and submission of construction drawings, as-constructed drawings, and building grade certificates. This section also includes the requirements for the preparation and submission of Digital As-constructed Plan Drawings.

SECTION 3: ENGINEERING SERVICES

General requirements with respect to the services to be provided by a Consulting Engineer on behalf of the Developer, including sample Construction Completion Certificate (CCC) and Final Acceptance Certificate (FAC) inspection reports.

SECTION 4: NEIGHBOURHOOD AREA STRUCTURE PLAN

General requirements for the preparation of a Neighbourhood Area Structure plan with respect to street classification and layout, noise study guidelines, traffic study guidelines, servicing boundaries and constraints, utility corridors, criteria for determining the area of a Neighbourhood (Central) School/Park site, transit routes, etc.

SECTION 5: SUBDIVISION SERVICING STUDY

Requirements for the preparation and approval of site grading, servicing and roadway design for the Neighbourhood Area Structure Plan, and geotechnical report requirements.

SECTION 6: EROSION AND SEDIMENT CONTROL GUIDELINES

Specific requirements for the implementation of erosion and sediment control measures to be implemented in conjunction with site clearing and grading.

SECTION 7: SITE CLEARING AND GRADING GUIDELINES

Specific requirements for the design and implementation of the site clearing and grading.

SECTION 8: WATER DESIGN STANDARDS

Specific requirements for the design of the water system, including fire protection requirements.

SECTION 9: SANITARY DESIGN STANDARDS

Specific requirements for the design of the sanitary sewer system.

SECTION 10: STORMWATER MANAGEMENT STANDARDS

Specific requirements for the design of the stormwater system, including major drainage, minor drainage and detention/retention ponds.

SECTION 11: SERVICE CONNECTIONS STANDARDS

Specific requirements for the design of the water, sanitary and storm service connections.

SECTION 12: GAS, POWER, TELEPHONE AND CABLE TELEVISION STANDARDS

Basic information with respect to gas, telephone, and cable television services. Detailed information is available from each of the Utility Companies.

SECTION 13: ROADWAY DESIGN STANDARDS

Specific information for the design of roadways and lanes, pavement marking and traffic control signs, post and cable fencing, emergency access, roadway landscaping, and driveways.

SECTION 14: LANDSCAPING STANDARDS

Community Services requirements with respect to development and landscaping of Municipal Reserves, Neighbourhood Park Sites, and Detention Ponds.

SECTION 15: DESIGN DRAWINGS

The Design Drawings are supplemental to the various Sections and illustrate the design criteria/concepts noted in text form.

1. DEFINITIONS

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

- .1 **Town** shall mean the Corporation of the Town of Blackfalds in the Province of Alberta.
- .2 **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.
- .3 **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 and The Town's Detailed Contract Specifications.
- .4 **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.
- .5 **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.
- .6 **Development** shall mean the area to be serviced, as determined by the Developer.
- .7 **Development Agreement** shall be the document prepared by The Town specifying legal, administrative, and technical requirements of the Developer.
- .8 **Ecological Profile** means a report prepared by the Community Services which identifies all natural features (treed and wetland areas) located on undeveloped land in the Town and rates them for preservation purposes.
- .9 **Electrical Specifications** shall mean Fortis, Light, and Power Construction Specifications to which the power and lighting portions of the Municipal Improvements must conform.
- .10 **Director** shall mean the Director of Infrastructure and Property Services or his authorized Representative.
- .11 **Level One Landscaping** means the work included in preparing the site to specified grades, placing and levelling topsoil, seeding to grass, establishing turf, planting shrubs, trees, or other plant amenities, all in accordance with The Town's current Design Guidelines and Standard Specifications.

- .12 **Level Two Landscaping** means the work included in supplying and installing various park facilities and/or amenities (e.g. Trails, trail directional signs, playground equipment, bollards, post and cable fencing, site furnishings, etc.), all in accordance with The Town's current Design Guidelines and Standards Specifications.
- .13 **Level Three Landscaping** means the work included in supplying and installing optional/enhanced amenities (e.g. Ornamental structures, sculptures, feature walls, water features, fountains, spray pools, enhanced plantings, etc.) all in accordance with The Town's current Design Guidelines.
- .14 **Municipal Improvements** shall mean all improvements within the Development, including, but not restricted to:
- .1 paved roadways, including pavement marking;
 - .2 sidewalk, para ramps, 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 (e.g. playground equipment, benches, etc.); and;
 - .10 traffic control, street name, subdivision information (including updates) signs.
- .15 **Professional Engineer** shall mean a licensed member of The Association of Professional Engineers, Geologists, and Geophysicists of Alberta;
- .16 **Public Sector Accounting Board (PSB)** is requiring all municipalities to develop an Asset Management Plan. In preparation, the *Town of Blackfalds* is requiring all Developers to provide As-constructed costs for all infrastructure. This will be a required submission for all Construction Completion Certificates.
- .17 **TAC** refers to the Transportation Association of Canada.

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, along with all related Town of Blackfalds current Bylaws and any and all current documentation as determined by the Town at the time of the Development permit including all financial, construction, maintenance, and security requirements of the Developer.

Following the approval of the preliminary Construction Drawings, the Developer shall request, in writing, that the Town of Blackfald's Planning and Development Department proceed with the preparation of the Development Agreement. Included at the end of this Section, as Figure 1, is a flow chart that illustrates the Development Agreement process.

Note: Development Agreements will not be issued until all Servicing Study issues, including clearing, topsoil stripping, site grading, erosion control measures and sediment control measures have been approved by the Director and copies of all relevant drawings and reports as listed in "Section 5 – Neighbourhood Servicing Study and Associated Reports" have been provided to The Town.

See Section 6 – Erosion and Sediment Control Measures and section 7 – Site Clearing and Grading Guidelines for additional requirements.

Revisions to the Servicing Study must be provided when the Neighbourhood Area Structure Plan revisions (i.e. roadway realignment, land use revision, etc.) are approved. Further Development Agreements will not be issued until the revised Servicing Study drawings and/or reports are submitted and approved.

2.2 Development Agreement Processing Schedule

The time required to process a Development Agreement varies, depending on the number of approvals required, complexity of the Development, timely submission of documentation required for the calculation of costs, and other factors. Included at the end of this Section, as Figure 2, is a bar chart that illustrates the average time required to process a Development Agreement.

2.3 Power, Gas, Telephone and Cable TV Alignment and Utility Right of Way Approvals

The Developer is responsible for coordinating the location of the power, gas, telephone and cable TV, including obtaining alignment and utility right of way approvals. The location of the shallow utilities at front of property must be confirmed to ensure that all of the required utility right of ways are shown on the Utility Right of Way Plan before it is submitted to Land Titles for registration. The Legal Plan and the Utility Right of Way Plan, together with the Utility Right of Way Agreements, are released for registration when the Development Agreement has been signed by Developer and the Town.

Shallow Utility drawing requirements are included in Section 2 - Clause 3.10. The procedure for the preparation, submission and approval of shallow utility

alignments is included in Section 12. It is the consultant's responsibility to provide the required digital base plans and EL&P alignments to the other utility companies.

The Consultant should prepare a form letter, similar to the Sample Letter included as Appendix D at the end of this Section that could be signed by the Utility company representative.

2.4 Submissions

.1 Construction Drawings and Specifications

The Developer shall provide the following information to the Town of *Blackfalds* Infrastructure and Property Services Department 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 City of Red Deer Contract Specifications.
- .3 Geotechnical Report (three copies) providing the information listed in Section 5.

The initial review of the construction drawings will identify such cost items as cost recoveries for area, boundary and/or oversize improvements, and revisions to drawings affecting pavement marking and signage costs, connections to existing mains, future cost recoveries, etc.

.2 Initial Development Agreement Submissions

The Developer shall provide the following information to the Town of Blackfalds Planning and Development Department, along with their initial request for preparation of the Development Agreement.

- .1 Name and address of Developer
- .2 Copy of Legal Plan (Scale 1:1000) showing the following information:
 - .1 Total subdivision area,
 - .2 Legal description and area for each MR parcel,
 - .3 Legal description and area of any non-developable lands (i.e. addition to any expressway and/or arterial road right of ways, high pressure gas main right of way, power transmission right of way, environmental reserve parcels, etc.).

- .3 Letter from the Town of Blackfalds outlining the Conditions of Subdivision set by the Planning and Development Manager, including any money due in place of reserve dedication. The land value for money in place of reserve dedication will be determined by the Planning and Development Department.
- .4 Cost estimates for the following Municipal Improvements, when applicable:
 - .1 Power distribution and street lighting costs,
 - .2 Cost estimate for Pavement including base course, asphalt and construction cost of line painting,
 - .3 Cost estimate for Water and Wastewater Services contribution,
 - .4 Municipal Improvement Cost Recoveries (Area, Boundary and/or Oversize improvement costs).

Note: Separate cost estimates must be provided if recoveries are to be paid to two or more previous Developers. Estimate to be based on as-constructed quantities and current contract prices.
 - .5 Cost estimate to construct Subdivision Entrance Sign(s),
 - .6 Wall Surface Area and Estimated Construction Cost of any Sound Attenuation Walls,
 - .7 Cost estimate to construct Level Three Landscaping – Enhanced Amenities (i.e. decorative cairns, fencing on Town Lands, etc.),
 - .8 The following information that will be used to calculate Stormwater Retention (Wet) Pond maintenance costs:
 - .1 Permanent water surface area,
 - .2 Number of water fountains and/or any other aeration equipment,
 - .3 Source of make-up water.
 - .9 Cost estimates for the construction of Trunk Main Facilities and/or Expressways and Arterial roadways by the Developer on behalf of The Town. Separate estimates for arterial roadway streetlighting and pavement marking are to be provided, if applicable.
 - .10 Cost estimates for Future Municipal Improvement

“Endeavour to Assist” Cost Recoveries (Area, Boundary and/or Oversize improvement costs).

- .11 Cost estimates for the construction of all Municipal Improvements to be constructed by the Developer as listed in Schedule G – Security Requirements of the Development Agreement. All estimates are to include an allowance for Engineering and Contingencies. Release of the Construction Completion Certificates will be based on the cost breakdown provided by the Developer. (i.e. Separate C.C.C.’s will be issued for detention pond landscaping if the costs are separated from any other landscaping costs.)

.3 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 Town of Blackfalds Infrastructure and Property Services Department.

- .1 Letters from the Shallow Utility Companies approving the proposed alignments and utility right of way plan(s).
- .2 Letter from the Town of Blackfalds Fire Chief approving proposed hydrant locations, fire flows, and fire access.
- .3 Letter from the Community Services Director granting approval of landscape plans required for the Development, prepared by the Consulting Engineer in conformance with Section 14.

- .4 Proposed Development Schedule,

Note: The proposed schedule should allow a minimum of 3 weeks following final development agreement submissions to allow for final document preparation, printing, submission of document to developer for signing, and return of documents by Developer. (See Clause 2.5)

- .5 Copy of the approved land use (zoning) plan,
- .6 Copy of the tentative legal plan,
- .7 Copy of each utility right of way plan,
- .8 Copy of the approved setback plan,
- .9 Copies of the following Alberta Environmental Protection Act documents:

- .1 Copy of “Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System”

(includes copy of Town Confirmation Letter, copy of Consultant Application Letter and copy of signed "Notice".

- .2 Copy of "Letter of Authorization for Storm Drainage Treatment Facilities", and /or
- .3 A copy of "Amendment to *Town of Blackfalds* Wastewater and Storm Drainage Permit".

(See Clause 5 for additional information regarding the noted EPEA Documents)

- .10 Copies of applicable approved Crossing, Proximity, Ground Disturbance and/or Encroachment Agreements.
- .11 Water Distribution System Flushing Drawing approved and signed by the Director of Infrastructure and Property Services,
- .12 Electrical Servicing Plans (where servicing is to be completed by a private Contractor) conforming to the requirements of Section 12 approved and signed by the Director of Infrastructure and Property Services,
- .13 Pavement Marking and Signage Drawings approved and signed by the Director of Infrastructure and Property Services,
- .14 Landscape Drawings approved and signed by the Community Services Director,
- .15 Provide computer graphic files for tentative legal plans and approved overall construction drawings. The Drawing Submission Standards are outlined in Section 2.

2.5 Performance and Maintenance Security

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

2.6 Notice to Proceed with the Construction of Municipal Improvements

The Director will issue a preliminary "Notice to Proceed" once The Town has approved all applicable documents prior to signing of the Development Agreement. **Approval to start construction is not permitted prior to the issuance of a "Notice to Proceed".**

The "Notice to Proceed" will not be issued until the Developer has arranged to do the following:

- .1 Sign, seal, and return the Development Agreement.
- .2 Pay the Developer's net initial payment amount, as indicated in

accordance with Schedule "D" of the Development Agreement.

- .3 Provide an Original Irrevocable Letter of Credit in accordance with Clause 5.1.2 of the Development Agreement.
- .4 Provide an Original Certificate of Insurance in accordance with Clause 3.22 of the Development Agreement.
- .5 Provide photocopies of the following Developer/Contractor documents for all construction contracts:
 - .1 Labour and Materials Payment Bond,
 - .2 Performance Bond,
 - .3 Certificate of Insurance with Town of Blackfalds named as Certificate Holder and additional insured.
- .6 One copy of the Development Agreement and the official "Notice to Proceed" will be sent to the Consultant once the Development Agreement has been signed by The Town.
- . Note: Canada Post will confirm the final location of the mailbox pad with the Developer and/or property owner prior to installation.

3. 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 Stormwater Drainage Systems in Alberta. Under the Environmental Protection Enhancement Act (EPEA), municipal water supply, wastewater, and stormwater 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.

4. ALBERTA ENVIRONMENT APPROVALS

4.1 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 following Acts govern construction activities: (www.environment.alberta.ca)

- .1 Environmental Protection and Enhancement Act - Chapter E-12,
- .2 Water Act - Chapter W-3.

Effective October 2003, Alberta Environment has introduced Codes of Practice for the operation of water, sanitary sewer and stormwater systems. Alberta Environment has also revised the notifications and approval procedures as noted in Clauses 5.2 and 5.3.

, The following documents are to be submitted to Alberta Environment by the Consulting Engineer on behalf of the Developer and The Town:

- .1 Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System for extension to a waterworks, wastewater or storm drainage system,
- .2 A Letter of Authorization for an amendment to *Town of Blackfalds'* Wastewater and Storm Drainage Permit.
- .3 Submission details are included in Clause 5.4 of this Section.

Effective February 2007, Alberta Environment introduced a revised edition of their "Provincial wetland Restoration/Compensation Guide", which outlines how applications will be reviewed under the **Water Act** when loss of wetland area occurs. It explains "wetland compensation"; a process to help reduce loss of wetland area by restoring drained or altered naturally occurring wetlands.

Developers and Consultants are advised to contact Alberta Environment if proposed developments contain existing wetlands and if there are changes proposed to those wetlands.

Effective February 2007, Alberta Environment introduced a revised addition of their "Provincial Wetland Restoration/compensation Guide", which outlines how applications will be reviewed under the Water Act when loss of wetland area occurs. It explains "wetland compensation"; a process to help reduce loss of wetland area by restoring drained or altered naturally occurring wetlands.

Developers and Consultants are advised to contact Alberta Environment if proposed developments contain existing wetlands and if there are changes proposed to those wetlands.

4.2 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 stormwater treatment units installed upstream of a stormwater 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.

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

4.3 Codes of Practice

The design and construction of water distribution systems, sanitary sewer collection systems and storm drainage systems is regulated by the following Codes of Practice:

- .1 For a Waterworks System Consisting Solely of a Waterworks Distribution System.

The Environmental Protection and Enhancement Act, RSA 2000, c.E-12, as amended and the Environmental Protection and Enhancement (Miscellaneous) Regulation, AR 118/93, as amended.

- .2 For Wastewater (Storm Drainage and Sewage) Systems Consisting Solely of a Wastewater Collection System

This above noted Code is made under the Environmental Protection and Enhancement Act, RSA 2000, c.E-12, as amended and the Wastewater and Storm Drainage Regulation, A.R. 119/93.

- .3 Water, Sanitary and Storm Code Submission Requirements

As specified in the above noted Codes, the Developer shall submit a “**Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System**” for the water distribution systems, sanitary sewer collection systems and storm drainage systems. A copy of the “Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System” is appended to this Section.

Detailed submission procedures are included in Clause 5.4 of this Section.

- .4 Miscellaneous Codes of Practice

The following Codes of Practice have specific submission and approval requirements. Copies of the Application Forms are appended to this Section.

- .1 Code of Practice for Outfall Structures on Water Bodies [made under the Water Act and the Water (Ministerial) Regulation],
- .2 Code of Practice for Watercourse Crossings [made under the Water Act and Water (Ministerial) Regulation],
- .3 Code of Practice for Pipelines and Telecommunications Lines Crossing Water Bodies [made under the Water Act and the Water (Ministerial) Regulation].

The Town of Blackfalds will not allow construction to proceed until copies of the required Code notices have been received and forwarded to Alberta Environment.

4.4 Submission of Applicable Letters and Forms

- .1 As noted in Clause 5.1, the Consulting Engineer is responsible for submitting the following documentation to Alberta Environment of behalf of the developer and the Town:
 - .1 Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System;
 - .2 A Letter of Authorization for an amendment to *Town of Blackfalds* Wastewater and Storm Drainage Permit.

Note that the Wastewater and Storm Drainage Permit amendment must be posted for a 30-day appeal period. The permit amendment will be issued following the appeal period.

- .2 The following procedure is to be followed in this regard:
 - .1 Submit a complete set of construction drawings to Alberta Environment for review;

Note: The Town will not approve any construction drawings until all Servicing Study issues have been approved by the Engineer and copies of all relevant drawings and reports as listed in Section 5 have been provided to The Town.
 - .2 Revise drawings, as required;
 - .3 Resubmit revised "Issued For Construction" drawings;

Note: Place a signature block similar to the following example on the Cover Sheet of the Construction Drawing Set.

Town of Blackfalds Infrastructure and Property Services Department Construction Drawing Approval	
These Construction Drawing have been reviewed and approved for construction of the noted Municipal Improvements.	
_____	_____
Director	Date

- .4 Complete and submit the application letter (See Appendix A1 – Sample Application Letter) to The Town; and
 - .5 Submit the applicable “Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System” and/or “Letter of Authorization” form(s) to the Town.
 - .6 Provide an 11” x 17” (50% reduction) copy of the approved construction drawing set for submission to Alberta Environment.
- .3 The following action will be taken by the Town and Alberta Environment:
- .1 The Town will forward the application letter, applicable Alberta Environment forms and approved construction drawings, together with *Town of Blackfalds* confirmation letter (See Appendix A2 – Sample Confirmation Letter) to Alberta Environment.
 - .2 No further action will be taken by Alberta Environment in regards to a “Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System” application. Submission of the application, notice and confirmation letter by The Town is APEA's approval of the Work.
 - .3 In regards to a “Letter of Authorization for an amendment to the *Town of Blackfalds* Wastewater and Storm Drainage Permit” application, Alberta Environment will issue a “Letter of Authorization”, including Registration Number following the 30-day appeal period.
 - .4 All of the above noted documentation must be included in the Development Agreement.

5. CROSSING, PROXIMITY, GROUND DISTURBANCE AND/OR ENCROACHMENT AGREEMENTS

6.

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.

The Developer will not be allowed to proceed with the construction of any Municipal Improvement until all approvals, if required, have been received and provided to the Town for inclusion in the Development Agreement.

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.

He shall also submit documentary evidence that such permits/approvals have been applied for at the time of his initial drawing submission to the *Town of Blackfalds*.

Applications shall be prepared as specified by the various approving agencies. The applications shall be accompanied by the following:

- .1 A covering letter outlining the type of Agreement required (crossing, proximity, ground disturbance, and/or encroachment).
- .2 All applications will be made on behalf of the *Town of Blackfalds* by the Developer.
- .3 Three copies of drawings (11" x 17" or 8 1/2" x 11") clearly marking in **RED** the location of the proposed crossing, proximity, ground disturbance, and/or encroachment. Plan/profile drawings are required for all crossings.
- .4 If an Encroachment Agreement is needed, then the applicant shall

provide a current up to date Certificate of Title.

6.3 High Pressure Gas Main Crossing

Where a permanent or temporary roadway or lane, water main, sanitary sewer main, and/or storm sewer main will cross a high pressure gas main right of way, the Developer will be required to obtain a Crossing Agreement prior to the start of construction.

Appendix C, appended to this Section, illustrates the application format.

7. ROAD CLOSURES AND DETOURS

7.1 General

The Developer must submit an application for a road closure or detour to the Director 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 at least 48 hours prior to the start of any work.

All signing must be in accordance with the *Alberta Transportation Guidelines and/or as determined by the Director*

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 Director 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 the location of the proposed crossing or detour.

8. DEVELOPER'S SUBDIVISION SIGNS

8.1 Subdivision Map Signs

Subdivision Map Signs shall be installed on collector roadways of arterial/collector roadway intersections. The signs should show the total area that uses the same prefix letter (i.e. Cottonwood Meadows Section). Subdivision

maps (or revisions to same) shall conform to Land Use Bylaw Regulations,

8.2 General Information Signs

General Information Signs shall be installed near the entrance to each new phase of Development, indicating where the public may obtain information related to:

- .1 the existing and proposed subdivision development,
- .2 information regarding proposed school location and construction,
- .3 information regarding the Neighbourhood Park Site, and
- .4 any other amenities that would be of interest to perspective homeowners.

The signs shall be similar in design to the sample "Subdivision Information Signs" included in Section 17 – Drawings and shall conform to Land Use Bylaw Regulations, Infrastructure and Property Services standards.

8.3 Neighbourhood School/Park Site Signs

Neighbourhood Park Site Information Signs shall be installed near the boundary of the Neighbourhood Park Site indicating where the public may obtain information related to the Neighbourhood Park Site development. The sign shall be similar in design to the sample "Subdivision Information Signs" included in Section 17 - Drawings.

Future school site indicating where the public may obtain information related to the future construction of a school. The sign shall be similar in design to the sample "Subdivision Information Signs" included in Section 17 - Drawings.

8.4 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 Section 17 - Drawings.

Sign locations shall be shown on the Engineering Drawings.

8.5 Street Name Signs

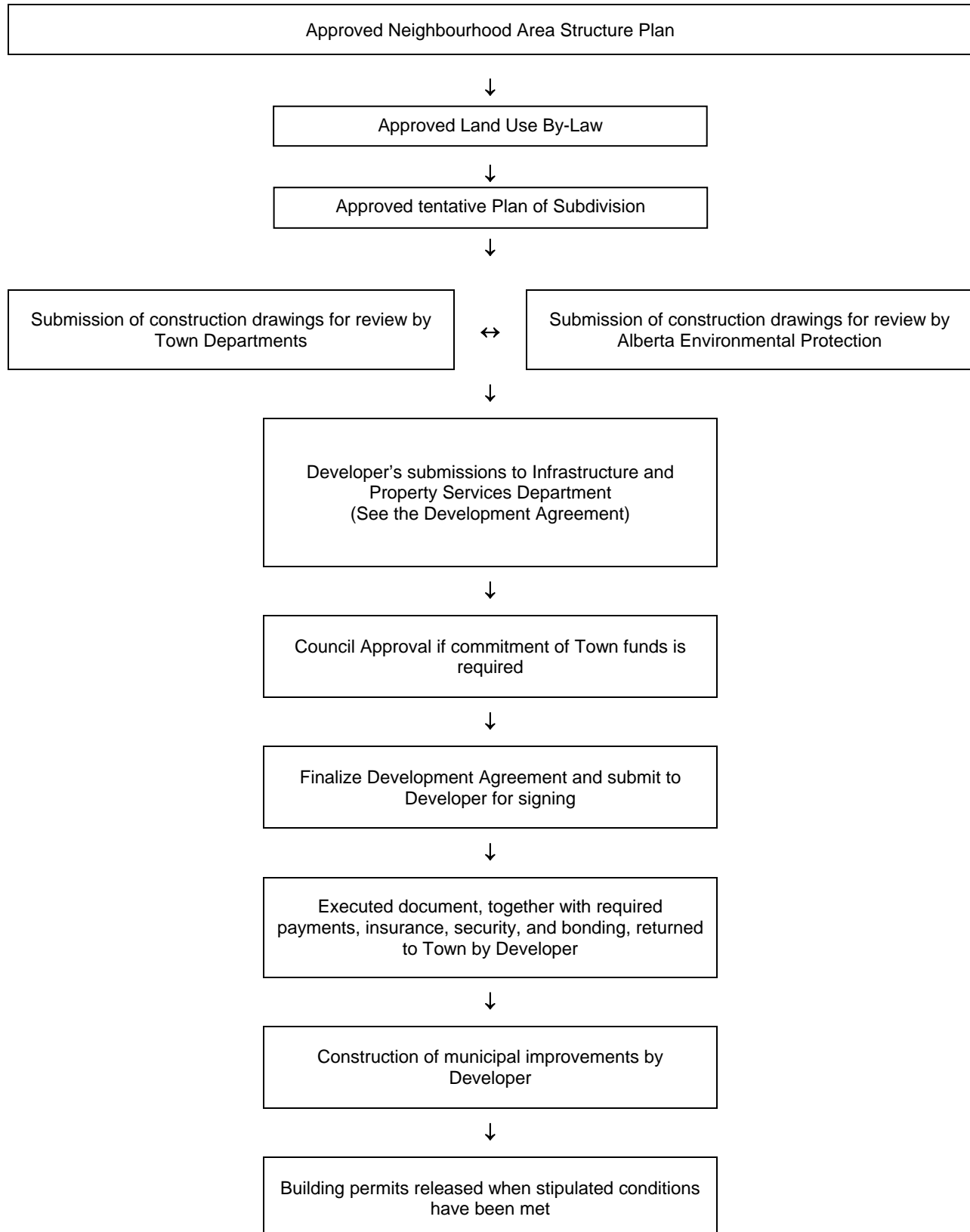
Streets name signs shall conform to Infrastructure and Property Services standards.

8.6 Subdivision Entrance Signs

When a Developer proposes to construct entrance signs to identify the new community, the following design criteria is to be used:

- .1 The proposed entrance sign should be located on public property (e.g. municipal reserve, roadway boulevard, etc.).
- .2 The sign should be located as shown in Section 17 – Drawing 6.05 and shall be in accordance with the Land Use Bylaw.
- .3 A Development Permit **is not** required for the construction of any entrance signs. The location of any entrance sign must be reviewed and approved by the Engineer.
- .4 Drawings showing the proposed sign location(s) shall be forwarded to the Infrastructure and Property Services Department prior to installing the signs for review and approval.

DEVELOPMENT AGREEMENT PROCESS





DEVELOPMENT AGREEMENT SCHEDULE

ITEM	WEEK NUMBER													
	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10
1. Approved Neighbourhood Area Structure Plan Servicing Study														
2. Approved Land Use By-law														
3. Approved Plan of Subdivision														
4. Construction Drawings														
a. Drawing Submission from Consultant														
b. Initial Drawing Review														
c. Consultant Revisions														
d. Final Drawing Review and Approval														
5. Alberta Environment														
a. Letter of Authorization for construction of Stormwater Management Facilities														
b. Notification for Construction of Water, Sanitary and Storm Mains														
6. Development Agreement														
a. Receipt of Submissions from Consultant														
b. Prepare Draft Development Agreement														
c. Submit Development Agreement to Consultant for Review														
d. Council Approval of Town Costs (See Note)														
e. Finalize Development Agreement and Submit to Developer														
7. Execution of Development Agreement by Developer														
8. Review of Insurance and Security Documents, Issue Preliminary "Notice to Proceed".														
9. Development Agreement Signed by Town, "Notice to Proceed" Issued by Town														
Note: Council approval is not required if the Standard Development Agreement is used and expenditure of Town funds has been approved in the current budget. Council approval is required if the estimated cost or contract cost exceeds the approved budget amount.														

SAMPLE APPLICATION LETTER

Date

_____, Director,
Infrastructure and Property Services Department
The Town of Blackfalds
PO Box 220
Blackfalds, AB T0M 0J0

Dear Sir:

Re: Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities or Storm Outfall – Permit Number X,

AND/OR

**Notification For Extension to a Waterworks, Wastewater, or Storm Drainage System – Permit Numbers X and X
For [Name of Developer]
[Name of Subdivision] Phase [00]
In ¼ Section - 39 - 27 - W4 in The Town of Blackfalds**

Please accept this letter on behalf of [Name of Consultant] for the above noted project. The following outlines the requested project information.

1.	Owner's Name:	"Name of Developer"
2.	Project Name:	"Subdivision Name and Phase Number"
3.	Project Type:	Construction of water mains, sanitary sewer mains, storm sewer mains, and service connections.
4.	Confirmation by Professional Engineer regarding increased flows and/or treatment capacity:	Confirmation to be provided by The Town of Blackfalds Infrastructure and Property Services Department.
5.	Construction Schedule:	Construction on this project is proposed to start on _____ and to be complete by _____.

Enclosed please find approved plans for the proposed construction and signed originals of the "Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities or Storm Outfall" and/or "Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System".

If applicable, add the following sentence:

Please note that this project does not comply with all of the Standards and Guidelines. Attached to the application is a detailed description of the deviation and, in our opinion, why the deviation is necessary.

Yours truly,

[Consultant], P. Eng.

XX/yy

Encl.

SAMPLE TOWN CONFIRMATION LETTER



Date

_____, Director
Infrastructure and Property Services
Town of Blackfalds
Box 220
Blackfalds, AB T0M 0J0

Dear Sir:

Re: Submission of Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System – Permit Numbers X and X, AND/OR Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities and/or Storm Outfall – Permit Number X For [Name of Developer] [Name of Consultant] [Name of Subdivision] Phase [00] In [NE] ¼ Section [XX] - 39 - 27 - W4 in the Town of Blackfalds

Please accept this letter on behalf of the *Town of Blackfalds* for the above noted project.

A. Submission of Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System – Permit Numbers X and X

The Town has reviewed and approved the attached construction drawing for the above noted project. We hereby confirm that the related water distribution system, wastewater (sanitary sewer) collection system and/or the stormwater drainage system construction will not exceed the design capacity of the distribution and collection systems or the capacity of the treatment facilities.

B. Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities and/or Storm Outfall – Permit Number X

The Town has reviewed and approved the attached construction drawing for the above noted project. We hereby confirm that the related stormwater management storage facility construction will not exceed the design capacity of the downstream stormwater minorsystemandreceivingwaterbody.

C. Summary

Enclosed please find the following:

- a. Copy of submission letter to *Town of Blackfalds* prepared by the above noted Consultant;
- b. Copy of "Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System" signed by the above noted Consultant.
- c. Copy of "Application for a Letter of Authorization for Storm Drainage Treatment Facilities" signed by the above noted Consultant.
- d. Plans of the proposed construction approved by the *Town of Blackfalds*.

Yours truly,

[REDACTED],

Director of Infrastructure and Property Services, Town of Blackfalds

XX/yy

Encl.

- c. Consultant

Alberta Environment Fact Sheets and Application Forms

The following listings have been provided to assist the Consultant in applying for and receiving timely approval for the construction of Municipal Improvements in a development.

1. Extending Water Distribution and Wastewater Collection System Information Requirements
2. Water Act
 - 2.1. Approvals – www.environment.alberta.ca/1632.html
 - 2.2. Licences - www.environment.alberta.ca/1633.html
 - 2.3. Application - www.environment.alberta.ca/1594.html
 - 2.4. Notification for the placement, construction, installation, maintenance, replacement or removal of a watercourse crossing or Pipeline or Telecommunications Line Crossings
www.environment.alberta.ca/1398.html
3. Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System
4. Application for a Letter of Authorization for Storm Drainage Treatment Facilities
5. Application for Shoreline/Water body Modification Under the Public Lands Act and the Water Act
www.srd.gov.ab.ca/lands/usingpublicland/shorelands/pdf/LS_102_APPLICATION_FOR_SHORE_LINE_WATER_BODY_MODIFICATION.pdf

(Includes Application for Aquatic Vegetation Control, Bank Stabilization, Beach Construction, Domestic Waterline, Erosion Protection, Outfall Construction, Permanent Boat Launch, Permanent Pier Site, Reservoir Construction, and/or Other Noted Work)



October 2003

Extending water distribution and wastewater collection systems

Information requirements

Alberta Environment Regional Offices

Northern Region
Grande Prairie
Box 24, Room 1701
Provincial Building
10320 - 99 Street
Grande Prairie AB T8V 6J4
Ph: (780) 538-5351
Fax: (780) 538-5336

Edmonton
Twin Atria
111, 4999 - 98 Avenue
Edmonton, AB T6B 2X3
Ph: (780) 427-5296
Fax: (780) 427-7824

Central Region
Stony Plain
52322 Golf Course Road
Stony Plain, AB T7Z 2K9
Ph: (780) 963-6131
Fax: (780) 963-4651

Red Deer
304, Provincial Building
4920 - 51 Street
Red Deer, AB T4N 6K8
Ph: (403) 340-7052
Fax: (403) 340-5022

Southern Region
Calgary
200, 3115 - 12 Street NE
Calgary, AB T2E 7J2
Ph: (403) 297-6582
Fax: (403) 297-5944

Lethbridge
2nd Flr, Provincial Building
200 - 5 Avenue South
Lethbridge, AB T1J 4L1
Ph: (403) 382-4254
Fax: (403) 381-5337

Approval or Registration Holders, or their authorized agents (such as developers or consultants) must provide certain information to Alberta Environment, **prior to construction**, as part of the written notice required when extending or replacing watermains, sanitary sewers and/or storm sewers.

INFORMATION THAT MUST BE PROVIDED

- ☐ The Approval or Registration number for the facility/facilities
- ☐ The location of the project (i.e. name of the municipality/development, subdivision name, street, etc)
- ☐ The type of project (i.e. water, sanitary sewer, storm sewer, etc.)
- ☐ Confirmation by a professional engineer that the increased flows associated with the extension are within the design capacity of the existing distribution or collection system
- ☐ Confirmation by a professional engineer that the additional loading as a result of the extension is within the design capacity of the system supplying treatment
- ☐ Confirmation that all aspects of the design meet Alberta Environment's *Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*
- ☐ Any other pertinent information

The Approval or Registration Holder must also meet the specific requirements of their Approval.

The Director (at Alberta Environment) must authorize any waterworks system being extended to a new development that is not serviced by a wastewater system authorized under the *Environmental Protection and Enhancement Act (EPEA)*.

The Director must be satisfied that the wastewater produced as a result of supplying water can be satisfactorily handled by other means.

Construction may proceed on projects where the Director or inspector has requested to review the plans and specifications.

IF THE DESIGN DOES NOT MEET STANDARDS

If all aspects of the design do not meet Alberta Environment's *Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*, the project **cannot proceed** until the Director has issued written authorization.

The Approval or Registration Holder must indicate why the standards cannot be met and justify the alternative proposed design.

For projects that include new storm water ponds and/or outfall(s) to a water body or drainage course, the Approval or Registration Holder must also obtain an additional authorization or registration as required by EPEA and its associated regulations.

A separate application under the *Water Act* may also be required for projects involving storm water pond(s) and/or outfall(s). Check with your regional district office of Alberta Environment.

RANDOM COMPLIANCE INSPECTIONS

As part of an ongoing compliance inspection program, Alberta Environment may conduct random, unannounced inspections of construction activity.

Extensions to water distribution and wastewater collection and storm drainage systems that do not meet Alberta Environment's *Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems* may be subject to enforcement action.

For more information, contact your regional district Alberta Environment office.

NOTIFICATION
For
EXTENSION TO A WATERWORKS, WASTEWATER, OR STORM DRAINAGE SYSTEM

Project Name _____

Location _____

Municipality _____

I acknowledge that I have reviewed the *Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*, January 2006, and certify that the design of the above noted project complies with all of the requirements specified for the construction of the water distribution, wastewater collection and storm drainage systems.

SIGNED AND STAMPED BY A PROFESSIONAL ENGINEER.

NAME

COMPANY

Designs that are found to not be in accordance with the Standards and Guidelines may result in enforcement action and/or referral to APEGGA.
For projects that do not comply with all of the Standards and Guidelines please submit a detailed explanation of the deficiency and why it is, in your professional opinion, necessary. Note that projects that do not comply with all of the Standards and Guidelines will require a Letter of Authorization.

**APPLICATION FOR A
LETTER OF AUTHORIZATION
For
STORM DRAINAGE TREATMENT FACILITIES**

Project Name _____

Location _____

Municipality _____

I acknowledge that I have reviewed the *Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*, January 2006, as well as the *Stormwater Management Guidelines for the Province of Alberta*, January 1999 and certify that the design of the above noted project complies with all of the requirements specified for the construction of the stormwater management facilities.

SIGNED AND STAMPED by a professional engineer.

NAME

COMPANY

Designs that are found to not be in accordance with the Standards and Guidelines may result in enforcement action and/or referral to APEGGA.
For projects that do not comply with all of the Standards and Guidelines please submit a detailed explanation of the deficiency and why it is, in your professional opinion, necessary.

HIGH PRESSURE GAS MAIN CROSSING APPLICATION

Date

Land and Permits, Crossings
ATCO Gas Limited
10035-105 Street
Edmonton, AB T5J 2V6

Dear Sir:

Re: Permit to Cross High Pressure Gas Main
Location Description
Quarter Section Legal Description in the Town of Blackfalds, Alberta

In accordance with the conditions of _____ Agreement_____, we are hereby forwarding on behalf of *the Town of Blackfalds* for your approval, plans and profiles for crossing and/or working adjacent to the high pressure gas main at the location shown on the attached drawings.

We propose to start construction in the vicinity of the high pressure gas main on or about "Date".

If any additional information is required regarding this application, please call " _____ " at (____) ____-____.

Yours truly,

Project Engineer
Encl.

**SAMPLE UTILITY ALIGNMENT
AND
UTILITY RIGHT OF WAY APPROVAL LETTER**

Company Address

Attention: Name of Company Representative

Re: Approval of Natural Gas, Cable Television and/or Telephone Alignments and Utility Right
of Ways For "Name of Development"

Attached is a copy of the Shallow Utility Drawing No. ____ showing the power distribution, street lighting, gas, telephone and cable television alignments and utility right of ways for the above noted development. Please review the drawing for any errors and/or omissions. Please contact _____ at (_____) _____ at your earliest convenience if you have any questions or comments in regards to the information provided.

Please sign a copy of this letter in the space provided if the alignments and utility right of ways for your facilities are shown correctly. If we have not received a reply to this letter by _____ (4 weeks from date of letter), we will assume that the alignments and utility right of ways are correctly shown on the Drawings and advise *the Town of Blackfalds* accordingly.

Thank you.

John Doe, P. Eng.

XX/yy

Att.

We have reviewed the drawing and hereby approve the alignments and utility right of ways provided for "Name of Company".

Name of Company Representative:
(Please Print)

Signed by:

Date

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:

Section 6 - Erosion and Sediment Control Measures

Section 7 - Site Clearing and Grading Guidelines

Section 8 - Water Design Standards

Section 9 - Sanitary Design Standards

Section 10 - Stormwater Management Drainage Systems

Section 11 - Service Connections Standards

Section 12 - Gas, Power, Telephone, and Cable Television Standards

Section 13 - Roadway Design Standards

Section 14 - Landscaping Standards

Section 15 - Traffic Signal and Detector Loop Installation Standards

Section 16 - Design Drawings

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 8 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. Legend

The symbols illustrated in the Appendix A - Digital As-constructed Drawing Standards are to be used on the Construction Drawings to provide consistency for the preparation of Town record drawings.

2.9. 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 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 An approved Development Permit from the Town of Blackfalds is required before clearing and grading the area.
 - .2 Identify the owners of all lands adjacent to or within the clearing and grading area,
 - .3 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,
 - .4 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,
 - .5 Any unusual site conditions,
 - .6 Existing utility rights of way (easements),
 - .7 Existing survey control stations and markers,

- .8 Existing ground contours,
- .9 Proposed ground contours,
- .10 Test hole locations and original ground elevations at test hole location,
- .11 Identify natural features that are to be preserved and/or removed,
- .12 Details of topsoil stockpiles; include height, width, length and volumes,
- .13 Location of all existing (e.g. water, sanitary sewers, storm sewers, gas, electrical, etc.),
- .14 The means by which all storm water in and from the subject lands will be controlled and disposed of, including:
 - .1 How drainage from its natural route(s) will be controlled.
 - .2 What erosion and sediment control measures are to be installed.

.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.
- .2 Areas with fills ≥ 1.2 metre are to be highlighted on the drawing(s).

3.3. Roads, Lanes, and Walkways Drawing

- .1 Street and/or Lane Name(e.g. Lane "A" if applicable). Street names must be approved by the Town's "Addressing Committee",
- .2 Cross-section designation (e.g. 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 Centreline and Face of curb curve data (radius, length of curve, tangent length and deflection angle),
- .11 Face of curb radii for all curb returns (general note acceptable),
- .12 Lane and Public Utility Lot P.I. elevations,
- .13 Lane and Public Utility Lot distance and property line grade between P.I.'s,
- .14 Direction of flow along lanes and utility lots,
- .15 Catchbasin manholes and catchbasins, including type and identification number,
- .16 Erosion and sedimentation control measures,
- .17 Reinforced lane and/or driveway crossings,
- .18 Para ramps,
- .19 Temporary access roads and/or turnarounds,
- .20 Walkways, including bollard locations,
- .21 Typical cross sections for all roadway designations,
- .22 Subdivision Entrance Signs,

3.4. Pavement Marking and Signage Drawing

- .1 Traffic Signs,
- .2 Pavement Markings,

- .3 Street Name Identification Signs,
- .4 Subdivision Information Signs,
- .5 Subdivision Map Sign,
- .6 Detention Pond Warning Signs.

Note: Place a signature block similar to the following example on the Traffic Control and Signage Drawing.

Town of Blackfalds Infrastructure and Property Services Department Traffic Control and Subdivision Sign Approval	
Traffic Section Pavement Markings Traffic Control Signage Street Name Signs <div style="display: flex; justify-content: space-between;"> <div>_____</div> <div>_____</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Director</div> <div>Date</div> </div>	
Streets and Utilities Section Subdivision Information Signs Subdivision Map Sign Detention Pond Warning Signs <div style="display: flex; justify-content: space-between;"> <div>_____</div> <div>_____</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Director</div> <div>Date</div> </div>	

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,
- .5 Valves and valve identification numbers,
- .6 Fittings.

3.6. Water Distribution Disinfection and Flushing Drawing

- .1 Show civic address for all lots.

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

Note: Place a signature block similar to the following example on the Disinfection and Flushing drawing.

<i>Town of Blackfalds</i> Infrastructure and Property Services Department Disinfection and Flushing Drawing Approval	
<hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> Director of Infrastructure and Property Services	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> Date

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– Major 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,
- .7 If applicable, a Stage, Area, Volume and Discharge Table as described in Section 5 - Clause 3.6.6.

3.9. Storm Sewer Drawing – 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,
- .8 Detention Ponds, including contours, perimeter drainage facilities, outline of playing field (if applicable), etc.
- .9 Erosion and sedimentation control measures.

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 (e.g. pedestals, cabinets, etc.),
- .3 Location of Community mailboxes, (If applicable)
- .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 Lot drainage pattern,
- .10 Location of power, telephone, and television service,
- .11 Location of hydrants, streetlights, transformers, switch gear cubicles, URD's, telephone pedestals, and cable television pedestals,
- .12 Location of community mailboxes,
- .13 Indication of areas where depth of fill exceeds 1.2 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.

Note: Place a signature block similar to the following example on the Landscape Drawing.

Town of Blackfalds Director of Community Services Landscape Design Approval	
_____ Director of Community Services	_____ Date

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 (e.g. Lane “A”),
- .2 Cross-section designation (e.g. 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 Centreline curve data (radius, length of curve, tangent length and deflection angle),
- .11 Face of curb radii, including all curb returns,

- .12 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.
- .13 L.O.G. grades for all curves,
- .14 Curb return grades,
- .15 Lane and Public Utility Lot P.I. elevations,
- .16 Lane and Public Utility Lot distance and property line grade between P.I.'s,
- .17 Direction of flow along lanes and utility lots,
- .18 Catchbasin manholes and catchbasins, including type and identification number,
- .19 Reinforced lane and/or driveway crossings,
- .20 Paraplegic ramps,
- .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 Length and grade between P.I.'s for utility mains and surface improvements,
- .4 Vertical curve information, if applicable,
- .5 Vertical alignments of manholes, valves, and hydrants,
- .6 Hydrant flange elevations,
- .7 Manhole rim and invert elevations,
- .8 Utility main lengths, sizes, materials, and gradients.

5. SUBMISSION OF PROPOSED CONSTRUCTION DRAWINGS

5.1. General

One complete set of Construction Drawings, including the Shallow Utility and Building Grade Drawings, shall be submitted to each of the following Departments for review and approval:

- .1 Infrastructure and Property Services Department,
- .2 Community Services Department,

One copy of the Traffic Control and Signage Drawing shall be submitted to the Infrastructure and Property Services Department for review and approval.

One copy of the Water Distribution Disinfection and Flushing Drawing shall be submitted to the Operations and Engineering Service Department. ?

One Copy of the Landscaping Plan shall be submitted to the Community Services Department

Upon receiving approval of the preliminary Construction Drawings, the Consulting Engineer shall submit the following:

- .4 One set of the corrected Construction Drawings marked "Issued for Construction".
- .5 Digital copy of the following Plan View Construction Drawings submitted in or AutoCAD 2010 or 2011 formats:
 - .1 Roads, Lanes, and Walkways Drawing,
 - .2 Pavement Marking and Signage Drawing,
 - .3 Water Distribution Drawing,
 - .4 Sanitary Sewer Drawing,
 - .5 Storm Sewer Drawing – Minor System,
- .6 Electrical System, if installed by a private contractor,
- .7 Landscape Drawings.

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. See Section 12 for additional information.

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 .

The Consulting Engineer shall submit revised Construction Drawings (bond or vellum media) if significant design changes are made following approval and submission of the Construction Drawings and execution of the Development Agreement. Changes include revisions to drainage boundaries, pipe sizes, pipe or roadway grades, roadway cross-sections, pavement structures and/or other significant changes. All changes are to be clouded and tagged with revision number.

The Consulting Engineer shall submit a “Change Order” in a format similar to the Contract Change Order Form included in *City of Red Deer* Contract Documents – Section 00 60 00 with the revised Construction Drawings detailing the changes.

The Director 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, digital and PDF as-constructed drawings and information as outlined in this clause.

Digital files of As-constructed Plan View Drawings must be submitted in AutoCAD DWG formats. The digital data must conform to the “Digital As-constructed Drawings Standards” as outlined in Clause 8 of this Section.

.1 As-constructed Submission Timelines

- .1 As-constructed information for each applicable Municipal Improvement shall be submitted within 3 months of the submission date of the applicable C.C.C.
2. As-constructed files for paved roadways may be submitted with the Construction Completion Certificate for curb, gutter, and sidewalk (see Clause 7.3.1) as the grades and cross section dimensions will have been established at this stage of construction allowing for the calculation of the as-constructed centreline grades, P.I. elevations and vertical curves.
3. As-constructed information for all Municipal Improvements must be received prior to the submission of the final F.A.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 Plan View Drawings for:
 - .1 Water, sanitary and storm utility,
 - .2 Digital locations of curb stops to be recorded but not submitted to The Town unless requested.
 - .3 Concrete work and gravel/paved roadways,
 - .4 Pavement Marking and traffic control signage,
 - .5 Paved lanes,
- .2 Hard copies of all plan view as-constructed drawings for the associated utility and road / lane C.C.C. application. These drawings may be printed on vellum, bond, or 3 mil Mylar media.

.3 F.A.C. As-constructed Digital Submissions

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

- .1 Digital files of As-constructed Plan View Drawings for:
 - .1 Paved roadways,
 - .2 Paved laneways,

If As-constructed files for paved roadways and paved laneways have been submitted previously with the Construction Completion Certificate and accepted they will not be required for re-submission at this stage.

.4 Hard Copy As-constructed Submissions

3 mil Mylar as-constructed drawings for all improvements, to form a complete drawing set, must be submitted at this time. If 3 mil Mylar hardcopy drawings have been previously submitted and accepted they will not be required for re-submission at this stage.

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).

.5 PDF As-constructed Submissions

As-constructed digital files of the complete drawing set (i.e. title page, index page, overall plans, plan / profile pages, details, and sections etc.) equivalent to the hardcopy set are to be submitted in a "TIF" format.

The Town will not process or release any further C.C.C's or F.A.C's and/or security reductions if any of the above staged conditions have not been met.

7.2. Site Clearing and Grading

- .1 Extent of encroachment into adjacent lands for backsloping or other purposes, if applicable,
- .2 Existing ground contours prior to topsoil stripping,
- .3 Test hole locations and original ground elevations,
- .4 As-constructed ground contours,
- .5 Details of topsoil stockpiles; include location, height, width, length and volumes,
- .6 Cut/Fill as-constructed elevations and depth of cut or fill,
- .7 Areas with fills ≥ 1.2 metre are to be highlighted on the drawing(s).

7.3. Roadways

- .1 As noted in Clause 7.1.1.2, 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 mylars (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 issued until all concrete work is complete.

- .2 Spot elevation checks should be completed following paving to verify grades, V.P.I. elevations and slope.
- .3 Confirm all centreline and face of curb (F.O.C.) radii.
- .4 Revisions to type of sidewalk and/or curb and gutter installed.
- .5 Revisions to pavement cross-section, including location of filter fabric.
- .6 Revisions to pavement markings.
- .7 If the Developer installs the traffic, street name, and information signs utilizing the services of a Private Contractor, the Developer shall complete the Sign Survey Sheet forms and procedures available from The Town's Director of Infrastructure and Property Service Department. The Town will complete the Sign Survey Sheet if the Developer retains Town Forces to install the traffic, street, and information signs.

7.4. Lanes and Public Utility Lots

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

7.5. 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 and dimensioned in two directions. 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. Digitally locate curb stops after installation. When curb stops are inspected at FAC time, curb stops not found can be easily located by the survey information.

7.6. Building Grade Plan

- .1 Revised lowest top of footing elevation (based on the higher of as-constructed sanitary or storm inverts, plus 0.85 m for lane/utility lot servicing or 0.70 m for street servicing).
- .2 Revise Back of Walk (B.O.W.) and Lane/PUL elevations if variance from design is greater than 10mm as determined in Clauses 3.2.1. and 3.2.2.
- .3 Complete a Service Location Report for each serviced lot. Included at the end of this Section, as Appendix B, is a sample report.

7.7. Subdivision Entrance Signs

- .1 Detailed Construction Drawings of the sign(s) are to be provided. Include list of materials, suppliers, colours and all necessary details on plans. 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.

7.8. Sound Fences

Detailed Construction Drawings of the fence to be provided. These drawings are to be used for future maintenance and repair of the fence. Supplier, colour, material list and necessary details to be provided on plans.

7.9. Building Grade Certificates/Building Permits

- .1 General

Prior to the issuance of a Construction Completion Certificate for service

connections (water, sanitary and/or storm), the Developer shall provide to The Town the relevant Building Grade Certificates for each lot in the Development.

As outlined in Part Three of 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, sanitary, and/or storm 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, community mailboxes, and any other surface improvements.

This information shall be provided in the form as shown on the sample drawing included in Section 16, Drawing 4.10 - New Residential Building Grade Certificate.

7.10. Completion Date

- .1 The month and year of completion of construction shall be shown on each Plan for both underground utilities and surface improvements.

8. DIGITAL AS-CONSTRUCTED DRAWING STANDARDS

8.1. Overview

The Infrastructure and Property Services Department has developed a Municipal Infrastructure Management System (MIMS) to manage the recording and distribution of road, sanitary, storm, traffic, and water as-constructed information. The IMS is comprised of digital record drawings, associated database records, and custom routines to automate the input and extraction of data. The system is based on Bentley's MicroStation products and Microsoft's Access Database.

Digital files of As-constructed Plan View Drawings must be submitted in AutoCAD DWG format. These standards are based on AutoCAD Layer format, with AutoCAD Attribute data attached to AutoCAD Blocks.

These standards will be updated and modified as engineering practices change. Any changes will be noted in this document.

8.2. Submitting Files

The following illustrates the basic steps for preparing an as-constructed file for submission.

- .1 Place the as-built data into separate files for each improvement (road, sanitary, storm, traffic, and water). Each file can only contain as-constructed information. Note any changes to the existing infrastructure (i.e. hydrant removed, main replaced, internal drop installed in manhole, etc.) on the miscellaneous level or layer. Rename the files according to the contract and improvement.
- .2 As-constructed data must conform to NAD'83 3TM coordinates or be drawn in ground units with the legal base information provided in each file on the specified level or layer. Ensure the data is represented in ground units or at a 1:1 relationship in model space. Paper space drawings will not be accepted.
- .3 Organize the data within each file to conform to the standards listed in Appendix A appended at the end of this Section.
- .4 The underground utilities require the attachment of attribute data to various features. The tag or attribute fields must be defined and contain the required values, with no units, for the various features as specified in Appendix A.
- .5 Submit a transmittal form that shows the following:

- Project Name
- Consultant
- Contract Number
- Graphic File Format (DWG or DGN)
- Version (e.g. AutoCAD R14)
- Projection (NAD83 3TM or Ground Units)

8.3. Drawing Standards

In order to ensure a smooth integration of the as-constructed data into the MIMS, the following standards must be followed. Failure to do so will result in the rejection of the file and will require the consultant to resubmit the digital as-constructed data.

Appendix A contains The Digital As-constructed Drawing Standards that specify the AutoCAD Layer, Element Type, Block Name, the Attribute Field information, placement notes and illustrations for each improvement (road, sanitary, storm, traffic, and water).

Appendix B, included at the end of this Section, contains information for creating symbols for AutoCAD systems.

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

- .1 Pipes are to be drawn as a single continuous element from feature to feature (i.e. manhole to manhole, reducer to tee, bend to hydrant). Simple lines or line strings are preferred. Multiple pipes at a manhole should all connect to the centre point of the manhole.
- .2 Flow arrows are to be placed on all pipe segments for the water, sanitary, and storm systems. The insertion point of the arrow must be placed at the downstream end of the pipe, at approximately 2.5 m back from the end of pipe (i.e. to ensure that the flow arrows on sanitary and storm sewers are located on the outer edge of the manhole symbol).
- .3 Valves are placed on top of the water pipe. The water pipe is not broken at the insertion point of the valve.
- .4 Attribute data must contain only the required values with no units (i.e. 35.0 not 35.0 m; 200 not 200 mm; 0.45 not 0.45%)
- .5 The dimension style should resemble the dimensions shown in Appendix A. Dimensioning should be dropped to primitive elements.
- .6 Blocks are to be created as shown in the "RDIMS Project Cell Library" in Appendix B. AutoCAD specifications are listed for each cell.

.7 All dimensions are to be SI metric units and to 2 decimal units.

8.4. Attribute Data

The underground utilities require the attachment of attribute data to various features. Because AutoCAD cannot attach attribute data to linear elements, the attribute data is attached to the flow arrow. Therefore, flow arrows are required on the water system. The features that require these attachments include flow arrows, manholes, hydrants, valves, and catch basins.

The required field names for each attribute set are shown on the Digital As-constructed Drawing Standards in Appendix A for each feature. Only the required values with no units are to be entered into the appropriate fields, as specified in the standards. Approved pipe material and class abbreviations for each improvement are listed on the bottom of the standards sheets.

Example: A flow arrow for a storm main having a description of “45.23 – 200 mm PVC-DR 35 @ 0.15%”, would have the following tag or attribute set:

FIELD NAME	VALUE
Size	200
Material	PVC
Length	45.23
Slope	0.15
Class	DR 35
Upperz	880.15
Lowerz	880.08

8.5. Additional Information

If you have any questions about the Digital As-constructed Drawing Standards please contact the Director of Infrastructure.

APPENDIX A


Digital As-constructed Drawing Standards



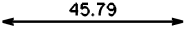




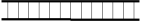
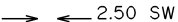
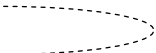

BLACKFALDS
ALBERTA

*a nice place
to grow!*

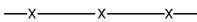






Digital As-constructed Drawing
Standards

ROADWAYS			
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name
ROAD INFORMATION			
Road Grade 36.50 @ 0.60%	R1-road_grade	text	-
PI Elevation 885.03	R1-PI_elevation	text	-
PI Point +	R1-PI_point	wblock	PI
Road Cross-Section $\begin{array}{r} 75 \\ 100 \\ 450 \end{array}$	R1-X-section <i>Asphalt / base course / pitrun. Also identify areas where filter fabric is used.</i>	text & line	-
Boulevard & Median Width → ← 3.05 BV	R1-boulevard_dim	text & wblock	DIMA
Carriage Width ↔ 12.00 ↔	R1-carriage_dim	text & wblock	DIMA
Curb Line _____	R1-curb	line	-
Curb Cut 	R1-curb_cut	line	-
Curb or Centre Radius RFC=13.00	R1-radius	text	-
Drainage Arrow →	R1-drain_arrow	wblock	DRARW
Edge of Road (no curb) - - - - -	R1-edge_of_road	dashed line	-
Standard Curb Lip of Gutter _____	R1-gutterline <i>Exaggerate gutter width by 2 times. Gutterline is not shown for rolled curb.</i>	line	-
Median Curb _____	R1-median_curb	line	-
Median Gutter Line _____	R1-median_gutter	line	-



ROADWAYS			
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name
ROAD INFORMATION			
Turning Bay Dimension 	R1-turnbay_dim	text & wblock	DIMA
Vertical Curve VC=30.00 M=0.17	R1-vertical_curv	text	-
SIDEWALKS AND TRAILS			
Back of Walk 	R2-back_of_walk	line	-
Bike Trail 	R2-trail	line	-
Bike Trail Text 2.50 ASP SW	R2-trail_text	text & wblock	DIMA
Curb Ramp 	R2-ramp	wblock	RPARA
Separate Sidewalk 	R2-sep_sidewalk	line	-
Sidewalk - Brick Inlay 	R2-sidewalk_bric	pattern/hatch	-
Sidewalk Text 	R2-sidewalk_text	text & wblock	DIMA
BARRRIERS			
Barrier Text POST & CABLE	R3-barrier_text	text	-
Berm 	R3-berm	line	-
Berm Text BERM SLOPE 3:1	R3-berm_text	text	-
Concrete Barrier 	R3-barrier_con	wblock	CBARR



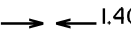




ROADWAYS			
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name
BARRRIERS			
Fence 	R3-fence	line & cell	X
Guard Rail 	R3-guard_rail	line	-
Guard Rail Post 	R3-guard_post	wblock	GRP
Guard Rail End Post 	R3-guard_endpost	wblock	GRE
Retaining Wall 	R3-retain_wall	line	-
DITCH			
Culvert 	R4-culvert	line & cell	CUL
Ditch and Swale 	R4-ditch	wblock	DIT
Ditch, Swale and Culvert Text	R4-ditch_text	text	-
MISCELLANEOUS			
Miscellaneous Graphics	R5-misc_line	line	-
Miscellaneous Text	R5-misc_text	text	-
Property Lines	X-base	line	-
<i>Registered and proposed lot lines</i>			

Ensure:







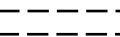



- only 2 decimal places are used.
- text is upper case, centre bottom justified and not italicized.



WATER				
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name	Attribute Field
WATER MAINS				
Pipe Description 14.56-150mm PVC-DR 18 @ 0.40%	W2-pipe_descript	text	-	-
Format: length-diameter 'mm' material-class '@' slope'%'.				
Invert Elevation 881.57	W2-invert_elev	text	-	-
Placed below the pipe. Use only 2 decimal places				
Bends, Tees & Crosses 200x150 TEE	W2-tees	text	-	-
Pipe is broken at these points. Include 'LIVE TAP' text for tapping sleeve or saddle tap.				
Curve Information R=115.00	W2-curve_info	text	-	-
Placed below the pipe and contains the radius, format 'R=15.00' . Radius is not required if the pipe follows a property line.				
Flow Arrow 	W2-flow_arrow	wblock	FLARW	size, material, length, slope, class, upperz, lowerz
Flow arrow must be place 0.5m from the low invert of the pipe.				
Grade Deflection 	W2-grade_deflect	wblock	UPI	-
Pipe is broken at these points.				
Pipe -----	W2-pipe	dashed line	-	-
Pipes are to be drawn as simple lines, line strings or polylines and can contain NO arcs. Each pipe is placed at the centre of the element. (ie. tee to tee.)				
Pipe Alignment 	W2-pipe_align	text & wblock	DIMA	-
Dimension the shortest distance.				
HYDRANTS				
Hydrant 	W1-hydrant	wblock	HYD	fieldnum
Hydrant Valve 	W1-hyd_valve	wblock	HV	-



BLACKFALDS
ALBERTA
a nice place to grow!

WATER				
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name	Attribute Field
VALVES				
Air Release Valve 	W3-air_release	wblock	ARV	fieldnum
Check Valve 	W3-check_valve	wblock	CV	fieldnum
Valve 	W3-valve	wblock	VV	fieldnum
Valve Chamber 	W3-valve_chamber	line	-	-
Valve in a Manhole 	W3-valve_in_mh	wblock	VMH	fieldnum
MISCELLANEOUS				
Encasements 	W4-encasement	wblock	ENC	-
Insulation 	W4-insulation	dashed line	-	-
Parks Service Box 	W4-ps_box	wblock	PSB	-
Plug 	W4-plug	wblock	PL	-
Reducer 	W4-reducer	wblock		
Misc Graphics	W4-misc_line	line	-	-
Misc Text	W4-misc_text	text	-	-
<i>CLASS A BEDDING', 'TEMP HYDRANT', 'EXISTING PIPE REMOVED' and other relevant information</i>				
Property Lines	X-base	line	-	-
<i>Registered and proposed lot lines</i>				



Ensure:

- flow arrows must be included so that the tag information can be added.
- flow arrows are placed 1.5m from the low invert of the pipe.
- pipes are drawn as lines, line strings or polylines.
- valves used to isolate a hydrant should shown as a hydrant valve, not a main valve.
- only 2 decimal places are used.
- pipe material and class are abbreviated as listed.
- text is upper case, centre bottom justified and not italicized.
- tag sets do not include any units or symbols (ie. mm or %).
- PVC-CL 150 pipe is labelled as PVC-DR 18

Material-Class

AC-CL 150

AC-CL 200

CI-MJ

DI-CL 50

DI-CL 51

DI-CL 52





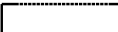
PVC-DR 18

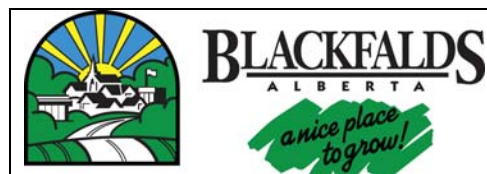
HPC 301-CL 12

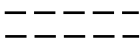


HPC 303-CL 150



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SANITARY				
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name	Attribute Field
SANITARY SEWER MAINS				
Pipe Description 82.36-450mm C76-CL 3 @ 0.50%	S2-pipe_descript	text	-	-
Format: length-diameter 'mm' material-class '@' slope'%'. 				
Invert Elevation 881.57	S2-invert_elev	text	-	-
Place text below the pipe 				
Curve Information R=115.00	S2-curve_info	text	-	-
Placed below the pipe and contains the degree, rad, delta, tangent. The information is not required when the pipe follows the property line 				
Flow Arrow 	S2-flow_arrow	wblock	FLARW	size, material, length, slope, class, upperz, lowerz
Placed on the low end of the pipe, approximately 0.5m from the end. 				
Grade Deflection 	S2-grade_deflect	wblock	UPI	-
Pipe is broken at these points 				
Pipe - . - . - . - .	S2-pipe	dashed line	-	-
Pipes are to be drawn as simple lines or linestrings (no arcs). Each pipe is placed at the centre of the element. i.e.. centre of manhole to centre of manhole. 				
Pipe Alignment 	S2-pipe_align	text & wblock	DIMA	-
Dimension the shortest distance 				
MANHOLES				
Manhole 	S1-manhole	wblock	SMH	fieldnum, rimelev
Manhole Dimension 	S1-manhole_dim	text & wblock	DIMA	-
Only required when a manhole is not aligned with an adjacent property line 				
MISCELLANEOUS				
Encasement 	S3-encasement	lines & wblock	ENC	-



SANITARY				
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name	Tag/Attribute Field
MISCELLANEOUS				
Insulation 	S3-insulation	dashed line	-	-
Lift Station 	S3-lift_station	wblock	LST	-
Plug 	S3-plug	wblock	PL	-
Misc Graphics	S3-misc_line	line	-	-
Misc Text	S3-misc_text	text	-	-
Property Lines	X-base	line	-	-
	Registered and proposed lot lines			

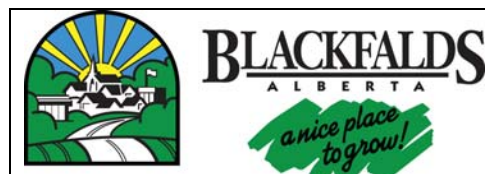
Ensure:







- flow arrows are placed 1.5m from the low invert of the pipe.
- pipes are drawn as lines, line strings or polylines.
- only 2 decimal places are used.
- pipe material and class are abbreviated as listed.
- text is upper case, centre bottom justified and not italicized.
- tag sets do not include any units or symbols (i.e.. mm or %).

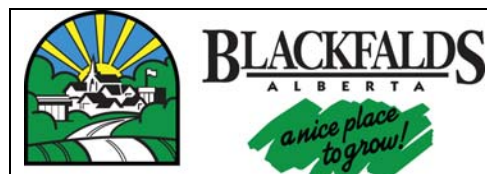
Material-Class




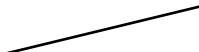
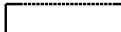
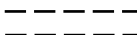


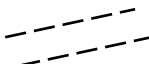

AC-XS
VCT-XS
C14-XS
C14-CL 1
C14-CL 2
C14-CL 3

PVC-DR 28
PVC-DR 35
PVC-DR 41
PVC-KF
PVC-PL
PVC-UR
PE-SER 60
C76-CL 2
C76-CL 3
C76-CL 4
C76-CL 5
C463-HDB



STORM				
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name	Attribute Field
STORM SEWER MAINS				
Pipe Description 82.36-450mm C76-CL 3 @ 0.50%	D2-pipe_descript	text	-	-
<i>Format: length-diameter'mm' material-class '@' slope'%</i>				
Invert Elevation 881.57	D2-invert_elev	text	-	-
<i>Text is placed below the pipe</i>				
Curve Information R=115.00	D2-curve_info	text	-	-
<i>Placed below the pipe and contains the degree, rad, delta, tangent. The information is not required if the pipe follows the property line.</i>				
Flow Arrow 	D2-flow_arrow	wblock	FLARW	size, material, length, slope, class, upperz, lowerz
<i>Placed once per pipe segment at the downstream end of the pipe.</i>				
Grade Deflection 	D2-grade_deflect	wblock	UPI	-
<i>Pipe is broken at these points.</i>				
Pipe 	D2-pipe	line	-	-
<i>Pipes are to be drawn as simple lines or linestrings (no arcs). Each pipe is placed at the centre of the element. ie. centre of manhole to centre of manhole.</i>				
Pipe Alignment 	D2-pipe_align	text & wblock	DIMA	-
<i>Dimension the shortest distance</i>				
MANHOLES				
Manhole 	D1-manhole	wblock	DMH	fieldnum, rimelev
Catchbasin Manhole 	D1-cb_manhole	wblock	CBMH	fieldnum, rimelev
Manhole Dimension 	D1-manhole_dim	text & wblock	DIMA	-
<i>Only required when a manhole is not aligned with an adjacent property line</i>				



STORM					
Item/ Symbol	AutoCad Layer	l	Element Type	Wblock Name	Attribute Field
CATCHBASINS					
Catchbasin – Standard 	D3-cb_standard		wblock	SCB	fieldnum
Catchbasin – Rolled 	D3-cb_rolled		wblock	RCB	fieldnum
Catchbasin Dimension 	D3-cb_dim		text & wblock	DIMA	-
	Only required when the manhole is not in alignment with an adjacent property line				
Catchbasin Lead 	D3-cb_lead		line	-	-
	Leads are drawn from the centre of manhole to the origin of the catchbasin.				
MISCELLANEOUS					
Encasement 	D4-encasement		line & wblock	ENC	-
Insulation 	D4-insulation		dashed line	-	-
Lift Station 	D4-lift_station		wblock	LST	-
Outfall 	D4-outfall		wblock	OFSTR	-
Underdrain 	D4-underdrain		dashed line	-	-
Underdrain Text 15m	D4-underdrain_text		text	-	-
Plug 	D4-plug		wblock	PL	-
Misc Graphics	D4-misc_line		line	-	-
Misc Text	D4-misc_text		text	-	-



STORM				
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name	Attribute Field
MISCELLANEOUS				
Property Lines	X-base	line	-	-
Registered and proposed lot lines				

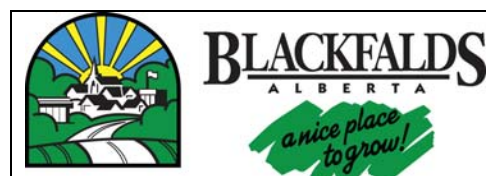
Ensure:

- flow arrows are placed 1.5m from the low invert of the pipe.
- pipes are drawn as lines, line strings or polylines.
- only 2 decimal places are used.
- pipe material and class are abbreviated as listed.
- text is upper case, centre bottom justified and not italicized.
- tag sets do not include any units or symbols (i.e.. mm or %).

Material-Class

AC-XS
 VCT-XS
 PVC-DR 28
 PVC-DR 35
 PVC-KF
 PVC-UR




 C14-XS
 C14-CL 1
 C14-CL 2
 C14-CL 3
 C655-85D
 C76-CL 2
 C76-CL 3
 C76-CL 4
 C76-CL 5
 C655-85D
 C655-100D
 C655-115D
 C655-145D
 C655-150D
 C655-170D



TRAFFIC MARKING AND SIGNAGE			
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name
PAINTED LINES			
Solid Centre Line	T4-solid_pnt_c	line	-
Broken Centre Line	T4-broken_pnt_c	broken line	-
Solid Lane Line	T2-solid_pnt_l	line	-
Broken Lane Line	T2-broken_pnt_l	broken line	-
Edge Line	T2-edge_pnt_l	line	-
Intersection Guide Line	T2-turning_pnt_l	dashed line	-
Stop Bar	T8-stopbar_pnt	line	-
Crosswalk Line	T8-pedest_pnt	line	-
Cross Hatching	T2-hatch_pnt_l	line	-
Cross Hatching	T4-hatch_pnt_c	line	-
PERMANENT LINES			
Solid Centre Line	T1-solid_perm_l	line	-
Broken Centre Line	T3-broken_perm_c	broken line	-
Solid Lane Line	T3-solid_perm_c	line	-
Broken Lane Line	T1-broken_perm_l	broken line	-
Edge Line	T1-edge_perm_l	line	-
Intersection Guide Line	T1-turning_perm_l	dashed line	-
Stop Bar	T7-stopbar_perm	line	-
Crosswalk	T7-pedest_perm	line	-
Cross Hatching	T1-hatch_perm_l	line	-
Cross Hatching	T3-hatch_perm_c	line	-

PAINTED SYMBOLS			
Straight Only Arrow	T6-straight_pnt	wblock	STD
Left Turn Only Arrow	T6-left_pnt	wblock	LTN
Right Turn Only Arrow	T6-right_pnt	wblock	RTN
Straight / Left Turn Arrow	T6-st_left_pnt	wblock	LST
Straight / Right Turn Arrow	T6-st_right	wblock	RST
Merge Arrow	T6-merge_pnt	wblock	MERGE
PERMANENT SYMBOLS			
Straight Only Arrow	T5-straight_perm	wblock	STD
Left Turn Only Arrow	T5-left_perm	wblock	LTN
Right Turn Only Arrow	T5-right_perm	wblock	RTN
Straight / Left Turn Arrow	T5-st_left_perm	wblock	LST
Straight / Right Turn Arrow	T5-st_right_perm	wblock	RST
Merge Arrow	T5-merge_perm	wblock	MERGE
PAINTED TEXT			
Directional Markings	T6-dir_text_pnt	text	-
Painted Stop Bar	T8-stopbar_text	text	-
Painted Crosswalk	T8-pedest_text	text	-
PERMANENT TEXT			
Directional Markings	T5-dir_text_perm	text	-
Stop Bar	T7-stopbar_text	text	-
Crosswalk	T7-pedest_text	text	-

TRAFFIC MARKING AND SIGNAGE			
Item/ Symbol	AutoCad Layer	Element Type	Wblock Name
<h1>Traffic Marking and Signage Standards</h1> <p>Page 2 of 3</p>			

REGULATORY SIGNS			
Sign Location 	T9-sign_location	wblock	SIGN
Stop Sign 	T9-stop_sign	wblock	STOP
Yield Sign 	T9-yield_sign	wblock	YIELD
MISCELLANEOUS			
Property Lines <i>Registered and proposed lot lines</i>	X-base	line	-

Ensure:

- broken lines are to be drawn to scale.



SERVICE LOCATION REPORT

Subdivision	XYZ Estates
Civic Address	15 Country Boulevard
Legal Description	Lot 1 Block 2 Plan 003-0000
Consulting Engineer	XYZ Consulting Ltd.
Contractor	ABC Construction Ltd.
Service Completion Date	30/09/03

1. SERVICE CONNECTION DETAILS

Item	Water Service	Sanitary Service	Storm Service
Location of Service from Side Property Line	4.75m N of S	5.05m N of S	4.45m N of S
Location of Service Box/Curb Stop	1.72m		
Service Size (mm)	25 mm	150 mm	100 mm
Type of Material (e.g. Copper, PE or DR28)	PE	DR 28	DR 28
Water, sanitary and/or storm Invert at Service Box location (m)		887.93	887.88
Service Information			
a. Saddle	(Y/N)	N	Y
b. Killed	(Y/N)	N	N
c. Main Stop	(Y/N)	Y	N/A
d. Insulated	(Y/N)	N	N
e. Riser	(Y/N)	N/A	Y
f. Service into Manhole	(Y/N)	N/A	N
g. Inspection Chamber	(Y/N)	N/A	N/A
If insulated, specify type, size, and dimension of insulation:			

2. STATUS OF EXISTING MAINS

Item	Existing Water Main	Existing Sanitary Main	Existing Storm Main
Main Location (e.g. Lane, PUL, Street, etc.)	Lane	Lane	Lane
Main Size	200 mm	200 mm	375 mm
Main Material (e.g. DR18, DR35, Ultra-rib, etc.)	DR 18	DR 35	Ultra-Rib

Report Prepared By John Doe, P.Eng. Month dd, yyyy
 Consulting Engineer Date

Clearing and Grubbing Checklist	
Item	Completed Or Not Applicable
General	
Review plans for all site conditions. Check for encroachments to be removed and notices to adjacent property owners, if required.	
Check limits of work and make sure they are clearly staked in accordance with the plans.	
Check location and protection of all survey markers and monuments.	
Determine what structures, trees and other improvements are to remain.	
Locate all utilities and other substructures. Pipelines and conduits should be uncovered as specified by the specific utility company.	
Local depressions or holes caused by grubbing or removals must be filled and compacted before any subsequent grading or fill operations begin.	
Check for proper haul roads and permits.	
Check for contractor's authority to stockpile or dispose of material on private or Town property. Check for spillage and dust on public roadways and take corrective measures.	
Check for drainage, erosion control and protection of adjoining property from damage or loss of lateral support.	
Has a herbicide been applied to the finished surface in the proper proportions and rate of application, where required by the Specifications?	

Site Grading Checklist	
Item	Completed Or Not Applicable
General	
Review Clearing and Grubbing Checklist.	
Check for seepage and other latent conditions that might affect the foundation of the fill.	
Report unsuitable foundation conditions to the Contractor for investigation.	
Order survey to establish ground lines for payment purposes.	
Are organic materials removed and surfaces scarified? Are benches cut into existing fill to tie in new fill?	
Check for adequate drainage. Do not permit ponding of water in new fill.	

Check for haulage conditions on public roadways; spillage and dust control.	
Test for optimum moisture content range for adequate compaction.	
See that compaction tests are performed at an early stage to verify contractor's method.	
Observe the operations and verify the uniformity of spreading, mixing, lift thickness and moisture control.	
Check for uniformity of compactive effort, equipment used, coverage and number of passes.	
Evaluate adequacy of equipment; quantity, type and condition.	
Be sure the mixing equipment (plows, discs, etc.) are adequate to break up and mix soil and distribute moisture uniformly.	
Observe earth under roller for movement and signs of excess moisture. Have contractor rip and aerate, if necessary.	
Watch for changes in fill material.	
Order sufficient compaction tests to evaluate quality. Remember that good fill construction results and fewer tests will be required when the material is uniform, the moisture is uniform (at or near optimum), and the compacting method and procedure are uniform.	
Have all areas and lifts that have failed been reworked and retested satisfactorily?	
Observe the finished surfaces, contours and slope rounding for appearance, drainage and other requirements.	
Order survey to check for conformity and payment quantities.	

Erosion and Sediment Control Checklist

Item	Completed Or Not Applicable
General	
Have erosion and sediment control plans been approved by the Town?	
Are temporary and permanent erosion and sediment control devices being installed as required?	
Has the contractor provided for standby crews for emergency work?	
Have retention and desilting basins been promptly dewatered and cleaned following a rainfall event?	
Do you have the contractor's emergency telephone number?	

Water, Sanitary and Storm Main Checklist

Item	Completed Or Not Applicable
Preliminary	
Check plan requirements, utilities and other substructure (ducts) pipe materials, joints, and bedding. Are shop drawings required?	
Has Water Flushing Plan been approved by Public Works Department staff.	
Are road closures required for connections to existing mains?	
Are connections to existing mains being made by Contractor or Town Forces?	
If required, are temporary traffic signs, delineators, and barricades in place?	
Are utilities (gas, electrical, telecommunications, etc.) marked by the respective companies? Have their depths been confirmed by hydrovacing or other approved means?	
Have Crossing, Proximity, Ground Disturbance and/or Encroachment Agreement(s) been received? Field copies available?	
Is construction surveying complete? Off-set distance sufficient for protection of hubs? Grade sheets on job-site?	
Trenching	
Does trench comply with Alberta Occupational Health and Safety requirements for slope and protection?	
Check for maximum trench depth.	
Line and grade control satisfactory?	
Does actual soil condition agree with geotechnical report? Is approved shoring method adequate for the actual trench condition?	
Is spoil pile clear of trench?	
Check subgrade. Is it granular or will imported bedding material be required?	
Check trench for evidence of unconsolidated fill. If in trench bottom, may require additional excavation and backfill with select material. If located above pipe invert, may require additional compaction.	
Is temporary support of existing utilities and improvements being provided? In the event of damage, are the owners promptly notified?	
Are sufficient ladders provided? Check AOH&S requirements.	
Pipe Laying	
All loose soil removed from the trench?	
Required granular bedding material and thickness provided? Shaped to cradle pipe?	
Excavation provided for projecting bells?	
Method of transferring line and grade into trench accurate?	
Provisions for increased bedding at locations where maximum trench width is exceeded?	

Pipe handling satisfactory? Not being damaged?	
Is ground water being controlled adequately (not allowed to enter pipe)?	
Jointing of pipe satisfactory? Gaskets and contact surface lubricated as required?	
In-place pipeline checked for line and grade?	
Has additional bedding (if required) been placed alongside and under haunches of the pipe after laying? Is the bedding rodded or spaded so that it completely fills all the space in the trench?	
Backfill and Compaction	
Is backfill material placed in lifts and compacted as specified?	
Manholes, Structures and Catch basins	
Is excavation size sufficient for working room? Sloped back or shored?	
Is grading for bottom of excavation completed properly? All loose earth removed, firm and unyielding?	
Is bedding material properly placed and compacted?	
Are stubs set to correct alignment and inverts?	
Are rungs along properly? Spaced and located as per specifications?	
Check frames and covers for compliance. Does cover seat in frame without rocking?	
Are all joints and openings sealed properly?	
Miscellaneous and Testing	
Water disinfection and testing procedures completed in accordance with specifications?	
Sewer cleaning and testing completed in accordance with specifications?	

Tunneling and Jacking Checklist	
Item	Completed Or Not Applicable
General	
Have all required crossing permits been obtained?	
Does the contractor have a Safety Program for the tunneling operation?	
Has a pre-construction meeting been held prior to beginning of any tunnel work?	
When tunneling or jacking is proposed, has the Consulting Engineer provided additional soil information and reports?	
Have the contractor's shop drawings for jacking pit bracing, shaft bracing, and tunnel supports been approved?	
Is the contractor's plan for monitoring ground movement submitted to the Consulting Engineer for approval prior to beginning any tunneling or jacking operation?	

Pipe Installation	
Is the supplied pipe designed for jacking and does it meet dimensional tolerances?	
Has the contractor implemented the approved plan to monitor groundwater?	
Is the jacking force monitored to ensure that the maximum is not exceeded?	
Is the unlined portion of lined RCP being oriented at the bottom (invert) when less than 360° of liner coverage is specified?	
Have spacers been properly installed?	
Back Packing and Grouting	
Are tunnel supports back packed as soon as possible after loss of ground occurs?	
When grouting of voids around the outside face of the pipe is required, is the method of placement and mix design approved by the Consulting Engineer?	
Has the contractor's method to prevent pipe shifting or flotation been approved by the Consulting Engineer?	

Service Connection Checklist	
Item	Completed Or Not Applicable
Preliminary	
Check plan requirements, utilities and other substructure (ducts) pipe materials, joints, and bedding.	
Are connections to existing mains being made by Contractor or Town forces?	
If required, are temporary traffic signs, delineators, and barricades in place?	
Are utilities (gas, electrical, telecommunications, etc.) marked by the respective companies? Have their depths been confirmed by hydrovacing or other approved means?	
Is construction surveying complete? Off-set distance sufficient for protection of hubs? Grade sheets on job-site?	
Trenching	
Does trench comply with AOH&S requirements for slope and protection?	
Check for maximum trench depth.	
Line and grade control satisfactory?	
Check subgrade. Is it granular or will imported bedding material be required?	
Is temporary support of existing utilities and improvements being	

provided? In the event of damage, are the owners promptly notified?	
Pipe Laying	
All loose soil removed from the trench?	
Required granular bedding material and thickness provided? Shaped to cradle pipe?	
Excavation provided for projecting bells?	
Method of transferring line and grade into trench accurate?	
Provisions for increased bedding at locations where maximum trench width is exceeded?	
Pipe handling satisfactory? Not being damaged?	
Is ground water being controlled adequately (not allowed to enter pipe)?	
Are connections to mains properly made?	
Jointing of pipe satisfactory? Gaskets and contact surface lubricated as required?	
In-place pipeline checked for line and grade?	
Has additional bedding (if required) been placed alongside and under haunches of the pipe after laying? Is the bedding rodded or spaded so that it completely fills all the space in the trench?	
Backfilling and Compaction	
Sanitary and storm sewer services checked for cross connection? Stubs painted proper colors?	
Have as-constructed invert elevations and locations been obtained prior to start of backfilling?	
Has location of standpipe and end of service stubs been properly marked? Has corporation cock been turned on?	
Is backfill material placed in lifts and compacted as specified?	
Have test results and other reports been forwarded to the Engineer?	

Concrete Work Checklist	
Item	Completed Or Not Applicable
General, Before Placing Concrete	
Check drawings and specifications and review with contractor.	
Check for completion of site work and grading; completion of underground construction; and utility clearance before beginning concrete work.	
Check Subgrade. Firm and on grade? Any base material required? Elevation proper for thickness required?	
If required, check forms. Rigid? To correct alignment? Elevation?	
Joints laid out and expansion joints installed, if required.	
Curing compound and spray equipment on job.	

Check finishing tools.	
Extruded Concrete Work	
Check alignment and off-set before start of work.	
Check extruding machine and mold; does the mold form conform to the specifications?	
How will grade be controlled? Check wire line for sensor or track setting.	
If a crawler type is used, check smoothness of subgrade (machine sensor cannot correct for rough grade); check transverse grade (should be level for the operating width of the machine).	
Check extruded shape for accuracy (use level and rule); check for sag before concrete sets; check alignment.	
Check cross-slope.	
Concrete Placement and Finishing	
Subgrade dampened prior to concrete placement?	
What finishes are required?	
Finishers and equipment on job are sufficient for work to be done?	
Check delivery tickets and observe concrete mixture as it is being placed. Is the type of concrete correct? From approved source? General appearance and consistency satisfactory?	
Check slump and prepare compression test cylinders as required.	
Is concrete being deposited properly? Without segregation? Spaded, tamped or vibrated?	
Spreaders being removed as concrete is placed in curb?	
Curb alignment checked after front face is stripped and curb straightened while still plastic? Check back edge for alignment.	
Check sidewalk finishing sequence; spaded at face of form or header; screed and tamped; bull floated and edged; steel floated? Check for surface humps and hollows? Edge sloped down?	
Additional toweling of sidewalk after water sheen has disappeared? Broom finish timed for proper texture?	
Expansion joints located and edged?	
Construction joints installed and edged?	
Sidewalks 2.5 m or wider have been saw cut at centerline of walk?	
Check cross slope.	
After Placing and Finishing	
Curing compound applied at specified rate?	
Work properly barricaded to protect finished concrete?	
Notices to adjacent property owners to avoid vehicular/pedestrian traffic over fresh concrete?	
Site cleaned up?	
Have test results been forwarded to the Engineer?	

Geotextile and Subgrade Check List	
Item	Completed Or Not Applicable
Preliminary	
Is the fabric of the specified type and thickness?	
Is each lot clearly identified and accompanied with a test certificate from an approved testing laboratory?	
Is the fabric in good condition, free of shipping and handling damage, and is it wrapped in a protective envelope?	
Has the fabric been properly stored in a clean, dry place or if outdoors, stored at least 0.3 m above the ground? Is it protected from exposure to ultraviolet (sunlight)?	
Has the fabric been re-covered while in storage?	
Are fabric rolls being handled properly in transporting to site or while being installed in the field?	
Subgrade Preparation	
Has the subgrade been shaped to the proper section? Is it free of rocks or other sharp objects that could puncture the fabric?	
Has all vegetation been removed from the area and the subgrade sterilized?	
Is there standing water or mud in any area where fabric is to be placed?	
Are anchor trenches properly located and of the proper depth?	
Fabric Installation	
Has the fabric been stretched taut to eliminate major wrinkles, but not to the extent that there is no provision for shrinkage?	
Are the panels properly aligned with the specified lap at adjacent joints?	
Have the seams been heat welded and do they meet the specified tensile strength?	
Are all tears, punctures or scuffed areas properly repaired?	
Has aggregate fill over the fabric been properly placed, spread and compacted?	

Roadway and Lane Subgrade, Sub-base and Base Checklist	
Item	Completed Or Not Applicable
Is all underground construction complete? Deficiencies corrected? Concrete work?	
Locate manholes and valves to be brought to grade or to be plated over during Subgrade and base construction.	



Check plan requirements for existing soil foundation preparation and stabilization, sub-base and base. Thickness? Density?	
Grade stakes set? Check for protection and setting of hubs by contractor.	
Review requirements and procedure with contractor. Sources of sub-base and base materials; soil stabilization method, if required; material tests and approvals; compaction tests.	
Check for soil movement and under rollers and hauling equipment to detect soft spots. Backfilled trenches may not be sufficiently dried out and ready for sub-base and base construction.	
Are all pockets of soft or yielding material ripped up and dried out or replaced with suitable material?	
Is existing soil processed to required depth and at Subgrade for sub-base? Watered; ripped; disced and mixed; large rocks removed; rolled to required density; required grade, cross section and smoothness tolerance; and tested?	
Imported sub-base or base material sampled from material delivered to site? Test results okay?	
Maintain adequate dust and noise control during all grading operations.	
Watch for changes in grading of material and appearance of all types of sub-base and base material (imported or jobsite processed); and if warranted, order additional sampling and testing.	
Watch for degradation during spreading operations.	
Check for adequacy and uniformity of operations; moisture control and mixing; lift thickness; compaction effort (coverage and number of passes of equipment).	
Collect delivery tickets for weight payment, if required.	
Test for compacted density of sub-base material and base.	
Have test results been forwarded to the Engineer?	
Check finished base surface for grade, cross section and surface smoothness as specified in specifications.	
Check contractor's provisions for protection of finished base course surface. Do not permit base to dry out prior to being covered with a finish surface (prime coat or asphalt).	
Have approved erosion control devices been installed at/in catch basins to prevent silt infiltration?	

Asphalt Checklist	
Item	Completed Or Not Applicable
Preliminary	

Check drawings and specifications for pavement type, thickness, number of courses, method of payment, and other project paving requirements.	
Inspect base course surface. Has surface been checked for grade, cross section and compaction? Is it firm, hard and unyielding?	
Is all underground construction complete? Deficiencies corrected?	
Are manholes and valve boxes marked?	
Are contact surfaces and joints prepared? Existing pavement trimmed? Surfaces cleaned? Tack coat applied to gutter edges, pavement joints?	
Review procedures and requirements with contractor.	
Overlay of existing pavement required? Check fills for variations and thickness to determine necessity for leveling course. Check for broken pavement that should be removed.	
Gutter and other concrete strength okay to lay pavement against.	
Delivery of Paving Mixture	
Does delivered material meet the requirements of the job? Truck beds free of holes and depressions? Equipped with tarpaulins (when required)? Compatible with paver? Beds covered with an approved bond breaking agent and properly drained?	
Check for truck spillage of mix on base or previous lift.	
Collect delivery tickets for weight payment, if required.	
Check temperature periodically. If bottom dump trucks are delivering and windrowing the mix, check temperature in windrow ahead of pickup by paver. Stop asphalt placement if temperature drops below minimum for laying.	
Spreading Operation	
Is direction of spreading satisfactory (generally in same direction as traffic)?	
Check operation of spreader. Thickness of mat being laid? Lane width okay? Joint overlap?	
Check surface appearance of mat behind spreader. Uniformity of texture; evidence of degradation or poor mixing?	
Check handwork at joints. Is overlapped material being laid pushed back into mat with lute?	
Check for source of irregularities in surface and require correction. Try to minimize hand raking. When depressions are corrected, surface must be loosened and material added and graded, preferably with a lute. High spots loosened, excess material removed and area graded.	
Stop delivery from plant if weather conditions warrant. Permit pave- out of remaining material if possible.	
Have test results been forwarded to the Engineer?	
Traffic Control Marking and Signage	
Has the Traffic Control Marking and Signage plan been approved?	
Has the Public Works Department been advised that seasonal or all	

roadwork is complete and ready for signage and/or marking?	
Have Street Identification signs been installed?	
Have all information signs been installed?	
Have the Subdivision Map signs been installed/amended?	

Landscaping - General Check List	
Item	Completed Or Not Applicable
Site Preparation and Topsoil Placement	
Has the area been graded to the approved grades?	
Have all ponding areas been repaired?	
Has any erosion damage been repaired?	
Does the new landscape areas blend into existing landscaping?	
Is the area to be landscaped excavated to the proper depth and scarified for topsoil placement?	
Is the area to be landscaped graded to required dimension below curbs and/or walks?	
Is the source of topsoil approved?	
Is the mixture and preparation of the topsoil in accordance with the requirements?	
Is the topsoil backfill consolidated with the areas to receive planting not excessively compacted?	
Verify layout of major plant materials and adjustment to field conditions.	

Level One Landscaping Check List	
Item	Completed Or Not Applicable
Seeding	
Has the seed mixture been approved? Does it comply with the specifications?	
Has the proper fertilizer been applied at approved application rate?	
Has the proper seed coverage been achieved?	
Is seed germinating properly?	
Sodding	
Is the finished surface even?	
Have the edges been knitted in?	
Does the new sod blend into existing landscaping?	
Is the area being watered as specified?	
Do the tree locations conflict with other improvements?	
Have the plant (shrub) materials been approved, checked and recorded?	
Do the plants have any diseases, insect damage?	
Are the trees approved, tagged and of the proper size?	
Complete a fertilizer and spoil amendment check for type and class required.	
Does the preparation of topsoil meet specified requirements?	
Are the tree holes of the size, depth, and shape required?	
Has strapping, wire and/or burlap been removed?	
Are the trees staked and properly tied as specified?	
Are root barriers required for tree wells?	
If required, is tree well 100 mm pipe drain installed to proper elevation, with proper amount of rock?	
Are tree grates flush and tight to adjacent walk?	

Level Two Landscaping Check List	
Item	Completed Or Not Applicable
Fencing	
Has fencing been installed?	

Pathways/Hard surfaces	
Alignment/location correct?	
Acceptable slopes?	
Defects/ponding?	
Asphalt tests?	
Play Equipment	
Equipment layout as per approved plans?	
Adequate safety zones?	
Protruding concrete bases/anchor bolts?	
Equipment height to specifications?	
Correct base depth?	
CSA Certificate of Compliance?	
Manufacturer's warranty?	
Parks Amenities	
Have benches been properly installed?	
Are garbage receptacles in place?	
Have all other amenities been installed as per the drawings?	

Level Three Landscaping Check List	
Item	Completed Or Not Applicable
General	
Have special amenities been approved by the Infrastructure and Property Services department?	
Have special amenities been approved by Public Works?	
Have special amenities been approved by Community Services?	
Have maintenance agreements been negotiated?	

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.

It shall be the responsibility of the Consulting Engineer to determine if inspections and/or testing in excess of the levels specified in the Contract Specifications are necessary, and to so advise the Developer and the Director.

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 Director has the right to request that the Developer, through the Consulting Engineer to correct deficiencies as the Director 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 Director may, as specified in the Development Agreement – General Conditions, 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 Director 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 specified as in the City of Red Deer Contract Specifications – Section 00 72 13.

3. DOCUMENTS AND SCHEDULES

- .1 The Consulting Engineer, prior to commencement of construction, shall be completely familiar with:
 - .1 Town of Blackfalds Design Guidelines.
 - .2 City of Red Deer Contract Specifications.
 - .3 The Development Agreement for the Project.
 - .4 The Engineering Agreement (for Town Projects).
- .2 The Consulting Engineer shall notify the Director 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 Director of all changes to the Work schedule.
- .3 Notification by the Consulting Engineer shall be by letter, fax (403-885-4610), or e-mail (pweran@blackfalds.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 Director, 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 Director 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 Director 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 in the form appended at the end of Part Six. Copies of the Certificates are available at the Planning and Development Department.

.2 Town Developments/Projects

Seasonal Completion Certificates, Substantial Completion Certificates, Construction Completion Certificates, and Final Acceptance Certificates for Town developments and Projects are to be submitted as detailed in the Contract Specifications in the form included in Section 00 6 00. Copies of the Certificates are available at the Planning and Development Department.

5.2. Reporting of Deficiencies by the Director

Any deficiencies observed by the Director 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 City of Red Deer Construction Specifications.

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

The Consulting Engineer shall obtain the certified results of tests conducted for submission to and approval by the Director.

The Contractor will not be permitted to install any material not approved by the Director and/or the Town.

5.4. Testing Frequencies

The following is a summary table of the minimum required testing frequencies for all construction projects in the *Town of Blackfalds*.

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

6.1. General

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 Director and/or the Town 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 Town may require all work to be exposed for an inspection at the Contractor's expense.

6.2. Inspection Check Lists

Appended at the end of this Section are Construction Inspection Checklists for various construction activities. The Check Lists provide an overview of the work

to be completed by a Site Inspector in conjunction with the Work specified on the Drawings and in the Contract Specifications.

The checklists are not intended to be a complete comprehensive list, but rather are to be used as a general guideline by the Consulting Engineer prior to and during construction of the various Municipal Improvements.

Project specific requirements of the Drawings and Specifications will require additional inspections and shall take precedence over any comment included in the Check Lists.

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 Town. Prior to forwarding any Construction Completion Certificates to the Town, all related outstanding change orders are to be resolved and any omissions to be approved by the Town. Construction Completion Certificates for Landscaping (Levels One – Four and Collector Roadway tree planting) must also be approved by the Community Services Director or his Representative.
- .2 The Construction Completion Certificate applications shall be accompanied by the following documentation:
 - .1 Underground Utilities
 - .1 Letter documenting completion of successful water pressure testing, flushing, and disinfections (copy of Bacteriological Water Sample Report to be submitted with Construction Completion Certificate).
 - .2 As-constructed drawing.
 - .3 Copy of video inspection log reporting deficiencies and corrective action taken.
 - .2 Surface Improvements
 - .1 As-constructed drawing.
 - .2 Letter of compliance covering compaction and materials testing.
 - .3 Documentation of any deficiencies, which will have payment reductions as per the Contract Specifications.

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

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

1. GENERAL

As noted in *Area Structure Plan* are prepared by the Developers are responsible for preparing a more detailed Area Structure Plan as a pre-condition for subdivisions of larger land areas (i.e. quarter section).

- .1 Major Area Structure Plan.
- .2 Natural, historical, and constructed features.
- .3 Lane versus laneless subdivision.
- .4 Street classification and layout.
- .5 Oil wells, gas wells and pipelines.
- .6 Traffic, rail, industrial, and/or commercial noise.
- .7 Traffic volume, capacity, and control.
- .8 Servicing boundaries, capacities, and constraints.
- .9 Drainage routing and detention.
- .10 Erosion and sediment control.
- .11 Municipal Reserve parcels.
- .12 Transit System.
- .13 Development phasing.
- .14 Subdivision entrance signs.
- .15 Enhanced subdivision amenities.

2. MAJOR AREA STRUCTURE PLAN

The Major Area Structure Plan is a generalized plan covering several quarter sections of land. Identified on the plan are some of the following features:

- .1 Arterial and collector roadways.
- .2 General land uses, proposed neighbourhood and area commercial sites, industrial land uses, etc.
- .3 Proposed Public and Separate Schools (K - 9, middle school, high school, etc.)
- .4 Neighbourhood park sites, environment reserves, natural features, linear parks, and walkways connecting neighbourhoods, etc.

3. PHYSICAL FEATURES OF THE SITE

When preparing the Neighbourhood Area Structure Plan, careful consideration should be given to the following:

- .1 Soil and groundwater conditions.
- .2 Topography and major drainage routes.
- .3 Natural features such as rivers, creeks, wooded areas, wetlands, etc. that are to be preserved and incorporated in the design. The Community Services Director may have prepared Ecological Profiles for undeveloped land in the proposed area. The profiles will identify and rate the natural features that should be considered when preparing the Neighbourhood Area Structure Plan.
- .4 Man-made features such as highways, railways, major power lines and substations, high pressure gas mains and regulating stations, telecommunications facilities (e.g. fibre optics alignments), etc.
- .5 Environmental concerns such as contaminated soil or well sites.

4. LANE VERSUS LANELESS SUBDIVISIONS

In general, the *Town of Blackfalds* is in favour of subdivisions that have rear lanes.

Laneless subdivisions are acceptable for areas backing onto park, recreation or school sites, or backing onto major arterial roadways. Service mains in these areas should still be routed along the front of the lots. There may also be small areas of land where a laned subdivision is not practical or feasible. A laneless subdivision is not recommended where the lots are narrow or where lots are placed back to back. As per the Land Use By-law, the side yard on one side of the dwelling unit may have to be increased in width to allow for vehicle access to the rear yard in laneless subdivisions.

5. STREET CLASSIFICATION AND LAYOUT

5.1. General

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

- .1 Urban Arterial Roadways,
- .2 Residential Collector Streets,
- .3 Residential Local Streets,

.4 Industrial Roadways,

.5 Lanes.

Classification of the street system must be undertaken during subdivision design (commencing with the area structure plan), in order that the necessary right of way requirements can be established and approved by The Town. Geometric design standards are summarized in Section 13 – Appendix A and described in the following Clauses.

5.2. Road Characteristics

.1 General

In an ideal road system, lanes and locals connect with collectors, collectors with arterial roadways, and arterial roadways with expressways and freeways.

It is preferable to minimize the interconnection of lanes and locals with arterial roadways, and of collector roadways with expressways and freeways. Local roadways rarely, if ever, connect with freeways. Such applications are strongly discouraged.

Connections by classification are summarized in the following Table:

Roadway Classification	Normally Connects With
Lane	Lane, Local Roadway, Collector Roadway
Local Roadway	Lane, Local Roadway, Collector Roadway
Collector Roadway	Lane, Local Roadway, Collector Roadway, Arterial Roadway
Arterial Roadway	Collector Roadway, Arterial Roadway, Expressway, Freeway

.2 Urban Arterial Roadways

Urban arterial roadways carry large volumes of all types of traffic moving at medium to high speeds. These roadways serve the major traffic flows between the principle areas of traffic generation and connect to rural highways and collectors.

Direct access to adjacent developments from arterial roads is normally prohibited. Such access should be confined to collector roads, frontage roads, or auxiliary lanes.

.3 Residential Collector Roadways

Residential collector roadways provide both traffic service and land service (access to front yards, park sites, school sites, playgrounds, etc.). The road service function for this type of roadway is to carry traffic between local and arterial roadways. Full access is generally allowed on undivided collectors.

A residential collector street should generally not collect traffic from more than 600 dwelling units before connecting to an arterial roadway.

.4 Residential Local Roadways

Residential local roadways provide land access and connections to residential collector roadways. They primarily carry traffic with an origin or destination along its length. They are not intended to carry through traffic. Direct access is normally allowed to all abutting properties.

An undivided residential local street should generally not collect traffic from more than 100 dwelling units before connecting to a collector roadway.

.5 Industrial Collector Roadways

Industrial collector roadways provide both traffic service and land service. The service function for this type of roadway is to carry traffic between arterial and local industrial roadways. Access to adjacent properties is permitted; however, the Engineer must approve all access locations and widths.

.6 Industrial Local Roadways

Industrial local roadways provide land access and connections to industrial collector roadways. They normally carry traffic with an origin or destination along its length and are not intended to carry through traffic. Direct access is normally allowed to all abutting properties.

.7 Frontage Roadways

Frontage roadways are normally located adjacent to arterial roadways. They may be used to control access to the arterial, to provide direct access to adjoining property, and to provide circulation of traffic on each side of the arterial roadway. Frontage roadways are to be designed to urban industrial local roadway standards.

.8 Lanes

Lanes provide access to the rear yard of residential, commercial, and/or industrial lots. Lanes are not intended to carry through traffic. The maximum length of lane before connecting to a street should not exceed

350 m. .1 R-1M = 23 lots,

.

5.3. Horizontal Layout of Streets

.1 General

The horizontal alignment of streets typically consists of a series of tangents and circular curves (simple, compound, and reverse curves). Transition or spiral curves may also be incorporated in the design. Other street pattern designs may also be considered.

.2 Minimum Curve Radius

Minimum radii are to be as listed in TAC Geometric Design Guide for Canadian Roads (Current Edition), Chapter 2.1 - Alignments and Lane Configuration. These are summarized in Section 13 – Appendix A.

.3 Curvilinear Designs

Curvilinear designs are used effectively to integrate the street infrastructure with the existing topography and other subdivision features to promote slower traffic speeds, and to enhance aesthetics.

.4 Broken Back Curves

Broken back curves (two curves in the same direction connected by a short tangent) are to be avoided in a curvilinear design unless the distance (measured in metres) from the end of one curve to the beginning of the next curve is greater than four times the design speed (measured in kilometres per hour).

.5 Intersection Angle

For curve linear roadways, the intersection angle shall be measured at the approach beginning of curb return. Tangent sections of at least 20 m in length should be used leading in to intersections where possible, particularly at high volume intersections.

Intersection angles less than 75° are not acceptable.

.6 Lane/Street Intersections

Where a lane forms the 4th leg of a roadway “T” intersection, the lane centreline should be a continuation of the roadway centreline. Where a lane connects to a roadway within the limits of an expanded bulb corner, the lane centreline shall intersect with the horizontal point of intersection of the two legs of the roadway.

5.4. Street Intersection Spacing

.1 Arterial Roadways

The desirable intersection spacing along divided arterials is 400 m to 800 m. For minor, undivided arterials, intersection spacing may be reduced to 200 m if traffic signals are not anticipated. (i.e. signalized intersections must be spaced at least 400 m apart.)

.2 Collector and Local Roadways

The minimum distance between opposing intersections along collector or local roadways in residential or industrial subdivisions is 45 m, measured from centre to centre of the respective intersections; however, spacing of less than 80 m should be avoided, if possible.

Cross (four-legged) intersections on local roadways are to be avoided.

.3 Lanes

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

Cross (four-legged) lane-to-lane intersections are not permitted. Cross (four-legged) lane to street intersections ("T" roadway with lane being fourth leg) with collector or local roadways are also to be avoided; however, if a cross intersection is being provided, the centre line of the lane should be an extension of the opposing street centre line.

5.5. Cul-de-Sacs

The maximum length of a cul-de-sac shall be 200 m; measured along the road centerline, from the property line of the intersecting roadway to the end of the bulb. No more than 40 dwelling units may be developed on a cul-de-sac.

An emergency access is required within 90 m of the end of the cul-de-sac if the lots within the cul-de-sac are serviced from the street, as there is a higher probability of road closure due to utility repairs in this situation. The emergency access must be designed as outlined in Section 13.

5.6. P-Loops

The maximum length of a "P-Loop" with an undivided entrance road is 850 m, measured along the road centerline and including the length of the entrance and all internal roadways. The length of the P-Loop entrance road shall not exceed 200 m. No more than 85 dwelling units shall be developed on a P-Loop with an undivided entrance roadway.

The maximum length of a “P-Loop” with a divided entrance road is 1200 m, measured as above. No more than 150 dwelling units may be developed on a P-Loop with a divided entrance roadway. The entrance roadway must meet the divided collector roadway standard cross section (i.e. four travel lanes and no parking).

An emergency access or lane connection must be provided within the loop section if the “P-Loop” entrance road is undivided or if there are deep utilities routed along the entrance road. The emergency access must be designed as outlined in Section 13. The use of “P-Loop” will be at the discretionary of the Town.

5.7. Crescents

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

5.8. Dead-end Lanes

Dead-end lanes are to be kept to a minimum and used only when a looped lane design is not possible. Dead-end lanes shall end with a turnaround designed to accommodate a SU-9 vehicle (e.g. garbage truck). See Section 16 for standard details.

5.9. Curved Lanes and Public Utility Lots

Curved lanes and public utility lots are not permitted. A series of chords should replace the curves (this will allow property owners to construct straight fences rather than curved fences).

5.10. Interim Access

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

5.11. Expanded Bulb Corners

Expanded bulb corners, as illustrated in Section 17, may be used on local streets in lieu of the minimum radius of curvature noted in Section 13 – Appendix A.

5.12. Medians

Medians should not generally be used on collector and local roadways except where required to separate or delineate traffic streams (e.g. at arterial

intersections or on large P-Loop entries where two distinct roadways are required). Use of medians to create entry features is permitted, but should be kept to a minimum. Medians should be at least 5 m wide if tree planting is to be included (see Sections 13 and 14). Medians should be predominantly hard surfaced to reduce maintenance requirements.

Avoid lots fronting onto divided sections of local or collector roadways, as front driveways will not be permitted in these areas. Where frontage cannot be avoided along divided roadways, rear access to the lots must be provided.

5.13. Provision of Waste Management Collection Services

Under the Town's Waste By-Law, property owners are required to place their garbage as near as practical to the lane for collection, unless no lane exists or there is some other impracticality. The Developer shall provide lanes where practical to accommodate waste management.

When lane construction is delayed in new subdivisions, waste collection will be from the street on an interim basis until the lanes have been constructed. Property owners must be made aware of the interim and permanent waste collection routes.

6. OIL WELLS, GAS WELLS AND PIPELINES

There are a number of active, suspended and abandoned oil and gas wells, including associated pipelines, compressor stations, etc., located in future development areas. The Energy Resources Conservation Board (ERCB – formerly EUB) has established minimum development setbacks for the wells and pipelines. These setbacks or buffer widths are based on the type of well or pipeline, the content of the well or of the material being conveyed in the pipeline. (i.e. sweet gas, sour gas (H₂S), etc.). The specific buffer widths are determined by ERCB following discussions with the well and/or pipeline licensee at the time of development. Based on the well or pipeline content, the setbacks may range from strictly the pipeline right of way width to 800 m.

For abandoned wells, setbacks ranging from 5 m to 15 m are applicable. The minimum setback for abandoned pipelines is the edge to the pipeline right of way. A 100 m development setback is required from all active oil wells and all active sweet or Level 1 sour gas wells. Typically no development setback, other than the right of way width, is required for pipelines carrying oil, sweet gas or Level 1 sour gas. Any wells or pipelines approved at a higher level than Level 1 may be required to have larger setbacks such as 100 m, 400 m, or 800 m.

Additional information regarding development setbacks in the vicinity of wells and/or pipelines can be found in ERCB General Bulletin GB 99-4, (ERCB Website – Archive Bulletins and General Bulletins), ERCB Directive 026, the Pipeline Act ([ERCB - Industry Zone - Rules, Regulations - Acts & Regulations - Pipeline Act](#)), particularly clause 42 but not limited to), Municipal Affairs ("Advisory Land Use Planning, notes on Abandon Well sites - [Municipal Affairs - Municipalities & Communities - Services for Municipalities - Planning and Development - Abandon Well sites](#)"). For additional information refer to the

Oil and Gas Well in Urban Settings Policy for the Town of Blackfalds.

Accordingly, the developer shall use the following offsets for adjacent development.

- .1 A minimum separation width of 2 metres shall be provided between the property line of the pipeline right of way and adjacent the lane/public utility lot where a pipeline right of way is located parallel to a lane and/or public utility lot, as illustrated on Drawing 4.01. A 1:1 slope from the right of way property line to the invert of the adjacent main shall be maintained at all times. The width of the separation shall be increased as the depth of the adjacent utility main increases.
- .2 An easement with a minimum width of 2 metres must be provided between the pipeline right of way and a building where a pipeline right of way is located parallel to the side yard of a parcel of land, as illustrated on Drawing 4.01.

The developer shall include the following information in the NASP submission:

1. Drawing showing location and type of the well, including dimensions to ¼ lines,
2. Drawing showing location of any pipelines, including right of way dimensions,
- .3 Copy of development approvals, including setbacks, issued by EUB and the Licensee.
- .4 Copies of any reclamation certificates.

7. TRAFFIC STUDY

A Traffic Study may be required where a proposed Subdivision is located adjacent to Provincial primary and secondary highways, arterial roadways, established subdivisions, industrial development, commercial development, and/or other potential traffic generators.

7.1. Study Objective

The objective of the Traffic Study is to:

- .1 Document the existing and projected traffic flows on adjacent arterial and/or collector roadways as a result of the proposed Neighborhood Area Structure Plan.
- .2 Recommend the access points, intersection/road geometry, and internal road layout required to meet the demand of the proposed development, and minimizing the traffic and parking impact to the neighboring subdivisions and roads.

7.2. Required Traffic Impact Information

- .1 The following information is required for the noon and p.m. peak hours on all impacted arterial and collector intersections:
 - .1 The development generated traffic volumes.
 - .2 A drawing showing the development trip distribution pattern.
 - .3 A drawing showing the turning movement volumes of proposed intersections, as well as other impacted intersections and roadways.
- .2 The traffic volumes should be detailed as follows:
 - .1 Existing traffic.
 - .2 Projected fifth year background traffic.
 - .3 Additional development generated traffic.
 - .4 Through traffic that shortcuts through adjacent residential roads.
 - .5 Total traffic.
- .3 Analysis showing the volume/capacity ratio of all affected roadways/intersections with and without the recommended improvements.
- .4 A drawing showing the internal and external road improvements required to accommodate the projected traffic pattern. Among other items, the drawing should identify the following:
 - .1 The internal collector street layout.
 - .2 The external access points and intersection locations.
 - .3 The number of lanes and the length of any turn bays required for each arterial and collector street intersection.
 - .4 The length of the controlled accesses inside the development area and around each major intersection.
 - .5 Any traffic control device addition, deletion, or revision required. This includes parking, pavement markings, signs, traffic signals and/or phasing, and timing revisions.
- .5 The year or development level in which the above recommended improvements are required.

7.3. Issues That May Affect the Traffic Study

The Developer should meet with the Operations and Engineering Services Director to obtain background information that may have an impact on the Traffic Study.

7.4. Information Available

- .1 The 2003 Town of Blackfalds Transportation Study Report.
- .2 The current Town of Blackfalds Traffic Count is available from the Infrastructure and Property Service Director. For all daily traffic volumes shown, hourly breakdowns are available. For all intersections with a circled number, selected peak hour turning movement counts are available. The number inside the circle indicates the latest year that the turning movement survey was conducted.
- .3 Traffic counts will be made available upon request.

7.5. Review Time

The Town of Blackfalds requires a minimum of three weeks for the review of traffic studies submitted.

8. SERVICING BOUNDARIES AND CONSTRAINTS

The Developer is required to provide a conceptual servicing design in the Area Structure Plan Report. Drawings and preliminary analyses are to be included in the report supporting the following:

- .1 The routing of water, sanitary sewer, and storm sewer mains,
- .2 Location, depth, and size of detention ponds,
- .3 Major drainage routes,
- .4 Erosion and sedimentation control,
- .5 Power, telephone, cable, and natural gas systems,
- .6 Assessment of system capacities relative to the proposed development.

This conceptual servicing study is intended to demonstrate the viability of the proposed Area Structure Plan.

Following approval of the Neighbourhood Area Structure Plan, the Developer must provide a more detailed servicing report for the quarter section. Detailed servicing study criteria are included in Section 5 of this document.

9. UTILITY CORRIDORS

In planning development servicing, corridors may be required for routing of utility mains, secondary emergency access, walkways, and major drainage outside of the lane or roadway rights of way.

Where the corridor is used for access, walkways, and/or major drainage, a Public Utility Lot should be provided. The Public Utility Lot is usually between 6 m to 13 m.

Where the corridor is only required for routing of utility mains, it should be contained in an easement. The following conditions will apply to any easement that has deep utilities routed through them:

- .1 The property owner will not be permitted to use the easement area for any purpose other than for lawn and/or garden,
- .2 The property owner will not be permitted to place, erect, or build any concrete or asphalt driveways, pads or paths, rock gardens, building, or structure whatsoever within the boundaries of the easement,
- .3 The property owner will not be permitted to plant any tree, hedge, or other vegetation which in any way prevents or hinders the Town of its rights to maintain all utilities under such lands,
- .4 If the area is to be fenced, the property owner will be required to install 7.0 m gates to allow for maintenance vehicle access,
- .5 The property owner will be permitted to park private cars, trucks, or recreation vehicles upon such land.

The preceding conditions should be included in the information package provided to the perspective lot purchaser.

10. MUNICIPAL RESERVE/PARKS

10.1. Municipal Reserve/Detention Pond Joint Use Sites

At the Discretion of Council, a parcel no more than 1.0 ha within a storm pond may be credited towards the 10% Municipal Reserve requirement if the area is to be developed as usable sports fields. The need for storm management facilities shall not result in an inconvenient location for school/park sites or limit the capacity of the municipality to preserve natural areas. Location and sizing of all park areas will be determined at the time of the Area Structure Plan approval.

10.2. Site Financing and Construction

Construction and financing responsibility for the Neighbourhood Park site and/or Detention Pond is included in Section 14.

11. DEVELOPMENT PHASING

The purpose of the development phasing plan is to establish the proposed sequence of development. The proposed sequence of development should be based on the logical extension of deep utilities, shallow utilities, and roadway access. The need for construction traffic to travel through established development areas to access a new phase of development should be avoided. Construction of temporary access roadways may be required for interim access to a proposed development.

12. ENHANCED/OPTIONAL SUBDIVISION AMENITIES

12.1. General

The following Enhanced/Optional Subdivision Amenities have been approved for use in proposed Neighbourhoods:

- .1 Sound attenuation walls,
- .2 Subdivision Entrance Signs,
- .3 Decorative pillars at roadway intersections,
- .4 Storm retention (wet) ponds,
- .5 Enhanced municipal/environmental reserve landscaping (i.e. walking paths, benches, additional tree and shrub planting, water features, viewing platforms, etc.) in addition to the minimum specified by the Community Services Director.
- .6 Distinctive "Street Name" sign blades.

Any other proposed enhanced/optional features must be approved by various Town Departments.

Developers will be responsible for all associated construction costs. Where applicable, maintenance costs will be as calculated in the Development Agreement.

All proposed enhanced subdivisions amenities should be identified in the Area Structure Plan.

12.2. Specific Design Criteria

Special conditions are applicable for some of the Enhanced/Optional Subdivision Amenities, as follows:

- .1 Sound Attenuation Walls

The Developer will be required to construct sound attenuation walls where underlined in Development Agreement.

.2 Subdivision Entrance Signs

If the Developer wishes to construct a Subdivision Entrance Sign at the entrance to a subdivision, the sign shall be located within the road right of way.

Additional Subdivision Signs will not be permitted within the subdivision without the approval of the Town.

.3 Decorative Pillars at Roadway Intersections

If the Developer wishes to construct Decorative Pillars at various locations throughout the subdivision, they shall be located within the road right of way. To be in conformance with Land Use Bylaw, the height of the pillars cannot exceed 0.9 m in height. The pillars may be stand alone items or may be used as the base of Street Name sign posts.

.4 Distinctive "Street Name" Sign Blades

The existing blade and two optional blade shapes will be allowed in subdivision. The same blade design is to be used throughout the Neighbourhood Plan area. The background color of green (std.) . The lettering will follow the current standard for font and size. Lettering type will be silver (standard). The developer agrees to pay for all costs for sign blades and maintenance.

1. GENERAL

The Developer has provided a conceptual servicing design in the Area Structure Plan Report. Before proceeding with a phase of development, the Developer must provide a more detailed servicing report, together with servicing drawings for the quarter section.

2. SERVICING STUDY

The report is intended to establish the site development and servicing requirements for the staged development of the 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, shallow utilities, and public roadways. The report should include discussion pertaining to the systems, such as

- .1 Existing conditions (e.g. vegetation, soils groundwater, structures, contaminants, topographic feature, erosion and sediment control measures, etc.),
- .2 Site grading, major drainage routing, permanent and/or temporary erosion and sediment control measures 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 (e.g. geotechnical, ecological profile, noise, traffic, water modelling, sanitary sewer system modelling, stormwater management, erosion and sediment control) may be contained in separate reports, but should be coordinated, referenced, and summarized in the Neighbourhood Servicing Study Report.

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

Specific requirements for the Erosion and Sediment Control Report are detailed in Clause 7 of this Section.

The Clearing and Grading Permit (Section 7, Appendix A), must be approved by the Town prior to any clearing, stripping and grading work being undertaken. In addition, Development Agreements will not be issued until the Director has approved all Servicing Study issues.

Revisions to the Servicing Study must be provided when the Neighbourhood Area Structure Plan revisions (i.e. roadway realignment, land use revision) are approved. Further Development Agreements will not be issued 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 scale of 1:2000 conforming to the approved Area Structure Plan. The following preliminary design plans are to be submitted as part of the servicing report:

- .1 Site grading plan, including erosion and sediment control measures,
- .2 Roadway grading plan,
- .3 Water distribution network,
- .4 Sanitary sewer system,
- .5 Major drainage system, including any stormwater management features,
- .6 Minor storm sewer system,
- .7 Shallow utility systems (power distribution, gas, telephone, cable television), [Note: show Community mailboxes on this drawing]
- .8 Conceptual landscaping plan,

Note: Proposed phase boundaries and phasing are to be shown on all of the above noted plans.

3.2 Erosion and Sediment Control Plan

- .1 Site Plan

The Site Plan should show:

- .1 Existing and final site contours at a interval and scale sufficient for distinguishing runoff patterns before and after disturbance,
- .2 Existing vegetation, such as grassy areas or vegetative buffers, that may reduce erosion or off-site sedimentation,
- .3 Limits of each phase of clearing and grading,
- .4 Critical areas within or near the project area, such as streams, lakes, wetlands, highly erodible soils, public streets and residences,
- .5 Locations and types of ESC measures, with dimensions,
- .6 A legend, if necessary.

.2 Detailed Drawings

- .1 Detailed drawings of ESC structures and measures,
- .2 Provide details for all water crossings,
- .3 Any other important details,

.3 Erosion and Sediment Control Report

Detailed requirements for the Servicing Study Erosion and Sediment Control Report are included in Section 6.

3.3 Site Grading Plan

The purpose of the Site Grading Plan is to provide a preliminary earth balance for the quarter section, establish the major drainage routing, establish erosion and sediment control measures 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 a sufficient interval 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. Identify any future variances in natural grade adjacent to these areas which would either impact drainage or root systems.

.4 Geotechnical Information

- .1 Test hole locations,
- .2 Boundaries of different soil types within the development,
- .3 Areas within or near the proposed development with potential for serious erosion or sediment problems.

.5 Existing and Final Drainage Patterns

Show the dividing lines flow direction for the different drainage areas before and after development.

.6 Limits of Clearing and Grading

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

.7 Stockpile Data

Stockpile locations must be approved. Consideration to include proximity to homes, watercourses, escarpments, etc.

.8 Erosion and Sediment Control Measures

Location, names and dimensions of all proposed temporary and permanent erosion and sediment control measures.

Note: All surface drainage must be filtered or run through sediment control features before leaving the site.

.9 Storm Water Management System

.1 Location of permanent storm drain inlets (catchbasins), pipes, outlets, detention/retention pond, etc.

.2 Cross-section of swales and/or channels, including depth of flow,

.3 Volume, depth, overflow rates and the routes the flow will follow after overtopping the sediment basins.

10. Details of Dust Control Measures To Address Wind Erosion

Show proposed location and type of ground cover.

The Town must approve the Servicing Study prior to any clearing and grading work being undertaken.

3.4 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 contours, (including roadway setbacks/side slopes with a maximum slope ratio of 3.5:1),

.2 Proposed P.I. elevations,

.3 Tentative road and lane centre line grades,

.4 Typical roadway cross-sections,

- .5 Proposed Canada Post community mailbox locations,
- .6 Any proposed subdivision entrance signs should also be shown on this plan.

Detailed roadway design criteria are included in Section 13 of this document.

3.5 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 Invert elevations,
- .3 Hydrant locations, and
- .4 Location of valves.

Valve locations should be established in conjunction with proposed development phasing and the flushing sequence for each phase.

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

Detailed water system design criteria are included in Section 8 of this document.

3.6 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 Outline Plan area must also be considered, and alternatives for service extensions to these areas (e.g. 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 9 of this document.

3.7 Major Drainage System

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

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

In the past, storm drainage systems were designed using the rational method using the Edmonton Five Year Storm (prior to 1970), the Red Deer Three Year Storm (1970 to 1990), and subsequent to 1990, the Atmospheric Environmental Services I.D.F. storm curves for the Red Deer Airport. In addition, major drainage was not considered prior to 1990.

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

The major drainage plan should show the following:

- .1 Major drainage area boundaries,
- .2 Major drainage routes,
- .3 Detention pond locations and shapes (e.g. 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 Neighbourhood Area Structure Plan and show how this drainage is to be redirected or stored.
- .6 Include a Table, listing pond area, volume and discharge table for notable pond elevations and rainfall frequencies for each pond in the development area, as follows:

Design Parameter	Elevation	Pond/ Water Surface Area (ha)	Pond Volume (m ³)	Outlet Discharge (l/sec.)	Notes
Original Ground	884.3	3.6	N/A	N/A	
Plugged Outlet (1:100)	882.2	2.8	42,000	0	L.T.F. Elevation
1:100	881.6	2.7	28,500	510* ¹	Weir crest regulated
1:50	881.2	2.1	27,300	490	Orifice flow regulated
1:25	881.1	2.0	18,600	420	Orifice flow regulated
1:10	880.8	1.8	12,400	380	Orifice flow regulated
1:5	880.2	1.6	7,500	350* ²	Orifice flow regulated
Pond Bottom	880.1	1.2	500	250	Nominal pond bottom
Inlet Crest	880.0	0.001	0	245	
Invert By-pass pipe	878.0	0	0	0	
* ¹ – equates to 0.01 L/sec/ha					
* ² – equates to 0.001 L/sec/ha					

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 10 of this document.

3.8 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 Neighbourhood Area Structure Plan area to the existing minor system based on topographic considerations and downstream transmission capacities. This may include analysis of the existing minor system in terms of planned and projected flows, and assessment and monitoring of existing system capacities and flows. Future growth areas beyond the limits of the Neighbourhood Area Structure Plan area must also be considered, and alternatives for service extensions to these

areas (e.g. 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 10 of this document.

3.9 Shallow Utility Systems

The purpose of the Shallow Utilities Plan is to establish the proposed system requirements. The shallow utility companies should be provided with a copy of the deep utility and road layout drawings to assist them in locating surface features such as transformers, switch gear, telephone switching cabinets, etc.). Detailed design criteria are included in Section 12 of this Document.

3.10 Conceptual Landscaping Plan

A Conceptual Landscape Plan is to be provided to illustrate how the municipal reserve parcels will be developed, in particular the Neighbourhood Park Site(s) identified in the Neighbourhood Area Structure Plan.

The plan should show the following:

- .1 Areas of existing wetlands, trees, and vegetation to be removed or retained, as identified in the Ecological Profile prepared by the Community Services Department,
- .2 Identify topographic features and drainage patterns for all municipal reserve parcels,
- .3 Proposed trail system, including connection to the trail system in adjacent developments,
- .4 Proposed tree/shrub bed locations along arterial roadways,
- .5 Roadways where collector tree planting is required,

- .6 Proposed development plan for the Neighbourhood Park site(s), including site amenities (e.g. school parcel, sports fields, playground apparatus, etc.), detention pond, water levels and structures, trails, site grading, etc.
- .7 Preliminary tree/shrub bed locations in parkette,
- .8 Special landscaping features that are being considered for incorporation in the development area.
- .9 Mailboxes and transit stops and other street furniture, hydrants, etc.
- .10 All existing and proposed easements.
- .11 Proposed site grading and slope evaluation

Detailed landscaping design criteria are included in Section 14 of this document.

3.11 Submission of Servicing Study Report and Drawings

One complete set of servicing Drawings shall be submitted to each of the following for review and approval:

- .1 Infrastructure and Property Services Department,
- .2 Community Services Department,
- .3 (Fortis, Alberta), Power Department
- .4 (Atco Gas), Gas Company,
- .5 (Telus), Telephone Company, and
- .6 (Shaw), Cable Television Company.

One copy of the draft report, including individual studies (e.g. geotechnical, ecological profile, noise, traffic, water modelling, sanitary sewer system modelling, stormwater management, erosion and sediment control) shall be submitted to the Infrastructure and Property Services Department for review and comments.

Following approval of the drawings and the report, submit three copies of the report and one complete set of reproducible drawings to the Infrastructure and Property Services Department.

Provide one complete set of reproducible drawings to the Community Services Director.

Provide one copy of the Shallow Utilities Plan to the (Fortis, Alberta) Power Department, (Atco Gas) Gas Company, (Telus) Telephone Company, and (Shaw) Cable Television Company.

4. GEOTECHNICAL REPORT

4.1 General

The Developer shall engage the services of a qualified soils consultant to prepare a report prior to commencing detailed subdivision design. 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. The test holes are to be of sufficient depth to indicate soil conditions for utility construction. Standard piezometers shall be installed in each test hole.

4.2 Required Testing

The minimum number of tests required for this report is as follows:

- .1 Soil moisture contents at 1 m intervals throughout each borehole,
- .2 A sufficient number of soil sulphate tests to represent the various soil types throughout the Development,
- .3 A sufficient number of California Bearing Ratio (CBR) tests to represent the road subgrade soils throughout the Development,
- .4 Sieve analysis for each predominant soil type,
- .5 Standard penetration tests for determination of in-situ relative soil density and consistency of the various soil strata,
- .6 Measurement of groundwater table and analysis of its influence with respect to the design of roadways, utility trenches, and foundations. Groundwater readings shall be provided on completion of drilling, 1 day after drilling, 7 days after drilling, 14 days after drilling, 1 month after drilling, and once a month thereafter for 5 additional months.

4.3 Final Report

Three copies of the report shall be submitted to The Town's Infrastructure and Property Services Department, 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 0.50 m intervals,
- .4 Recommendation on suitability of site for the proposed Development,
- .5 Comments on the soil bearing capacity and recommended setbacks from

escarpments for various types of building foundations,

- .6 Recommendations with regard to trench excavation and backfill specifications, and road pavement structure requirements.

5. SLOPE STABILITY GEOTECHNICAL REPORTS

5.1 General

- .1 A Slope Stability Geotechnical Report is required for all sites where, in the opinion of the Infrastructure and Property Service Department or Community Services Department, slope stability is a concern.
- .2 Geotechnical Report requirements to be applied, relative to the intended land use shall include the following:
 - .1 The assessment of the Factor of Safety (Fs) for the existing slope or the proposed design slope profile.
 - .2 The assessment of a safe set-back or buffer zone back from the crest or away from the toe of the slope.
 - .3 If the Fs for a slope or proposed setback is less than that recommended by the Geotechnical Engineer, the slope may be modified using remedial measures recommended by the Geotechnical Engineering Consultant. Any remedial measures to increase the Fs must consider the affect on adjacent man-made and natural features and be approved by the Director and/or Town.
 - 4. If the development is proposed to be constructed on a slope, the Geotechnical Engineer shall recommend a suitable Fs for the on-slope development, based on a specific risk assessment of the proposed development.
- .3 It is the responsibility of the Developer and/or builder to ensure that all development conditions identified in the Slope Stability Geotechnical Report are complied with.

5.2 Slope Stability Geotechnical Report Requirements

- .1 As a minimum, the scope of the report should provide setback limits or development recommendations based on the recommended Factor of Safety. The minimum recommended setback shall be shown on the final development plan.
- .2 The basis for the presented conclusions shall be clearly defined and the selected method of analysis shall be adequate relative to the ground conditions, project type and size, and public interests.

- .3 The Geotechnical Report requirements must consider the following issues, as well as other site-specific issues identified by the Geotechnical Engineer.
 - .1 Property lines and setbacks as per the Zoning By-law.
 - .2 Stability limit, established with respect to most probable adverse groundwater and loading conditions.
 - .3 Top of embankment or escarpment.
 - .4 Toe of slope (Note: Where the development at the toe of the slope is proposed, the report is to address the effect and extent of slope failure on the subject land and the adjacent properties and the protection of same).
 - .5 Erosion control and other mitigation measures (e.g. drainage works, grading, etc.) close to the slope crest.
 - .6 Appropriate recommendations pertaining to revegetation, dewatering, and slope reconfiguration (e.g. cutting, filling, regrading, retaining walls, etc.).
 - .7 Building location and foundation design.
 - .8 The effect of surcharges due to the proposed structures, retaining walls, and future site grading.

5.3 Verification

- .1 The Developer shall retain the Geotechnical Engineer to review the final drawings and confirm, in writing, that the plans are in accordance with the recommendations made in the Geotechnical Slope Stability Report. This documentation is required before the Foundation and/or Building Permit will be issued.
- .2 The Developer shall retain the Geotechnical Engineer to inspect slope and site improvements during and after completion of the work.
- .3 The Geotechnical Engineer shall certify, in writing, that construction procedures were conducted in accordance with design recommendations and that the completed work complies with the recommendations made in the Geotechnical Report.

6. ENVIRONMENTAL ASSESSMENT REPORTS

- .1 An Environmental Site Assessment or Environmental Impact Assessment is required for all sites where environmental issues are of concern.
- .2 An Environmental Site Assessment (ESA) is required for any situation where contamination on or adjacent to the subject site poses a current or future

environmental concern to the Public. The level of ESA required will vary depending on circumstance as follows:

- .1 Phase 1 ESA – Site Reconnaissance and Historical Review.
 - .2 Phase 2 ESA – Site Investigation and Assessment.
 - .3 Phase 3 ESA –Planning and Implementation of Remediation.
- .3 The Environmental Report for development of a site shall include but not be limited to the following:
- .1 A definition of the scope of the assessment and the assessment criteria to be used for the study site.
 - .2 A detailed discussion of the site assessment, including a review of the chemical or biophysical data with respect to the assessment criteria.
 - .3 A clear and concise summary of the conclusions of the study and/or recommendations for further investigation/ remediation.
 - .4 A complete package of supporting documentation and appendices including, but not limited to plans, photographs, aerial photographs, borehole logs, test results, checklists, etc.
 - .5 A statement of limitations for the report.
- .4 Environmental Reports will be reviewed to the satisfaction of The Town and its appointed review agencies which may include Alberta Environment, or other approved agents. The level of work required will be dependent on the situation and findings. In general:
- .1 Phase 1 ESA's are to be prepared in accordance with accepted guidelines, practices, and procedures that include, but are not limited to those outlined in the Canadian Standards Association Publication (1993) titled "Phase 1 Environmental Site Assessment - Z768-94".
 - .2 If the Phase 1 ESA indicates an environmental issue, a Phase 2 ESA shall be prepared to detail the existence, type, concentration, and extent of on and off-site contamination. This report shall be prepared in accordance with accepted guidelines, practices, and procedures that include but are not limited to those outlined in the Canadian Standards Association Publication (1998) titled "Phase 2 Environmental Site Assessment - Z769-00".
 - .3 If the Phase 2 ESA indicates that there is a requirement for remediation or risk management, then a Phase 3 ESA program and documentation will be required. The report(s) shall document how the site will be remedied or risk managed to a level suitable for the intended development. Final confirmation testing and reporting will be required to verify remediation has taken place.

- .2 Indicate the area and the amount of grading for each phase of development.
- .3 Describe the permanent stormwater management system and the use of these facilities during the construction period.

6.4. Erosion and Sediment Controls

- .1 Determine runoff (snowmelt and rainfall) quantities from within the development area and from the upstream watershed area.
- .2 Provide a description of the methods that will be used to control erosion and sediment transport on the site. Provide detailed design information and calculations as required in Clause 6.5. Stabilization of soils should be the first line of defense.
- .3 Identify permanent and temporary control methods for each phase of development.
- .4 Determine the impact on the receiving water bodies (Blindman River) if the erosion and sediment controls are breached or fail.
- .5 Indicate good “housekeeping” practices.
- .6 Show the location, height and volume of stockpiles. Indicate erosion control measures to control sediment runoff from the stockpiles.
- .7 Indicate the types and scheduling of individual erosion control measures, including interim or short-term measures (Less than 45 days duration).
- .8 Clearly indicate the measures to control sediment export off the development site.
- .9 Describe how the site will be stabilized after construction (site grading and servicing) is completed.

6.5. Sediment Control Calculations

The following calculations/specifications should be provided in the report:

- .1 Design criteria and calculation such as the design particle size for sediment basins. (See Section 10 – Clause 4.4 for Alberta Environment guidelines for stormwater treatment unit design),
- .2 Calculations to demonstrate the design sediment removal efficiency from the runoff from the site as a percentage. Note: Calculations to determine soil loss using the Revised Universal Soil Loss Equation (RUSLE) can be found in Section 6 of the Alberta Transportation - Design Guidelines for Erosion and Sediment Control for Highways manual.

- .3 Seeding and vegetative specifications.
- .4 Inspection and maintenance notes.

6.6. ESC Plan Checklist

A checklist can assist in ensuring that all necessary elements of a comprehensive ESC Plan have been addressed. Appendix A, included at the end of this section, provides a checklist of the minimum requirements for an ESC Plan.

6.7. Modifications to ESC Plan

The ESC Plan must be a stand-alone document that can be located on the construction site for use by site personnel, inspectors and regulators. As site work progresses, the ESC Plan should be modified by the consultant and/or contractor, in consultation with Town staff, to reflect changing conditions.

6.8. Inspection and Maintenance

- .1 Establish a schedule of regular inspections and expected repairs of erosion and sediment control devices.
- .2 Record changes to the ESC Plan due to changing conditions, revised phase boundaries, etc.
- .3 Appendix B, included at the end of this section, is a sample ESC Inspection/ Maintenance Report.

ESC PLAN CHECKLIST

Project Name
Name of Developer
Consultant
Legal Land Description
Civic Address (If applicable)

Note: The ESC Plan must be developed to apply to the specifics of the site and project, but as a minimum the ESC Plan must address the following information. (Note: An “X” appears if the information should appear/be addressed in the report, drawings, and/or calculations portions of the ESC Report and/or ESC Plan.)

Item	Report	Drawing		Calculations
		Site Plan	BMP Details	
Site Characteristics				
Nature of proposed development	X	X		
Size of proposed development	X	X		
Proposed site access locations	X	X		
Adjacent properties/landmarks	X	X		
Existing Land Use				
Existing Use (agricultural, residential, etc.)	X	X		
General topography (slope gradients, lengths, orientation, etc.)	X	X		X
Drainage patterns – provide topography map with contour intervals sufficient to show drainage patterns, drainage divides and flow directions.	X	X		X
Vegetation (e.g. location and types of trees, shrubs, grass, rare vegetation, etc.)	X	X		
Soil types (grain size, erodibility, etc.)	X	X		X
Critical areas (protected vegetation, ravines, escarpments, etc.)	X	X		

Item	Report	Drawing		Calculations
		Site Plan	BMP Details	
Existing Land Use				
Neighbouring areas that may be impacted by development (e.g. rivers, streams, lakes, residential/commercial/industrial/public service developments, parks, roads, etc.)	X	X		
Proposed Development				
General Description of proposed development	X			
Development phasing	X	X		
Clearing and grading phasing	X	X		
Stockpile locations, heights, volumes and timing	X	X		X
Surplus topsoil disposal, including proposed haul routes	X	X		
Drainage flow directions and divides for each drainage area after each stage of development, including contours of finished grades.	X	X		X
Location and description of permanent stormwater management facilities including storm drain inlets, pipes, outlets, waterways, swales, ponds, emergency flow routes, etc.	X	X	X	X
Erosion and Sediment Control Measures				
Erosion potential – slope lengths/gradients, soil erodibility, evaluation summary	X		X	X
Erosion control – protection of exposed surfaces, runoff control, wind erosion.	X		X	
Sediment control – filtering, impoundment, mud control (vehicle tracking), catchbasin protection.	X	X	X	
Description, location and timing of all temporary and permanent ESC measures, including construction details	X	X	X	
Describe good housekeeping measures	X		X	
Stockpile locations, heights, volumes and timing	X	X		

Item	Report	Drawing	Calculations
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		Site Plan	BMP Details	
Erosion and Sediment Control Measures				
Cut/fill slope locations, heights, volumes and timing	X	X		
Exposed soil horizons, soil types (topsoil, fill, bedrock, clay, sand, etc.), locations and timing	X	X		
Temporary diversion of water on-site	X	X		
Winter operations/shut-down measures	X			
Control of spring runoff from adjacent lands	X	X	X	
Post-construction stabilization measures	X			
Seeding and mulching descriptions and locations	X	X		
Signage, Inspection and Maintenance				
Signage (Private property/No trespassing/No unauthorized personnel beyond this point, etc.)	X			
Schedule and records of regular inspections and expected maintenance of ESC measures	X			
Records of inspections and maintenance after storm events	X			
Update ESC plan for changing conditions	X			



SAMPLE ESC INSPECTION/MAINTENANCE REPORT				
Project Name:				
Inspection Date/Time:		Date of Last Inspection:		
Inspected by:				
Verbal/Written Notification given to:		Date:		
Current Weather:		Weather Forecast		
mm of rain last week:		mm of rain in last 24 hours		
Stage of construction				
Contractors on -site				
Construction activities on-site				
Inspection Checklist	Yes	No	Comments	Action Required
Has stripping and grading been phased where possible?				
Have stripped areas/exposed soils/steep slopes been protected and stabilized?				
Have waterways and drainage ways been protected and Stabilized?				
Are perimeter controls in place and functioning adequately?				
Are off-site/downstream properties/waterways protected?				
Are construction entrances stabilized to minimize tracking of soil and mud off-site?				
Are Sediment Control BMP's in place and functioning adequately?				
Are Transport Control BMP's in place and functioning adequately?				
Are Erosion Control BMP's in place and functioning adequately?				

1. GENERAL

In accordance with the current Land Use Bylaw, the Developer shall not do any fieldwork, including site clearing, stripping and/or grading prior to execution of a Clearing and Grading Permit or a Development Agreement that includes provisions for clearing, stripping and grading construction activities.

No grading, stripping or clearing of “sensitive lands” such as wetlands, drainage courses, treed areas or areas of concern to the public shall occur until the A.S.P. is approved by Town Council.

The Director and/or Town may permit grading of “non-sensitive lands” prior to A.S.P. approval, but not until the A.S.P. has been presented to the public.

The Clearing and Grading Plan(s) for a development phase must conform to the grading plan prepared for the Servicing Study, as detailed in Section 5. A specification for a detailed Clearing and Grading Plan is included in Section 2.

The Director of Infrastructure and Property Services must approve the Clearing and Grading Plan, including the location of topsoil stockpiles, prior to any work being undertaken.

The Developer must implement erosion and sediment control measures in the Clearing and Grading Plan as outlined in Section 6.

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

- .1 Approved Clearing and Grading Plan(s),
- .2 Approved Erosion and Sediment Control Plan, and
- .3 Alberta Transportation – Field Guide for Erosion and Sediment Control for Highways.

2. REGULATORY REQUIREMENTS

Federal, Provincial and Municipal regulatory requirements for clearing and grading are included in Section 6 – Erosion and Sediment Control Measures; Clause 3.

3. SUBMISSIONS

The Developer shall identify the owners of all lands adjacent to the clearing and grading area that may be affected by the clearing and grading operations.

The Developer shall provide written documentation (letters and/or agreements) from the affected property owners giving permission to access such lands, including Town owned lands, used for backsloping, drainage or other purposes.

Cross sections may be required to provide more information on the impact of the proposed clearing, stripping and grading on adjacent properties. The cross-section(s) should show the existing grade of the site, proposed grade for the site, grade of adjacent

sites, and grade of adjacent Town, County and/or Provincial roads. Datum points are required to ensure accuracy.

4. SPECIAL CONDITIONS

4.1 Restrictions, Notices and Site Preparation

After a permit has been approved by The Town and prior to the commencement of site clearing and grading, the Developer shall:

- .1 Notify the Infrastructure and Property Services Director 48 hours in advance and arrange a site meeting with the Consultant and the Contractor,
- .2 Erect fencing and provide other measures to ensure that the clearing and grading operation does not encroach into environmental reserves and other restricted areas,
- .3 Erect "Private Property" and "No Trespassing" signs on the perimeter of the Lands, stating the Developer's name and the telephone number of a representative.
- .4 No grading, filling or excavation is permitted within utility and road right of ways, under any overhead utility lines, or over any underground utilities, unless prior written authorization has been received from the utility agencies concerned (see Section 1 – Clause 6).
- .5 Where the Developer proposes to establish a haul route which crosses an existing roadway, the Developer shall apply for a Crossing Agreement as outlined in Section 1 – Clause 7.
- .6 When possible, clearing and grading should take place outside of the nestling/fledgling time period. If work is to occur during the nestling/fledgling time period, information regarding any restrictions should be noted in the City of Red Deer Contract Specifications – Section 01 35 43.

4.2 Environment Protection

- .1 All work associated with clearing and grading the work shall be completed in accordance with the City of Red Deer Contract Specifications - Section 01 35 43 .

4.3 Plant Protection

- .1 The Developer shall protect trees and plants on site and on adjacent properties where indicated on the Drawings. All clearing work is to be completed in accordance with the City of Red Deer Contract Specifications - Section 31 11 00.

4.4 Weed and Vegetative Growth Control

The Developer shall be responsible for controlling noxious weeds and excessive vegetative growth within the clearing and grading area.

5. TOPSOIL STOCKPILES AND DISPOSAL

5.1 General

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

The Developer shall dispose of all topsoil that is surplus to the requirements of the Developer's Lands.

5.2 Topsoil (Loam) Stockpiles

- .1 The amount of topsoil stockpiled on Municipal Reserve parcels shall be restricted to the quantity required to complete the topsoil replacement on the Park Site(s), any other Municipal Reserve parcels within the Development area. Stockpile side slopes shall be no steeper than 2:1 for safety purposes and to allow for weed control.
- .2 All topsoil that is set aside for later use on residential lots shall be stockpiled on a non-reserve parcel elsewhere in the Development area as approved by the Community Services Director.
- .3 Surplus topsoil shall not be stockpiled within undeveloped road right of ways.
- .4 The stripped loam shall be stockpiled in approved locations as shown on the Drawings. The stockpiles shall be neat in appearance, free from any hazardous conditions and treated to prevent erosion from wind and rainfall and shall be posted against dumping and designated "Private Property", "No Trespassing" and "No Unauthorized Personnel Beyond This Point".
- .5 The loam pile(s) shall be removed as development progresses. All loam piles, with the exception of the loam pile on the Neighbourhood School/Park site(s), must be removed prior to the last phase of development of the Developer's Lands.

6. STORMWATER MANAGEMENT FACILITIES

6.1 General

Construction of stormwater management storage facilities (detention ponds, retention ponds and/or constructed wetlands), including any storm sewer mains required to drain the stormwater management storage facilities, require Alberta Environmental Protection Act approvals. If a stormwater management storage

facility is to be constructed as part of the clearing, stripping and grading work, Alberta Environmental Protection Act approval must be received prior to any grading work proceeding. The approved Servicing Study Drawings can be used for the submission to Alberta Environment for the permit application.

6.2 Control of Drainage

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

7. EROSION AND SEDIMENT CONTROL MEASURES

7.1 General

- .1 The Developer shall prepare Erosion and Sediment Control Plans as detailed in Section 6.
- .2 The Developer of the lands being stripped and graded shall employ appropriate measures to control dust, particularly in the vicinity of existing roadways and dwellings, to ensure traffic safety and to minimize dust nuisance complaints from the public.

7.2 Erosion and Sediment Control Plan Modifications

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

8. REHABILITATION OF ADJACENT LANDS

Where clearing and grading operations have encroached on adjacent lands, the Developer, at its sole expense, and to the satisfaction of the Engineer, shall rehabilitate in a timely manner, any off-site areas or operations, storm water runoff, soil erosion, soil instability, sedimentation, dust or other problems which may arise from the clearing and grading operation.

9. DEEP FILLS GEOTECHNICAL REPORT

A "Deep Fills" report, completed by a Professional Engineer, is required when the constructed depth of fill is ≥ 1.2 metre. The report shall make general recommendations for different types of building foundations.

10. CONSTRUCTION COMPLETION AND FINAL ACCEPTANCE

10.1 General

Issuance of Construction Completion Certificates (C.C.C.'s) and Final Acceptance Certificates (F.A.C.'s) shall be subject to the following conditions being met. Failure to implement and comply with the ESC plan can result in legal action as outlined in the Navigable Water Protection Act, Fisheries Act, Environmental Protection and Enhancement Act and the Water Act.

10.2 Maintenance

The Developer shall promptly correct, at his own expense, all defects, damages, and deficiencies in the erosion and sediment control measures, whether related to materials, workmanship, operation, vandalism, or otherwise.

10.3 Maintenance Period

- .1 The Developer shall maintain temporary erosion and sediment control measures until the graded area is fully serviced and developed. Construction Completion Certificates and Final Acceptance Certificates will not be issued for temporary erosion and sediment control measures.
- .2 The Developer shall maintain permanent erosion and sediment control measures for a period of at least two years after the issuance of the Construction Completion Certificate and until a Final Acceptance Certificate is issued by the Engineer.

CLEARING AND GRADING PERMIT REQUIREMENTS LIST

DEVELOPMENT OF INDUSTRIAL, COMMERCIAL, INSTITUTIONAL AND/OR MULTI-FAMILY PARCELS

Item	Provided	Deficiency Corrected
1. Provide completed Clearing and Grading Permit application.		
2. Provide \$150 Permit Fee		
3. Provide one (1) - 8 ½" x 11" copy of an area map (to be attached to Clearing and Grading Permit) showing the following, if applicable:		
.1 The area to be cleared, stripped and/or graded to be outlined with a bold solid line.		
.2 The location of any preservation areas TO BE outlined with a bold dashed line.		
.3 The locations of any topsoil stockpiles to be outlined with a bold dashed line and crosshatched with lighter lines.		
.4 Identify the owners of all lands adjacent to the clearing and grading area.		
4. Where clearing and/or grading operations will encroach beyond the boundary of the parcel, provide the following:		
.1 Written documentation (Letters and/or Agreements) from the affected property owners giving permission to access such lands, including Town owned lands.		
.2 Cross sections must be submitted where the clearing and grading boundary abuts other property owners,		
5. Provide copies of Crossing Agreements for crossing gas mains, electrical transmission right of ways, etc., if required.		
6. Copies of Contractor Insurance Documents (as detailed in <i>Town of Blackfalds Development Agreement – Part Three</i>)		
7. Certificate of Insurance (Signed Original) as detailed in <i>Town of Blackfalds Development Agreement - Part Three</i>)		
8. Provide one (1) - 11" x 17" drawing (to be attached to Clearing and Grading Permit) showing the following:		
.1 Identify the owners of all lands adjacent to the clearing and grading area.		
.2 Any intended clearing, stripping 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 Clearing and Grading design (as detailed in <i>Town of Blackfalds Design Guidelines – Section Seven</i>)		
.4 Showing temporary and/or permanent Erosion and Sediment Control measures to be incorporated in the work (as detailed in <i>Town of Blackfalds Design Guidelines – Section Six.</i>)		
.5 Show the means by which all storm water in and from the subject lands will be controlled.		
.6 If applicable, show how flow along natural drainage courses will be intercepted or diverted around the site.		

CLEARING AND GRADING PERMIT REQUIREMENTS LIST

SUBDIVISION DEVELOPMENT

Item	Provided	Deficiency Corrected
1. Completed Clearing and Grading Permit Form		
2. \$150 Permit Fee, if clearing and grading work is to be completed prior to the signing of a Development Agreement.		
3. One (1) - 8 ½" x 11" copy of an area map (to be attached to Clearing and Grading Permit) showing the following:		
.1 The area to be cleared, stripped and/or graded to be outlined with a bold solid line.		
.2 The location of any preservation areas TO BE outlined with a bold dashed line.		
.3 The locations of any topsoil stockpiles to be outlined with a bold dashed line and crosshatched with lighter lines.		
.4 Identify the owners of all lands adjacent to the clearing and grading area.		
.5 Any intended clearing, stripping 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.		
4. Where the clearing and/or grading boundary abuts other property owners:		
.1 Provide written documentation (Letters and/or Agreements) from the affected property owners giving permission to access such lands, including Town owned lands, to be used for back sloping or other purposes.		
.2 Cross sections must be submitted.		
5. Provide copies of Crossing Agreements for crossing gas mains, electrical transmission right of ways, etc., if required.		
6. Copies of Contractor Insurance Documents (as detailed in <i>Town of Blackfalds Development Agreement, Part Three.</i>)		
7. Certificate of Insurance (Signed Original) as detailed in <i>Town of Blackfalds Development Agreement, Part Three.</i>)		
8. Submit One (1) set of the servicing study drawings, with a minimum scale of 1:1000 (as detailed in the Design Guideline – Section Five). The Drawing requirements are summarized as follows:		
.1 General Drawing Requirements		
.1 North arrow		
.2 Municipal Address		
.3 Legal Description		
.2 Clearing and Grading Drawing		
.1 Existing utility rights of way (easements).		
.2 Existing survey control stations and markers.		
.3 Existing ground contours.		
.4 Proposed ground contours.		
.5 Identify natural features that are to be preserved and/or removed.		
.6 Note any unusual site conditions.		
.7 Test hole locations and original ground elevations.		
.8 Details of topsoil stockpiles; include height, width, length and volumes.		
.9 Location of all proposed utilities (e.g. water, sanitary sewers, storm		

	sewers, gas, electrical, etc.)		
.10	The means by which all storm water in and from the subject lands will be controlled and disposed of, including:		
	.1 How flow along natural drainage courses will be controlled, whether flow is intercepted or diverted.		
	.2 What erosion and sediment control measures are to be installed.		
.3	Cut/Fill Plans		
	.1 Cut/Fill Plans are required for every clearing, stripping and grading project.		
	.2 Areas with fills ≥ 1.0 metre are to be highlighted on the drawing(s).		
.4	Development Phasing Plan		
	.1 The Phasing Plan should 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.		
9.	Deep Fills Geotechnical Report		
	.1 A "Deep Fills" report, completed by a Geotechnical Engineer, is required when the proposed depth of fill is ≥ 1.0 metre.		
	.2 The report shall make general recommendations for different types of building foundations.		
10	Additional Support Information		
	.1 Cross sections may be required to provide more information on the impact of the proposed clearing, stripping and grading on adjacent properties. The cross-section(s) should show the existing grade of the site, proposed grade for the site, grade of adjacent sites, and grade of adjacent Town, County and/or Provincial roads. Datum points are required to ensure accuracy.		
	.2 A revised site plan showing fencing, including the snow fence required at the boundary of any environment reserve land.		
	.3 An Erosion Control Report is necessary when erosion control measures are required.		

Application Date: _____

Permit No. _____

This permit is issued in accordance with the provisions of the Land Use Bylaw 1081/09, Section 11.3- Mechanical Excavations, Stripping & Grading of Parcels. Indicate below the specific activity currently being applied for.

Notes: It is the Contractor's responsibility to comply with the Alberta Transportation Act.
 Copies are available from the Town's Legislative and Administrative Services Department
 These documents are available on the *Town of Blackfalds* website. (www.blackfalds.com)
 Detailed Permit requirements are included in Section 7 of the *Town of Blackfalds* Design Guidelines.

Specific Activity Being Applied For		Fee
<input type="checkbox"/> Stripping Only. Submissions: 1, 2, 4 - 8		\$150.00
<input type="checkbox"/> Clearing only. Submissions: 1, 5, 7, 8		
<input type="checkbox"/> Clearing and Stripping only. Submissions: 1, 2, 4 - 8		
<input type="checkbox"/> Clearing, Stripping, and Grading. Submissions: 1 - 8		\$150.00

Submissions	
1.	8 1/2' x 11' Site Map identifying area to be cleared stripped and/or graded.
2.	Detailed Construction Drawing showing specific activity information and limits of construction.
3.	Detailed Cut and Fill Plan.
4.	Detailed Erosion and Sediment Control (ESC) Plan.
5.	Written approval from adjacent property owners, if required.
6.	Copies of Crossing Agreements, if required.
7.	Developer's Certificate of Insurance (Signed Original) as detailed in the <i>Town of Blackfalds</i> Development Agreement, Part Three – Clause 3.22 (Available on Town Website)
8.	Copies of Contractor Documents (Insurance) as detailed in the <i>Town of Blackfalds</i> Development Agreement, Part Three – Clause 3.22 and 3.23.

Property Owner: Name, _____

Address & Phone # _____

Developer: _____

Consultant: _____

Contractor: _____

Civic Address of Property: _____ Subdivision Name: _____

Legal Description: Lot(s) _____, Block _____, Plan _____
 _____ 1/4 Sec. _____, Twp. _____, Rge. _____, W4th Meridian

_____ Applicant's Signature _____ Applicants Name (Printed): Date: _____	_____ Engineering Services Department Approval Date: _____
--------------------------------------------------------------------------------------	---------------------------------------------------------------------

Comments: _____

 White – Infrastructure and
 Property Services

 Green – Planning and
 Development

Pink – Developer/ Consultant

Yellow - Contractor

INSPECTION CHECK LIST

Project Name: _____ Agreement No. _____

STAGE OF CONSTRUCTION

☐ Pre-construction Meeting
☐ Clearing and Grubbing

☐ Rough Grading
☐ Finish Grading

☐ Final Stabilization
☐ Maintenance Period

INSPECTION CHECKLIST

Item	Yes	No	NA	Comments
Have all cleared and stripped areas requiring temporary or permanent stabilization been stabilized?				
Seeded?				
Mulched?				
Graveled?				
Are stockpiles adequately stabilized with seeding and/or sediment trapping measures?				
Does permanent vegetation provide adequate stabilization?				
Have sediment-trapping facilities been constructed as the first step in stripping and grading?				
For perimeter trapping measures, are earthen structures stabilized?				
Are sediment basins installed where needed?				
Are finished cut and fill slopes adequately stabilized?				
Are on-site channels and outlets adequately stabilized?				
Do all operational storm sewer inlets have adequate inlet protection?				
Are stormwater conveyance channels adequately stabilized with channel lining and/or outlet protection?				
Are properties and waterways downstream from the development adequately protected from erosion and sediment deposition due to increases in peak stormwater runoff?				
Is runoff upstream of the development adequately directed to the temporary and/or permanent stormwater management facilities?				
Are soil and mud kept off public roadways at all access points to the site?				
Is in-stream construction conducted using measures to minimize channel damage?				
Are temporary stream crossings on non-erodible material installed where applicable?				
Is necessary restabilization on in-stream construction complete?				
Have all temporary control measures that are no longer required been removed?				
Have all permanent control structure repairs and sediment removal been performed?				

Report Completed By: _____ Date: _____

1. GENERAL

The water system consists of the regional water connections, reservoirs, trunk water mains, distribution mains, and appurtenances.

In general, water mains 350 mm and larger will be designated "Trunk Water Mains". Services should not be connected to Trunk Water Mains.

Water mains 150 mm - 300 mm will be designated "Distribution Main". Oversized water mains 300 mm or smaller are not consider oversized.

The design of the water system shall conform to Sections 4.7 and 4.8 of 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. PRESSURE ZONES

The water system is divided into pressure zones. The distribution system must be designed with consideration to the current pressure zones.

3. DESIGN FACTORS

3.1 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.

3.2 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 Flow Requirements

- 1. Per capita consumption shall be:

- Average Daily Demand - 450L/person/d
 - Maximum, Daily Demand - 2.0x Average Demand
 - Peak Hourly Demand - 3.0x Average Demand

- .2 Non-residential consumption rates:

For non-residential developments, the minimum water consumption rate shall be equal to 0.15 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).

The minimum fire flow used for developments larger than a single family (i.e.: commercial, apartment) should also be in accordance with the fire flow requirements set out by the architect.

.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.

4. DISTRIBUTION MAINS

4.1 General

The standard grid main network required within residential subdivisions is as shown on Drawing 1.02. 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. Water demands in industrial, commercial, and high-density areas must be analysed to determine the grid and main sizes required.

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.

4.2 Alignments

Water mains shall be located on the standard alignment shown on Drawing 4.07 for streets and Drawings 4.08 and 4.09 for lanes and public utility lots. A minimum separation of 2.5 m from sanitary and storm sewers shall be provided in all instances, unless approved otherwise by the Director and/or the Town.

Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

4.3 Depth of Cover

Water mains shall be installed with a minimum depth of cover of 3.0 m 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 3.0 m, the main/service is to be insulated as specified in Drawing 1.03 of the Construction Specifications.

4.4 Oversize

Oversize will not apply to distribution water mains installed in accordance with the standard grid.

5. HYDRANTS

5.1 Spacing

The maximum spacing between hydrants, as measured along the centre line of the right of way, shall be 180 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 90 m.

5.2 Approvals

A plan showing all proposed hydrant locations within the Development, must be submitted to the *Town of Blackfalds* Emergency Services Department and Fire Department, for approval of locations and spacing prior to finalizing the design of the water distribution system.

5.3 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.

5.4 Hydrant Type

Hydrants shall have plugged drain holes and be manufactured by an approved hydrant manufacturer as listed in The City of Red Deer Contract Specifications.

5.5 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.

6. VALVES AND FITTINGS

6.1 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 Section 17 for typical valve locations.

6.2 Protection

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

6.3 Operation of Boundary Valves During Construction

The Consulting Engineer shall clearly identify boundary valves on the engineering design drawings. Basic procedures for operating existing valves during construction are as outlined in the City of Red Deer Contract Specifications.

7. WATER MAIN FLUSHING AND DISINFECTION PROCEDURES

7.1 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 Current Edition, "Disinfecting Water Mains" and City of Red Deer Contract Specifications.

Note: The Developer must collect all water samples.

- .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.

1. GENERAL

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

In general, sanitary mains 375 mm or greater, and/or smaller diameter mains installed at depths greater than 6.0 m, complete with related pumping facilities, will be designated "Trunk Sanitary Mains". A sewer main 300mm or smaller are not considered oversized.

The design of the sanitary sewer system should conform to Sections 5.1 and 7.1 of 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

2.1 Residential (Population Generated)

Residential dry weather flows are to be calculated as follows:

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

Q_{PDW} = the peak dry weather design flow rate (litres/sec)

G = 320 litres/day/person

P = the design contributing population in thousands
(Population per hectare x contributing area/1000)
(Design population = 45 people per hectare)

Pf = Harmon's Peaking Factor = $1 + 14 / (4 + P^{0.5})$

2.2 Non-residential

For detailed system design, the average wastewater flow from non-residential land use areas are to be estimated as outlined in Section 7 of the Standards and Guidelines for Municipal Water Supply, Wastewater, and Storm Drainage.

Large non-residential developments should be evaluated based on site specific service requirements. The lower limit for average dry weather flow is:

$$Q_{AVE} = 0.15 \text{ litres/sec/ha}$$

Peak dry weather flows are to be determined as follows:

Peaking Factor, $Pf = 10 (Q_{AVE}^{-0.45})$, but not less than 2.5 or greater than 25.

Peak Dry Weather Flow, $Q_{PDW} = P_f \times Q_{AVE}$

2.3 Extraneous Flow Allowances - All Land Uses

For the *Town of Blackfalds*, a general allowance of 0.20 L/sec/ha shall be applied, irrespective of land use classification, to account for wet weather inflow to manholes and for infiltration into pipes and manholes.

An effort should be made during the design stage to locate sanitary manholes away from sag points.

3. SANITARY SEWER MAINS

3.1 General

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

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. See Section 11 for additional information.



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 greater than 90 m along the curve unless approved otherwise by the Director
- .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 4.07 for streets and Drawings 4.08 and 4.09 for lanes and public utility lots. A minimum separation of 2.5 m from water mains shall be provided in all instances, unless approved otherwise by the Director. 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 11, Clause 4; but not shallower than 2.7 m, unless otherwise approved by the Director. 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 1.03 of the Construction Specifications.

The maximum depth of cover shall not exceed 5.5 m in cases where sanitary and/or storm service connections are to be installed. In situations where depth of cover exceeds 5.5 m, the Consultant shall redesign the sanitary sewer system

and /or the site grading to reduce the depth of cover to less than 5.5 m. Where the depth of cover cannot be reduced to less than 5.5 m, a second small diameter main shall be installed on the same alignment as the deep main at the minimum depth required to meet the conditions of Section 11, Clause 4.

4. 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 750 mm in diameter or less. Pre-cast manhole vaults, or an oversized manhole barrel shall be used on mains 900 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. For safety reasons, all precast manholes shall be spigot-up.

Manhole bases may be cast-in-place or pre-cast complete with flow channel, benching, and pipe stubs. See manhole details in The City of Red Deer's Contract Specifications.

5. OVERSIZE

Oversize may be applicable for sanitary mains. Pipe sizes less than 300 mm are not considered oversized. Oversize costs will be determined as outlined in the Development Agreement.



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 Director prior to design proceeding.

In general, storm mains 1200 mm or greater than, as well as stormwater storage facilities and associated outlet piping, will be designated "Trunk Storm Mains".

The design of the storm sewer system should conform to Section 8.0 of 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".

This Section provides a brief summary of the design standards and guidelines for storm drainage systems in the Town of Blackfalds.

1.2 Stormwater Management

These Guidelines have been established pursuant to the Town of Blackfalds Stormwater Management Policy and 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 new development areas, and in existing downstream developments.
- .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 Director.



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 or pond without sustaining any surface ponding or excessive surface flows for events up to a 1 in 5 year return period, where reasonably attainable in the opinion of the Director.

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 (e.g. flooding of buildings) occurs during the 100-year storm event, where reasonably attainable in the opinion of the Director.

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 Red Deer Industrial Airport.

2002 Extrapolated IDF Formulas (1964 – 1999 Data)		
Frequency	Average Intensity (mm/hr.)	
	(5 Minute - 2 Hour Time Interval)	(2 - 24 Hour Time Interval)
3 months	61 (t+11.2) ^{-0.55 **}	3052 (t+140.2) ^{-1.18 **}
6 months	144 (t+4.2) ^{-0.67 **}	446 (t+64.6) ^{-0.83 **}
1 year	270 (t+3.9) ^{-0.76 **}	252 (t+37.3) ^{-0.70 **}
2 year	408 (t + 4.3) ^{-0.81}	175 (t + 13.3) ^{-0.62}
5 year	667 (t + 4.4) ^{-0.86}	165 (t + 6.1) ^{-0.57}
10 year	873 (t + 4.7) ^{-0.89}	169 (t + 4.4) ^{-0.55}
25 year	1120 (t + 4.8) ^{-0.91}	176 (t + 1.8) ^{-0.53}
50 year	1320 (t + 4.9) ^{-0.92}	182 (t + 1.0) ^{-0.52}
100 year	1477 (t + 4.8) ^{-0.93 **}	187 (t - 1.6) ^{-0.51}

t = storm duration in minutes

** Use with discretion

These IDF formulas shall be used for all new storm basins. For established basins, the current three-year intensity curve may be used at the discretion of the



Director. Rainfall intensity (mm/hr) for the three-year storm is defined by the following formula:

$$i_3 = 1372 / (t+15)$$

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 (e.g. 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 Director and/or the Town.

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. Direct connections between roof leaders and the town storm sewer system are not permitted. Roof leaders may be connected to private storm sewers, provided a grit separator and onsite control manhole are provided.

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 except where building density makes this impractical.

Weeping tile connections to the storm sewer shall be provided for all buildings. Where the storm sewer service will be higher than the footing elevation, the connection shall be made using a sump pump in accordance with Drawing 4.04.

.1 Site Drainage and Storm Sewer Service Restrictions

All developments are required to provide a detailed site grading drawing(s) identifying storm drainage patterns, on-site detention, storm sewers, manholes, and catch basins.

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

If the site is between 0.2 ha and 0.4 ha and a large portion of the site is landscaped, on-site catch basins and storm sewer connection requirements may not be required at the discretion of the Infrastructure and Property Services Department.

Calculations for storm sewer and detention sizing must be provided for sites larger than 0.4 ha.

.2 Storm Service Design Criteria

The storm service size is to be determined based on the following, depending on the capacity of the downstream storm sewer system:



.1 Redevelopment Areas

Where the new service is being connected to an existing main in an older area of the Town, the allowable capacity for the development will be based on the following formula:

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

The calculated capacity of the service will likely be less than a 1:5 year storm discharge, but the allowable discharge shall not be greater than the 1:5 year discharge as calculated for new development areas.

.2 New Development Areas

Where the new service is being connected to an existing main in a recently developed area of the Town service, the allowable capacity for the development will be determined using the 1:5 year rainfall IDF curve and the appropriate run-off coefficient.

.3 Major Drainage Ponding

The 1:25 year storm is to be detained on site with an emergency drainage route for the 1:100 year event being provided. The 1:100 year storm must be detained on site if an emergency route cannot be provided.

Information regarding the Intensity-Duration-Frequency Curves (IDF Curves), Run-off Coefficients (C), and design methods to be used to determine the storm service size is included in the Town of Blackfalds Design Guidelines.

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 Director.

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 Material

All 200 mm storm sewer pipe shall be PVC SDR 35. See Section 11 for additional information.

2.4 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.



2.5 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 11, Clause 4, but not shallower than 1.5 m, unless otherwise approved by the Director. 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 1.03 of the City of Red Deer Construction Specifications.

The maximum depth of cover shall not exceed 5.5 m in cases where sanitary and/or storm service connections are to be installed. In situations where depth of cover exceeds 5.5 m, the Consultant shall redesign the storm sewer system and /or the site grading to reduce the depth of cover to less than 5.5 m.

2.6 Minimum Sizes

The minimum size of a storm sewer main shall be 300 mm in diameter. Mains installed for weeping tile connections only shall be 200 mm in diameter with a minimum grade of 0.40%.

2.7 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".

2.8 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.

2.9 Alignment

Storm sewers shall be located on the standard alignment shown on Drawing 4.07 for. A minimum separation of 2.5 m from water mains shall be provided. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

2.10 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 750 mm in diameter or less. Precast manhole vaults or an oversized manhole barrel shall be used on mains of 900 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. For safety reasons, all precast manholes shall be spigot-up.

2.11 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 curb ramp. Invert crossings of streets (swales) are not permitted.

.2 Catch Basin Leads

Catch basin leads shall connect directly to a manhole. If a twin catch basin is required to drain an area, the twinned unit shall consist of a catch basin and a catch basin manhole interconnected by means of 250 mm pipe. The lead from the catch basin manhole to main line manhole shall be a 300 mm pipe. Single catch basins require 250 mm leads. 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-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. All catch basin manholes shall be built with a 1200 mm barrel. All catch basins and catch basin manholes shall be built with a 250 mm deep sump.



The type of inlet assembly, as illustrated in the City of Red Deer Contract Specifications, to be used for catch basins and catch basin manholes shall be as follows:

- .1 Type K-1 catch basin assembly is to be used in conjunction with standard curb and gutter, and standard monolithic sidewalk construction,
- .2 Type K-3 catch basin assembly is to be used in conjunction with lane construction,
- .3 Type K-6 catch basin assemblies may be used to drain landscape areas and swales,
- .4 Type SK-7 catch basin is to be used in conjunction with rolled monolithic sidewalk construction,
- .5 Type SK-7 and Type DK-7 catch basin assemblies are to be used for expressways and arterial roadways,
- .6 Trash grate may be used to drain ditches, see the City of Red Deer Contract Specification drawings as reference.

2.12 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 400 mm 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)
0.8	0.5
0.3	1.0
0.2	2.0
0.1	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. Overland flow capacities of typical local and collector street cross sections and a typical trap low storage area are illustrated in Section 17.

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 are required to reduce peak flow rates to downstream sewer systems and/or watercourses, or to provide a temporary receiving area for peak major drainage flows. Their approximate location and size must be identified and 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.

.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 Erosion and Sediment Control

An erosion and sediment control plan, as detailed in Section 6 is required as part of the Stormwater Management Study to define measures which must be undertaken for the control of sediment into the stormwater storage facility and into the receiving stream.

.5 Storage Alternates

.1 General

The review of the stormwater management alternatives for application to a specific area should consider the storage methods listed.

.2 Dry Pond (Detention) Storage

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



.3 Wet Pond (Retention) Storage

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

.6 Outflow Control

The outlet from a stormwater management storage system must incorporate appropriate means for the control of outflow and to limit the rate of discharge. The release rates are to be calculated by detailed modelling of the existing storm sewer system and are to be based on any proposed changes in the release rate to the receiving water body and revisions to the basin boundaries.

.7 Emergency Spillway Provisions

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

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

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

.8 Land Dedication for Stormwater Management Facilities

The requirements for dedication of land on which a stormwater management facility is to be situated will be in accordance with Council directives

.9 Landscaping Requirements

Detention pond landscaping requirements are detailed in Section 14.

.10 Detention Pond Development Costs



Detention pond financing and construction responsibility is detailed in Section 14.

.11 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 Director.

4.2 Dry Detention Ponds

.1 General

Dry ponds should have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the subdivision. Where possible, and as agreed by the Director of Community Services, they should be associated with municipal reserve areas to take advantage of the joint use ability of the facilities (e.g. extension of sports fields into the detention pond). Active park uses should not be located adjacent to the inlet/outlet facilities nor in areas that flood frequently (more than twice per year on average). The Community Services Department should be contacted to provide input to the design of detention facilities from the concept stage through to detailed design and construction. A typical joint use detention pond/park site is illustrated in Section 17.

.2 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.

.3 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 Maximum interior side slopes of 5:1 (7:1 is recommended).
- .5 Minimum freeboard of 0.6 m above 1:100 year high water levels.
- .6 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.
- .7 Maximum 4:1 ratio of effective length to effective width measured at 100-year high water level.
- .8 Dimensions must be acceptable to *the Town of Blackfalds* Community Services Department when the bottom of the pond is to be used for recreation facilities.
- .9 Minimum lateral slope in the bottom of the pond of 1.0% (2.0% is preferred) and minimum longitudinal slope of 0.5% (1.0% is preferred).
- .10 Low flow bypass for flows from minor events to be provided.
- .11 French drains are to be provided within pond bottom where water table is near pond bottom.
- .12 Address all safety issues (particularly during operation).
- .13 Sediment (Grit) Separation Stormwater Treatment Units, as specified in Item 4.4.

4.3 Wet Detention Ponds (Residential Subdivision)



The Town of Blackfalds Stormwater Management Policy does not encourage the use of wet ponds. The Developer will be responsible for all construction costs in excess of the cost to construct the original dry pond facility. The Developer will also be required to establish a maintenance fund for perpetual maintenance of the pond.

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

- .1 2.0 ha minimum water surface area.
- .2 Maximum side slopes of 7:1 between the high water level and 1.0 m below normal water level.
- .3 Minimum permanent pool depth of 2.0 m.
- .4 Maximum 1:100 year storage depth of 1.5 m.
- .5 Sediment forebays required at each inlet.
- .6 Hardedge treatment required along lake perimeter.
- .7 Minimum freeboard depth of 0.6 m. House footings must be above freeboard elevation.
- .8 Water recirculation and make-up system required. (May require Aeration device).
- .9 Provide access for maintenance and emergency equipment.
- .10 Design of outlet control structure to be capable of maintaining permanent pool depth and capable of draining the permanent pool for maintenance purposes.
- .11 When possible, preserve existing wetlands by incorporating them into the stormwater management plan.

4.4 Sediment (Grit) Separation Stormwater Treatment Units

- .1 Purpose



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

.2 Design Criteria

Alberta Environment Protection guidelines state "Treatment units are to be sized based on a minimum treatment flow rate of 75 l/s per hectare of development area and must be capable of conveying at least 150 l/s per hectare of flow through the treatment unit without re-suspending sediments or floatable materials within the treatment unit. The treatment unit shall remove at least 85% of all sediments of a 75-micrometer particle size or larger."

.3 Suppliers

The following oil/grit separator units are acceptable for use in *the Town of Blackfalds*.

Stormwater Treatment System	Supplier
CDS™ Technologies	Inland Pipe Limited (Calgary) 1-403-279-5531
Stormceptor®	Lafarge Canada Inc. (Calgary) 1-800-LAFARGE (523-2743)
Vortechinics™	Proform Concrete Services Inc. (Red Deer) 363-6099

The Town is prepared to consider other systems that may be available for this application; however, detailed engineering information must be provided to support use of the proposed alternate product.

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 Temporary Drainage System

Temporary drainage systems to intercept agricultural drainage and snowmelt shall be provided adjacent to new development. The temporary system may involve berming and/or ditching to detain or redirect the run-off to the storm system.

5.3 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.

5.4 Bridges

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.



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 property/easement line to allow for 100 mm private connections. The storm service shall have a plug installed at property/easement line.

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 in the drawings in Section 17.

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

3. SANITARY AND STORM SEWER CONNECTIONS TO MAIN

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

- .1 Service saddles,
- .2 In-line tees, and/or
- .3 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. These requirements are illustrated in Section 17.

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 1.03 of the Contract Specifications.

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 (see Section 14), unless otherwise approved by the Director.

The curb stop and standpipe shall be located 0.3 m from the easement line, within the easement. As shown on standard drawing 4.02.

To aid in locating the service, temporary markers shall be installed at the end of the service stub as shown in the City of Red Deer's Contract Specification Drawing 50 04 01.

6. WATER CURB STOP AND SERVICE BOX

The service box is to be installed at the time of service installation. The service should extend approximately 3m past the curb stop/service box location. The sanitary sewer reducer shall be installed at the end of the service stub.

7. RISERS

Vertical risers shall not be used unless otherwise approved by the Director. 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 property/easement line.



8. SERVICE CONNECTION RESTRICTIONS

Large sanitary and storm service connections may require the installation of a manhole at the main; refer to the manhole requirement chart in Section 16.

9. 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.

10. INSPECTION MANHOLES/CHAMBERS

All commercial, industrial, and institutional developments shall have an inspection manhole or chamber installed on their sanitary sewer service connection. Where possible, a service should connect to an existing or proposed manhole constructed on the sanitary sewer main alignment. Where a direct connection is made to the sanitary sewer main, an inspection manhole or chamber is to be located at the property line or easement line on the sanitary service.

1. GENERAL

2.1 Area Structure Plan Servicing Study

The Developer has prepared a preliminary Shallow Utilities Plan as part of the Servicing Study completed as outlined in Section 5. The tentative alignments for each utility are schematically shown.

2.2 Detailed Design Drawings

The Developer is required to prepare a detailed Shallow Utility Plan for each phase of development. The Developer shall make arrangements for the provision of natural gas, power, telephone, and cable television service for each phase of development as follows:

- .1 The Developer shall make arrangements with ATCO Gas Ltd. for the supply of natural gas by contacting the District Engineer in the City of Red Deer office at the following address:

District Engineer
ATCO Gas
7590 Edgar Industrial Drive
Red Deer, Alberta T4P 3R2

- .2 The Developer shall make arrangements with Telus Communication Inc. for the supply of telephone service by contacting Telus at the following address:

TELUS Communications Inc.
National Access Network Design
Floor 12
411 - 1 Street S.E.
Calgary, Alberta T2G 4Y5

- .3 The Developer shall make arrangements with Shaw Cable for the supply of cable television service by contacting Technical Manager at the Red Deer office at the following address:

Shaw CableSystems Ltd.
4761 62 Street
Red Deer, Alberta
T4N 2R4

- .4 The Developer shall make arrangements with Fortis Alberta for power services by contacting at:

FortisNewConnects@fortisalberta.com or 310-WIRE

- .5 The Power and Gas providers (ATCO Gas and Fortis Alberta), Telus Communication Inc. and Shaw Cable services are generally installed in a common trench; however, each utility company should be contacted to review their alignments and prepare their design.

2.3 Review and Approval of Detailed Shallow Utilities Plan

As noted in Section One – Clause 2.3, the Developer is responsible for coordinating the location of the power, gas, telephone and cable TV, including obtaining alignment approvals.

The Developer shall forward the following information to Fortis Alberta, ATCO Gas, Shaw Cable Systems and Telus Communications following approval of the power distribution and streetlighting design.

- .1 Copies of the roadway and deep utilities plan drawings,
- .2 Copy of the approved power distribution and street lighting design drawing.

Following the completion of the design of each service provider's facilities, copies of their alignments and easement requirements will be forwarded to the Developer for preparation of the Shallow Utilities Plan. Alignment approval letters will also be provided.

Note: The Developer is also responsible for any costs related to the provision of power, gas, telephone and cable TV to service a subdivision, including the cost of installing ducts for road crossing.

2. ELECTRIC SYSTEM

2.4 Design and Construction Options

As detailed in the Development Agreement, the Developer may arrange for the installation of street and walkway lighting, and power distribution in accordance with one of the following options:

- .1 Have an Electrical Consulting Engineer prepare the design in accordance with Clause 2.5 of these Guidelines and have a qualified contractor complete all electrical installations in accordance with the following:
 - .1 City of Red Deer Contract Specifications,

- .2 Fortis Alberta Construction Standards, and
- .3 Fortis Alberta Material Specifications.

The design of the power system must be approved by the Towns Operations and Engineering Service Department prior to installation. The installation must also be inspected by the Town. Energization of the system will be done by an electrical consultant once they have accepted the system has been approved.

2.5 General Design Guidelines

Before starting with the detailed design of the electrical system, the Developer should review the Shallow Utilities Plan prepared in conjunction with the Infrastructure and Property Services Department to confirm the proposed alignments. Standard utility alignments are included in Section 16.

Distribution cables (i.e. primary, secondary, and streetlight power, telephone, and cable television) are normally installed in a common 500 mm wide trench at the required alignment. Associated apparatus (e.g. streetlight poles, URD boxes, padmounted transformers, and switching cubicles) shall be installed as described by Fortis Alberta.

The following requirements are to aid the Developer in the design of his distribution system.

.1 Trench Locations

Where cables are installed along a street, walkway, or utility lot, they shall be located with standard clearances to other utilities. Where power, telephone, or cable television cables cross the water main, they shall be at a minimum distance of 3.0 m from any valve or hydrant, unless approved otherwise.

.2 Padmount Transformers

Padmount transformers are mounted on precast basements. Transformers shall be no closer to a corner cut than 6.0 m. Four transformer sizes are used for the residential distribution: 25 kVa, 37 kVa, 50 kVa and 75 kVa. Twenty-five kVa transformers may be loaded to a maximum of 8 services, 37 kVa transformers to a maximum of 13 services, 50 kVa transformers to a maximum of 18 services and 75 kVa transformers to a maximum of 25 services.

.3 Switching Cubicles

Dead-front switching cubicles are mounted on precast basements located on centre line of trench no closer to a corner cut than 30 m without relaxation, and must maintain a 3.0 m clearance to all other utility fixtures.

The main function of these cubicles is to provide a fused/sectionalised switching of the "primary distribution" system.

.4 Primary Distribution 25 KV

Primary distribution may be one phase or three phase loop circuits through the Development area. The Developer must ensure that the distribution of the primary circuits throughout the Development area is adequate for the zoning involved. The cable used for these circuits is a single conductor; #1 copper jacketed 25 kV (nominal) insulation, 100% current carrying concentric neutral conductor. These loop circuits may be loaded to a maximum of 1,000 kVa (single phase) and 3,000 kVa (three phase). The Consulting Engineer will be responsible for identifying the entry point (or points) of the primary circuits into the Development area; however, it is the responsibility of the Developer to obtain this information before he proceeds with the preliminary layout.

An open loop system is achieved by using either 200/600 amp three phase dead-front switching cubicles or a lateral that connects to the overhead lines. At each end of the loop it will be the responsibility of the Developer to ensure that each phase of the primary distribution system is balanced in accordance with the Town's requirements of the adjacent Developments. The Developer shall provide a detailed transformer connected-load-per-phase schedule to the Town for approval with the preliminary drawings, including proposed multiple family site and commercial site loadings.

The Developer's Consulting Engineers will determine the normal "open points" on the looped circuits.

.5 Secondary Distribution and Services

Secondary distribution circuits are defined as being radially fed from each transformer. A maximum of six secondary connections are allowed at each transformer. The cable used for secondary distribution is two conductor #4/0 aluminum 600V insulated 100% current carrying concentric neutral conductor. Transformer loading, wire size, and distances will be such that CSA bulletin CAN3-C235-83 recommended minimum voltage limit at the service entrance is met. The #4/0 Cable provides the distribution from the transformer to all URD boxes. At this point the secondary services are stubbed out at the easement line or property line where service connection is made.

Secondary services are radially fed from the URD boxes or transformer. Each service is considered to be a 1/0A1 cable for the normal 100 amp service.

Service stubs to each lot shall be capped with heat shrink caps at the easement line. Each service "stub-in" shall be marked and enter the property at the prescribed offset.

.6 Streetlighting

Residential roadway lighting shall be as follows:

.1 Local roadways - 100 watt mounted on 9.1 m (30') poles,

.2 Collector roadways - 150 watt mounted on 9.1 m (30') poles,

All lights shall be LED as approved by The Town. The pole will be mounted on a steel augured base.

Decorative lighting must be coordinated with the Infrastructure and Property Services Department before materials are ordered or final plans are submitted.

Each luminaries is to be individually controlled by photocell and shall utilize a 120 volt feed from the secondary pole located in the closest URD service box.

.7 Grounding

Grounding consists of driven ground rods and has copper strand wire as described by Fortis. Primary and secondary neutrals are both tied to the appropriate ground. Grounding is required at all switching cubicles, URD boxes, streetlights, and transformers as indicated on the appropriate drawing. All concentric neutrals shall be tied to the grounding facilities in the equipment.

.8 Materials

All materials used for this project shall be new and as specified by the Town and/or Fortis. The Developer shall not substitute any materials without prior written approval of the Town and/or Fortis. Material specifications require the Towns approval.

2.6 Electric System Drawings

.1 General Drawing Specifications

The electrical servicing plan shall conform to the current Towns standards.

.2 Electrical Layout

The electrical layout plan shall be at a scale of 1:1000 and shall show the following:

- .1 Property lines, block numbers, lot numbers, and street names.
- .2 Primary and secondary cable runs, including in symbol form the number of cables to be installed.
- .3 Telephone and cable television alignments.
- .4 URD pull boxes and service stub outs.
- .5 Transformers.
- .6 Streetlights.

.3 Preliminary Switching Plan

A preliminary switching diagram shall be provided as a separate drawing for each Development area, identifying feeder and distribution circuits, switching cubicles, and transformer numbers, etc. for the primary distribution system only, in accordance with Fortis Alberta standards.

.4 Submission of Drawings

The Developer shall submit to the Town two copies of all detailed Engineering drawings that are complete, accurate, and in accordance with current construction standards. The plans shall be sealed by a Professional Engineer and indicate his proposal for the power distribution system. The Town will review the drawings with respect to adherence to the standards, but will accept no responsibility for engineering omissions and errors shown on or relating to these plans. Where special crossings are involved, the Developer shall meet the requirements noted in Section 1.

Four prints of final approved detailed power, telephone, and cable television drawings, and two prints of all other utility drawings shall be provided to the Town seven days prior to commencement of construction. No construction will be permitted to proceed prior to receipt of such final drawings.

.5 Telephone and Cable Television

As noted in Clause 1.3 of this Section, the Developer shall coordinate, obtain approval, and provide joint use facilities for all telephone and cable television requirements. Telus "approval" print to be submitted to the Town.

.6 Design Revisions After Approval

Where it is necessary for any reason to make any change to the design drawings after they have been approved, two prints of each of the original drawings affected shall be submitted with the proposed changes shown in red, accompanied by a letter outlining the reasons for the required changes. If the proposed changes meet with the approval of the Town, one copy will be signed and returned, accompanied by a letter authorizing the changes. Four prints of the revision of the affected drawing shall be submitted to the Director of Infrastructure and Property Services. No changes are to be made to any original approved drawings without following this procedure.

.7 As-built Drawings and Other Records

The Developer shall, after satisfactory completion of the work, and prior to energization, submit to the Town four copies of as-built drawings, indicating all changes made to the original or revised approved Engineering drawings. The Developer shall, within 90 days after receipt of the Construction Completion Certificate, submit to the Director of Infrastructure and Property Services Department a set of as-built layout plans dimensioning all alignments and/or offsets. These drawings shall be signed and sealed by a Professional Engineer.

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 Expressways
- Urban Arterial Roadways
- Frontage Roads and Auxiliary Lanes
- Residential Collector Streets
- Residential Local Streets
- 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:

Geometric Design Guide for Canadian Roads, TAC
(www.TAC-ATC.ca)

Metric Curve Tables, TAC

A Policy on Geometric Design of Highways and Streets, AASHTO

Turning Vehicle Templates, TAC

Manual of Uniform Traffic Control Devices for Canada, TAC

Roadside Design Guide, AASHTO
(www.transportation.org)

TAC/ITE Canadian Guide to Neighbourhood Traffic Calming, TAC/ITE

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

The following standards will apply to roadways listed in Section 4 - Neighbourhood Area Structure Guidelines. These standards are summarized in Appendix A and Appendix B appended to this Section.

3.1. Auxiliary Lanes on Divided Arterial Roadways

An auxiliary lane providing right turn in/out access to adjacent properties may be considered as an alternative to a Frontage Road, subject to the approval of the Engineer. The auxiliary lane must be designed in accordance with TAC

Geometric Design Guide for Canadian Roads, and shall have a minimum lane width of 3.7m.

3.2. 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 ≥0.80% cannot be established due to adjacent development restrictions (e.g. existing concrete or paved driveways, garages, etc.). Grades <0.50% are not to be used unless approved by the Engineer.

3.3. Vertical Curves

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

.1 Length of Vertical Curve, $L = KA$

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

"A" is the algebraic difference between grades.

.2 Crest "K" Factor based on $L > SSD$

$$.1 \quad SSD = 0.278tV + d \quad (\text{TAC Formula 2.1.5})$$

$$\text{Where } d = V^2/254f \quad (\text{TAC Formula 1.2.4})$$

Where Perception and reaction time (t) = 2.5 sec., and F is as listed in Table 13.1 and TAC – Table 1.2.5.2

$$.2 \quad K_{(\text{Crest})} = SSD^2 / 200 (h_1^{-0.5} + h_2^{-0.5})^2 \quad (\text{TAC Formula 2.1.24})$$

Where $h_1 = 1.05 \text{ m}$ and $h_2 = 0.38 \text{ m}$

.3 Sag "K" Factor based on Comfort Control

$$K_{(\text{Sag})} = V^2 / 395 \quad (\text{TAC Formula 2.1.28})$$

Table 13.1 Vertical Curve “K” Values				
Design Speed	Coefficient of Friction	Stopping Sight Distance	K Factor	
(km/hr)	(f)	(m)	Crest Vertical Curve	Sag Vertical Curve
30	0.40	30	2	2
40	0.38	44	4	4
50	0.35	63	7	6
60	0.33	85	13	9
70	0.31	111	23	12
80	0.30	140	36	16
90	0.30	169	53	21
100	0.29	205	78	25
110	0.28	247	113	31
120	0.28	286	152	36
130	0.28	328	200	43

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,

The formulas for calculating the various vertical curve elements are included in Section 17.

3.4. Superelevation/Transition Spirals for Arterial Roadways

Superelevation is normally rotated about the centre line of the median; however, other rotation points can be used if the Engineer feels it is necessary and the rideability of the end product would be better.

The length of tangent runout shall be as shown in the following table:

Table 13.2 Superelevation Runout Rates (Based on AASHTO (1990) Table III-14 and TAC Urban Supplement)	
Design Speed (km/hr)	Runout Length Factor
60	1:167
70	1:182
80	1:200
90	1:222
100	1:250
Runout Length Factor = Maximum relative slopes for profiles between the edge of two lane pavement and the centerline (percent)	
Tangent Runout Length = $w \times 0.02 \times \text{Design Speed Factor}$ w = width of roadway from centre line to edge of pavement.	
Example: Design Speed = 80, $w = 10.5$, and normal crossfall = 2.00% Tangent Runout Length = $10.5 \times 0.02 \times 200 = 42.0 \text{ m}$	

3.5. Design and Posted Speed

.1 Design Speed

The design speeds for the various roadway classifications are summarized in Appendix A.

.2 Posted Speed

The Consultant is required to provide written recommendations and/or confirmation of the posted speed for all expressways and arterial (divided and undivided) roadways within their project limits.

The posted speed limit for collector and local roadways is 50 km/hr.

3.6. Design Vehicles

Based on recommendations included in the Geometric Design Guide for Canadian Roads (Chapter 1.2), the following design vehicles have been selected as being representative of vehicles operating in Canada:

- .1 Passenger Cars (P)**,
- .2 Light Single-Unit Truck (LSU)
- .3 Medium Single-Unit Trucks (MSU),
- .4 Heavy Single-Unit Trucks (HSU)**,

- .5 WB-19 Tractor Semitrailers (WB19)
- .6 WB-20 Tractor Semitrailers (WB20)**,
- .7 A-Train Doubles (ATD),
- .8 B-Train Doubles (BTD),
- .9 Standard Single-Unit Buses (B-12)**,
- .10 Articulated Buses (A-BUS),
- .11 Intercity Buses (I-BUS)

** Designates design vehicles selected as being representative of vehicles operating in the Town of Blackfalds. The Engineer may specify the use of smaller WB design vehicles in special circumstances.

Note: The minimum travel way designs for the HSU design vehicle will accommodate the single-unit truck, city transit bus, fire truck, garbage truck and other vehicles with a similar wheelbase.

Additional information on design vehicles is included in Geometric Design Guide for Canadian Roads – Chapter 1.2 and A Policy on Geometric Design of Highways and Streets (AASHTO).

3.7. Roadside Safety

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

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

- .1 Remove the obstacle.
- .2 Redesign the obstacle so it can safely be traversed.
- .3 Relocate the obstacle to a point where it is less likely to be struck.
- .4 Reduce impact severity by using appropriate breakaway device.
- .5 Shield the object with a longitudinal traffic barrier designed for redirection or use a crash cushion.
- .6 Delineate the obstacle if the above alternates are not appropriate.

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

Establishing a traversable and unobstructed roadside area (clear zone) extending beyond the edge of the traveled way, particularly on high-volume, high speed roadways will help prevent collisions with fixed objects. The term “clear zone” is used to designate the unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles. The clear zone includes any shoulders or auxiliary lanes.

The edge of the travelled way is generally determined as follows:

- .1 Expressways and Arterial Roadways – measured from the Face of Curb (FoC) or the shoulder (edge) line.
- .2 Divided Collector and Local roadways - measured from the Face of Curb (FoC)
- .3 Undivided Collector and Local roadways – measured from the edge of the parking lane (generally 2.25 m or 2.5 m from FOC).

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

3.8. Pedestrian Accessibility/Safety

Pedestrian environments which are designed to be used by the general public, including those with disabilities, should be accessible to all persons, as well as being safe, functional and attractive. The design elements to be addressed are identified in the Geometric Design Guide for Canadian Roads manual – Chapter 3.3.

Included in Section 16 are drawings illustrating typical boulevard widening at intersections and crosswalk locations.

3.9. Roadway Narrowing for Traffic Calming

Roadway narrowing at intersections and/or midblock locations will be determined on a case-by-case basis. Any proposed roadway narrowing measures must be identified and approved as part of the Neighbourhood Area Structure Plan approval process.

3.10. Traffic Calming

Traffic Calming is defined by the ITE as follows:

“Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorized street users”

Traffic calming measures will be determined on a case-by-case basis. Any proposed traffic calming measures must be identified and approved as part of the Neighbourhood Area Structure Plan approval process.

The design of traffic calming measures should the following factors:

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

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

4. CURB, GUTTER, AND SIDEWALKS

4.1. General

Curb and gutter will be required on all roadways with the exception of industrial roadways that may be constructed to a rural cross section. A 0.5 m wide concrete gutter shall be provided on expressways and arterial roadways. A 0.25 m gutter width shall be provided on all other road classifications. In addition to gutters, a shoulder may be required on expressways and arterial roadways.

The Consultant is required to provide written recommendations and/or confirmation of the cross-section for all expressways and arterial (divided and undivided) roadways within their project limits.

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, frontage roads, 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 and the Parks Department.

4.2. Arterial Roadways

A 3.0 m wide separate sidewalk shall be constructed on one side of the roadway to form part of the Town Trail System (as approved by the Town).

4.3. Residential Collector Roadways

Residential Collector Roadways require a 1.5m separate sidewalk on one side and a 2.5m separate sidewalk on the opposite side.

Curb and gutter to be standard or rolled with a 0.25m gutter. Standard curb and gutter is to be used on Collector Roadways that restrict front access.

Boulevard tree planting is required on Residential Collector Roadways.

4.4. Residential Local 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. The requirement for sidewalk may be waived by the Director where pedestrian traffic is expected to be low (e.g. no frontage areas, cul-de-sacs).

4.5. Industrial, Commercial, and Institutional Roadways

Sidewalks are generally not required for industrial areas, but should be provided in commercial or institutional areas. Specific requirements will depend on the anticipated pedestrian volumes and desirable walking routes.

4.6. Frontage Roads

A 1.5 m monolithic or separate sidewalk is generally required along the private property side of the frontage road.

5. PARA RAMPS

To provide barrier-free access, Para ramps shall be installed at the corner of any intersection which connects to an existing or planned sidewalk or pathway, as part of any new or upgrading construction project. An additional Para ramp shall also be installed on the through street of a three-legged intersection. Engineering approval is required whenever a curb ramp cannot be placed at the midpoint of the curb return.

6. ROADWAY DRAINAGE

Requirements for stormwater management, major drainage design standards, minor storm sewer design criteria, catch basin locations, length of drainage run, etc. are included in Section 10.

It is suggested that weeping tile drains may be installed at sag points in the roadway to drain the subgrade during construction.

7. ROADWAY CONSTRUCTION

7.1. Existing Soil Conditions

As discussed in numerous geotechnical reports, construction problems related to high groundwater tables and fine-grained silty soils are very common in Blackfalds. The silty soils are highly frost susceptible and sensitive to disturbance. This condition may impact roadbed construction depending on seasonal groundwater and weather at the time of construction. In these cases, it is recommended that all design roadway grades be established as high above the groundwater table as possible.

7.2. Pavement Design

The minimum pavement structure permitted for each road classification shall be as outlined in the following table:

Table 13.3 Pavement Structure					
Road Classification	Design Traffic (80 KN axles)	Asphaltic Concrete Depth (mm)	Granular Base Depth (mm)	Granular Subbase Depth (mm)	Total Depth (mm)
Expressway and Arterial	4 x 10 ⁶	125	200	350	675
Industrial Collector	2 x 10 ⁶	100	200	300	600
Residential Collector	1 x 10 ⁶	100	150	300	550
Industrial Local					

	8×10^5	90	150	300	540
Residential Local	9×10^4	75	100	250	425
Paved Lanes	1×10^3	50	200	-	250
Gravel Lanes	5×10^2	-	250	-	250

The pavement structures shown in Table 13.3 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.

7.3. 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.

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.

8. 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.

9. STAGED CONSTRUCTION OF LANES

9.1. Gravel Lanes

Gravel lanes shall be constructed to their final design cross section within one year of completion of underground utilities. After one year of initial lane construction, the lane shall be rehabilitated by removing contaminated material and soft spots, scarifying and recompacting the remaining base course gravel, and finally placing and compacting additional base course gravel to the design cross section.

9.2. Paved Lanes

Staged construction of paved lanes shall be undertaken where underground utilities have been constructed within one year. Initial construction shall be to a gravel lane standard section. After one year of the initial construction, the lane should be rehabilitated as outlined under Clause 9.1 above, shaped to the proper cross section, and then paved. All paved lanes shall be paved in two mats.

10. STANDARD ROAD CROSS SECTIONS

Standard roadway cross-section drawings are included in Section 16.

11. PAVEMENT MARKING AND TRAFFIC CONTROL SIGNS

11.1. Pavement Marking Materials

Pavement markings for the various roadway classifications are as follows:

Table 13.4 Acceptable Pavement Marking Materials	
Item	Type of Material
Arterial Roadways ¹	
1. Centre Lines	Type 1
2. Edge Lines	Type 1
3. Lane Lines	Type 1
4. Stop Bars	Type 1
5. Crosswalk Lines	Type 1
6. Guide Lines	Type 1
7. Arrows	Type 1
8. Concrete Bridge Decks	Paint
9. Asphalt Bridge Decks	Type 1



Collector Roadways	
1. Centre Lines	Type 1
2. Lane Lines	Type 1
3. Stop Bars	Type 1
4. Crosswalk Lines	Type 1

Local Roadways	
1. Centre Lines	Paint (optional)
2. Stop Bars	Paint (optional)
3. Crosswalk Lines	Paint (optional)
Notes:	
1. Expressway and Arterial roadways include any portion of a Collector or Local roadway within 50 m of an intersecting expressway or arterial roadway.	
2. Type 1 permanent pavement marking material - Thermoplastic "Hot In-Laid" material.	

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

11.2. Pavement Marking and Signage Drawing Approval Process

The Traffic Engineer shall approve pavement markings and traffic control signs. The approval process is as follows:

1. Consultant submits traffic signing and pavement marking drawings to the Traffic Engineer for review. Consultant to revise the drawings in accordance with the Traffic Engineer's comments and resubmit for final review.
2. Upon approval in principle, the Consultant submits reproducible original traffic drawings for stamping and signing by Traffic Engineer. The Traffic Engineer will issue a Manager's Order for sign installation.
3. Consultant to arrange for the installation of traffic signs and pavement markings through the use of a private contractor or by Town Forces as noted in the Development Agreement.

12. POST AND CABLE FENCING

Post and cable fencing is required along all lanes adjacent to public utility lots, municipal reserves, environmental reserves, and public open space areas as specified by the Engineer and/or the Director. The Community Services Department may, at their discretion, exclude the requirement for post and cable around a park site.

Local Roadways	
1. Centre Lines	Paint (optional)
2. Stop Bars	Paint (optional)
3. Crosswalk Lines	Paint (optional)
Notes:	
1. Arterial roadways include any portion of a Collector or Local roadway within 50 m of an intersecting expressway or arterial roadway.	
2. Type 1 permanent pavement marking material - Thermoplastic "Hot In-Laid" material.	

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

12.1. Pavement Marking and Signage Drawing Approval Process

The Engineer shall approve pavement markings and traffic control signs. The approval process is as follows:

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2. Upon approval in principle, the Consultant submits reproducible original traffic drawings for stamping and signing by Traffic Engineer. The Traffic Engineer will issue a Manager's Order for sign installation.
3. Consultant to arrange for the installation of traffic signs and pavement markings through the use of a private contractor or by Town Forces as noted in the Development Agreement.

13. EMERGENCY ACCESS DESIGN REQUIREMENTS

The clear unobstructed width of an emergency access right of way shall be a minimum width of 6.0 m with a 3.0 m driving surface. The driving surface may be concrete, asphalt, paving stone, or turf stone on a properly constructed base.

The emergency access shall be structurally and geometrically designed (e.g. width, turning radii, structure) to safely carry fire-fighting equipment loading to a connecting street or lane.

Avoid placing an emergency access in line with a road segment, so that it does not appear to be an extension of the road.

The overhead clearance through an emergency access shall be a minimum of 5.0 m.

Emergency access roads must be signed at each street or lane intersection as "Emergency Access", and the signs designed such that they meet the intent of the Alberta Fire Code.

Collapsible bollards must be installed at each street or lane intersection to limit access to traffic other than emergency vehicles. Reflectorized strips must be installed on the bollards so that they are visible to cyclists and pedestrians at night.

14. LANDSCAPING

14.1. Arterial Roadways

Level One Landscaping of medians and boulevards within 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 Three Landscaping as required by the Community Services Department.

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. A typical berm cross section is illustrated in Section 17.

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.

14.2. 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.

Level Three Landscaping may be provided in the medians of divided collector and local roadways. All tree and shrub planting shall be in accordance with Section 14.

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%.

14.3. 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. For stamped concrete, the colour shall be red and the pattern shall be Belgian Cobblestone.
- .2 The median shall be finished to Level Three Landscaping standards where the median width is greater than 3.0 m.
- .3 No trees shall be planted in an expressway or arterial roadway median area where the median width is less than 6.0 m.
- .4 The median cross section shall conform to the cross section shown in the Construction Specifications.

.2 Divided Collector and Local Roadways

- .1 The median shall be capped with concrete, stamped concrete if the median width is 3.0 m or less. For stamped concrete, the colour shall be red and the pattern shall be Belgian Cobblestone.
- .2 The median shall be capped with concrete, stamped concrete, or finished to Level Three 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.

- .4 The median cross section shall conform to the cross section shown in the Construction Specifications.

15. 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.

Driveways entering onto collectors shall be set back from intersections in accordance with TAC Standards. Front driveways will not be permitted on divided sections of collector and local roadways. Rear access is to be provided for these lots.

The minimum setback from the nearest face of curb in the intersection to the nearest edge of driveway shall be 30 m. See Section 16 for standard details.

A culvert (minimum diameter of 400mm) and an earth embankment must be installed where a proposed driveway crosses an existing ditch.

ROADWAY GEOMETRIC DESIGN ELEMENTS									
Roadway Designation	Design Elements								
	TAC Design Classification	Daily Service Volume (vpd)	Right Of Way Width	Horizontal Alignment Minimum Radius of Curvature	Minimum Intersection Angle (degrees)	Intersections			
						"Corner Cut-Off Dimensions"			
						Arterial Roadway	Collector Roadway	Local Roadway	Lanes
Divided Arterial	UAD 70	>20,000	60 m	250 m	75	Site Specific (See Dwg 5.04d)	10 x 10	N/A	N/A
Undivided Arterial	UAU 70	<20,000	48 m	250 m	75	Site Specific (See Dwg 5.04d)	10 x 10	N/A	N/A
Divided Residential Collector (See Note)	UCD 60	<10,000	See Drawing 5.06	185 m NC 135 m RC	75	10 x 10	5 x 5	5 x 5	N/A
Undivided Residential Collector (See Note)	UCU 60	<10,000	See Drawing 5.07	185 m NC 135 m RC	75	10 x 10	5 x 5	5 x 5	N/A
Divided Residential Local (See Note)	ULD 60	<3,000	See Drawing 5.08	115 m	75	N/A	5 x 5	5 x 5	N/A
11 m Undivided Residential Local (See Note)	ULU 50	<3,000	See Drawing 5.09	115 m	75	N/A	5 x 5	5 x 5	N/A
10 m Undivided Residential Local (See Note)	ULU 50	<3,000	See Drawing 5.10	115 m	75	N/A	5 x 5	5 x 5	N/A
Rural Industrial Collector	RCU 60	<10,000	30 m	185 m	75	10 x 10	10 x 10	10 x 10	N/A
Urban Industrial Collector	UCU 60	<10,000	22 m	185 m	75	10 x 10	10 x 10	10 x 10	N/A
Rural Industrial Local	RLU 50	<3,000	22 m	115 m	75	N/A	10 x 10	10 x 10	N/A
Urban Industrial Local	ULU 50	<3,000	22 m	115 m	75	N/A	10 x 10	10 x 10	N/A
Frontage (Service) Road	ULU 50	<3,000	20m	115 m	75	N/A	10 x 10	10 x 10	N/A
Lanes	20	<500	6 m	No Permitted	75	N/A	N/A	N/A	5 x 5
Note: Environmental capacity of Collector and Local Roadways within residential areas is 5,000 vpd and 1,000 vpd respectively.									



ROADWAY DESIGN ELEMENTS										
Roadway Designation	Design Elements									
	TAC Design Classification	Horizontal Alignment		Minimum "K" for Vertical Curves	Vertical Alignment			Intersections		
		Rate of Superelevation (As per TAC)			Road Gradient (%)			Curb Return Radii (m)		
		Desirable Rate (m/m)	Maximum Rate (m/m)		Maximum Grade	Desired Maximum Grade	Minimum Grade	Arterial Roadway	Collector Roadway	Local Roadway
Divided Arterial	UAD 70	0.04	0.06		6.00	3.00	0.50	Drawings 5.19 & See 5.20	15	N/A
Undivided Arterial	UAU 70	0.04	0.06		6.00	5.00	0.50		15	N/A
Divided Residential Collector	UCD 60	Normal Crown 0.02	Reverse Crown 0.02		6.00	6.00	0.50	15	8	8
Undivided Residential Collector	UCU 60	Normal Crown 0.02	Reverse Crown 0.02		6.00	6.00	0.50	15	8	8
Divided Residential Local	ULD 60	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50	N/A	8	8
10 m Undivided Residential Local	ULU 50	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.5	N/A	8	8
11 m Undivided Residential Local	ULU 50	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50	N/A	8	8
Rural Industrial Collector	RCU 60	Normal Crown 0.02	Reverse Crown 0.02		6.00	6.00	0.50	See Drawing 5.20		
Urban Industrial Collector	UCU 60	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50			
Rural Industrial Local	RLU 50	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50	N/A	See Drawing 5.20	
Urban Industrial Local	ULU 50	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50	N/A		
Rural Frontage (Service) Road	ULU 50	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50	N/A		
Urban Frontage (Service) Road	ULU 50	Normal Crown 0.02	Normal Crown 0.02	6.00	6.00	0.50	N/A			
Gravel Lanes	20	N/A	N/A	6.00	6.00	0.80	N/A	N/A	N/A	
Paved Lanes	20	N/A	N/A	6.00	6.00	0.60	N/A	N/A	N/A	

1. GENERAL

The Developer and The Town shall jointly be responsible for the design and development of the Neighbourhood Park Site(s), School Site, and Detention Ponds. The Developer shall be solely responsible for the design and development of all remaining public open space (e.g. tod lot, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms), including all amenities falling within these open spaces (e.g. plantings, walkways, furniture, playgrounds, buildings, structures) as approved by the Director of Community Services and as specified in the Development Agreement.

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

- .1 Area Structure Plan,
- .2 Area Structure Plan 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 Neighbourhood Area Structure Plan Servicing Study. The plans shall incorporate design information for the following landscape features:

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

2. LEVEL ONE LANDSCAPING

- .1 Level One Landscaping will be the Developers responsibility and means the site grading and leveling of topsoil to the final approved design grades. Soil composition and seeding to grass, and establishing turf; will comply with the Design Specifications.
- .2 The Developer is required to provide Level One Landscaping for all public open space areas (e.g. tod lot, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms, walkways), etc., as specified by the Director of Community Services.
- .3 The Developer shall provide Level One Landscaping for all boulevards located between the curb and separate sidewalk. The property owner/

Builder shall landscape the boulevard area located between the back of walk and the property line.

- .4 Level One Landscaping requirements and cost recoveries for detention pond facilities are included in Clause 7.

2.1 General

- .1 Level One Landscaping means seeding to grass, and establishing turf; all in accordance with the Landscape Specifications set out in Design Guidelines.
- .2 The Developer is required to provide Level One Landscaping for all public open space areas, ornamental parks, playgrounds, natural parks, boulevards, utility lots, walkways, buffer areas, roadway berms, medians, school sites and/or utility lots, as specified by the Community Services Director.
- .3 The Developer is responsible for providing Level One Landscaping for designated Neighbourhood Park site(s).

3. LEVEL TWO LANDSCAPING

3.1 General

Level Two Landscaping means the planting of shrubs, trees, associated materials including bed and well

3.2 Berms

- .1 Berms shall have a side slope not steeper than 3.5:1, have a horizontal crest not less than 2m wide, and be graded to the approved grades and cross sections. The bottom of all berms shall transition into adjacent elevations. A retaining wall will be required if the berm side slope is steeper than 3.5:1. The height of the wall will be determined using a 3.5:1 slope on either the fore slope or the back slope while maintaining a constant alignment for the centre of the berm. Included in Section 17 is a drawing showing a typical berm/retaining wall cross sections.
- .2 Berms along arterial roadways shall be graded to provide ± 400 mm depressions at regular intervals along the length of the berm for tree and shrub planting. The length of the depressions shall vary from 25 m to 50 m in length. The spacing of the depressions along the berm will follow a regular pattern, using either a single bed or a combination no more than four bed variations for planting. The spacing between depressions should be approximately 25 m. Linear hedge planting will be planted along the entire length of the upper crown of the berm between depressions, as approved by Director of Community Services.

3.3 Recommended Tree Species

- .1 Town of Blackfalds is located in Hardiness Zone 3 with an overlap of Zones 1 and 2. Appendix A, appended at the end of this Section, identifies trees and shrubs recommended for planting in these zones.
 - .1 Appendix A, Table A, identifies tree species that are suitable for planting in this area.
 - .2 Appendix A, Table B, identifies shrubs suitable for planting in this area.
 - .3 Appendix A, Table C, identifies trees listed in Table A that are suitable for arterial roadway, collector roadway boulevards and median tree planting.
- .2 The Developer shall identify all proposed tree and shrub species on the landscape drawing.
- .3 If the Developer proposes to plant species that are not listed in the Tables, the Developer shall submit a list of the proposed species for approval by the Community Services Director.
- .4 The Developer shall provide trees and shrubs to the minimum standards included in accordance with the Appendix. The minimum size of deciduous trees suitable for arterial roadway, collector roadway, and median tree planting shall be 75 mm (3 in.) calliper.

4 LEVEL THREE LANDSCAPING

Level Three Landscaping means the included in supplying and installing various parks, facilities and /or amenities (e.g.: trails, signage, playground equipment, bollards, fencing, site furnishing, etc.) in areas designated by the Director of Community Services and as specified in Schedule J: all in accordance with the Town of Blackfalds current minimum design standards for development, and approved landscape drawing(s).

The Developer is required to supply and install Level Two facilities and amenities in various locations throughout the Development, as identified in the Neighbourhood Area Structure Plan Servicing Study. Some of the standard Level Two Landscaping facilities and/or amenities to be provided are as follows:

- .1 Post and cable fences
- .2 Vinyl or white/black chain link fence as approved by the Director of Community Services
- .3 Bollards
- .4 Paved trails

- .5 Site furnishings (e.g. garbage receptacles, benches, etc.)
- .6 Tot lots and playground play structures, beyond those included in the Recreation Amenity Fund Program, and/or
- .7 Trail signage, to the Towns specifications.

4.1 Post and Cable

- .1 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. Unless excluded as a requirement by the Community Services Department.
 - .3 At other location specified by the Engineer and/or the Community Services Director.

4.2 Fencing

- 1. Vinyl and White/Black chain link fencing
 - .1 Separating neighbourhood parks from residential lots.
 - .2 Separating connecting walkways from residential lots.
 - .3 Separating residential lots in collection and different roadways.
 - .4 Separating residential lots from public utility lots.
- 2. or another type of fencing as determined by the Town.
- 3. No barbwire fence allowed in the Town.

4.3 Bollards

- .1 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

- .1 The Developer shall supply and install site furnishing at locations specified by the Community Services Director. All furnishings shall conform to Community Services Department's Standard Detail Specifications.

4.5 Trails

- .1 The minimum width for walkways shall be 3m wide of concrete side path and minimum 3m asphalt trails or other approved surface. Construction details shall conform to Community Services Department's Standard Detail Specifications.

4.6 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 center 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 2.0 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 center 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 as detailed in the current Contract Specifications.

5 COLLECTOR ROADWAY TREE PLANTING

5.1 Collector Roadway Tree Planting

The requirements for Collector Roadway tree planting shall be in accordance, which states as follows:

The Developer is required to provide one tree per single family residential lot (i.e. R1 Zoning). All other land fronting onto collector roadway (i.e., park sites, commercial, public service, and all other residential zoning) shall require tree spacing of between 11 m and 15 m, have alternating tree specifics ensuring spacing remains consistent with adjacent single family residential planting. Exceptions of one tree per lot may be considered by director of Community Services in unique circumstances for duplex lots or lots with narrow frontage.

5.2 Collector Roadway Tree Planting Standards

The following standards will apply:

- .1 Trees are to be planted within the road right of way, including boulevards adjacent to all municipal reserve parcels, in a straight line parallel to the property line.
- .2 Where a separate boulevard between the curb and sidewalk is provided, the Director of Community Services will determine the tree spacing. Typical tree and streetlight spacing is shown on drawings in Section 17.
- .3 Maintenance of trees planted within the road right of way (boulevard) shall be the responsibility of The Town.

6 LANDSCAPE DRAWING REQUIREMENTS

6.1 General

General Landscape Drawing requirements are listed in Section 2.

6.2 Detailed General Landscape Drawing

Detailed drawings at a scale of 1:500 shall be submitted showing the following:

- .1 Specific site location for all proposed plantings.
- .2 Size (height and calliper), botanical name, ~~and~~ specie names of all plant material and intended number of plants form each species indicated on a planting list and referenced to the specific plant location.
- .3 Mixture ratios and application rates for all grass seed and fertilizer.
- .4 Locations of all utility lines, services, and easements. (Included in Section 17 is a drawing showing a typical landscape and utility plan).

- .5 Existing and proposed grades.

6.3 Detailed Municipal Reserve Construction Drawings

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

- .1 Detailed grading plan showing drainage patterns, the tie-in to grading on adjacent land uses, and existing site elevations.
- .2 Detailed detention pond grading plan, if applicable.
- .3 Existing vegetation to be retained.
- .4 Existing and proposed utilities and easements, including storm sewer and catch basins for site drainage.
- .5 Detailed design of baseball diamonds and sports fields.
- .6 Detailed design of park furniture and playground structures indicating manufacturer and model number, log, boundaries, and sand areas.
- .7 Detailed design and specifications for the parking lot and hard-surface play area/tennis courts.
- .8 Detailed design and specifications for all trails.
- .9 Detailed design and specifications for the Community Shelter.
- .10 Tree and shrub planting details.

6.4 Detailed Detention Pond Construction Drawings

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

- .1 Detailed grading plan showing sideslope grades, drainage swale grades, the tie-in to grading on adjacent land uses, and existing site elevations.
- .2 Detailed design of any baseball diamond or soccer pitch/football field, if applicable.
- .3 Existing and proposed utilities and easements, including storm sewer mains, weeping tile drains and catch basins for site drainage.
- .4 Detailed design and specifications for any trails.
- .5 Tree and shrub planting details.

6.5 Drawing Review

The Developer shall submit landscape drawings, as detailed in Section 2 of this document, for review and approval.

6.6 Design Revisions

The Director of Community Services must approve all revisions to the approved design drawings.

6.7 As-Constructed Drawings

As-constructed drawings will be submitted to the Community Services Department for review and approval prior to Construction Completion Certificate inspection.

TREE SPECIES

COMMON NAME	BOTANICAL NAME	SIZE AT MATURITY HEIGHT/SPREAD (METRIC)	SIZE AT MATURITY HEIGHT/SPREAD (IMPERIAL)
CONIFEROUS TREES			
Colorado Blue Spruce	<i>Picea pungens</i> 'Glauca'	12 m/5 m	40'/16'
Colorado Spruce	<i>Picea pungens</i>	12 m/5 m	40'/16'
Lodgepole Pine	<i>Pinus contorta latifolia</i>	12 m/3 m	40'/10'
Norway Spruce	<i>Picea abies</i>	15 m/8 m	49'/26'
Ponderosa Pine	<i>Pinus ponderosa</i>	12 m/6 m	40'/20'
Scots Pine	<i>Pinus sylvestris</i>	12 m/6 m	40'/20'
Siberian Larch	<i>Larix sibirica</i>	12 m/5 m	40'/16'
White Spruce	<i>Picea glauca</i>	15 m/5 m	49'/16'
DECIDUOUS TREES			
American Elm	<i>Ulmus americana</i>	20 m/15 m	65'/49'
Amur Cherry	<i>Prunus maackii</i>	12 m/10 m	40'/33'
Brandon Elm	<i>Ulmus americana</i> 'Brandon'	15 m/10 m	49'/33'
Bur Oak	<i>Quercus macrocarpa</i>	10 m/10 m	33'/33'
Cutleaf Weeping Birch	<i>Betula pendula</i> 'Gracilis'	15 m/8 m	49'/26'
Flowering Crabapple	<i>Malus species</i>	5 m/4 m	16'/13'
Hawthorn	<i>Crataegus species</i>	3 m/2.5 m	10'/8'
Laurel-Leaf Willow	<i>Salix pentandra</i>	15 m/15 m	49'/49'
Little-leaf Linden	<i>Tilia cordata</i>	12 m/6 m	40'/20'
Mayday	<i>Prunus padus commutata</i>	10 m/10 m	33'/33'
Northwest Poplar	<i>Populus x</i> 'Northwest'	20 m/15 m	65'/49'
Ohio Buckeye	<i>Aesculus glabra</i>	12 m/10 m	40'/33'
Paper Birch	<i>Betula papyrifera</i>	12 m/6 m	40'/20'
Schubert Chokecherry	<i>Prunus virginiana</i> 'Schubert'	5 m/5 m	16'/16'
Swedish Columnar Aspen	<i>Populus tremula</i> 'Erecta'	12 m/1.5 m	40'/5'
Tower Poplar	<i>Populus x canescens</i> 'Tower'	10 m/1.5 m	33'/5'

SHRUB SPECIES

COMMON NAME	BOTANICAL NAME	SIZE AT MATURITY HEIGHT/SPREAD (METRIC)	SIZE AT MATURITY HEIGHT/SPREAD (IMPERIAL)
Adelaide-Hoodless Rose	Rosa species	1 m/1.5 m	3'/5'
Alpine Currant	Ribes alpinum	1 m/1.5 m	3'/5'
Amur Maple	Acer ginnala	4 m/4 m	13'/13'
Blue Fox Willow	Salix brachycarpa 'Blue Fox'	2 m/1.5 m	6 ½'/5'
Canada Buffaloberry	Shepherdia canadensis	1 m/1 m	3'/3'
Cherry Prinsepia	Prinsepia sinensis	2 m/1.5 m	6 ½'/5'
Common Caragana	Caragana arborescens	3 m/3 m	10'/10'
Common Lilac	Syringa vulgaris	3 m/2.5 m	10'/8'
Dart's Gold Ninebark	Physocarpus opulifolius 'Dart's Gold'	1 m/1 m	3'/3'
Diabolo Ninebark	Physocarpus opulifolius 'Diablo'	2 m/2 m	6 ½' / 6 ½'
Double-Flowering Plum	Prunus triloba 'Multiplex'	2 m/2 m	6 ½'/6 ½'
Elder	Sambucus species	3 m/2 m	10'/6 ½'
Fern-leaved Caragana	Caragana-arborescens 'Lorbergii'	3 m/2 m	10'/6 ½'
French Lilac Varieties or Cultivars	Syringa vulgaris	3 m/2.5 m	10'/8'
Globe Caragana	Caragana Frutex 'Globosa'	1 m/1 m	3'/3'
Globe Cedar	Thuja occidentalis 'Globosa'	1.5 m/1.5 m	5'/5'
Golden Ninebark	Physocarpus opulifolius 'Luteus'	2 m/2 m	6 ½'/6 ½'
Golden Twig Dogwood	Cornus sericea 'Flaviramea'	1.5 m/2 m	5'/6 ½'
Golden-Flowering Currant	Ribes aureum	2 m/2 m	6 ½'/6 ½'
Hansa Rose	Rosa species	1.5 m/1.5 m	5'/5'
Highbush Cranberry	Viburnum trilobum	3 m/2 m	10'/6 ½'
Miss Kim Lilac	Syringa patula 'Miss Kim'	3 m/2 m	10'/6 ½'
Mugo Pine	Pinus mugo	2 m/2 m	6 ½'/6 ½'
Nanking Cherry	Prunus tomentosa	2 m/2 m	6 ½'/6 ½'
Nannyberry	Viburnum lentago	4 m/3 m	13'/10'
Peking Cotoneaster	Cotoneaster acutifolius	2 m/2 m	6 ½'/6 ½'
Persian Yellow Rose	Rosa species	1.5 m/1.5 m	5'/5'
Potentilla (Shrubby Cinquefoil)	Potentilla fruticosa	1 m/1 m	3'/3'
Purple-Leaved Sandcherry	Prunus x cistena	1.5 m/1.5 m	5'/5'
Pussy Willow	Salix discolor	4 m/4 m	13'/13'
Pygmy Caragana	Caragana pygmaea	1 m/2 m	3'/6 ½'



COMMON NAME	BOTANICAL NAME	SIZE AT MATURITY HEIGHT/SPREAD (METRIC)	SIZE AT MATURITY HEIGHT/SPREAD (IMPERIAL)
Red Osier Dogwood	Cornus sericea	2m/3m	6 ½'/10'
Russian Almond	Prunus tenella	1m/1m	3'/3'
Sakhalin Honeysuckle	Lonicera-maximiwoczii sachalinensis	1.5m/1.5m	5'/5'
Sandbar Willow	Salix exigua	3m/1m	10'/3'
Saskatoon	Amelanchier alnifolia	3m/2m	10'/6 ½'
Savin Juniper Varieties or Cultivars	Juniperus sabina species	.6 m/2 m	2'/6 ½'
Sea Buckthorn	Hippophae rhamnoides	5m/3m	16'/10'
Siberian-Coral Dogwood	Cornus alba 'Sibirica'	1m/1m	3'/3'
Silver Buffaloberry	Shepherdia argentea	4m/3m	13'/10'
Silver-Leaved Dogwood	Cornus alba 'Argenteo-marginata'	1m/1m	3'/3'
Smooth Sumac	Rhus glabra	3m/4m	10'/13'
Snowberry	Symphoricarpos albus	1m/1m	3'/3'
Spirea	Spirea species	1m/1m	3'/3'
Theresa Bugnet Rose	Rosa species	2m/2m	6 ½'/6 ½'
Turkestan-Burning Bush	Euonymus nana'Turkestanica'	1m/1m	3'/3'
Upright Juniper	Juniperus scopulorum species	3m/1.5m	10'/5'
Wayfaring Tree	Viburnum lantana	3m/2m	10'/6 ½'
Wild Rose (Nursery)	Rosa species	1m/1m	3'/3'
Wolf Willow	Elaeagnus commutata	2m/2m	6 ½'/6 ½'

**TREES LISTED IN APPENDIX "A"
 SUITABLE FOR ROADWAY PLANTING**

COMMON NAME		
American Elm	Linden	Schubert Chokecherry
Amur Cherry	Mayday	Spruce
Brandon Elm	Mountain Ash	Swedish Columnar Aspen
Bur Oak	Ornamental Crabs	Tower Poplar
Hawthorn	Pine	Ussurian Pear
Larch		

SUBDIVISION PARK DEVELOPMENT STANDARDS

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Developer	Developer	Approved by Department
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	50 m ² /ha (5shrubs/10m ²)	100 m ² /ha	Approved species
Pre-School Play Structure	1 per neighbourhood	1 per neighbourhood	Department approved
Elementary Play Structure	1 per neighbourhood	1 per neighbourhood	Department approved
Tot Lot	1 per neighbourhood	2 per neighbourhood	Department approved
Class A Soccer Field	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Class B Ball Diamond	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Multi Use Pad	1 per 2 neighbourhoods	1 per neighbourhood	As per RP&C Specifications
Activity Center	1 per 2 neighbourhoods	1 per neighbourhood	Subject to School/City approval
Boarded Rink/Power/Lights	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Snow Bank Rink	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Sliding Hill	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Power to Site	1 per neighbourhood park site	1 per neighbourhood park site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per neighbourhood park site	1 per neighbourhood park site	18 parking stalls/sports field
Trails	500 lin. meters		As per 3m asphalt Contract Specifications
Picnic Tables	5 per neighbourhood	8 per neighbourhood	As per RP&C Specifications
Pedestal Park Benches	10 per neighbourhood	14 per neighbourhood	As per RP&C Specifications
Pedestal Garbage Receptacles	15 per neighbourhood	22 per neighbourhood	As per RP&C Specifications
Park Signage	1 per neighbourhood park site	1 per neighbourhood park site	As per RP&C Specifications

MULTI-NEIGHBOURHOOD PARK STANDARDS

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	15 trees/acre	20 trees/acre	Approved species
Shrub Planting	50 m ² /ha	100 m ² /ha	Approved species
Pre-School Play Structure	R,P&C discretion	RP&C discretion	Department approved
Elementary Play Structure	1 per site	1 per site	Department approved
Class A Soccer Field	1 per site	1 per site	As per RP&C Specifications.
Class B Ball Diamonds	2 per site	2 per site	As per RP&C Specifications
Multi Use Pad	1 per site	1 per site	As per RP&C Specifications
Activity Center	As required	1 per site	Subject to School/City approval
Boarded Rink/Power/Lights	1 per site	1 per site	As per RP&C Specifications
Snow Bank Rink	1 per site	1 per site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per site	1 per site	18 parking stalls/sports field
Trails	3m per asphalt	3m asphalt	As per RP&C Specifications
Picnic Tables	4 per site	6 per site	As per RP&C Specifications
Pedestal Park Benches	6 per site	10 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	10 per site	16 per site	As per RP&C Specifications
Park Signage	2 per site	2 per site	As per RP&C Specifications

NEIGHBOURHOOD/SCHOOL PARK STANDARDS

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	15 trees/acre	20 trees/acre	Approved species
Shrub Planting	50 m ² /ha	100 m ² /ha	Approved species
Pre-School Play Structure	As required/school type	1 per site	Department approved
Elementary Play Structure	1 per site	1 per site	Department approved
Class A Sports Field	1 per site	1 per site	As per RP&C Specifications
Multi-Use Pad	1 per site	1 per site	As per RP&C Specifications
Activity Center	As required	1 per site	Subject to school/City approval
Boarded Rink/Power/Lights	1 per site	1 per site	As per RP&C Specifications
Snow Bank Rink	1 per site	1 per site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per site	1 per site	Lot shared with school
Trails	3m asphalt	3m asphalt	As per RP&C Specifications
Picnic Tables	2 per site	3 per site	As per RP&C Specifications
Pedestal Park Benches	3 per site	5 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	5 per site	8 per site	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications

NEIGHBOURHOOD PARK STANDARDS

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	15 trees/acre	25 trees/acre	Approved species
Shrub Planting	50 m ² /ha	100 m ² /ha	Approved species
Pre-School Play Structure	1 per site	1 per site	Department approved
Class A Soccer Field	1 per site	1 per site	As per RP&C Specifications
Boarded Rink/Power/Lights	1 per site	1 per site	As per RP&C Specifications
Snow Bank Rink	1 per site	1 per site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per site	1 per site	18 parking stalls/sports field
Picnic Tables	1 per site	2 per site	As per RP&C Specifications
Pedestal Park Benches	2 per site	4 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	3 per site	6 per site	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications
Trails	3m asphalt	3m asphalt	As per RP&C Specifications
Pedestal Park Benches	1/acre	1/acre	As per RP&C Specifications
Pedestal Garbage Receptacles	1/acre	1/acre	As per RP&C Specifications
3 Bollards	1 set/trail opening	1 set/trail opening	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications

TOD LOT STANDARDS

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	15 trees/acre	25 trees/acre	Approved species
Shrub Planting	50 m ² /ha	100 m ² /ha	Approved species
Pre-School Play Structure	1 per site	1 per site	Department approved
Elementary Play Structure	R,P&C discretion	R,P&C discretion	Department approved
Trails	3m asphalt	3m asphalt	As per RP&C Specifications
Picnic Tables	1 per site	1 per site	As per RP&C Specifications
Pedestal Park Benches	1 per site	2 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	2 per site	3 per site	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications

LINEAR PARK STANDARDS

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	30 m ² /ha	70 m ² /ha	Approved species
Trails	3m asphalt	3m asphalt	As per RP&C Specifications
Pedestal Park Benches	1/acre	1/acre	As per RP&C Specifications
Pedestal Garbage Receptacles	1/acre	1/acre	As per RP&C Specifications
3 Bollards	1 set/trail opening	1 set/trail opening	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications

1. WATER DESIGN

- 1.01 Water System Facilities
- 1.02 Basic Water Main Grid
- 1.03 Typical Valve and Hydrant Locations

2. SANITARY DESIGN

- 2.01 N/A

3. STORMWATER MANAGEMENT DESIGN

- 3.01 2003 Statistical Curves for Rainfall Intensity - Duration - Frequency
- 3.02 Dry Stormwater Storage Facility
- 3.03 Typical Trapped Low Storage Area
- 3.04 Inlet/Outlet Structure Apron
- 3.05 Low Profile Inlet/Outlet Structure
- 3.06 Laneless Subdivision Drainage Swale
- 3.07 Manhole Inlet/Outlet Pipe Design Considerations

4. SERVICE CONNECTIONS

- 4.01 Oil and or Gas Right of Way Clearances
- 4.02 Service Locations
- 4.03 Typical Service Cross Sections
- 4.04 Shallow Storm Sewer Service Connection
- 4.05 Typical Lot Service Requirements
- 4.06 Typical Lot Grading
- 4.07 Typical Front Servicing Alignments
- 4.08 Current P.U.L. Servicing Alignments
- 4.09 San and Storm Manhole Requirements for Service Connections
- 4.10 New Residential Building Grade Certificate

5. ROADWAY DESIGN

- 5.01 Relationship of Street Classifications
- 5.02 Typical Berm Cross Section
- 5.02a Berm sideslope/Retaining Wall Requirements
- 5.02b Berm Height Reduction Next to a Commercial Site
- 5.02c Berm Height reduction next to commercial site
- 5.03 Undivided Arterial Roadway
- 5.04 Staged Arterial Construction
- 5.05 Residential Undivided Collector Roadway
- 5.06a 12m Undivided Local Roadways
- 5.06b Standard Divided Roadways

- 5.07 10 m Undivided Local Roadway
- 5.08 Rural and Urban Undivided Industrial Collector Roadway
- 5.09 Rural and Urban Industrial Local Roadway
- 5.10 Rural and Urban Service Road Adjacent to Arterial Roadway
- 5.11 Gravel and Paved Lanes
- 5.12 Arterial Roadway Pavement Structure Cross Section
- 5.13 Residential Roadway Pavement Structure Cross Section
- 5.14 Industrial Roadway Pavement Structure Cross Section
- 5.15 Gravel/Paved Lane Pavement Structure Cross Section
- 5.16 Arterial Roadway Right Turn Designs
- 5.17 Intersection Centre Line Control Radii
- 5.18 W. B. Design Vehicles
- 5.19 W. B. Vehicle Compound Curve Turn Design
- 5.20 Intersection Grade Adjustment
- 5.21 Divided to Undivided Roadway Transition
- 5.22 Collector and Local Roadway Centre Island
- 5.23 15/10 Local Residential Cul-De-Sac
- 5.24 16/11 Local Residential (Multi-Family) Cul-De-Sac
- 5.25 22/12.5 Local Industrial Cul-De-Sacs
- 5.26 Local Residential Expanded Bulb Corner
- 5.27 Industrial Roadway Expanded Bulb Corner
- 5.28 Industrial Roadway Curb Return Radii
- 5.29 Lane Turnarounds
- 5.30 Lane Grade Calculations
- 5.31 Storm Drainage Revisions for Gravel Lane to Paved Lane Construction
- 5.32 Sidewalk Alignment and Pedestrian Barrier Location
- 5.33 Left and Right Turn Lane Design
- 5.34 Arterial Roadway Visibility Triangle
- 5.35 Rural Cross-Section Hydrant & Power Pole Access
- 5.36 Roadway Narrowing for Pedestrian Accommodation
- 5.37 Traffic Calming

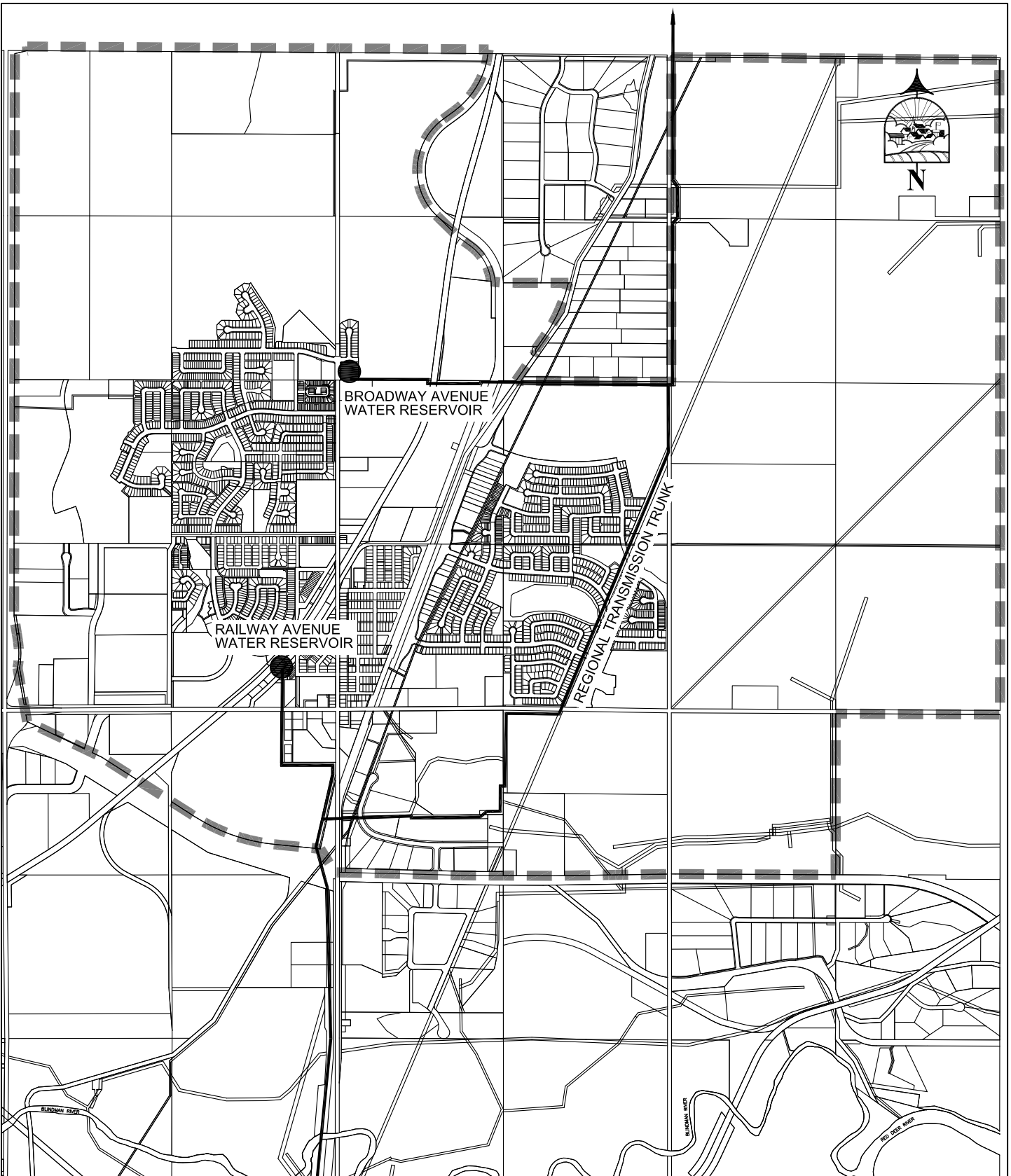
5.38	Vertical Curve Calculations
5.39	V.P.I. Location Calculation
5.40	Bollard Assembly
5.41	Knockdown Bollard Detail
5.42	Pedestrian Barrier
5.43	Post and Cable Fence



6. SIGNAGE AND PAVEMENT MARKING

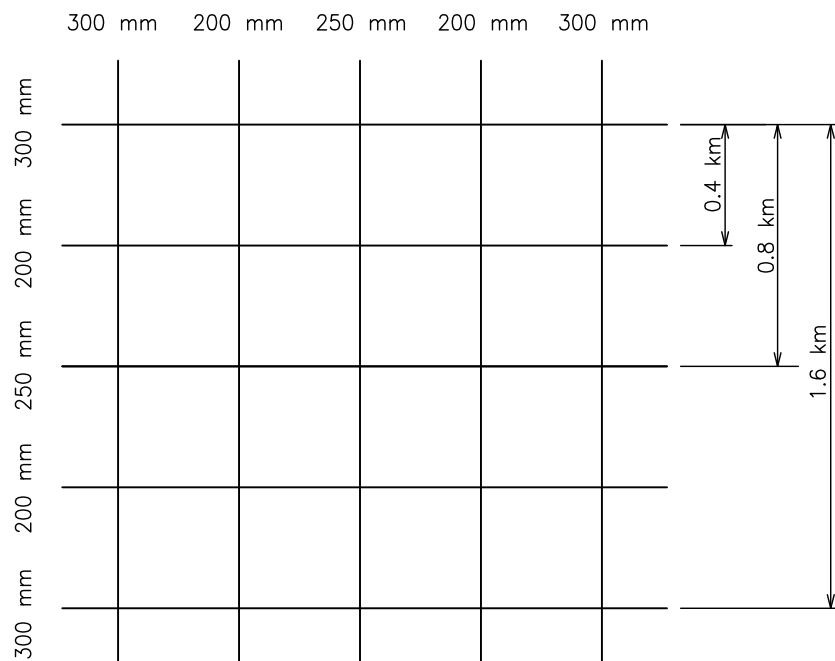
6.01	Yellow Curb Painting
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7. LANDSCAPE DESIGN

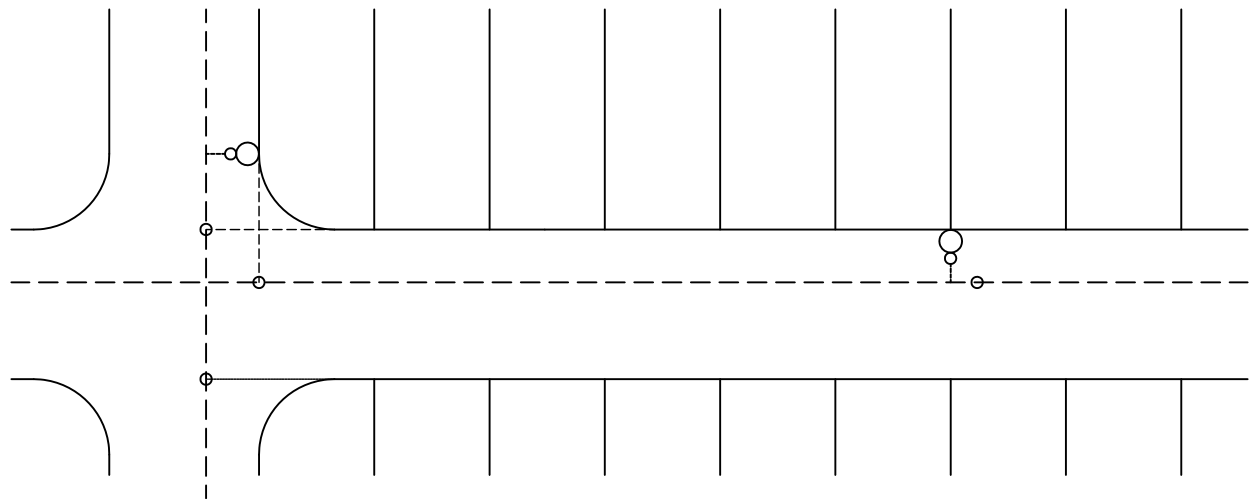
7.01	Fixed & Knock down 4-Bollard System for
7.02	Fixed and Knock down 3 Bollard System
7.03	Typical Neighbourhood School and Park Site
7.04	Typical Neighbourhood Park Site
7.05	Typical Neighbourhood Park Site/Storm Pond
7.06	Typical Parkette Site
7.07	Typical Linear Park Site



REVISIONS			 TOWN OF BLACKFALDS WATER SYSTEM FACILITIES & PRESSURE ZONES		
Date	Details	Drawn			
	-	-			
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		
-	-	-	Checked		
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:
					DWG. NO.
					1.01



REVISIONS				TOWN OF BLACKFALDS BASIC WATERMAIN GRID		
Date	Details	Drawn				
	-	-		TOWN OF BLACKFALDS BASIC WATERMAIN GRID		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked			1.02
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:	




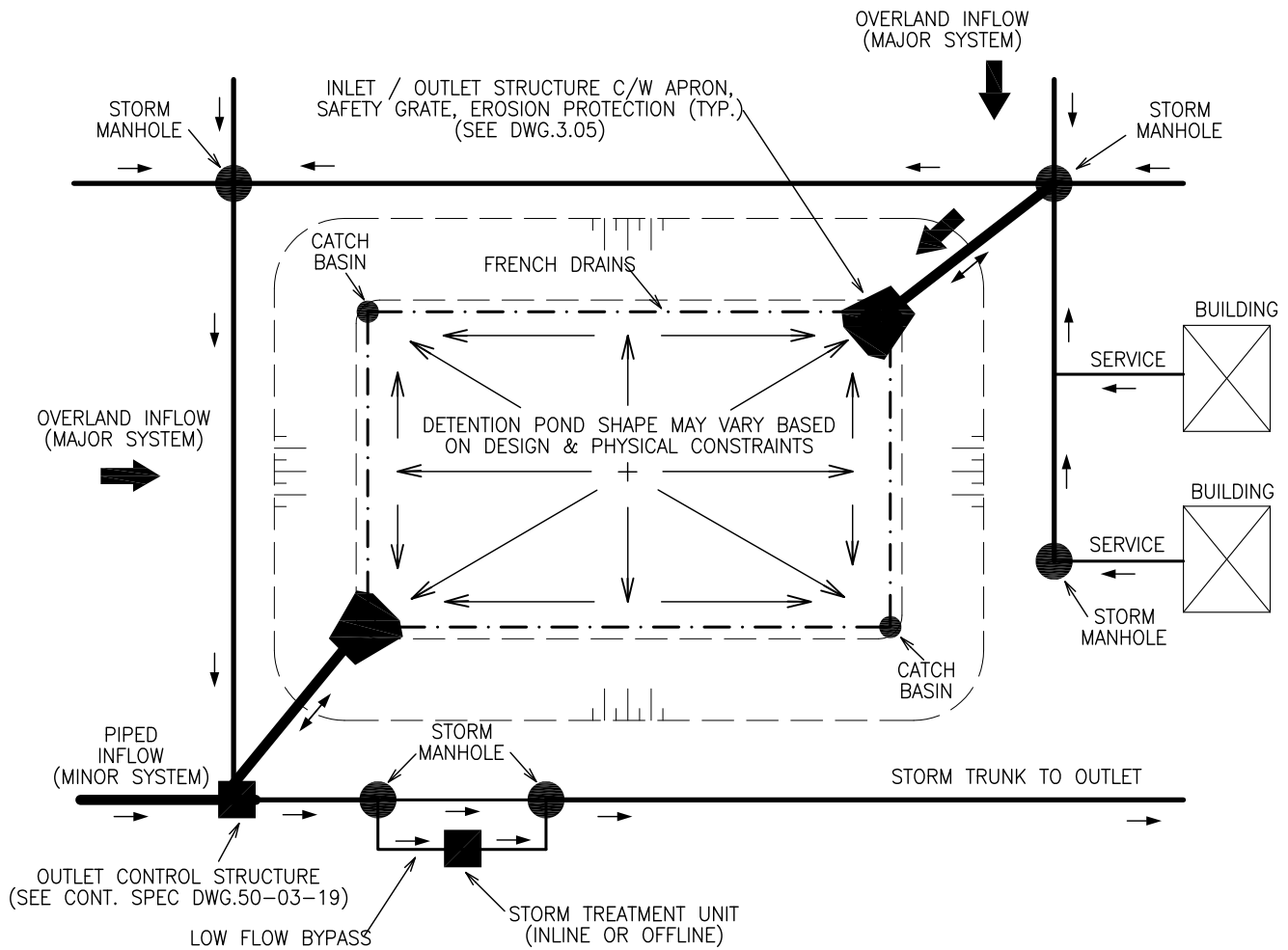
ROAD SERVICING

- — VALVE
- — HYDRANT
- — HYDRANT AND VALVE

NOTE :

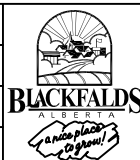
- AVOID USE OF EASEMENTS WHERE A STREET OR LANE ALIGNMENT IS AVAILABLE.
- HYDRANTS NORMALLY TO BE LOCATED NEAR STREET INTERSECTIONS.
- VALVES TO BE LOCATED OPPOSITE PROPERTY LINES AS ILLUSTRATED.

REVISIONS				TOWN OF BLACKFALDS TYPICAL VALVE AND HYDRANT LOCATIONS		
Date	Details	Drawn				
	—	—		Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
—	—	—				
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—	—	—				
—	—	—				
			DWG. NO. 1.03			



REVISIONS

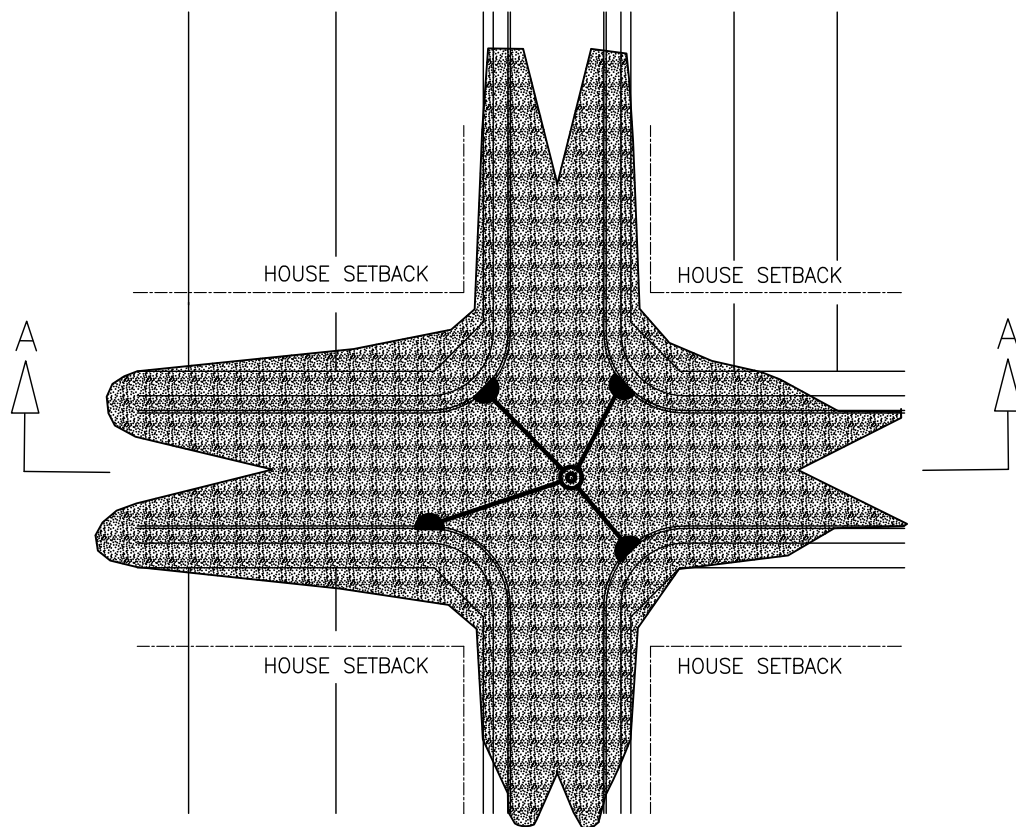
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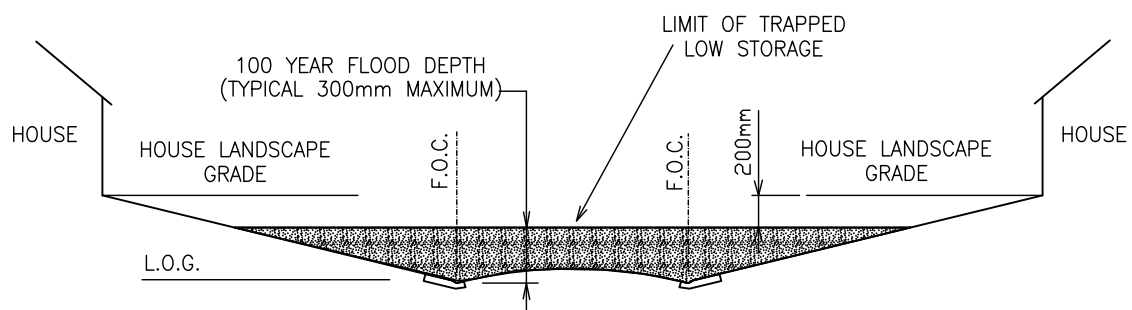
TOWN OF BLACKFALDS

DRY STORMWATER STORAGE FACILITY


Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		3.02
Date: 11.02.05	Scale: NTS	Drawn:

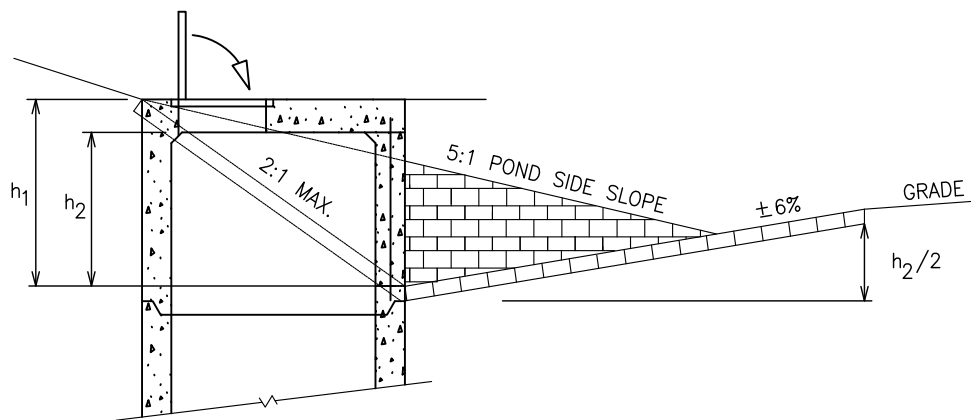
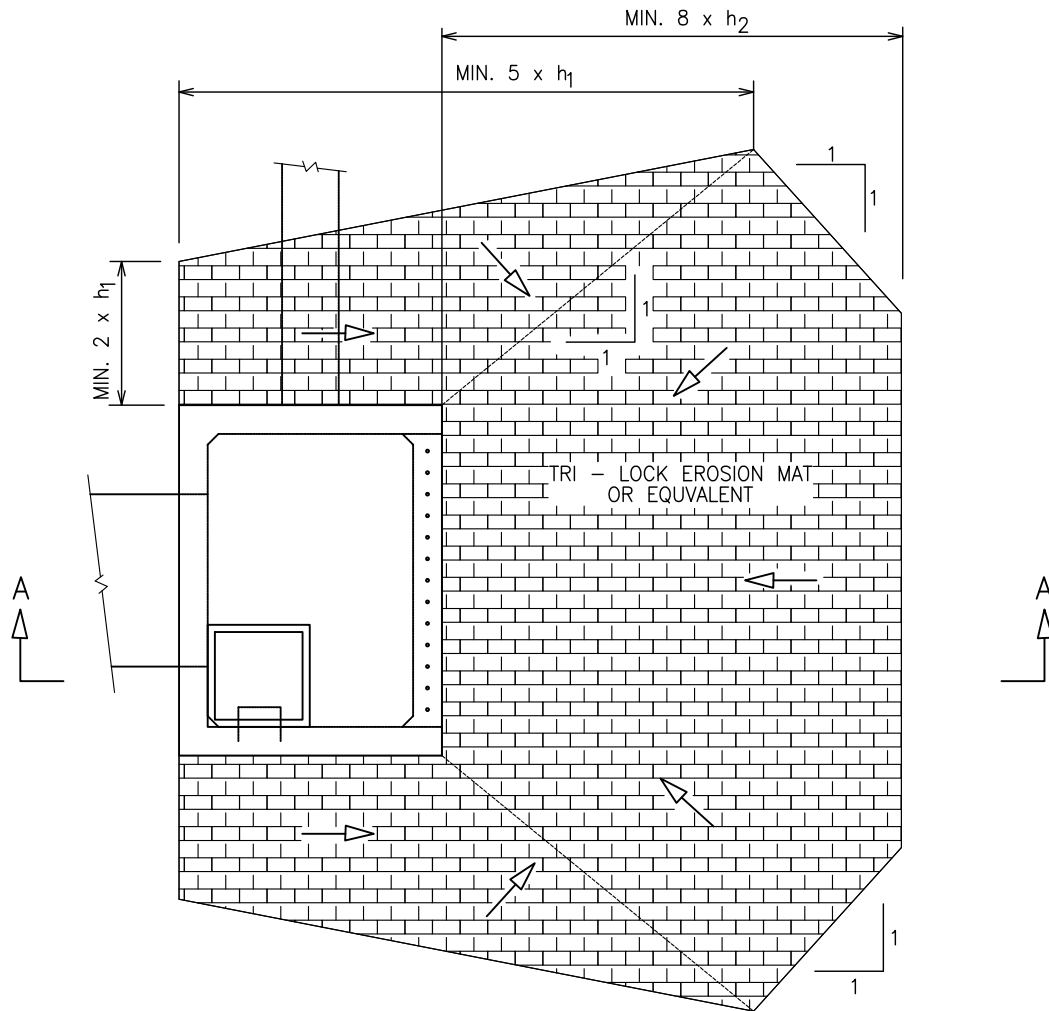


PLAN



SECTION 'A - A'

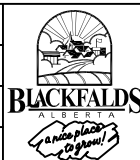
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
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-	-	-			
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-	-	-	Checked		3.03
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		



SECTION 'A - A'

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

INLET / OUTLET STRUCTURE APRON

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

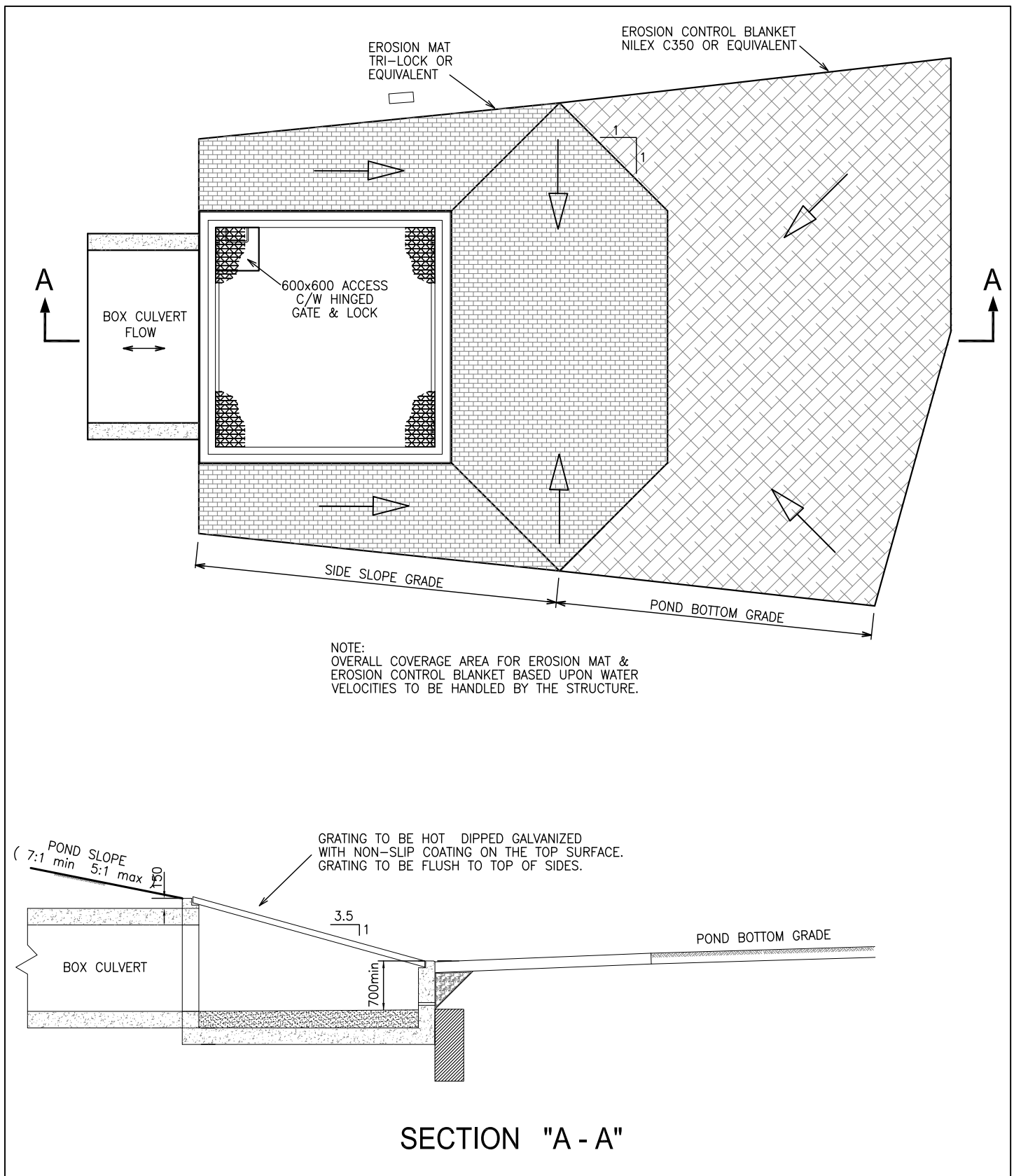
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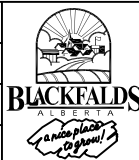
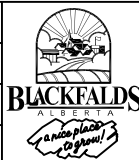
Date: 11.02.05

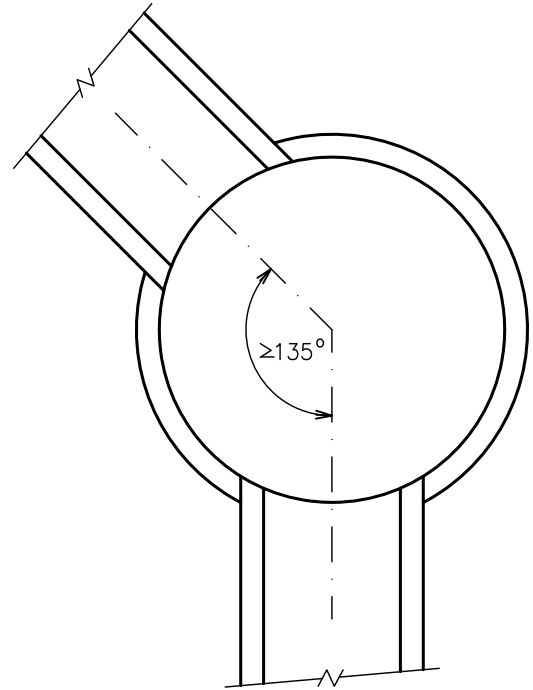
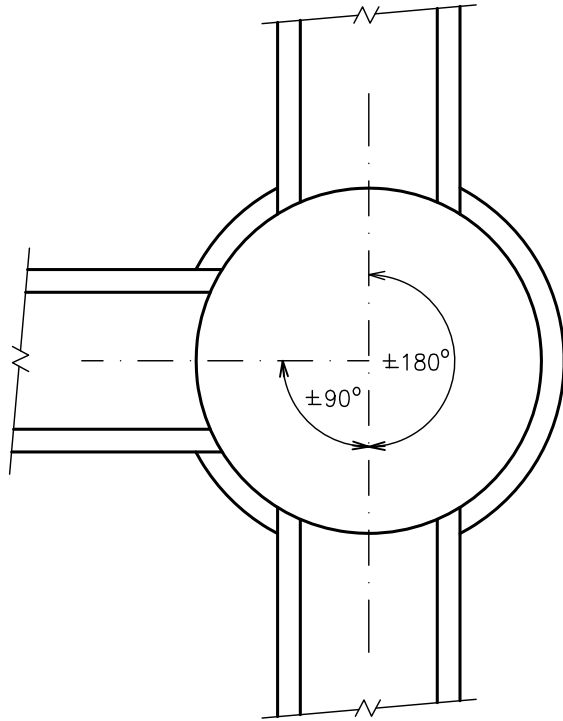
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3.04



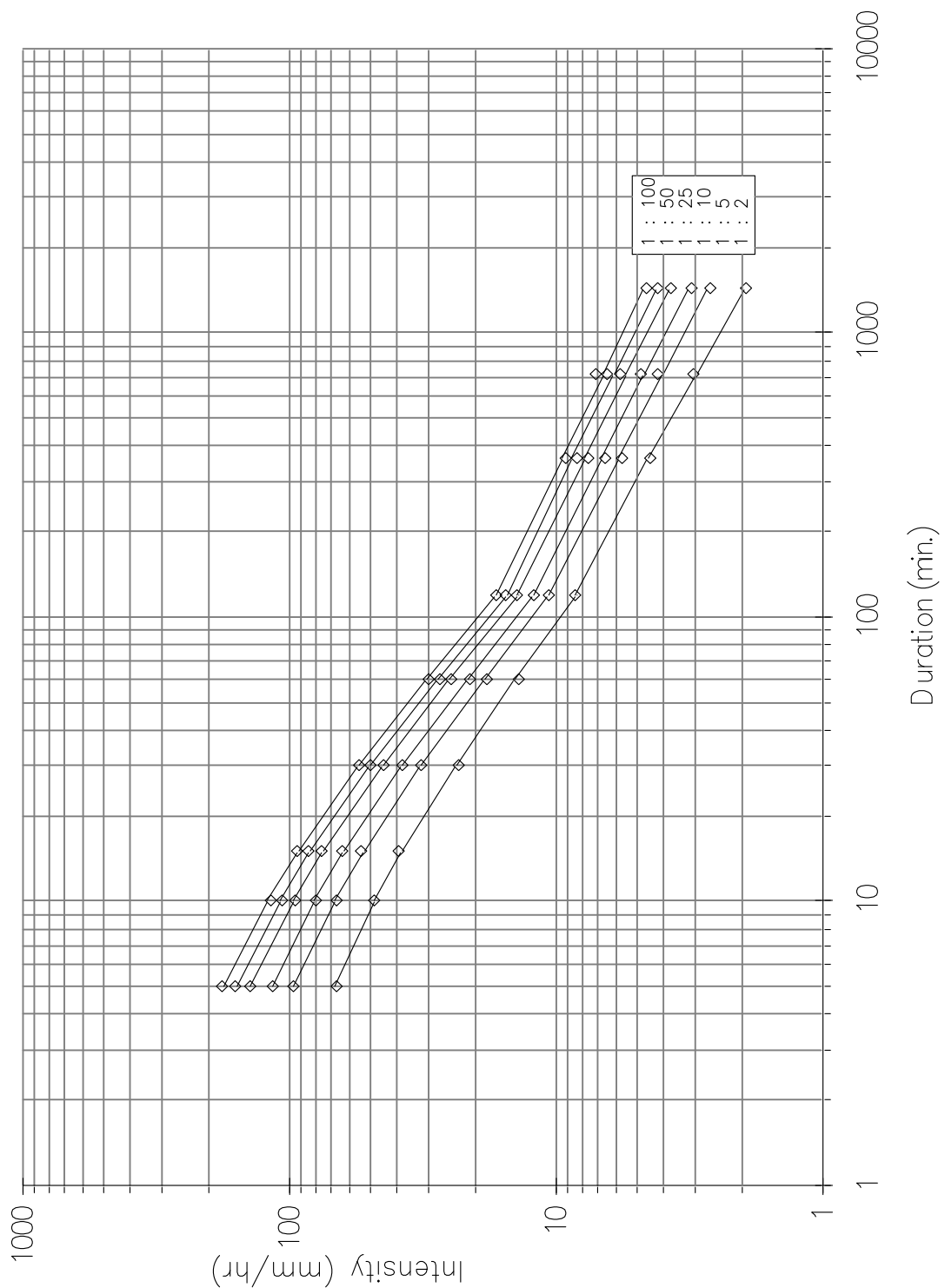
REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
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–	–	–	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
–	–	–	Checked			3.05
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	




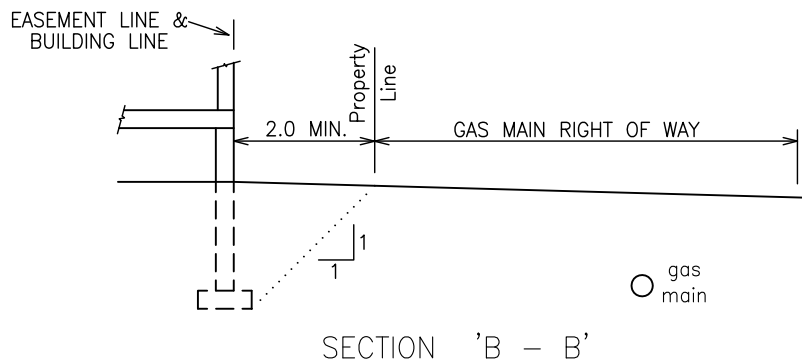
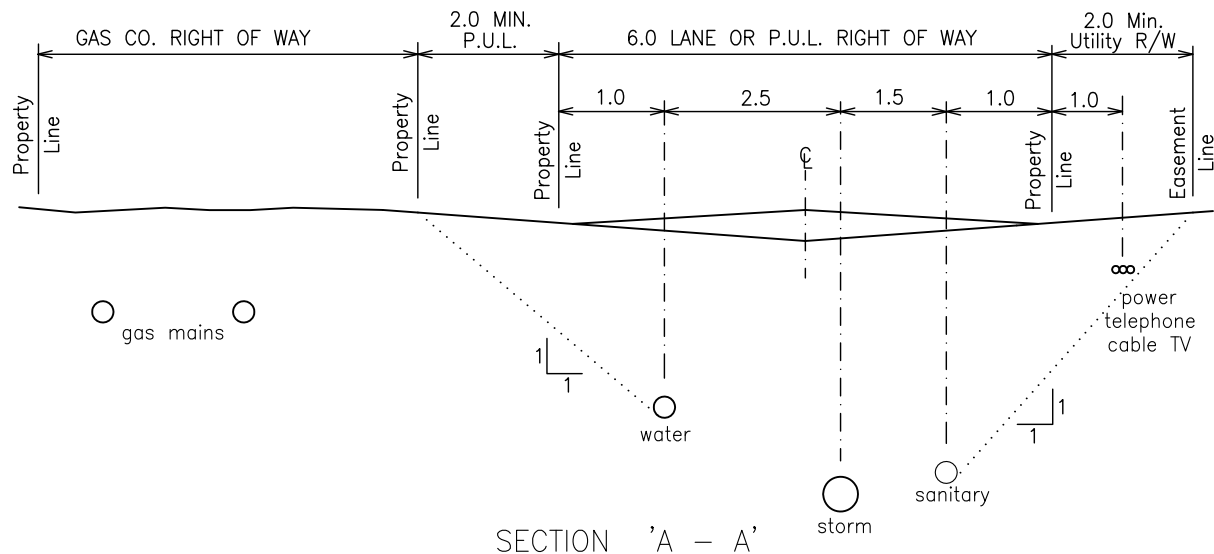
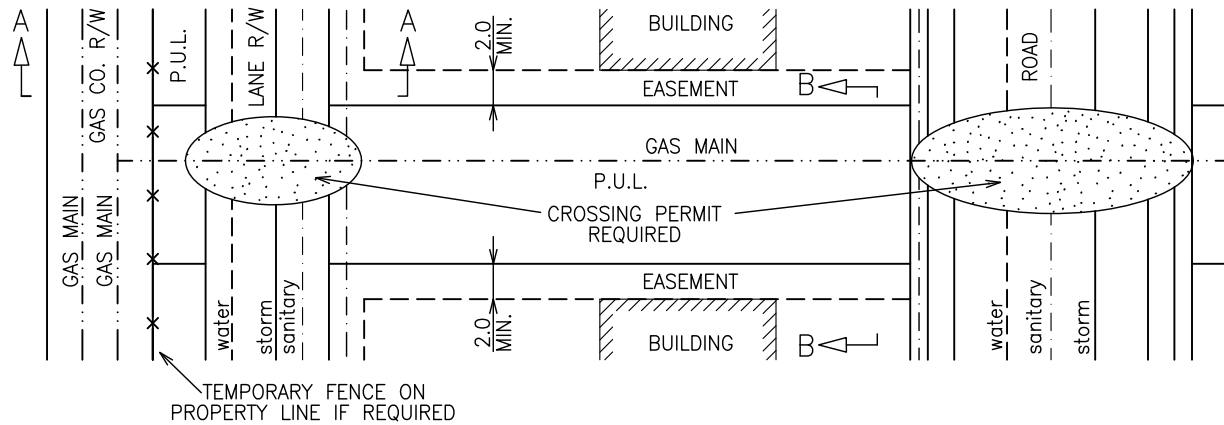
MANHOLE NOMINAL INSIDE DIAMETER	INLET / OUTLET PIPE SIZE		
	DEFLECTION ANGLE		
	±90°	≥135°	±180°
1200	600mm CONC. (765mm MAX. O.D.)	675mm CONC.	750mm CONC. 750mm PVC (940mm MAX. O.D.)
1500	750mm CONC. (940mm MAX. O.D.)	750 & 900mm CONC.	900mm CONC. (1120mm MAX. O.D.)
1800	900mm CONC. (1120mm MAX. O.D.)	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.)

REVISIONS				TOWN OF BLACKFALDS MANHOLE INLET / OUTLET PIPE DESIGN CONSIDERATIONS		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
						3.07


IDF – Red Deer (1964–1999 Data)

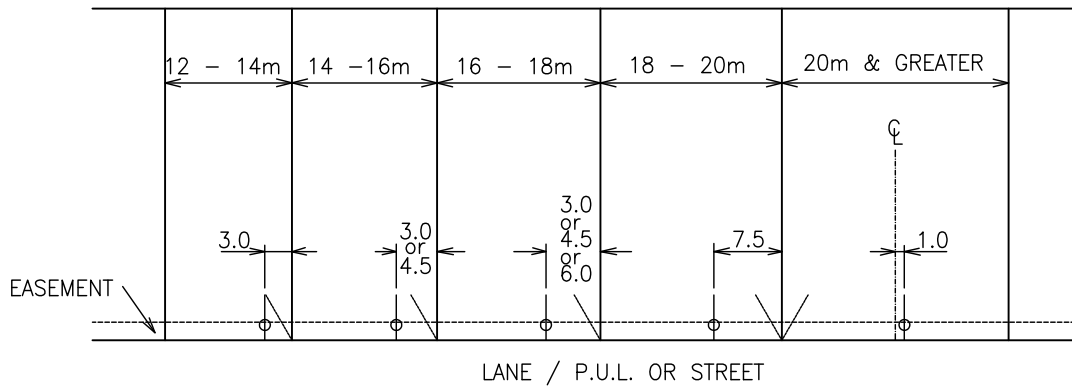


REVISIONS			 TOWN OF BLACKFALDS 2003 STATISTICAL CURVES FOR RAINFALL INTENSITY-DURATION-FREQUENCY		
Date	Details	Drawn			
	-	-	Approved PGW (TOWN OF BLACKFALDS)		
-	-	-			
-	-	-	Checked		
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:
			DWG. NO. 3.01		

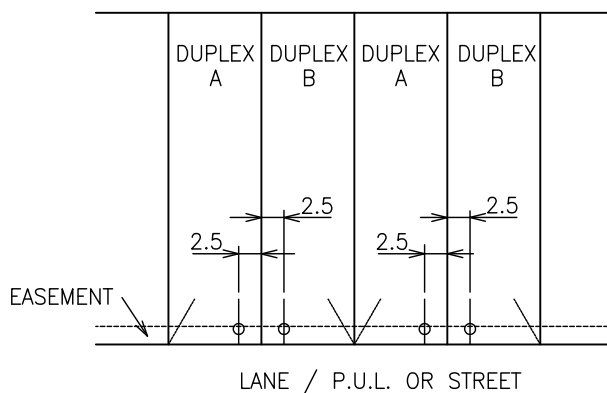


- NOTE :
- NO TRENCH ENCROACHMENT PERMITTED INTO GAS R/W.
 - BUILDING OR UTILITY SETBACKS TO BE ESTABLISHED ACCORDINGLY.

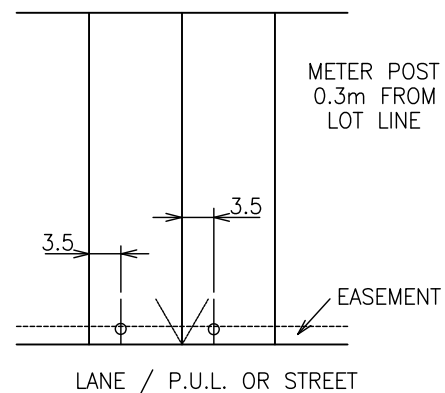
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	OIL AND/OR GAS RIGHT OF WAY CLEARANCES		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.01
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		



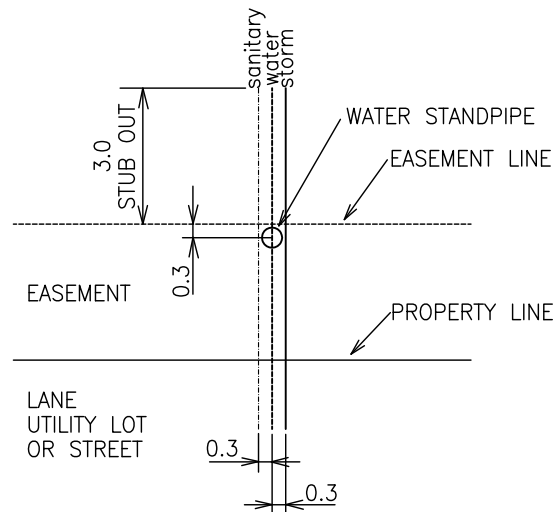
SINGLE FAMILY DWELLING



DUPLEX



MANUFACTURED HOME



SERVICE DETAIL

LEGEND



SANITARY SEWER, STORM
SEWER & WATER SERVICE

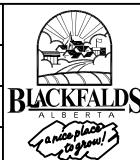
ELECTRICAL SERVICE

NOTE :

1. STANDPIPE & CURB STOP TO BE LOCATED 0.30m FROM EASEMENT LINE.
2. MINIMUM CLEARANCE FROM EDGE OF EL&P TRANSFORMER TO CENTRE OF WATER SHALL BE 3.30m.
3. EASEMENT WIDTH AS REQUIRED.

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

SERVICE LOCATIONS

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

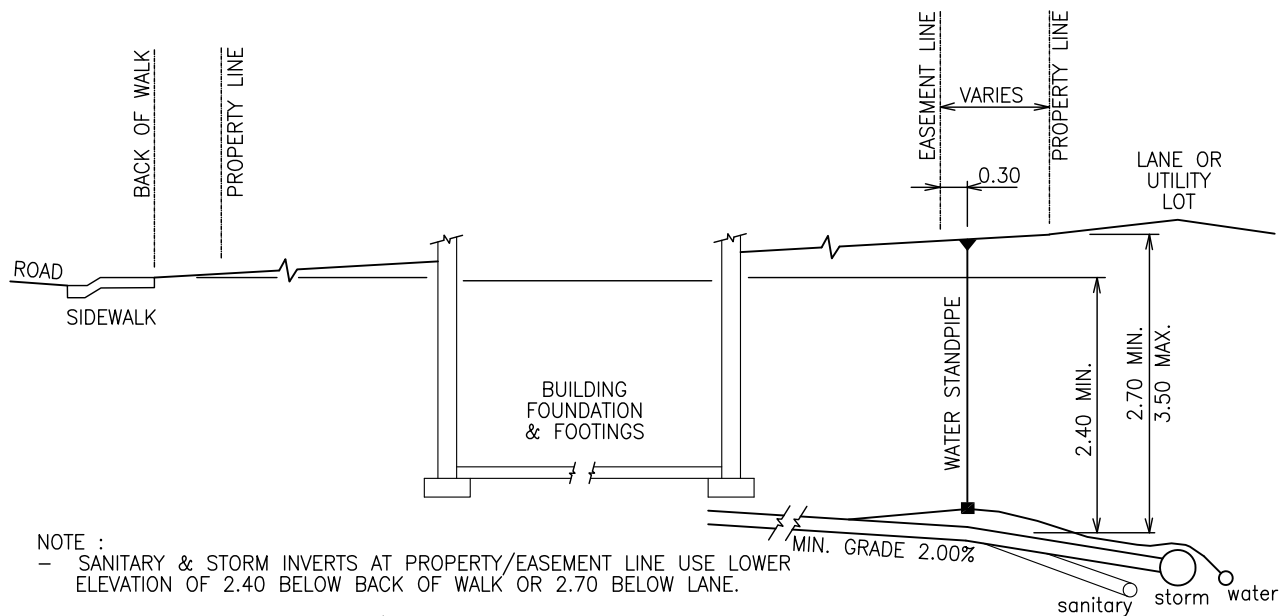
Checked

Date: 11.02.05

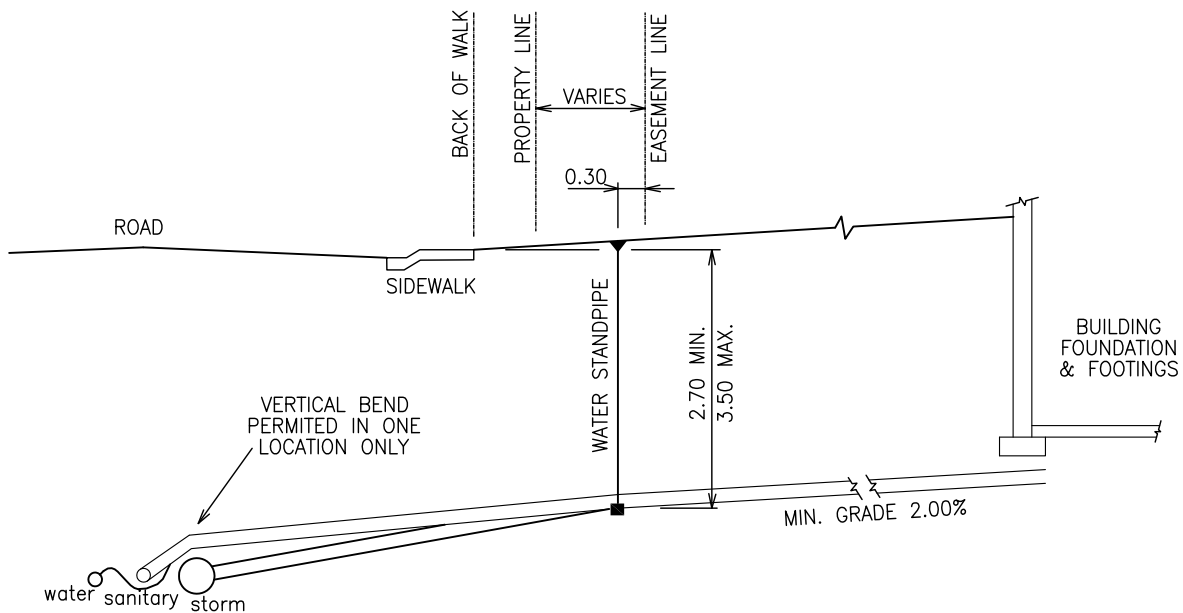
Scale: NTS

Drawn:


4.02

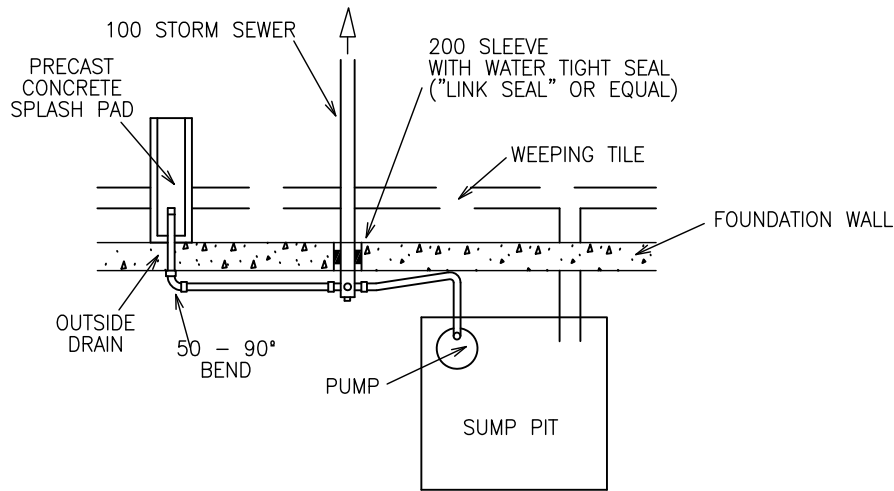


REAR YARD SERVICE CONNECTION

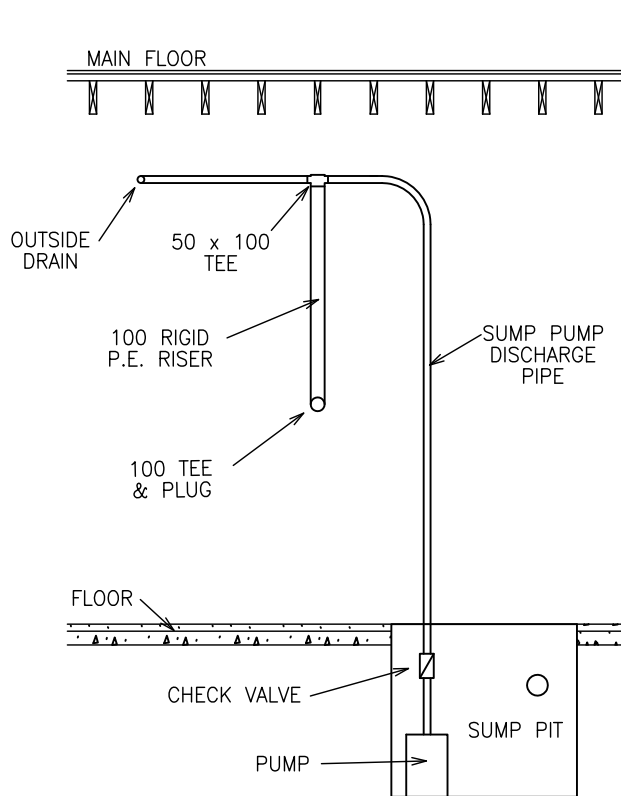


FRONT YARD SERVICE CONNECTION

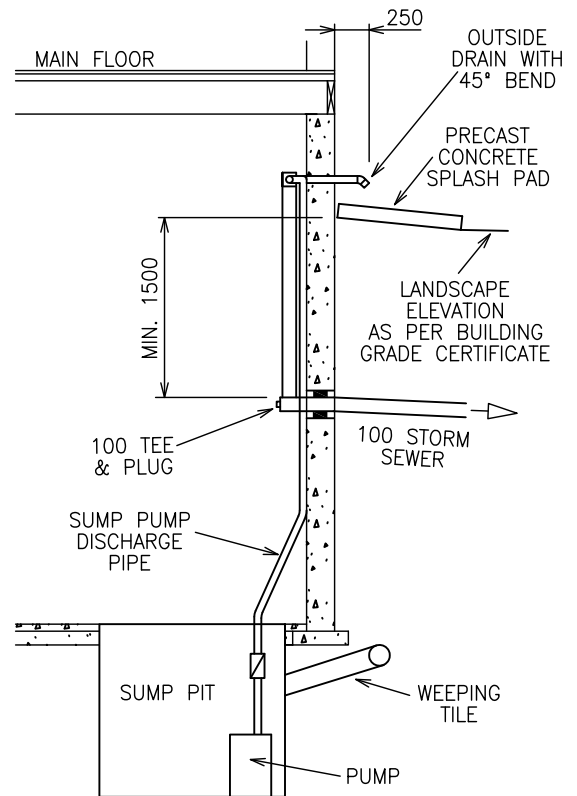
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	TYPICAL SERVICE CROSS SECTIONS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.03
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:



TOP VIEW



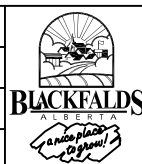
FRONT VIEW



SIDE VIEW

REVISIONS

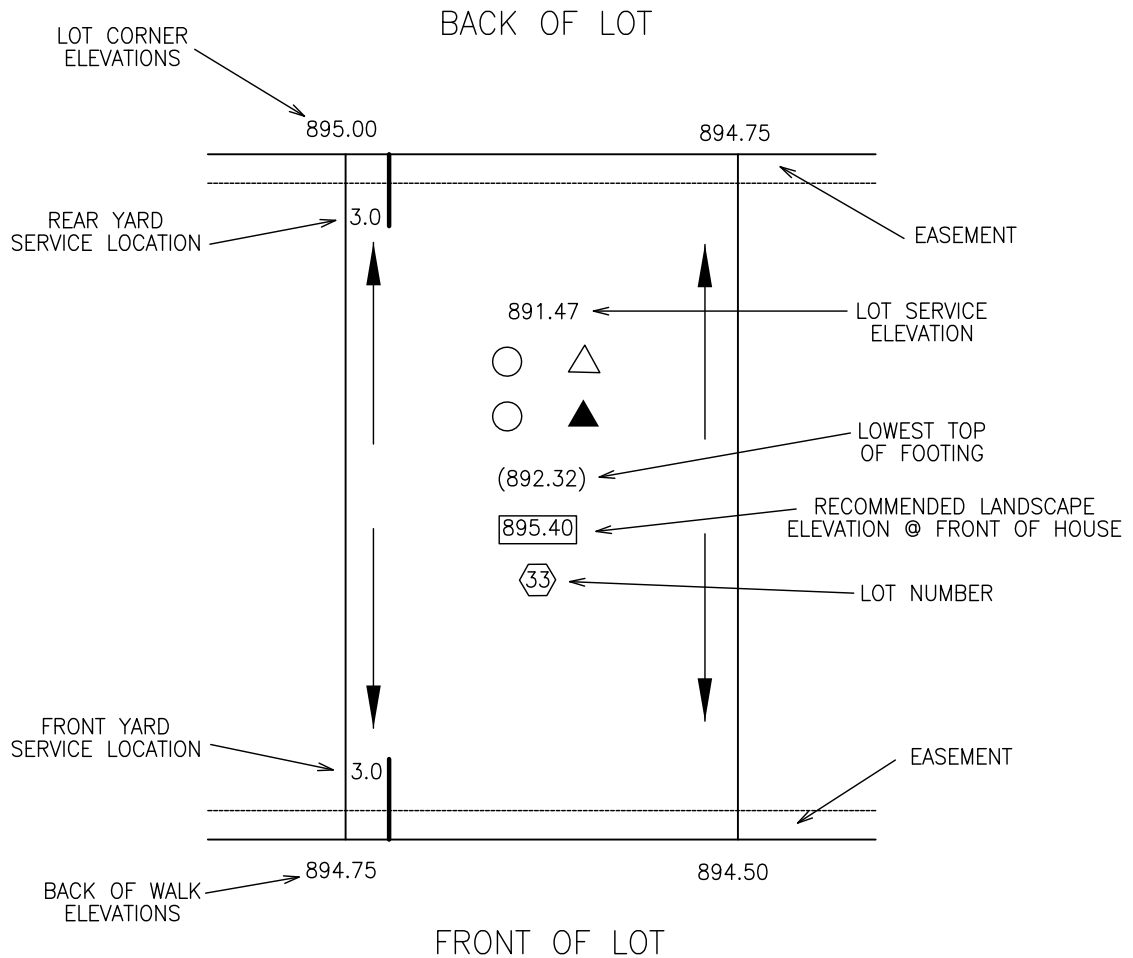
Date	Details	Drawn
	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

SHALLOW STORM SEWER SERVICE CONNECTION

Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		4.04
Date: 11.02.05	Scale: NTS	Drawn:




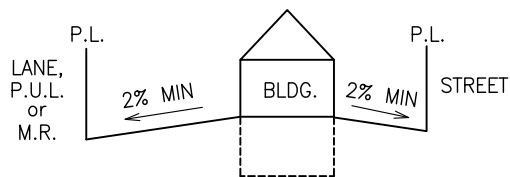
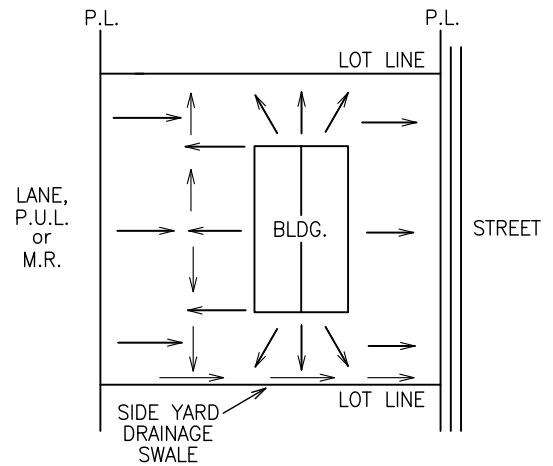
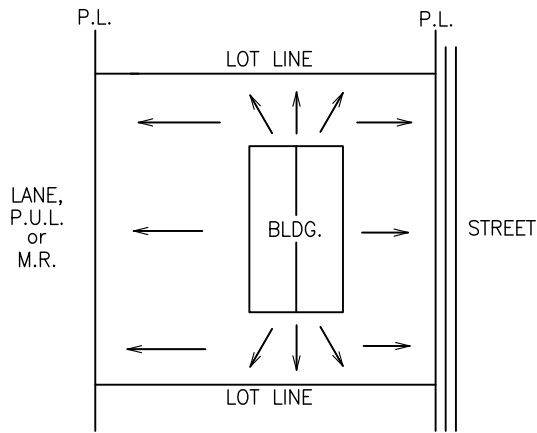
LEGEND :

- SINGLE WATER & SANITARY SERVICE
- DUAL WATER & SANITARY SERVICE
- △ SINGLE WATER, SANITARY & STORM SERVICE
- ▲ DUAL WATER, SANITARY & STORM SERVICE
- ← DRAINAGE PATTERN

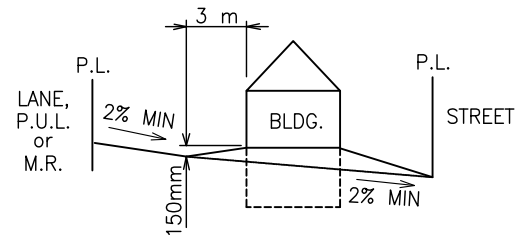
NOTE :

- EASEMENT WIDTHS VARY
- SERVICE LOCATION DIMENSIONS VARY (SEE DWG.S 4.01 & 4.02)

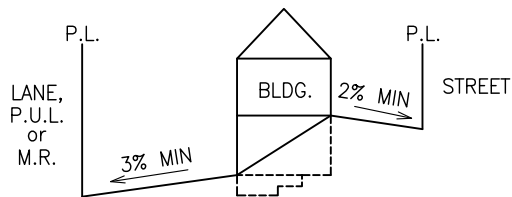
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	TYPICAL LOT SERVICE REQUIREMENTS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.05
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		




SPLIT DRAINAGE

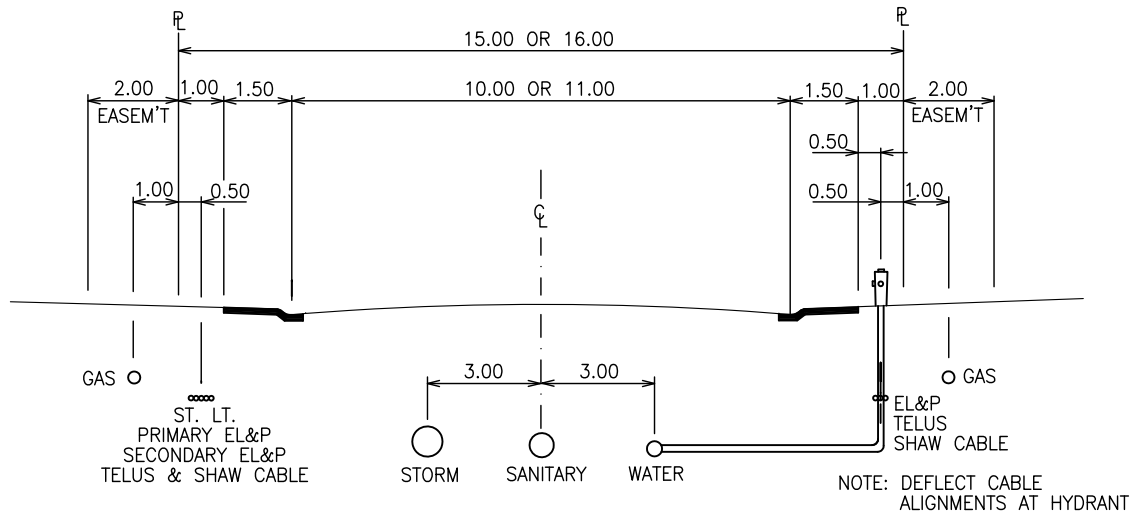


BACK TO FRONT DRAINAGE

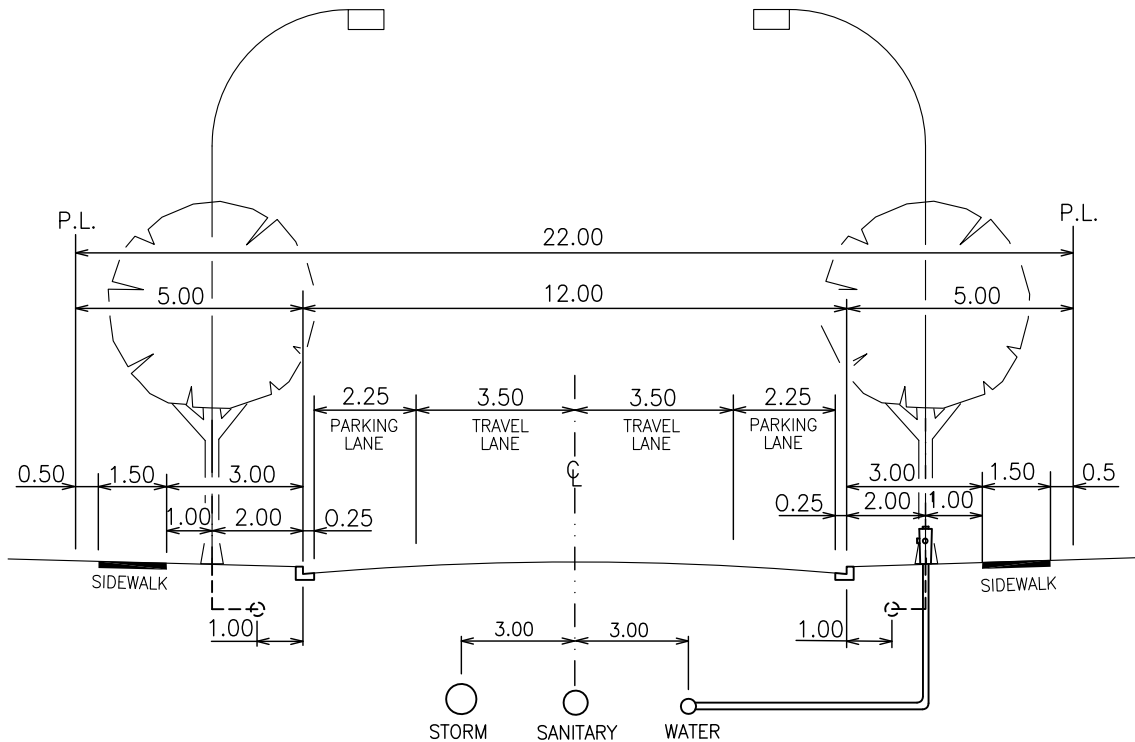


REARYARD BASEMENT WALKOUT
SPLIT DRAINAGE


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	TYPICAL LOT GRADING		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.06
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

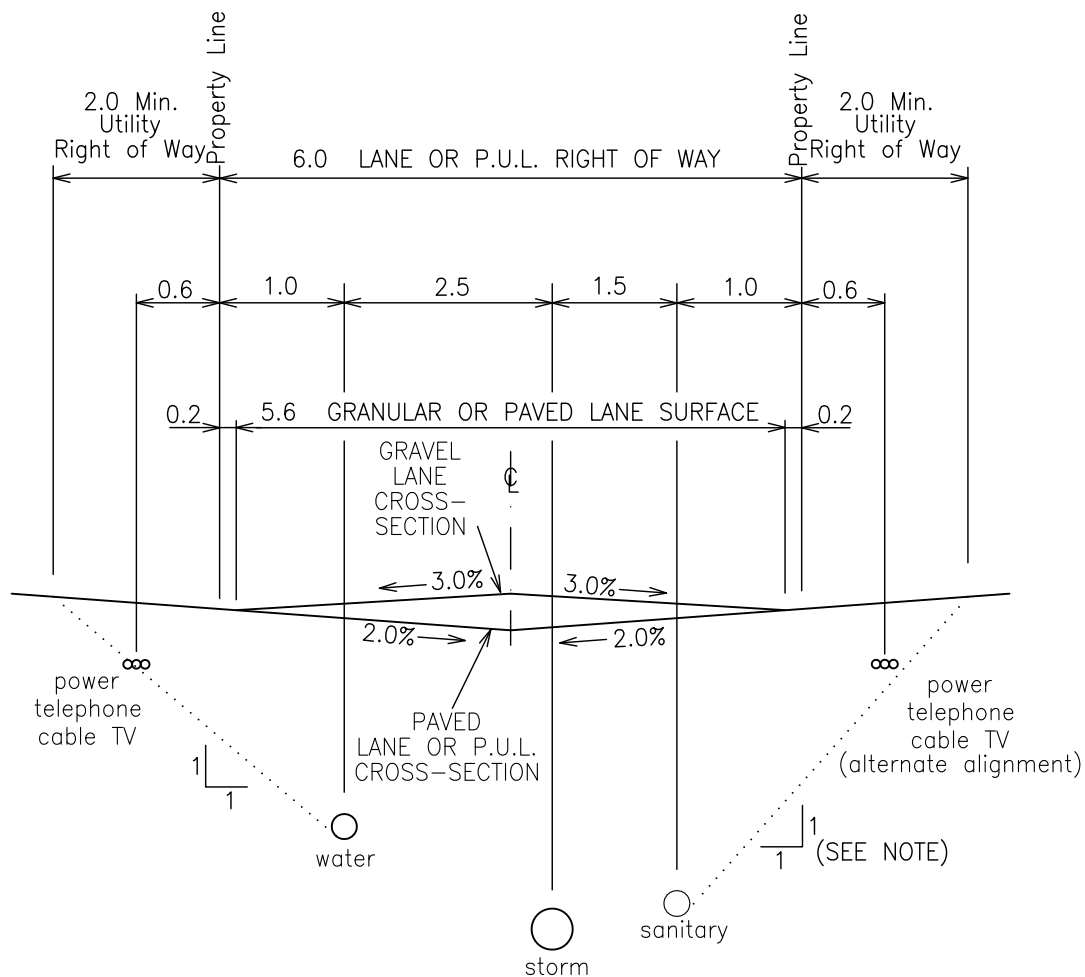


RESIDENTIAL LOCAL ROAD




COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK

REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	-	-		TYPICAL FRONT SERVICING ALIGNMENTS		
-	-	-				
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked			4.07
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:	




NOTE :

- 1:1 SIDESLOPE SHOWN IS TO BE USED AS A GUIDELINE FOR ESTABLISHING EASEMENT REQUIREMENTS TO PROVIDE A MINIMUM SETBACK FOR EXISTING REAR YARD BUILDINGS (EG. GARAGE, STORAGE SHED).
- ACTUAL TRENCH SIDESLOPES ARE TO BE BASED ON OCCUPATIONAL HEALTH & SAFETY GUIDELINES (SEE C.R.D. SPECIFICATION DRAWING: UTILITY TRENCH BACKFILL REQUIREMENTS CLASS B BEDDING)

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	CURRENT LANE / P.U.L. SERVICING ALIGNMENT		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.08
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

SIZE OF MAIN	SIZE OF SANITARY SERVICE							
	150 mm	200 mm	250 mm	300 mm	375 mm	450 mm	525 mm	600 mm
200 mm	MANHOLE NOT REQUIRED					SERVICE LARGER THAN MAIN NOT PERMITTED		
250 mm								
300 mm								
375 mm								
450 mm								
525 mm								
600 mm								
675 mm								
750 mm								
825 mm								
900 mm								
1050 mm								
1200 mm								
1350 mm								

SIZE OF MAIN	SIZE OF STORM SERVICE								
	100 mm	150 mm	200 mm	250 mm	300 mm	375 mm	450 mm	525 mm	600 mm
200 mm							SERVICE LARGER THAN MAIN NOT PERMITTED		
250 mm									
300 mm									
375 mm									
450 mm									
525 mm									
600 mm									
675 mm	MANHOLE NOT REQUIRED						MANHOLE REQUIRED		
750 mm									
825 mm									
900 mm									
1050 mm									
1200 mm									
1350 mm									

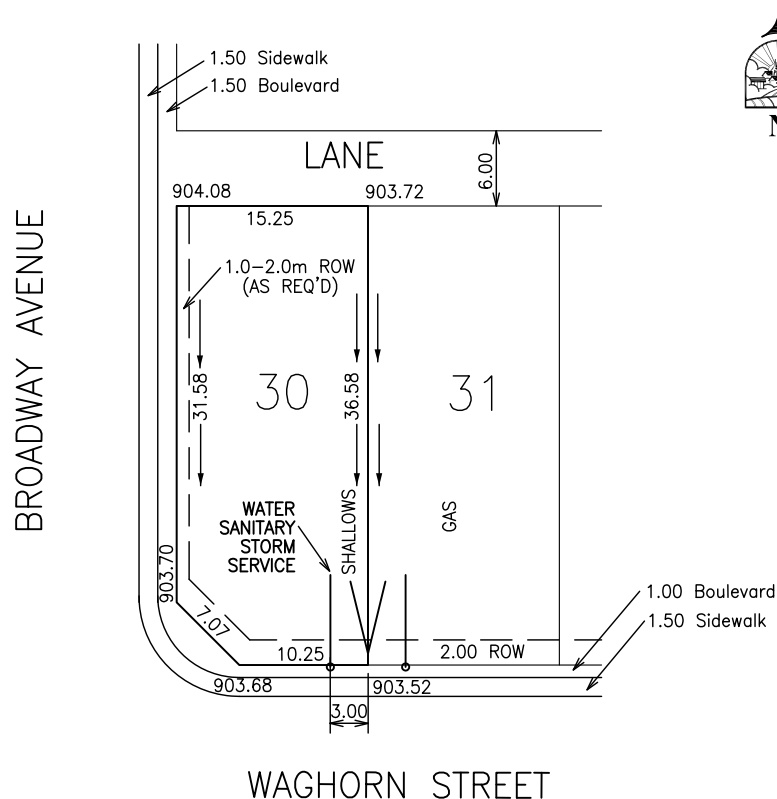
REVISIONS				TOWN OF BLACKFALDS SAN & STORM MANHOLE REQUIREMENTS FOR SERVICE CONNECTIONS	
Date	Details	Drawn			
	-	-			
-	-	-			
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		4.09
-	-	-	Date: 11.02.05	Scale: NTS Drawn:	

BUILDING GRADE CERTIFICATE

TOWN OF BLACKFALDS

Issued by: No.

1. WHEN EXCAVATING IN A RIGHT OF WAY (EASEMENT), CHECK FOR UTILITIES.
 2. STANDING AT THE WATER SHUTOFF AND FACING THE BUILDING, THE SANITARY SERVICE (PAINTED RED) IS ON THE LEFT SIDE OF THE WATER SERVICE; STORM SERVICE (PAINTED GREEN) IS ON THE RIGHT SIDE OF THE WATER SERVICE.
 3. ALL DIMENSIONS ARE IN METRES AND DECIMALS THEREOF. ELEVATIONS ARE IN METRES ABOVE GEODETIC MEAN SEA LEVEL.
 4. ELEVATIONS NOTED ON THIS CERTIFICATE ARE WITHIN 100mm OF ACTUAL.
 5. THE BUILDER MUST CONSTRUCT TO WITHIN 100mm OF THE DESIGN LANDSCAPE ELEVATION AND ILLUSTRATED DRAINAGE PATTERNS UNLESS OTHERWISE APPROVED BY THE DEVELOPMENT OFFICER.
- IF THE INFORMATION ON THIS CERTIFICATE HAS BEEN PREPARED BY A PRIVATE DEVELOPER OR HIS AGENT, THE TOWN OF BLACKFALDS ACCEPTS NO RESPONSIBILITY FOR ITS ACCURACY.



TOP OF FOOTING:
MAX. DEPTH BELOW AVERAGE SIDEWALK = 1.92
LOWEST ELEVATION = 875.78

SEWER INVERT ELEVATIONS:
SANITARY AT RIGHT OF WAY LINE = 874.87
STORM AT RIGHT OF WAY LINE = 874.88

CIVIC ADDRESS: 75 WAGHORN STREET
LOT: 30 BLOCK: 11 PLAN No.: 972 9999
DEVELOPER: ABC Developments Ltd. SCALE: 1:500
DRAWN BY: XYZ Consulting Ltd. DATE: YY.MTH.DD
APPROVED BY: _____ DATE: _____
RECEIVED BY: _____ DATE: _____

FRONT DESIGN LANDSCAPE GRADE = 878.05
REAR DESIGN LANDSCAPE GRADE = 878.25

I CERTIFY THAT THE FINAL LANDSCAPE GRADE WILL BE: _____
SIGNATURE OF OWNER OR REPRESENTATIVE: _____

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

NEW RESIDENTIAL BUILDING GRADE CERTIFICATE

Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:

4.10

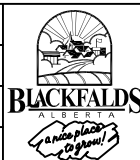


LEGEND

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

REVISIONS

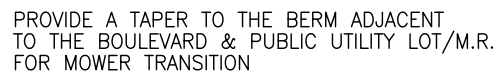
Date	Details	Drawn
	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

RELATIONSHIP OF STREET CLASSIFICATIONS

Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:
		5.01



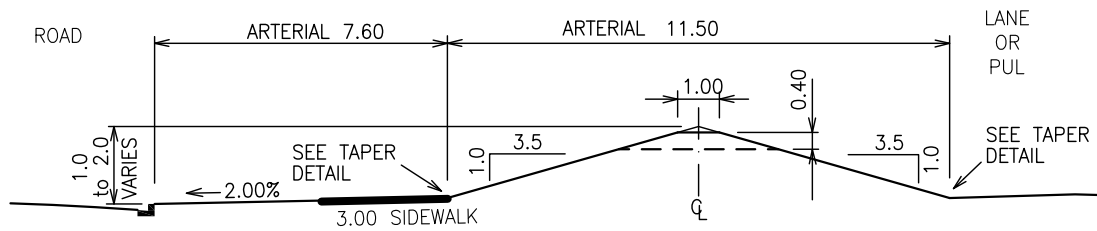
BERM TAPER DETAIL



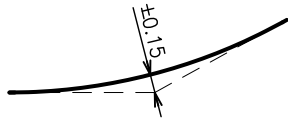
BERM PLAN VIEW



W:\AUTOCAD DWGS\DRAWINGS\2011_design_guideline_dwgs\5.02A.dwg

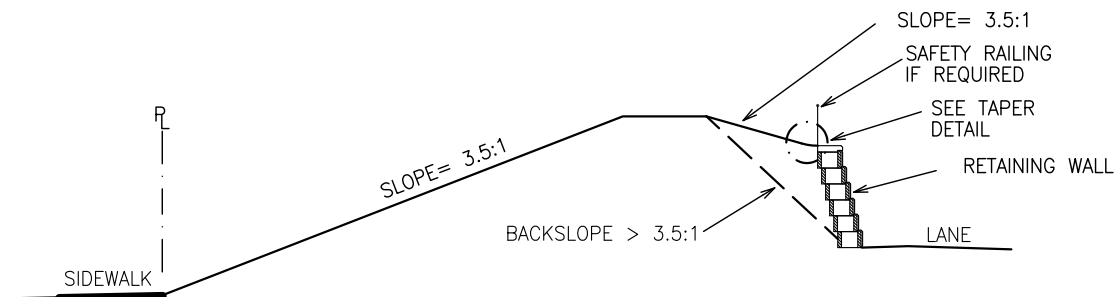


NORMAL BERM CROSS SECTION



NOTE :
PROVIDE A TAPER TO THE BERM ADJACENT
TO THE BOULEVARD & PUBLIC UTILITY LOT/M.R.
WHERE APPLICABLE

BERM TAPER DETAIL




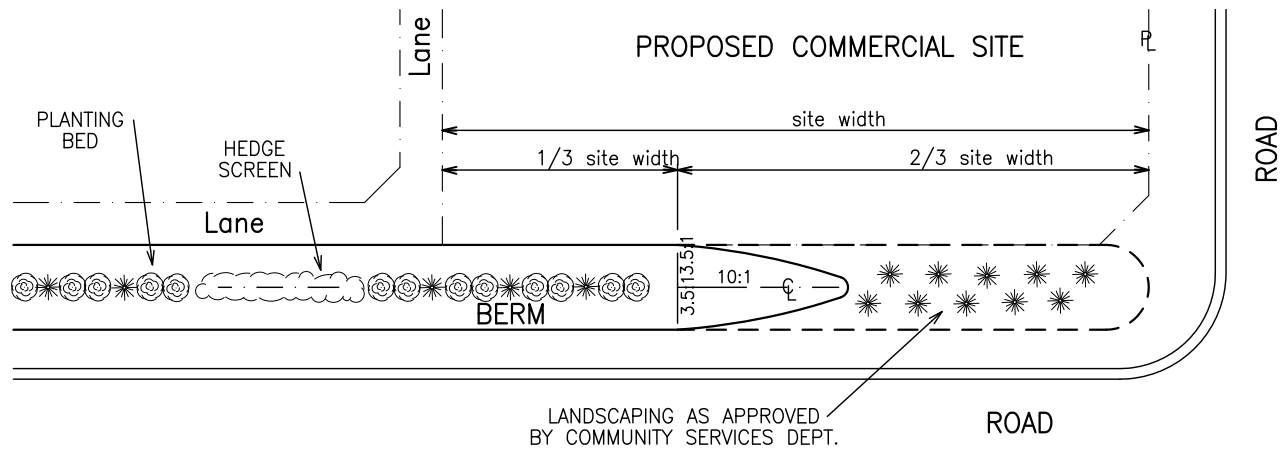
BACKSLOPE CROSS SECTION



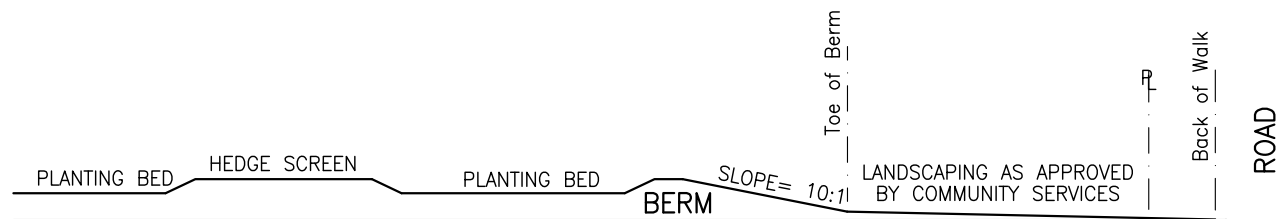
FORESLOPE CROSS SECTION

NOTE :
RETAINING WALLS, INCLUDING END TREATMENT, MUST BE DESIGNED ON A SITE-SPECIFIC
BASIS IN ACCORDANCE WITH THE MANUFACTURERS DESIGN SPECIFICATIONS.


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	BERM SIDE SLOPE / RETAINING WALL REQUIREMENTS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.02B
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:

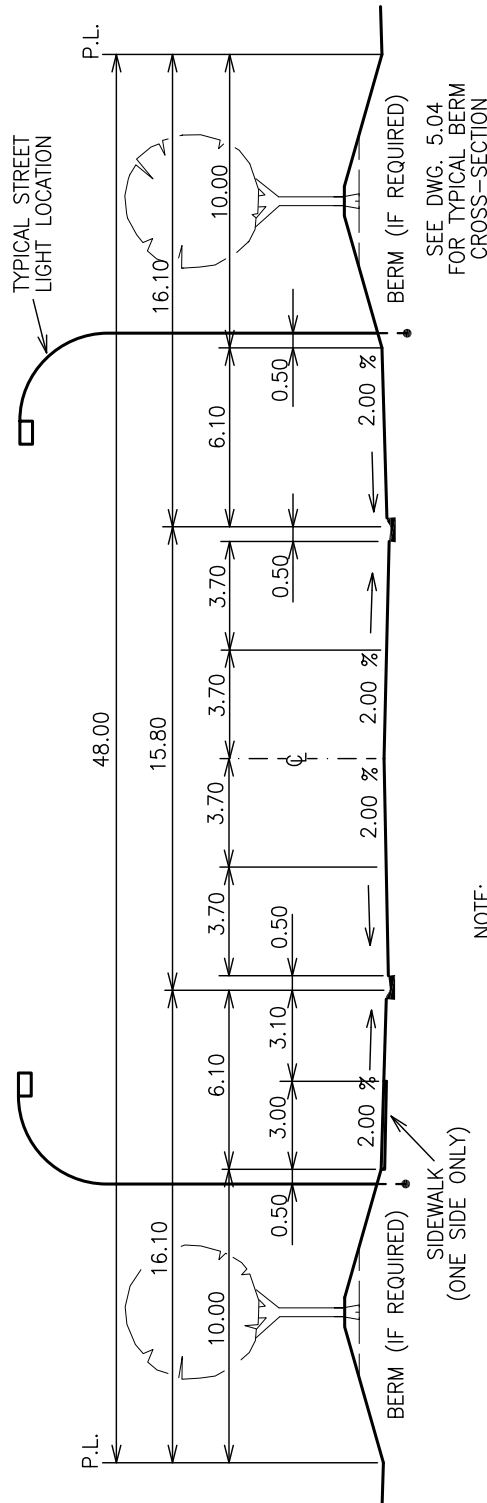


BERM PLAN VIEW



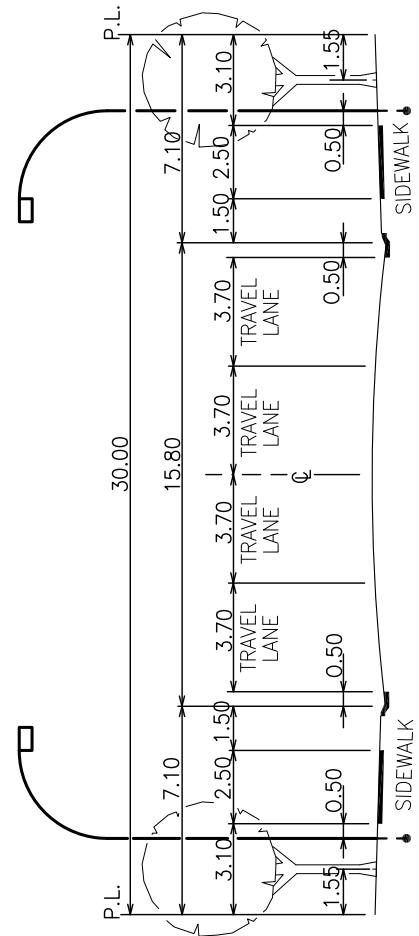
BERM ELEVATED VIEW

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	BERM HEIGHT REDUCTION NEXT TO COMMERCIAL SITE		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.02C
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		



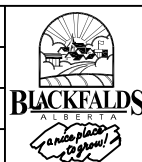
NOTE:
RIGHT OF WAY TO BE WIDENED AT MAJOR
INTERSECTIONS TO PROVIDE FOR LEFT TURN
CHANNELIZATION.

SEE DWG. 5.04
FOR TYPICAL BERM
CROSS-SECTION



REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

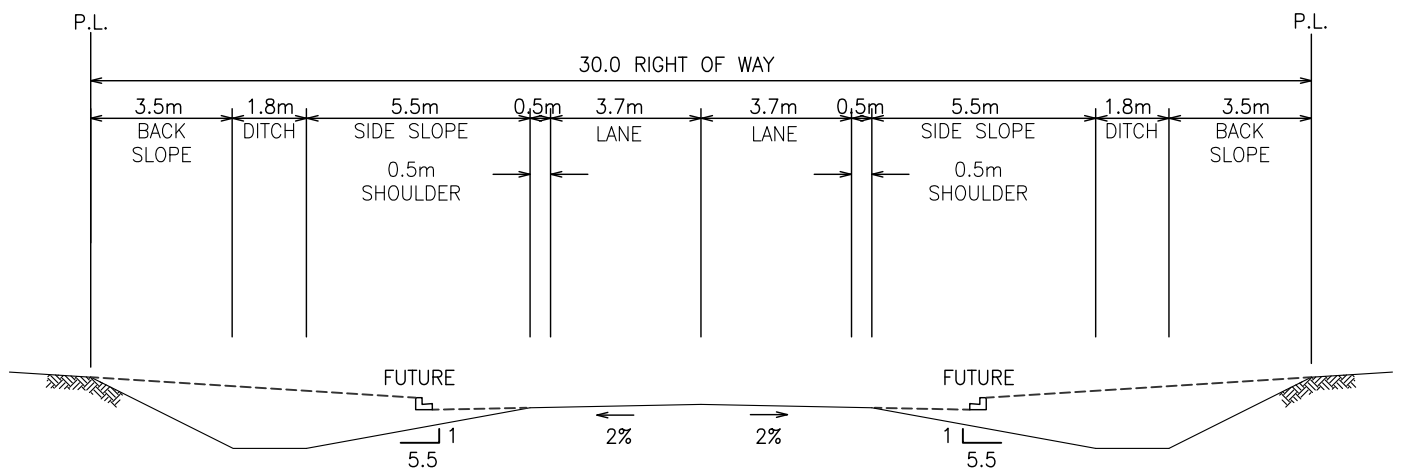


TOWN OF BLACKFALDS


UNDIVIDED ARTERIAL ROADWAY

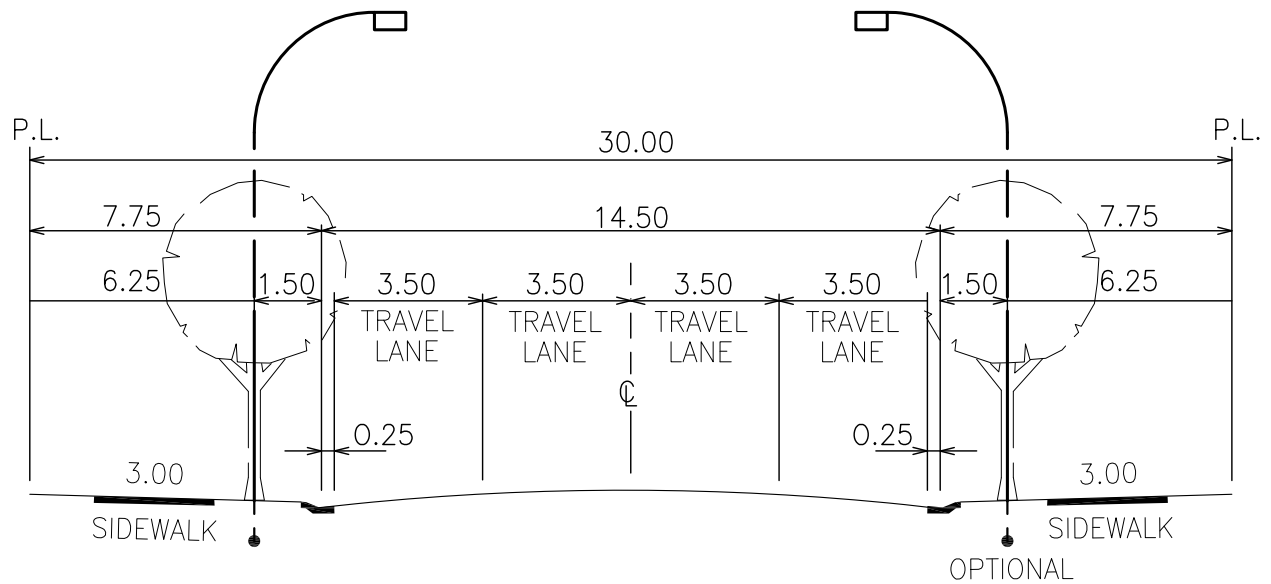
Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:

5.03

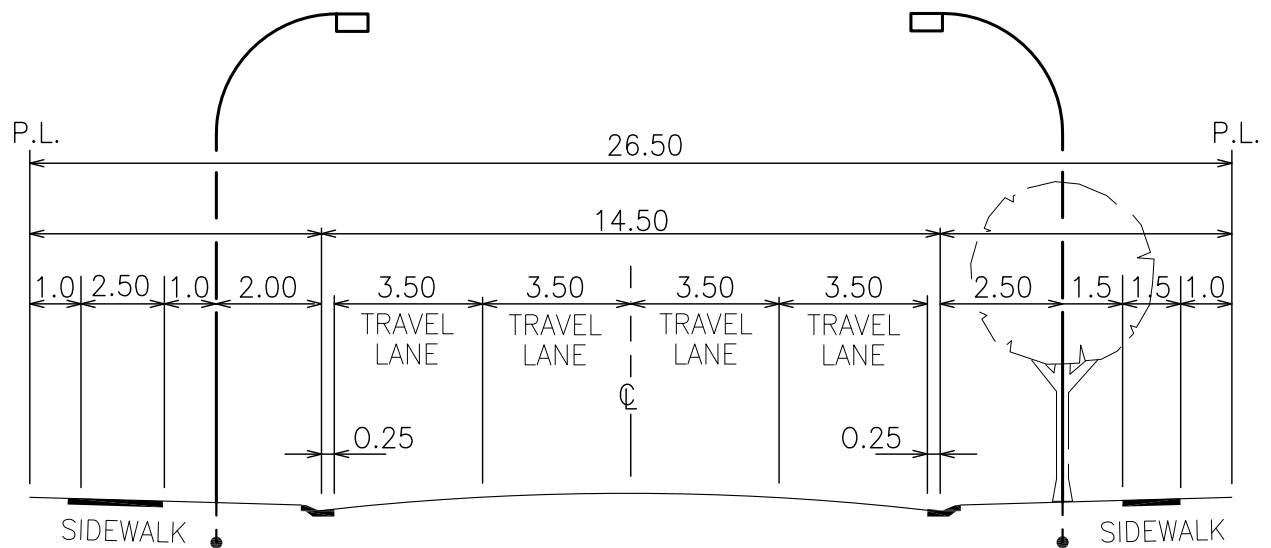


NOTES:
 ENSURE THAT ROAD PROFILE IS DESIGNED
 TO ACCOMMODATE FUTURE CURB AND
 GUTTER DRAINAGE. (ie. MINIMUM GRADE
 ALONG GUTTER LINE 0.5%).


REVISIONS			 TOWN OF BLACKFALDS STAGED ARTERIAL CONSTRUCTION		
Date	Details	Drawn			
	-	-	Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
-	-	-			
-	-	-			
-	-	-	DWG. NO. 5.04		



COLLECTOR ROADWAY WITH SEPERATE WALK

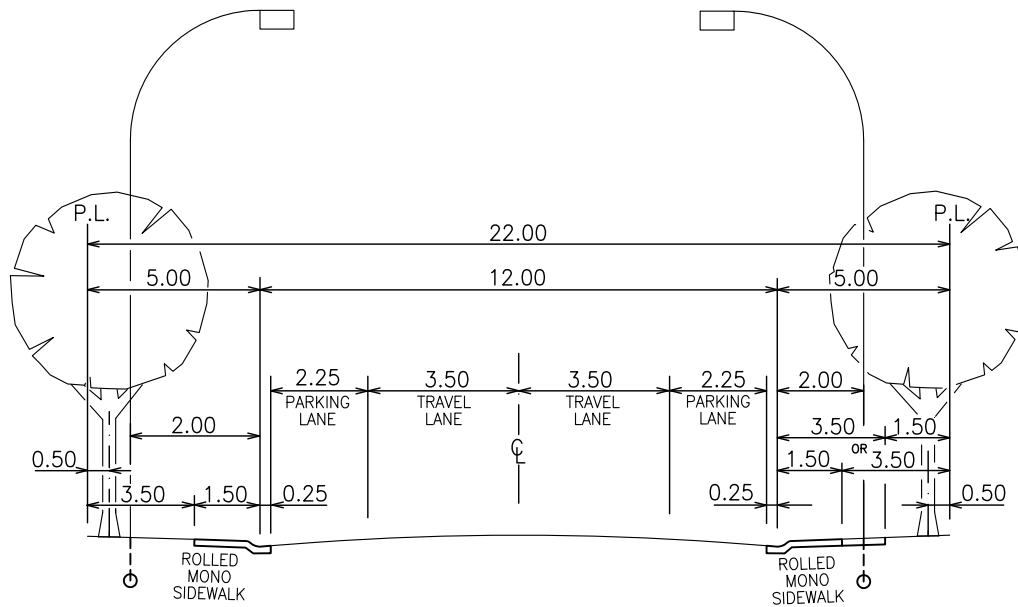


MODIFIED COLLECTOR ROADWAY WITH SEPERATE WALK

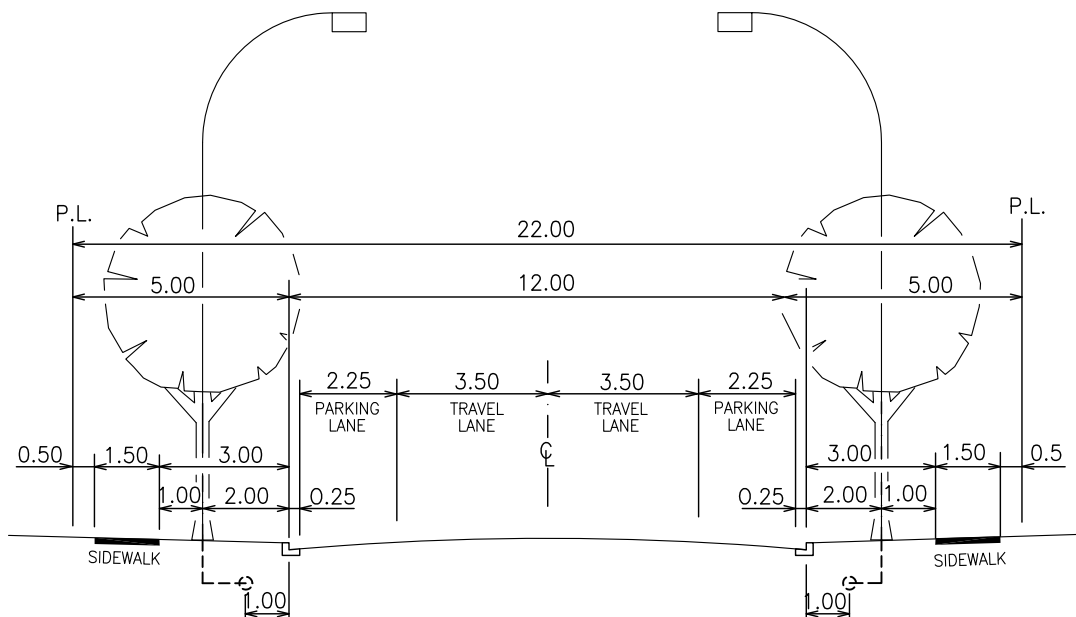
REVISIONS				TOWN OF BLACKFALDS RESIDENTIAL UNDIVIDED COLLECTOR ROADWAY		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:

DWG. NO.


5.05

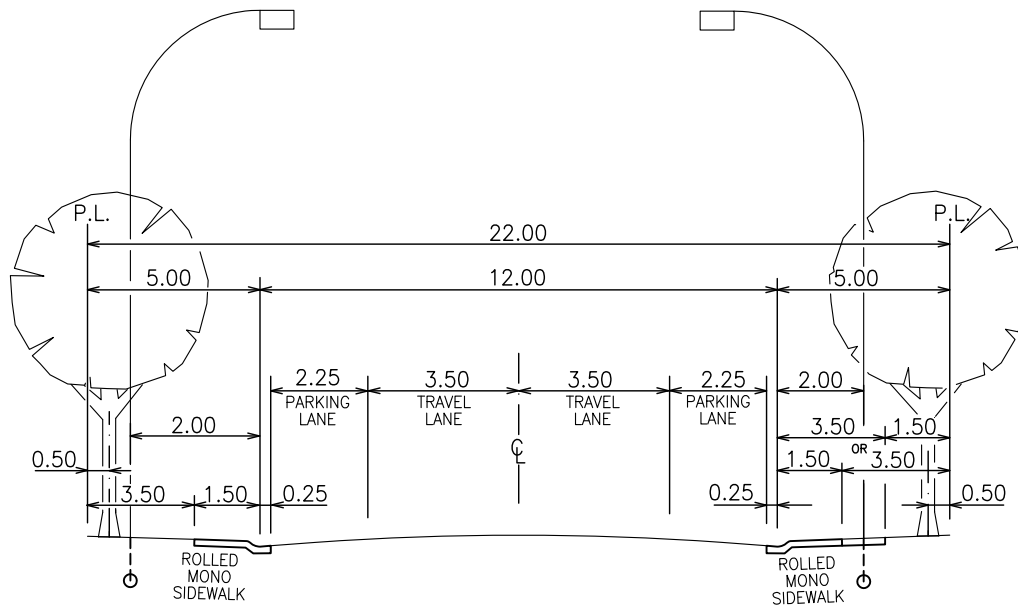


STANDARD COLLECTOR ROADWAY
WITH MONO SIDEWALK

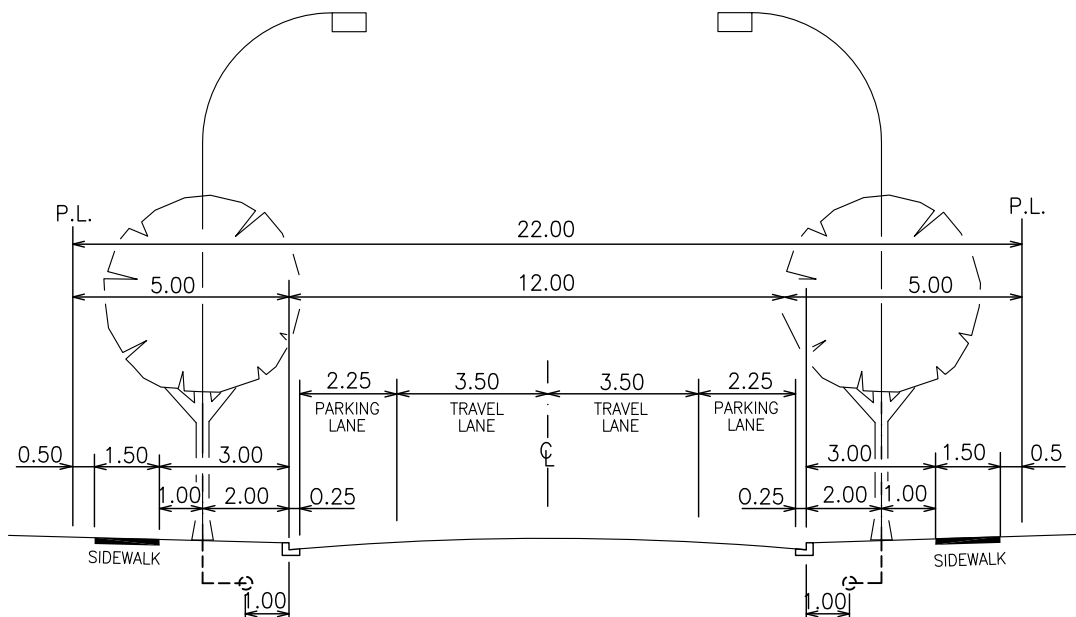


COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK

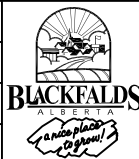
REVISIONS				TOWN OF BLACKFALDS 12m UNDIVIDED LOCAL ROADWAY		
Date	Details	Drawn				
-	-	-	-	Approved PGW (TOWN OF BLACKFALDS)		
-	-	-	-			
-	-	-	-	Checked		DWG. NO. 5.06
-	-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	-	Drawn:		

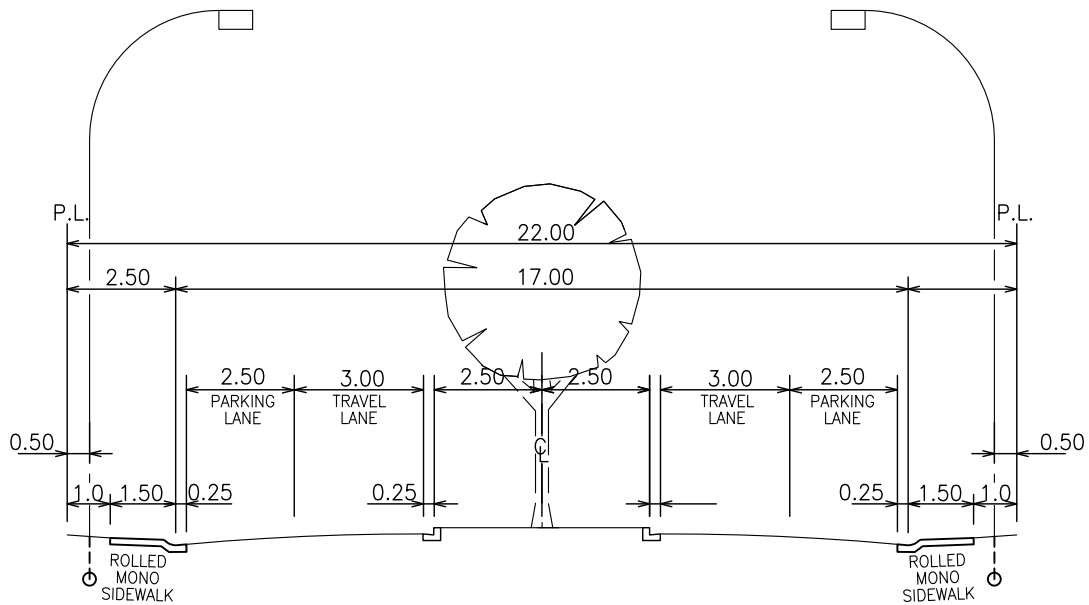


STANDARD COLLECTOR ROADWAY
WITH MONO SIDEWALK

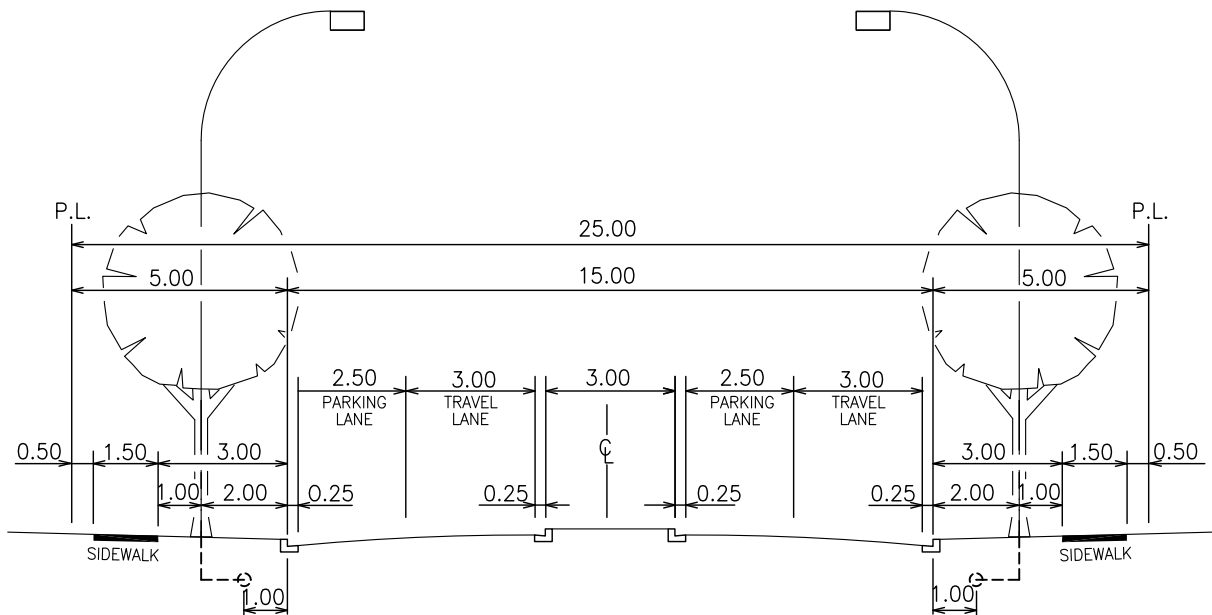


COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK


REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		12m UNDIVIDED LOCAL ROADWAY		
–	–	–				
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.	
–	–	–	Checked			5.06A
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	

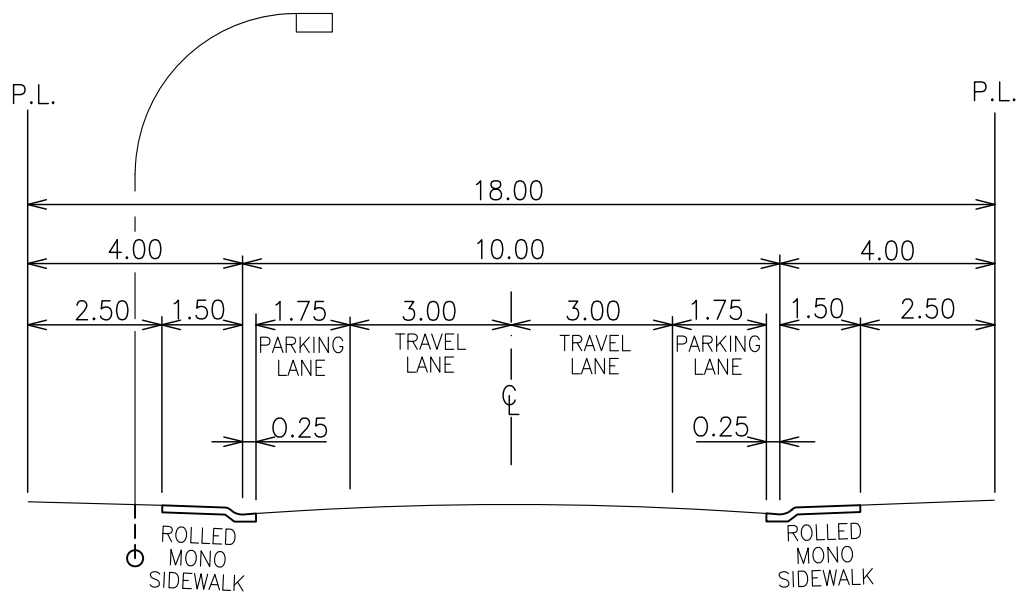


12m LOCAL DIVIDED ROADWAY
WITH MONO SIDEWALK




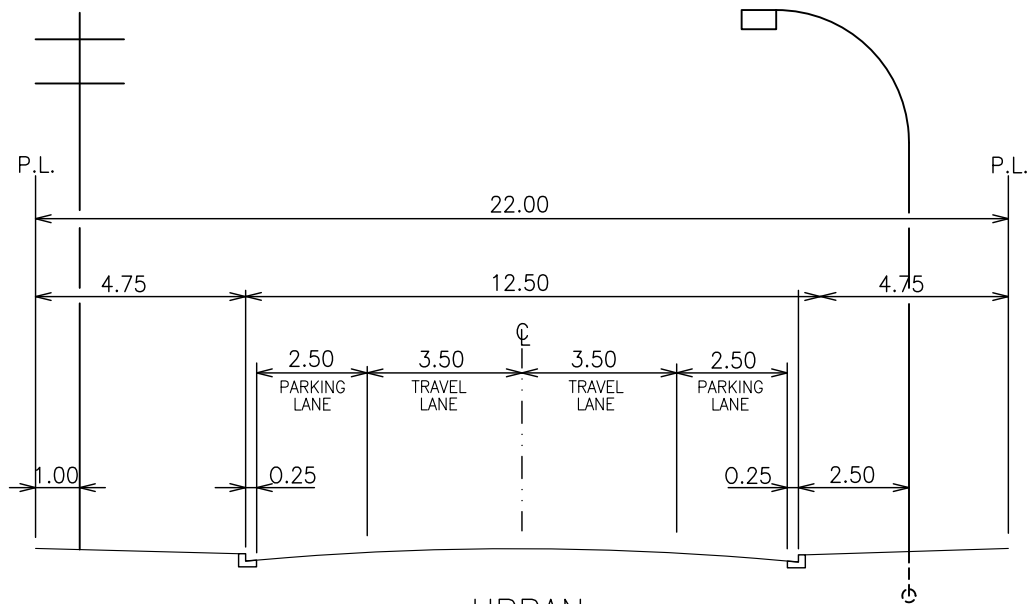
15m DIVIDED COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK

REVISIONS				TOWN OF BLACKFALDS STANDARD DIVIDED ROADWAYS		
Date	Details	Drawn				
-	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
				DWG. NO. 5.06B		

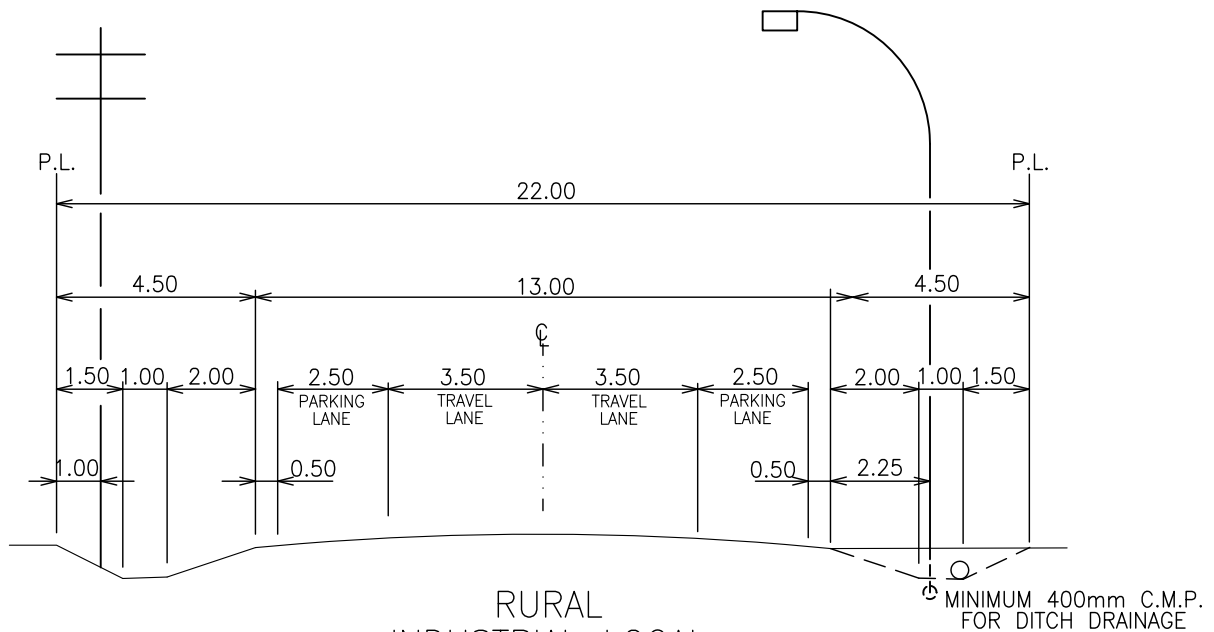


UNDIVIDED LOCAL ROADWAY


REVISIONS				TOWN OF BLACKFALDS 10m UNDIVIDED LOCAL ROADWAY		
Date	Details	Drawn				
	-	-		<div>Approved PGW (TOWN OF BLACKFALDS)</div> <div>DWG. NO.</div> <div>5.07</div>		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
			<div>Date: 11.02.05</div> <div>Scale: NTS</div> <div>Drawn:</div>			

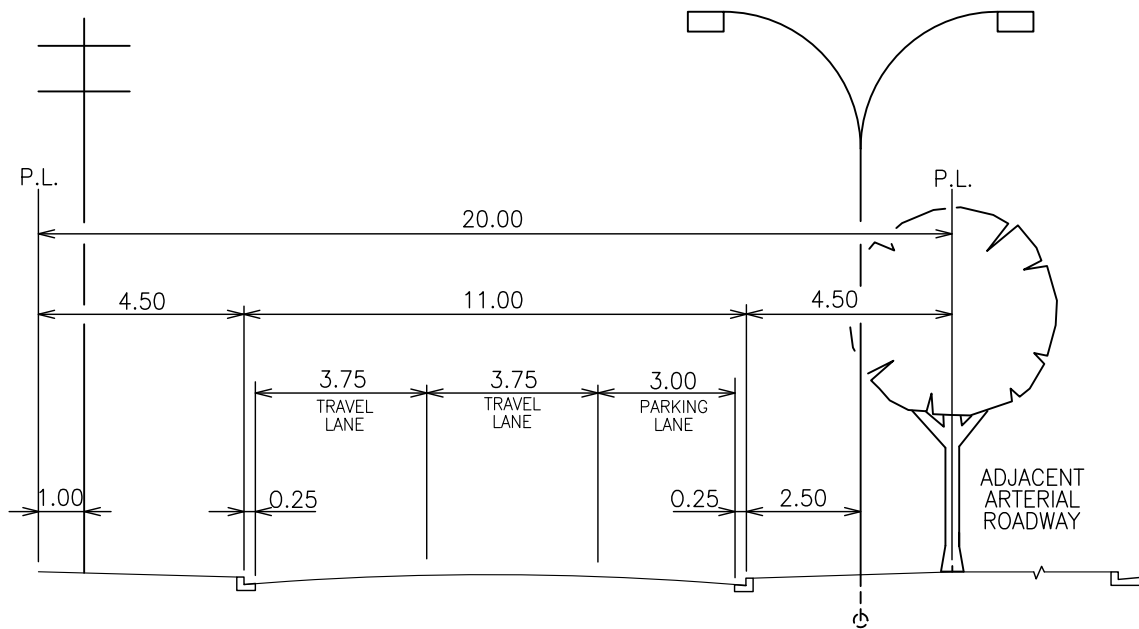


URBAN
INDUSTRIAL LOCAL
ROADWAY

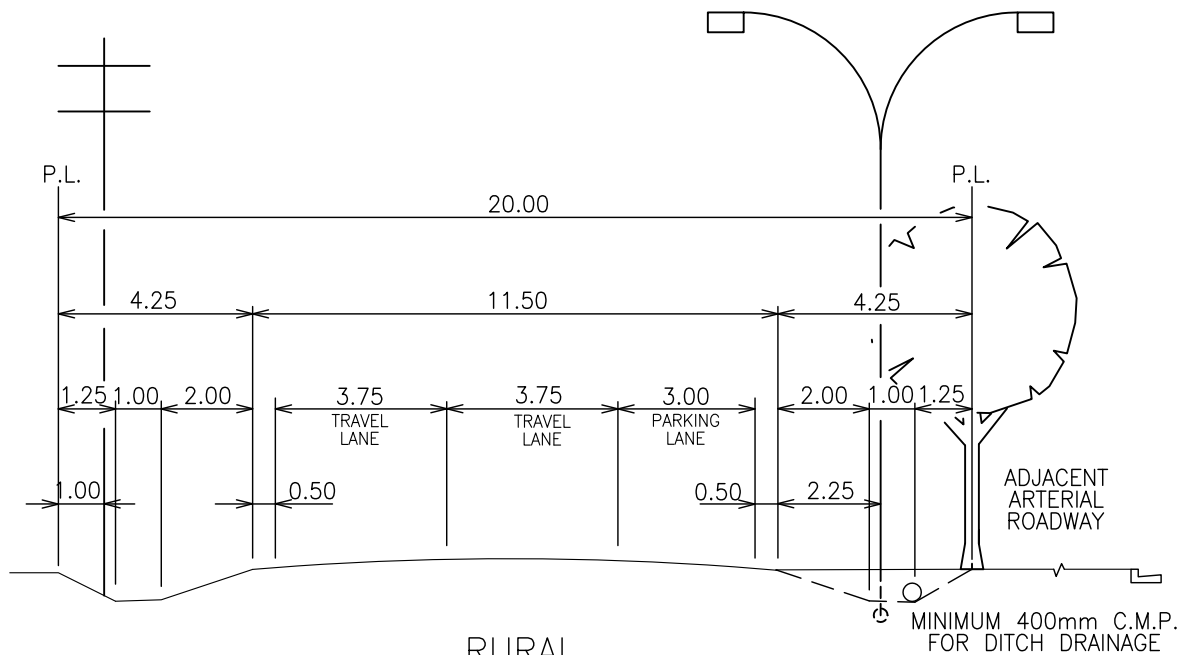


RURAL
INDUSTRIAL LOCAL
ROADWAY


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	RURAL & URBAN INDUSTRIAL LOCAL ROADWAY		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.09
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	Drawn:		

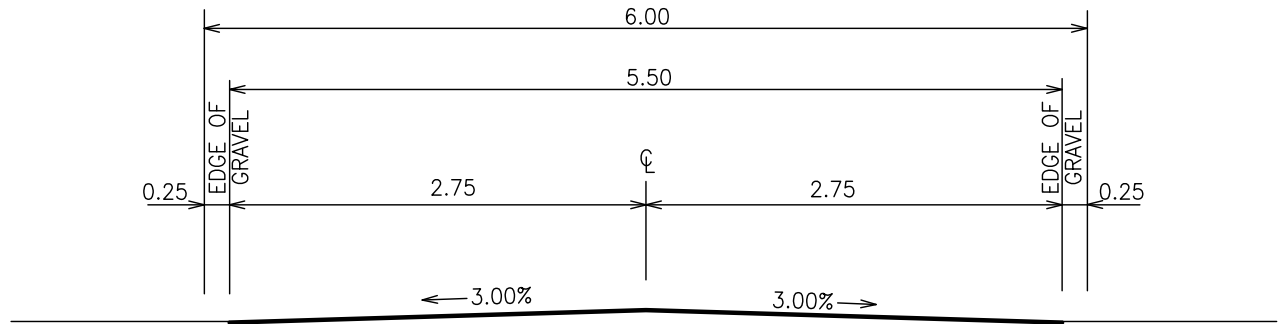


URBAN
SERVICE ROAD

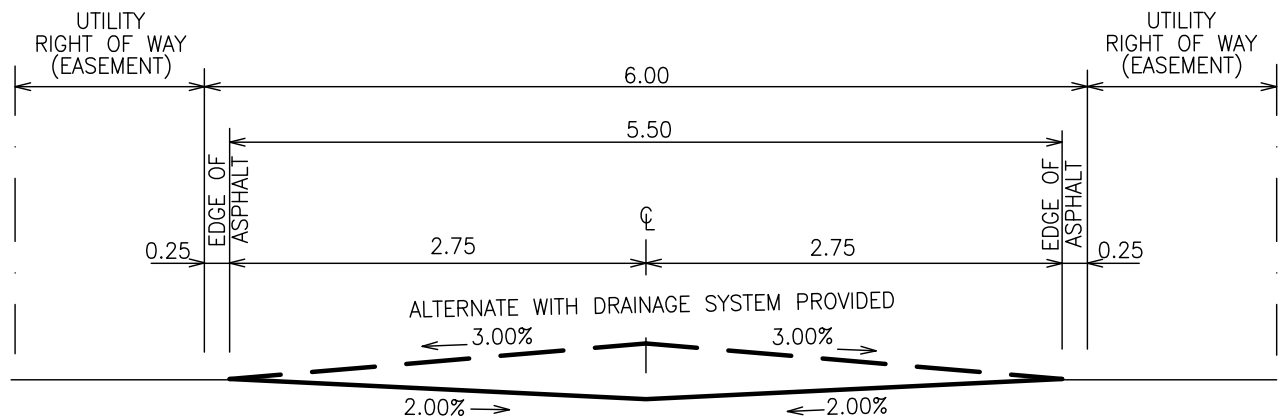


RURAL
SERVICE ROAD

REVISIONS				TOWN OF BLACKFALDS RURAL & URBAN SERVICE ROAD ADJACENT TO ARTERIAL ROADWAY		
Date	Details	Drawn				
	-	-		<div>Approved PGW (TOWN OF BLACKFALDS)</div> <div>DWG. NO.</div> <div>5.10</div>		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
			<div>Date: 11.02.05</div> <div>Scale: NTS</div> <div>Drawn:</div>			




GRAVEL LANE

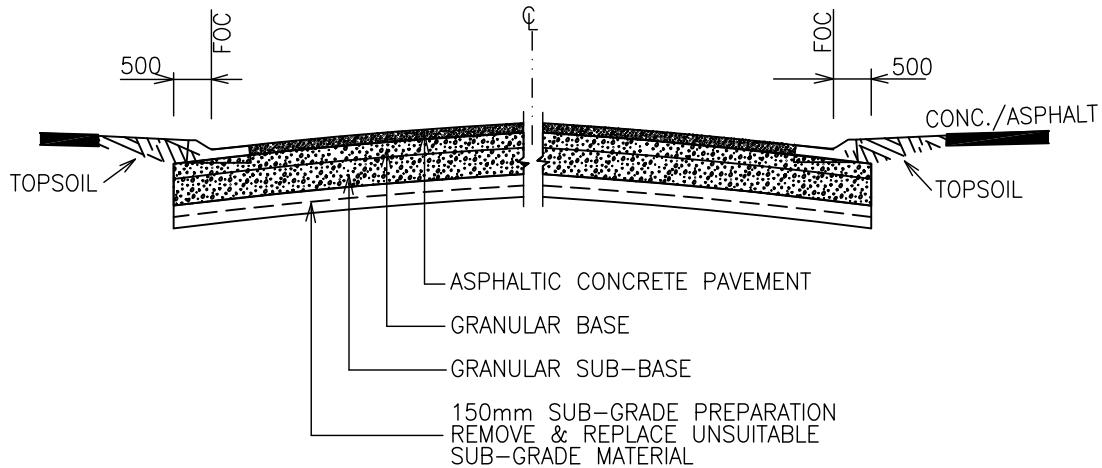


PAVED LANE

NOTE :

- LANE TO BE PAVED ADJACENT TO MULTI-FAMILY AND COMMERCIAL DEVELOPMENTS WHERE LANE ACCESS IS PROVIDED.


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	GRAVEL AND PAVED LANES		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.11
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

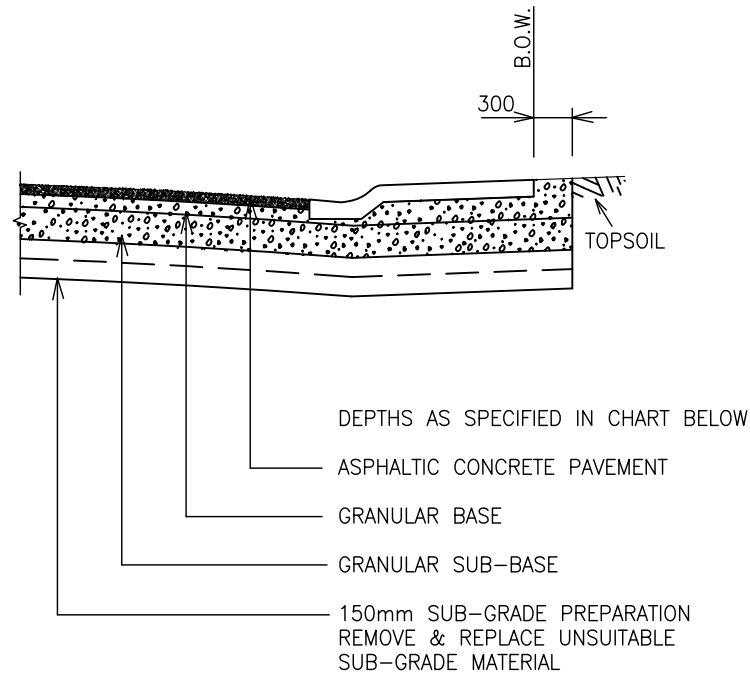


UNDIVIDED ARTERIAL ROADWAY

MINIMUM* DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
ARTERIAL	125	200	350	675

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS



REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	ARTERIAL ROADWAY PAVEMENT STRUCTURE CROSS SECTION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.12
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

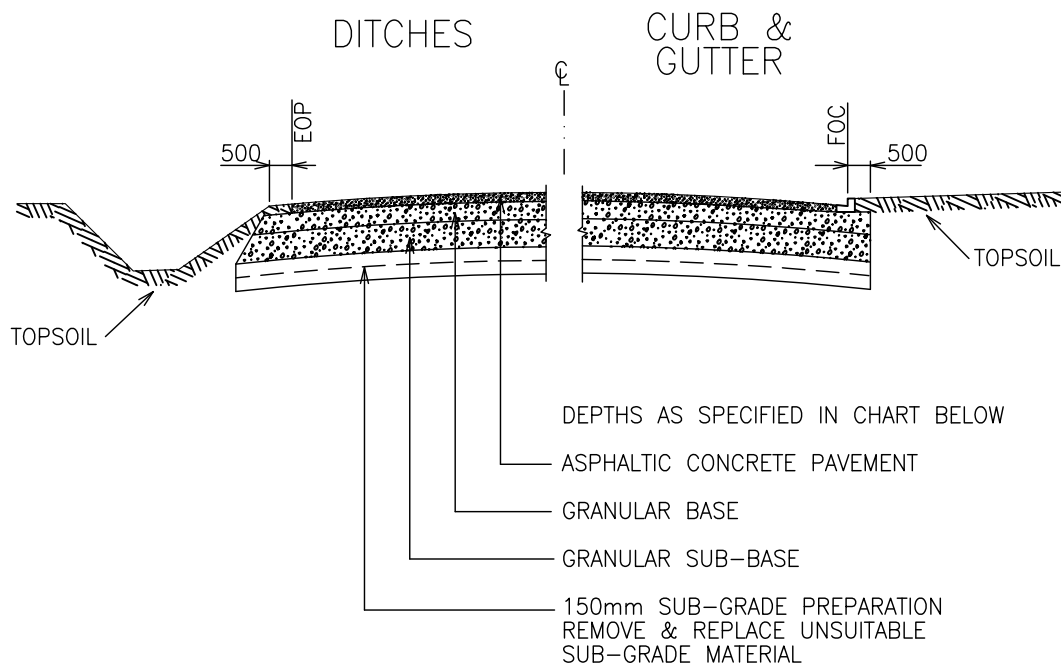


STANDARD RESIDENTIAL LOCAL & COLLECTOR ROADWAY

MINIMUM* DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
RESIDENTIAL LOCAL	75	100	250	425
RESIDENTIAL COLLECTOR	100	150	300	550

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS


REVISIONS			 TOWN OF BLACKFALDS RESIDENTIAL ROADWAY PAVEMENT STRUCTURE CROSS SECTION		
Date	Details	Drawn			
	-	-			
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.13
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

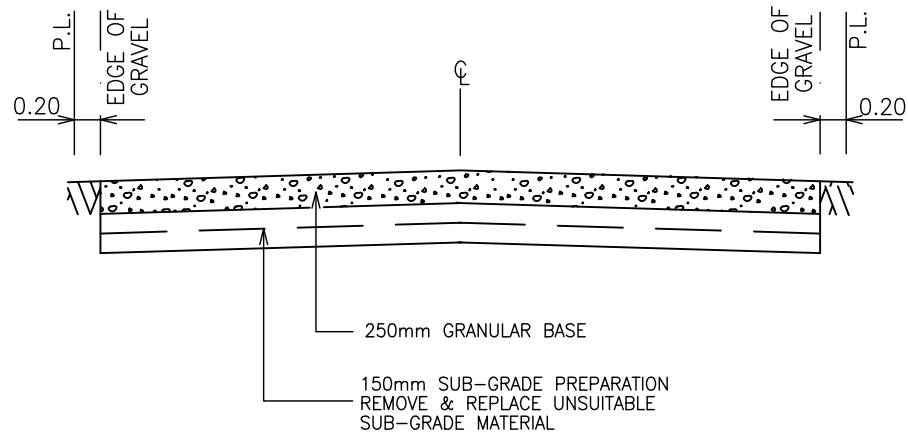


INDUSTRIAL LOCAL / COLLECTOR ROADWAY

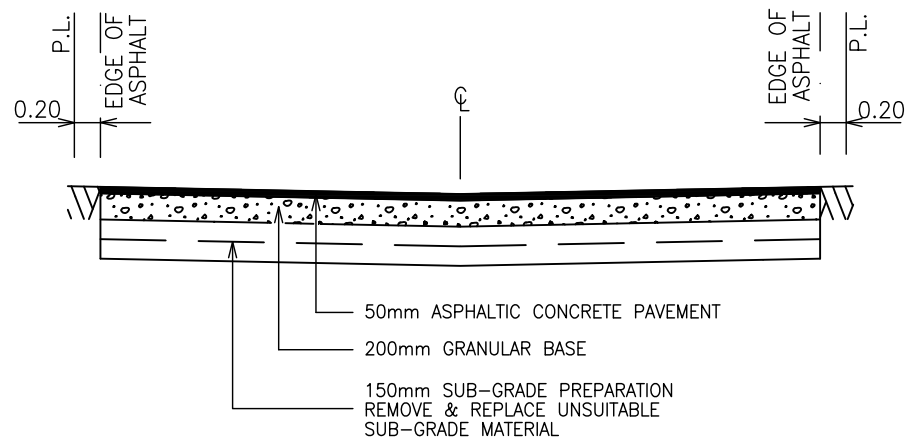
MINIMUM* DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
INDUSTRIAL LOCAL	90	150	300	540
INDUSTRIAL COLLECTOR	100	200	300	600

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS

REVISIONS				TOWN OF BLACKFALDS INDUSTRIAL ROADWAY PAVEMENT STRUCTURE CROSS SECTION		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
						5.14




GRAVEL LANE

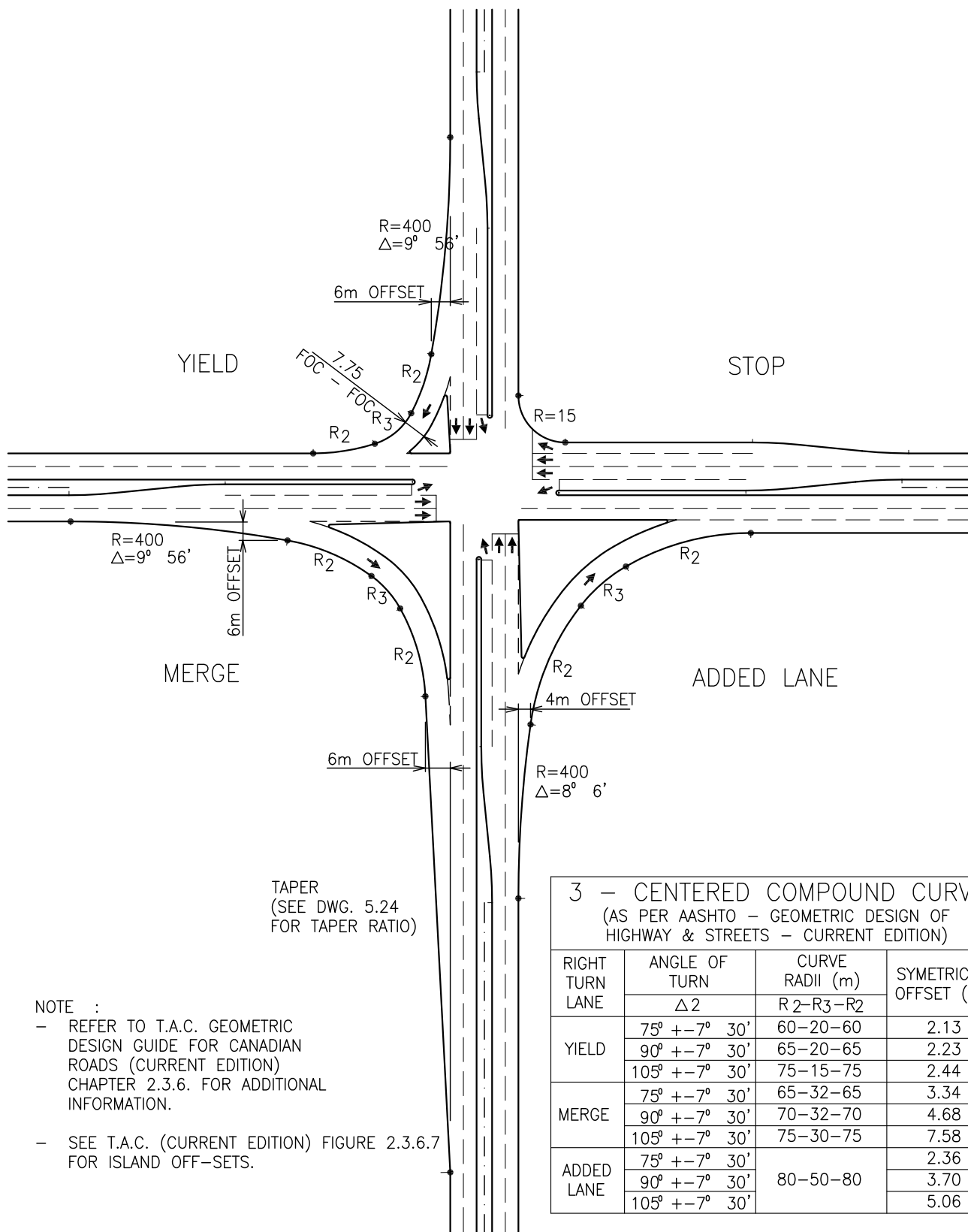


PAVED LANE

MINIMUM* 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

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	GRAVEL / PAVED LANE PAVEMENT STRUCTURE CROSS SECTION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.15
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		



REVISIONS

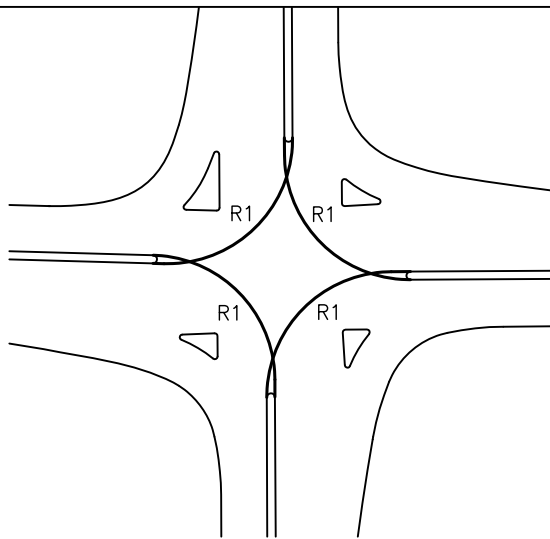
Date	Details	Drawn
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-	-	-
-	-	-
-	-	-
-	-	-



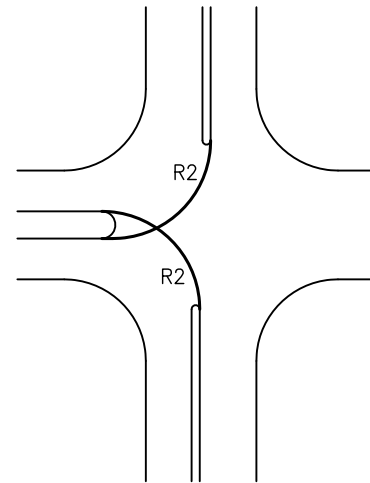
TOWN OF BLACKFALDS

ARTERIAL ROADWAY RIGHT TURN DESIGNS

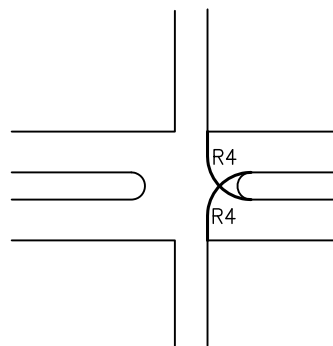
Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		5.16
Date: 11.02.05	Scale: NTS Drawn:	



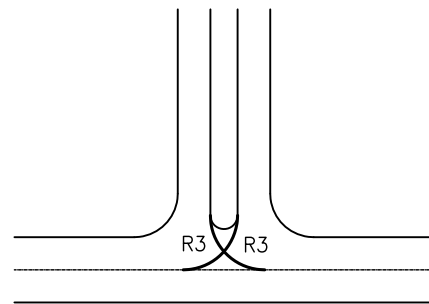
ARTERIAL TO ARTERIAL



ARTERIAL TO COLLECTOR



DIVIDED COLLECTOR OR LOCAL
TO LANE OR DRIVEWAY





COLLECTOR OR LOCAL
TO COLLECTOR OR LOCAL

TURNING RADII

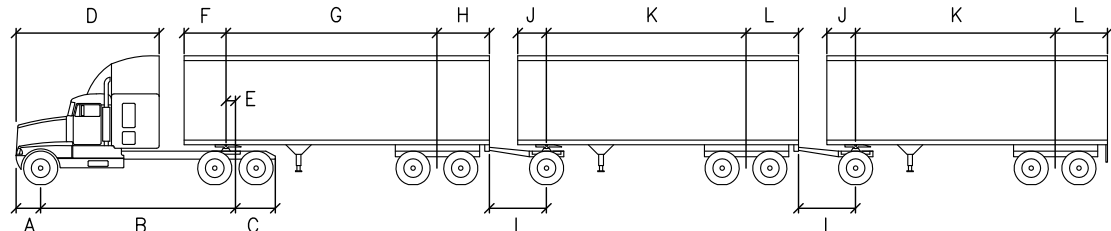
ARTERIAL TO ARTERIAL	R1	22m
ARTERIAL TO COLLECTOR	R2	18m
COLLECTOR TO COLLECTOR	R3	15m
COLLECTOR TO LOCAL	R3	12m
LOCAL TO LOCAL	R3	10m
COLLECTOR / LOCAL TO LANE	R4	8m

REVISIONS

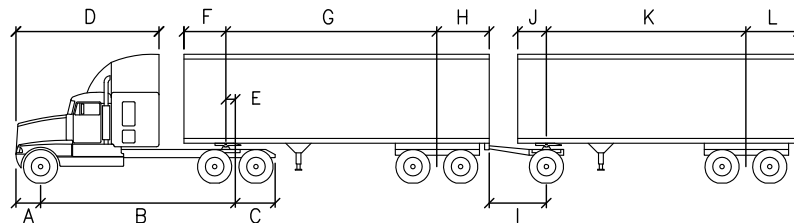
Date	Details	Drawn	 TOWN OF BLACKFALDS INTERSECTION CENTERLINE CONTROL RADII			
	-	-				
-	-	-				
-	-	-				
-	-	-	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
-	-	-	Checked			5.17
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:	

A side-view diagram of a truck with various dimensions labeled with letters. The truck consists of a cab and a trailer. Dimension A is the wheelbase from the front axle to the first rear axle. Dimension B is the wheelbase from the first rear axle to the second rear axle. Dimension C is the height from the ground to the top of the trailer body. Dimension D is the length of the cab. Dimension E is the height from the ground to the top of the cab. Dimension F is the height from the ground to the top of the trailer body. Dimension G is the length of the trailer. Dimension H is the height from the ground to the top of the trailer body.

WB-29



WB-35



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 Trailor Front	1.3	1.3	1.3	1.3	1.3
G Pin to Trailor Axle	9.1	11.5	14.3	6.3	12.2
H Trailor 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 Trailor Front	N/A	N/A	N/A	0.9	1.2
K Pin to Trailor Axle	N/A	N/A	N/A	6.6	12.2
L Trailor Rear	N/A	N/A	N/A	1.0	1.2

SEE DWG. 5.19 FOR VEHICLE TURNING RADII.

REVISIONS

Date	Details	Drawn
	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

W.B. DESIGN
VECHILES

Approved	PGW (TOWN OF BLACKFALDS)
----------	--------------------------

DWG. NO.

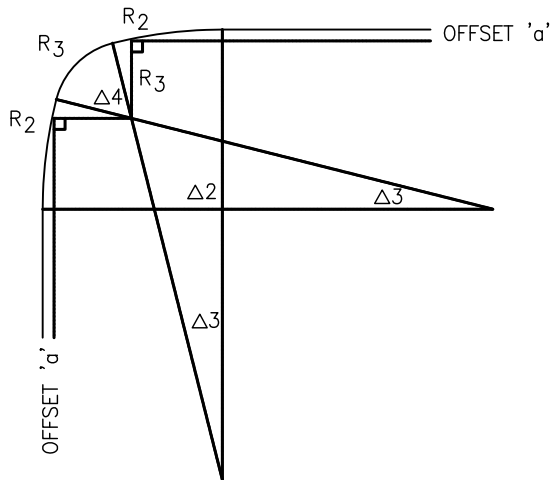
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Date: 11.02.05

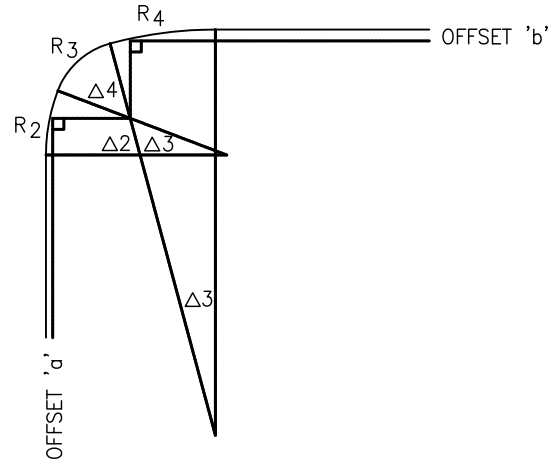
Scale: NTS

Drawn:

5.18




3 – CENTRED SYMETRICAL
COMPOUND CURVE

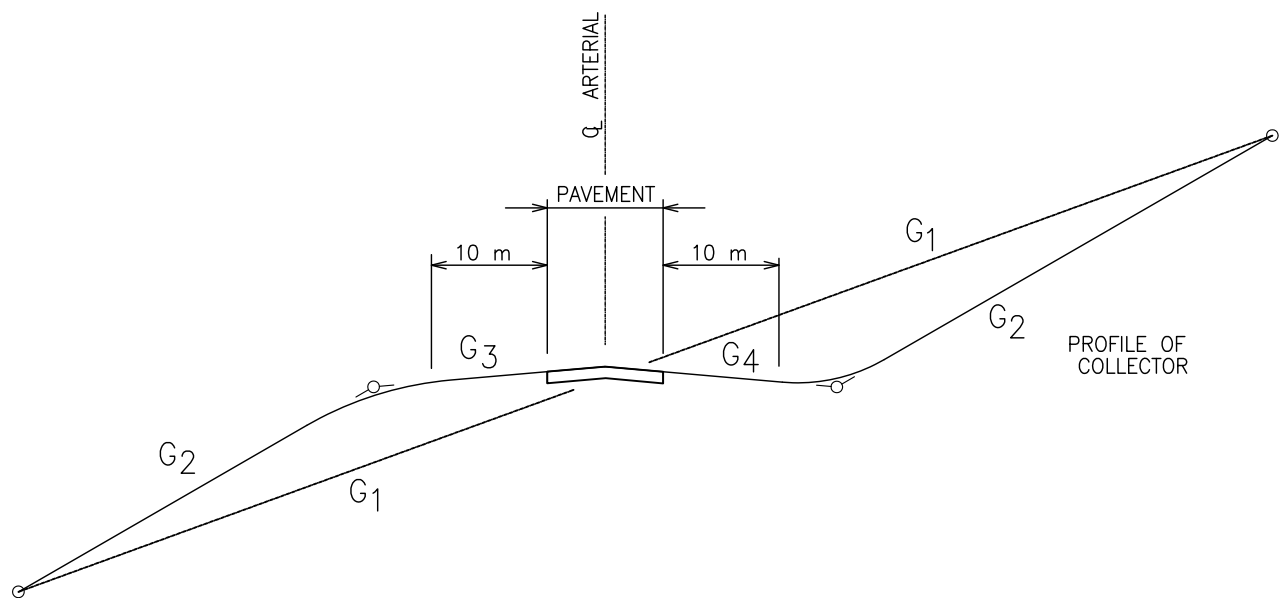


3 – CENTRED ASYMETRICAL
COMPOUND CURVE

NOTE :
Δ3 AND Δ4 TO BE CALCULATED USING
R₂ R₃ 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 ₄	a	b		
WB-15	75°+ – 7° 30'	46	15	46	1.83	46	15	69	0.61	3.05		
	90°+ – 7° 30'	55	18	55	1.83	37	12	61	0.61	3.05		
	105°+ – 7° 30'	55	14	55	2.44	46	12	64	0.61	3.05		
WB-17	75°+ – 7° 30'	61	21	61	2.13	37	18	61	0.61	3.05		
	90°+ – 7° 30'	61	20	61	2.13	30	17	79	0.61	3.05		
	105°+ – 7° 30'	73	15	73	2.44	30	14	152	1.22	3.05		
WB-20	75°+ – 7° 30'	134	23	134	4.57	43	30	165	1.52	3.66		
	90°+ – 7° 30'	122	21	122	3.05	49	21	110	1.83	3.05		
	105°+ – 7° 30'	158	15	158	4.57	110	23	183	1.22	3.20		
WB-29	75°+ – 7° 30'	76	24	76	1.40	30	24	91	0.50	1.50		
	90°+ – 7° 30'	76	21	76	1.40	61	21	91	0.30	1.50		
	105°+ – 7° 30'	76	18	76	1.50	30	18	91	0.50	1.80		
WB-35	75°+ – 7° 30'	213	38	213	2.00	46	34	168	0.50	3.50		
	90°+ – 7° 30'	213	34	213	2.00	46	29	168	0.60	3.50		
	105°+ – 7° 30'	213	29	213	2.40	46	24	152	0.90	4.60		

REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		W.B. VEHICLE COMPUND CURVE TURN DESIGN		
–	–	–				
–	–	–	Approved	PGW (TOWN OF BLACKFALDS)		DWG. NO.
–	–	–	Checked			5.19
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	




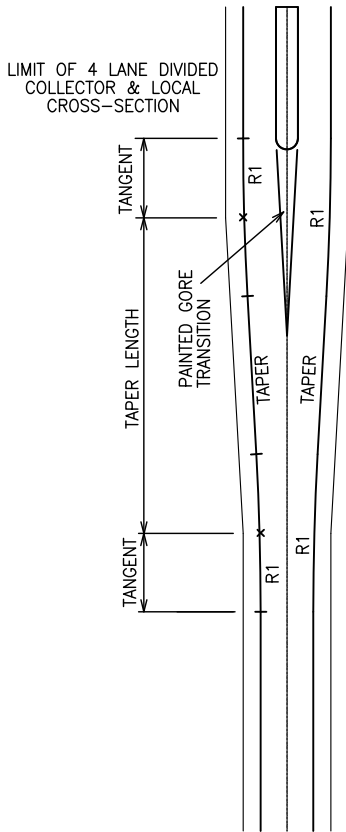
NOTE :

G₁ ORIGINAL GRADE OF MINOR ROAD

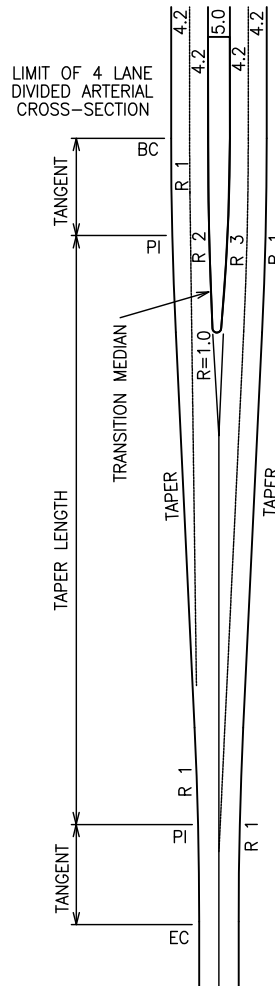
G₂ GRADE INTRODUCED TO ADJUST GRADE AT INTERSECTION

G₃ & G₄ GRADE ON COLLECTOR CONFORMS TO CROSS SLOPE ON ARTERIAL ROADWAY (EG. 0.5% TO 5.0%, NORMAL CROWN TO SUPERELEVATION).

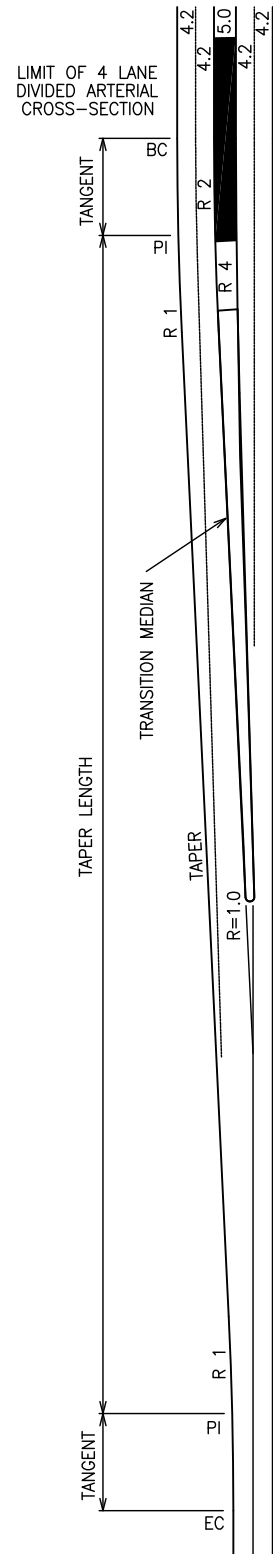
REVISIONS				TOWN OF BLACKFALDS INTERSECTION GRADE ADJUSTMENT		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
				5.20		



LOCAL / COLLECTOR CENTRELINE TRANSITION



ARTERIAL CENTRELINE TRANSITION



ARTERIAL OFFSET TRANSITION

OVERALL APPROACH OR DEPARTURE TAPER LENGTHS						
ROADWAY	DESIGN SPEED KM/H	TAPER RATIO	TRANSITION RADII (m)			
			R 1	R 2	R 3	R 4
LOCAL	50	15:1	500	---	---	---
COLLECTOR	60	18:1	700	---	---	---
ARTERIAL	70	21:1	930	921.6	475	2000
ARTERIAL	80	24:1	1200	1191.6	475	2000

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

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

DIVIDED TO UNDIVIDED
ROADWAY TRANSITION

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

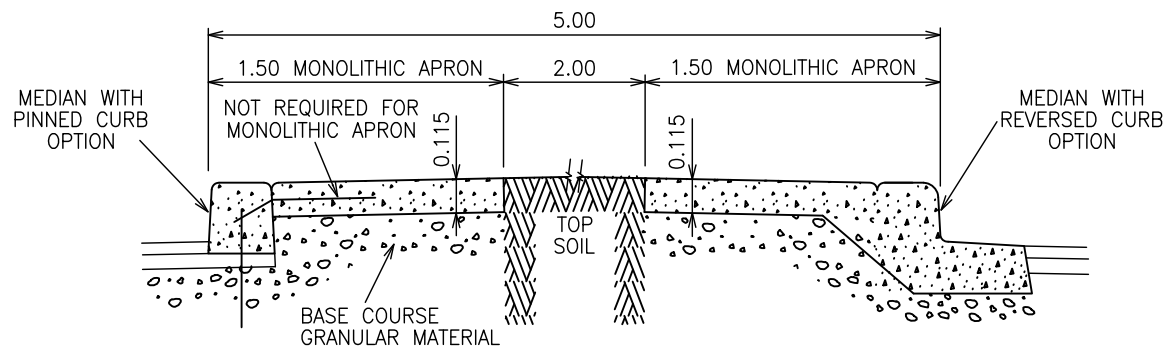
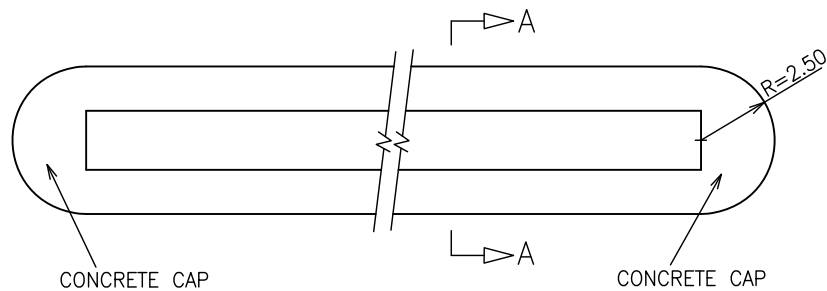
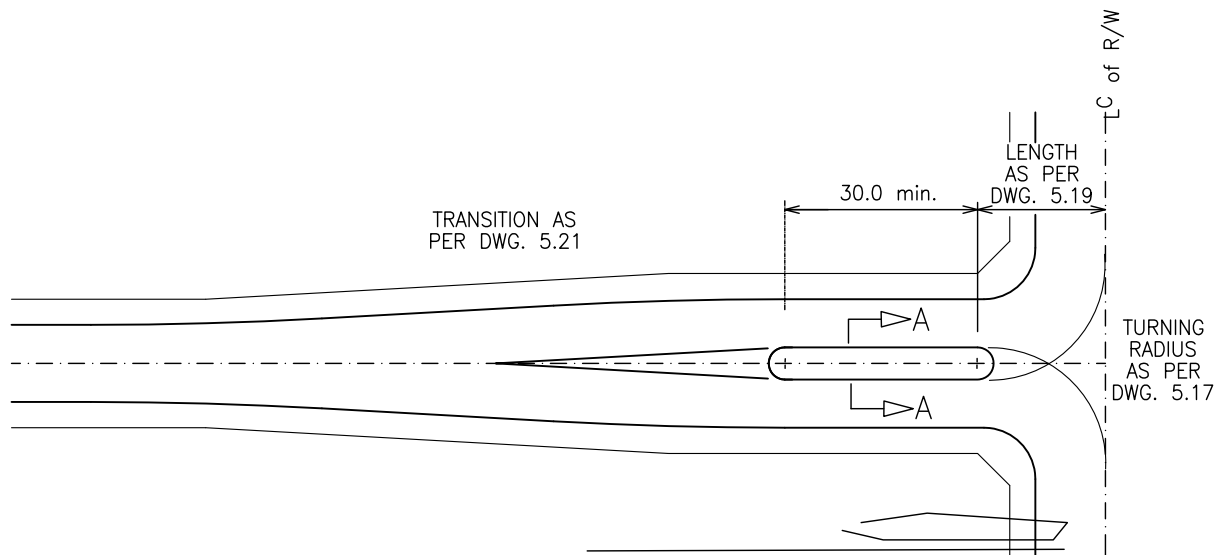
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Date: 11.02.05

Scale: NTS



Drawn:

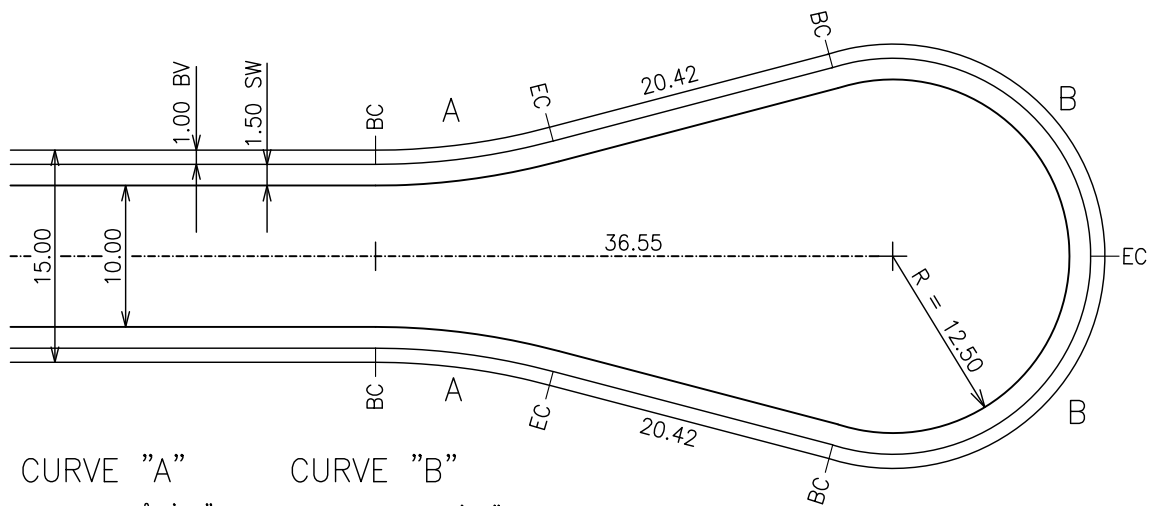
5.21



NOTE :
PATTERNED CONCRETE OR PAVING STONES MUST BE APPROVED BY THE TOWN

SECTION 'A - A'
(AS PER C.R.D. CONTRACT SPECIFICATIONS)

REVISIONS			 TOWN OF BLACKFALDS COLECTOR & LOCAL ROADWAY CENTRE ISLAND		
Date	Details	Drawn			
	-	-			
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		
-	-	-	Checked		
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:
DWG. NO. 5.22					

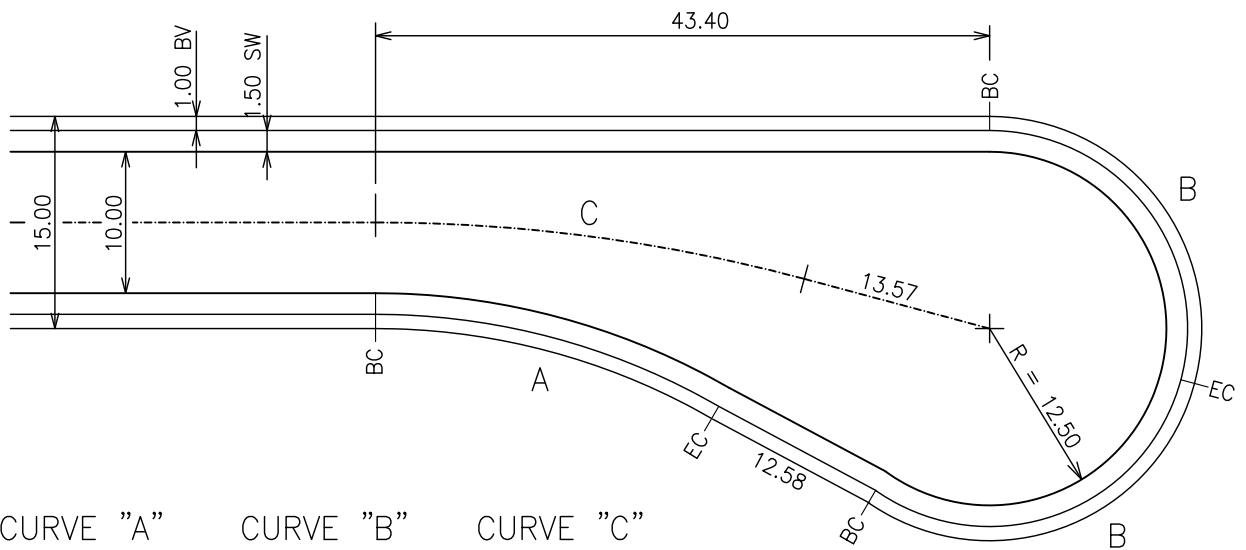


CURVE "A"

$\Delta = 15^\circ 0'00''$
 $R = 50.00$
 $ARC = 13.09$
 $TAN = 6.58$
 (at property line)

CURVE "B"

$\Delta = 105^\circ 0'00''$
 $R = 15.00$
 $ARC = 27.49$
 $TAN = 19.55$
 (at property line)



CURVE "A"

$\Delta = 30^\circ 0'00''$
 $R = 50.00$
 $ARC = 26.18$
 $TAN = 13.40$
 (at property line)

CURVE "B"

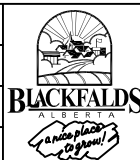
$\Delta = 105^\circ 0'00''$
 $R = 15.00$
 $ARC = 27.49$
 $TAN = 19.55$
 (at property line)

CURVE "C"

$\Delta = 15^\circ 0'00''$
 $R = 117.03$
 $ARC = 30.64$
 $TAN = 15.41$

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

15 / 10 LOCAL RESIDENTIAL
CUL - DE - SAC

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

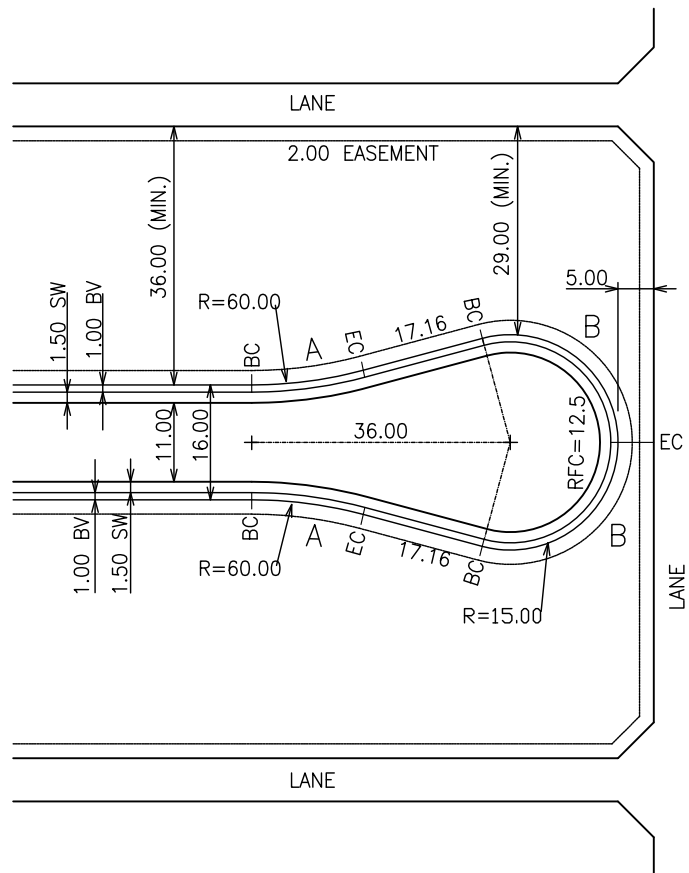
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Date: 11.02.05

Scale: NTS

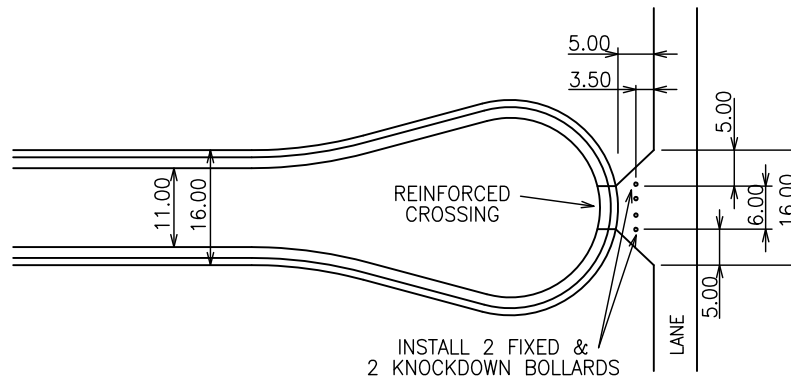
Drawn:

5.23




CURVE "A"
 $\Delta = 15^\circ 0'00''$
 $R = 50.00$
 $ARC = 13.09$
 $TAN = 6.58$

CURVE "B"
 $\Delta = 105^\circ 0'00''$
 $R = 15.00$
 $ARC = 27.49$
 $TAN = 19.55$

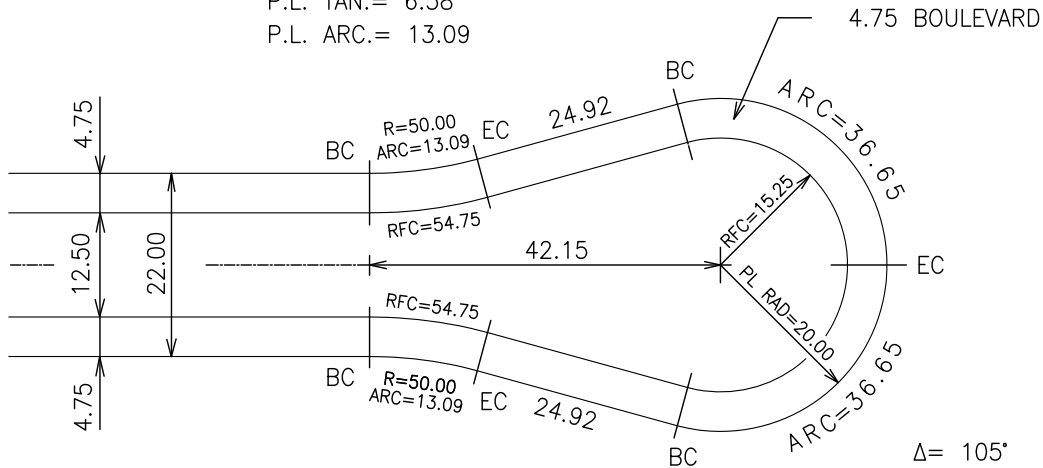


LANE ACCESS

NOTE:
 THIS DESIGN IS TO BE USED FOR DUPLEX,
 R1S AND ROW HOUSING DEVELOPMENTS.

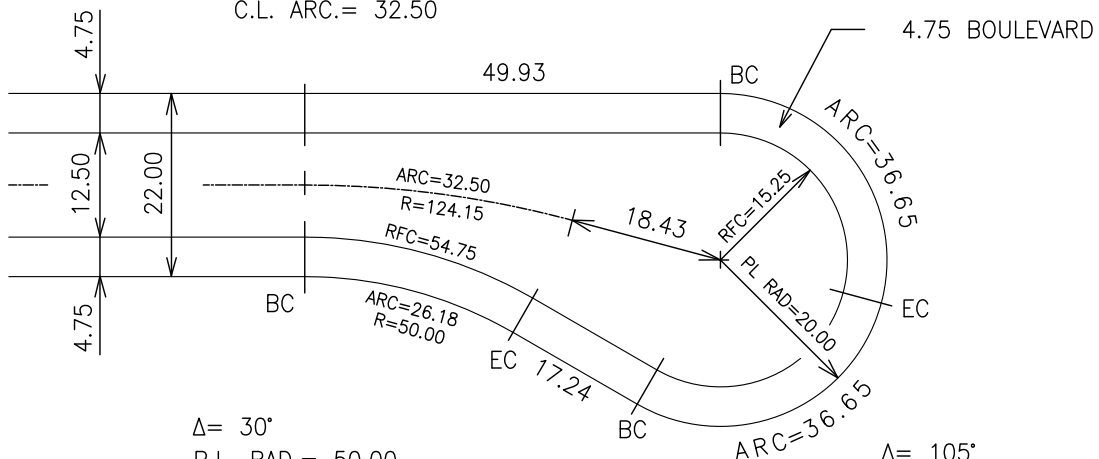
REVISIONS				TOWN OF BLACKFALDS 16 / 11 LOCAL RESIDENTIAL (MULTI-FAMILY) CUL - DE - SAC		
Date	Details	Drawn				
-	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
			DWG. NO.			5.24

$\Delta = 15^\circ$
 P.L. RAD. = 50.00
 P.L. TAN. = 6.58
 P.L. ARC. = 13.09



$\Delta = 105^\circ$
 P.L. RAD. = 20.00
 P.L. TAN. = 26.07
 P.L. ARC. = 36.65

$\Delta = 15^\circ$
 C.L. RAD. = 124.15
 C.L. TAN. = 16.35
 C.L. ARC. = 32.50

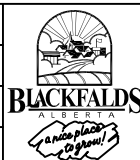


$\Delta = 30^\circ$
 P.L. RAD. = 50.00
 P.L. TAN. = 13.40
 P.L. ARC. = 26.18

$\Delta = 105^\circ$
 P.L. RAD. = 20.00
 P.L. TAN. = 26.07
 P.L. ARC. = 36.65

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

22 / 15 LOCAL INDUSTRIAL
CUL - DE - SAC

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

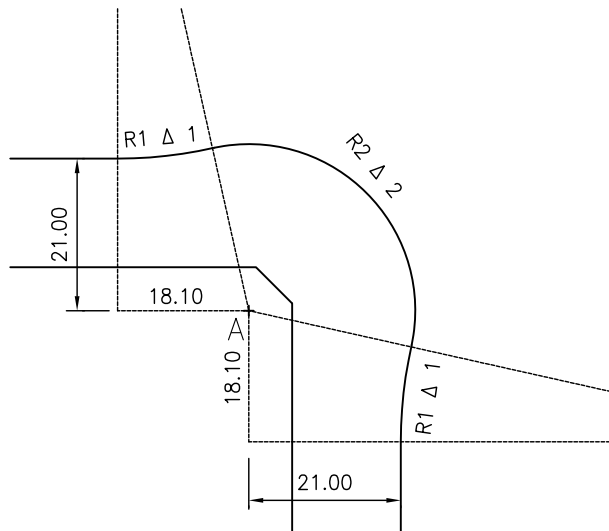
Checked

Date: 11.02.05

Scale: NTS

Drawn:

5.25

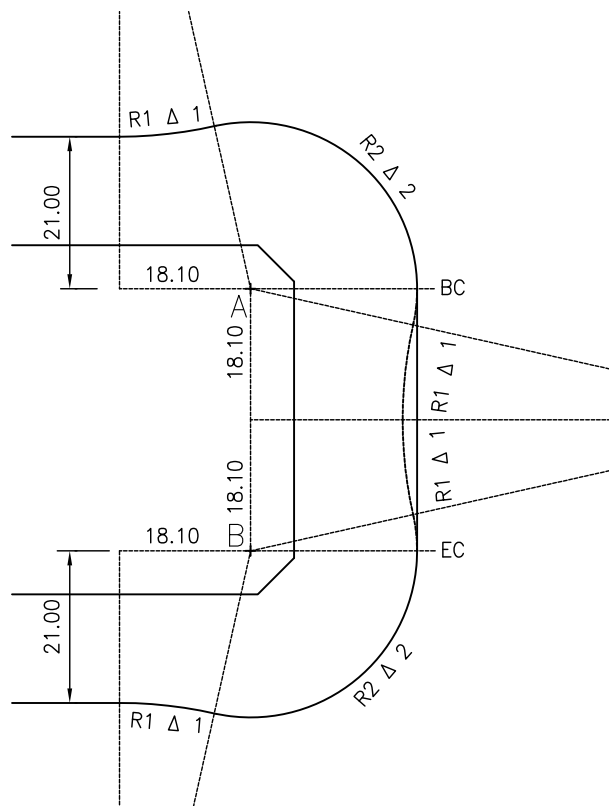


CURVE DATA

R1 = 60.00m
 $\Delta 1 = 12^{\circ} 36' 12''$
 ARC = 13.20

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

ROAD RIGHT OF WAY WIDTH
 VARIES




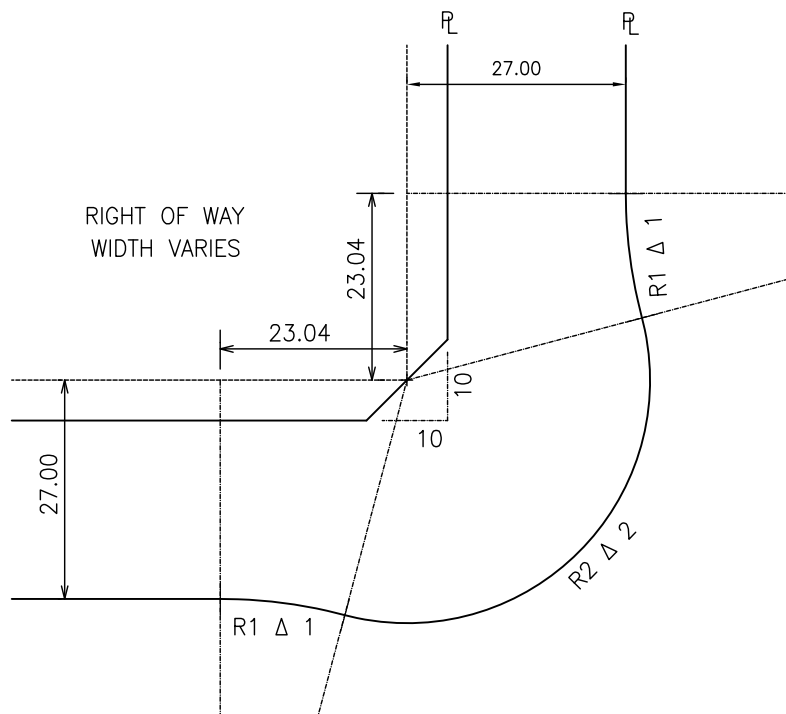
NOTE:

IF THE DISTANCE BETWEEN
 A & B IS LESS THAN 36.20m,
 REPLACE THE 60.00m RADIUS
 CURVES WITH A TANGENT FROM
 B.C. TO E.C.

ROAD RIGHT OF WAY WIDTH
 VARIES

REVISIONS

Date	Details	Drawn	 TOWN OF BLACKFALDS			
	-	-				
-	-	-	LOCAL RESIDENTIAL EXPANDED BULB CORNER			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
-	-	-	Checked			5.26
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:	




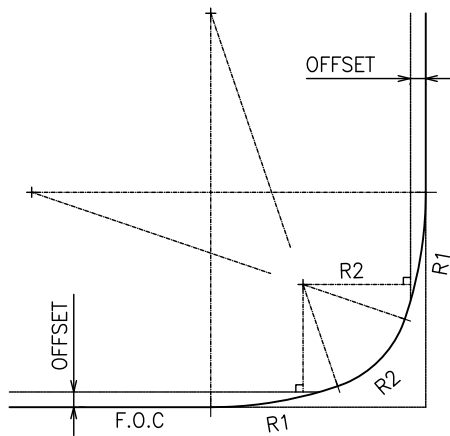
CURVE DATA

R1= 60.00m Δ 1= 14° 50' 05"

R2= 30.00m Δ 2= VARIES

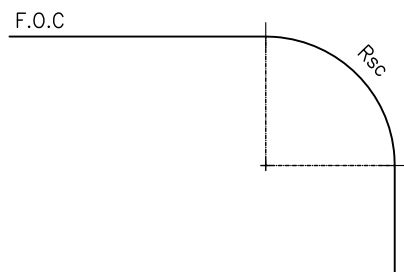
EXPANDED CORNER FOR INDUSTRIAL LOCAL

REVISIONS				TOWN OF BLACKFALDS INDUSTRIAL ROADWAY EXPANDED BULB CORNER		
Date	Details	Drawn				
	-	-		<div> <div>Approved</div> <div>PGW (TOWN OF BLACKFALDS)</div> <div>DWG. NO.</div> </div>		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
			<div> <div>Checked</div> <div>Date: 11.02.05</div> </div>	<div> <div>Scale: NTS</div> <div>Drawn:</div> </div>	<div>5.27</div>	




ANGLE OF TURN Δ	CURVE RADII R1 - R2 - R1	SYMETRICAL OFFSET FOR R2
FOR 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 - 60	2.44
FOR COLLECTOR TO LOCAL & LOCAL TO LOCAL (SU-9)		
75° ± 7' 30'	40 - 15 - 40	0.65
90° ± 7' 30'	40 - 12 - 40	0.65
105° ± 7' 30'	30 - 11 - 30	0.92

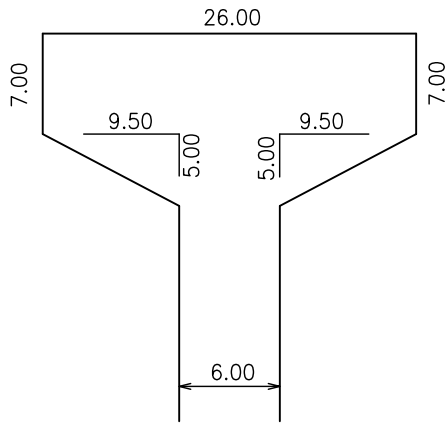
THREE CENTRED COMPOUND CURVE



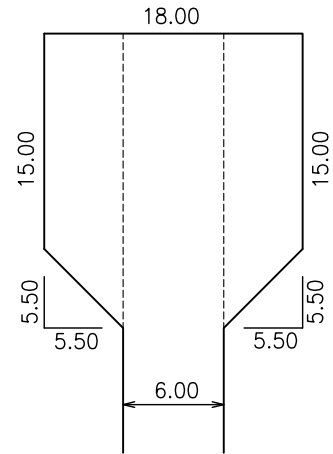
FOR COLLECTOR TO COLLECTOR	18.00
FOR COLLECTOR TO LOCAL	15.00
FOR LOCAL TO LOCAL	13.00

SIMPLE CURVE RADIUS (Rsc.)

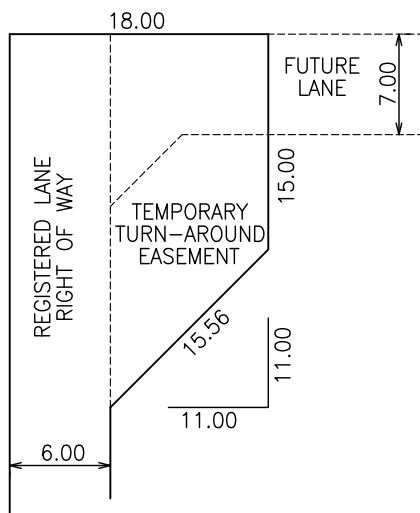
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	INDUSTRIAL ROADWAY CURB RETURN RADII		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.28
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:



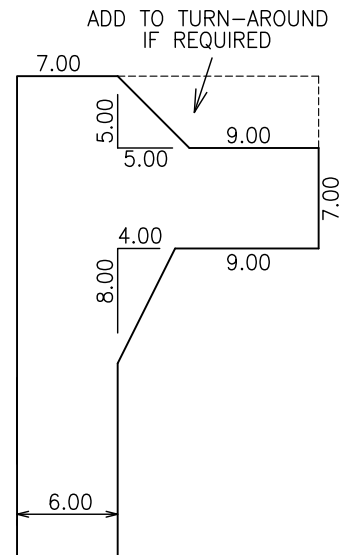
” T ” TYPE




STANDARD TYPE

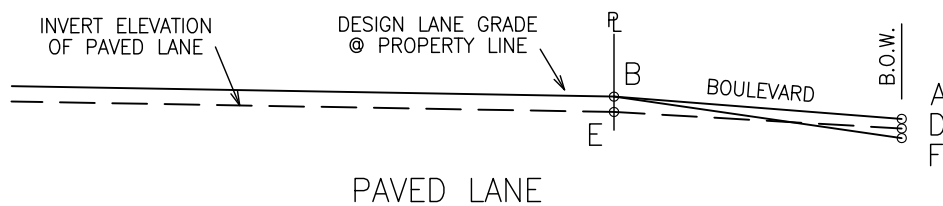
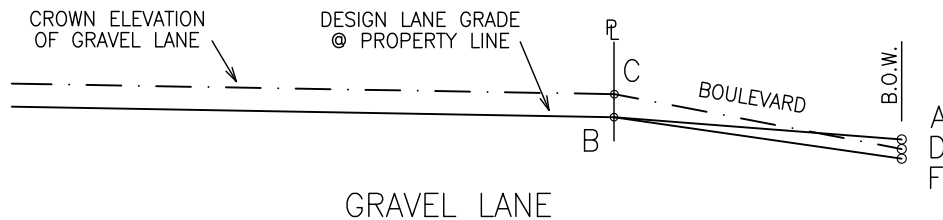
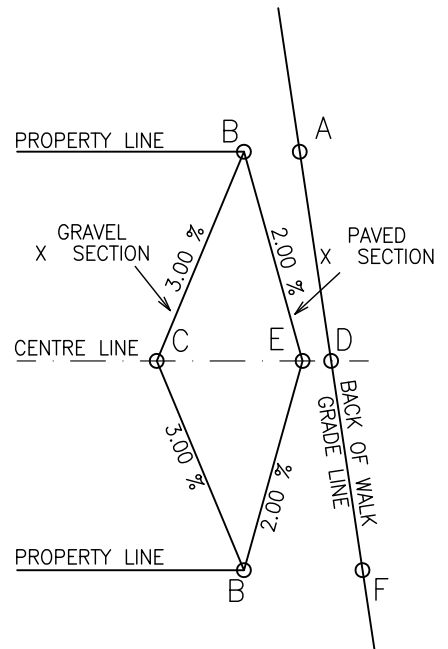
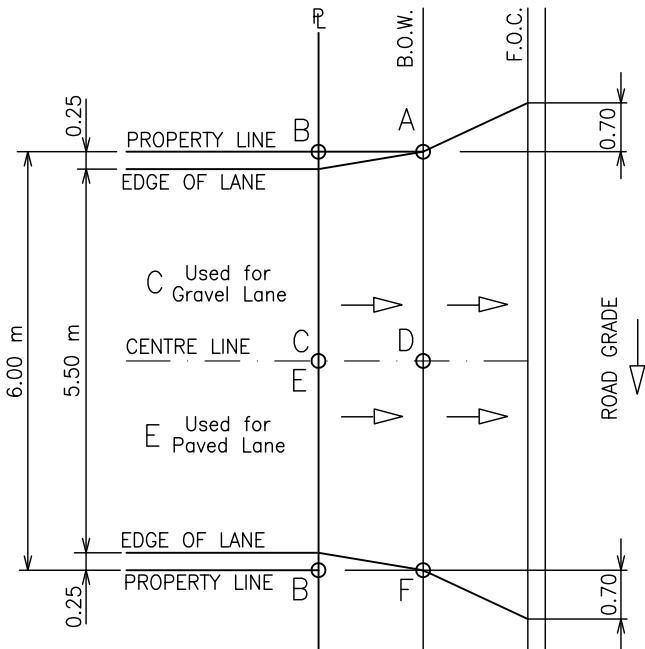


OFFSET TYPE




BRANCH TYPE

REVISIONS			 TOWN OF BLACKFALDS			
Date	Details	Drawn				
	-	-	LANE TURN - AROUNDS			
-	-	-				
-	-	-	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
-	-	-	Checked			5.29
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:	

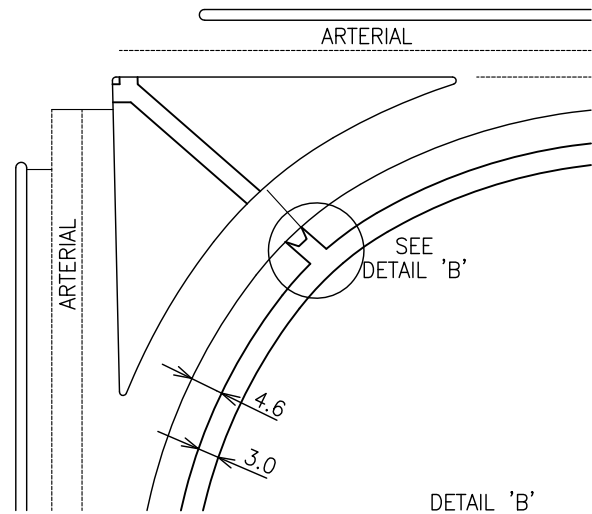
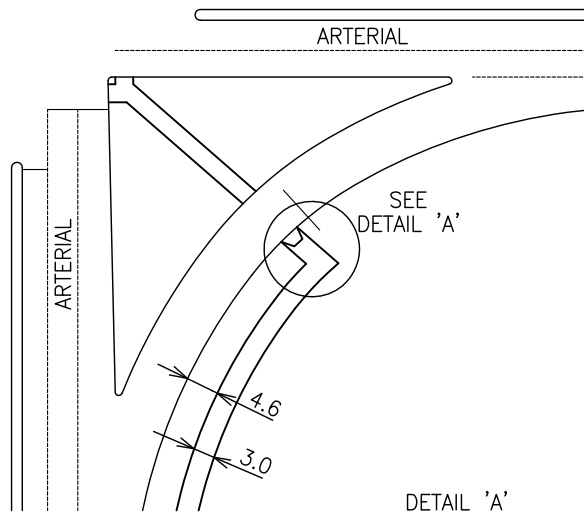


NOTE :

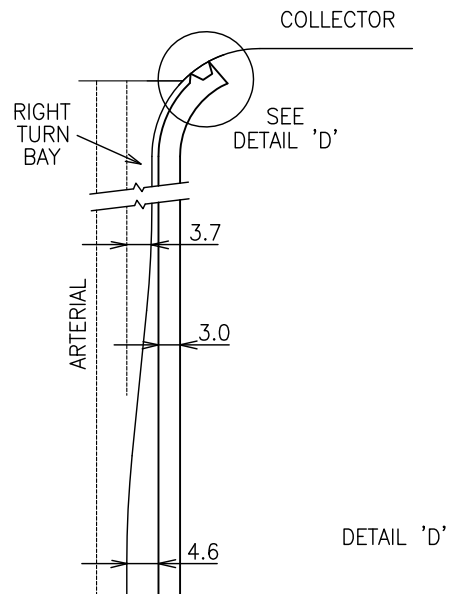
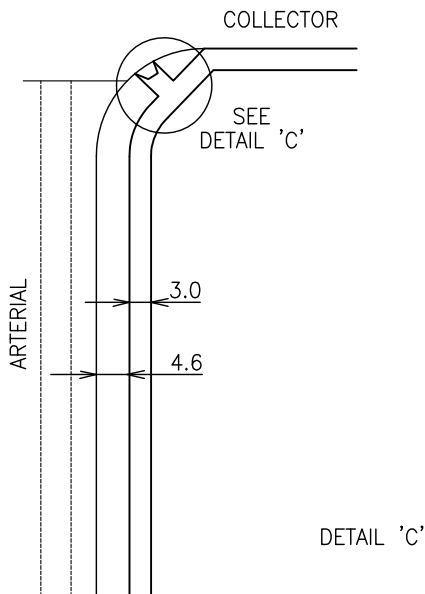
IF LANE ELEVATION (E) IS LOWER THAN BACK OF WALK ELEVATION (D), A DEPRESSED CROSSING AS PER C.R.D. CONTRACT SPECIFICATIONS MAY BE REQUIRED FOR DRAINAGE.

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	LANE GRADE CALCULATIONS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.30
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	Drawn:		


W:\AUTOCAD DWGS\DRAWINGS\2011_design_guideline_dwg\5.31.dwg

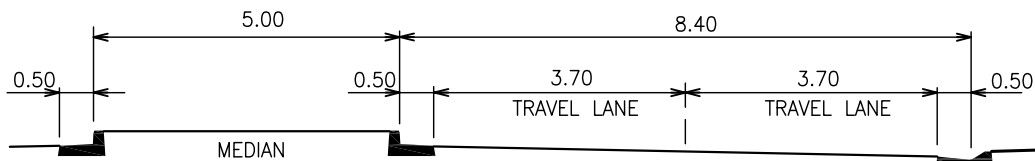
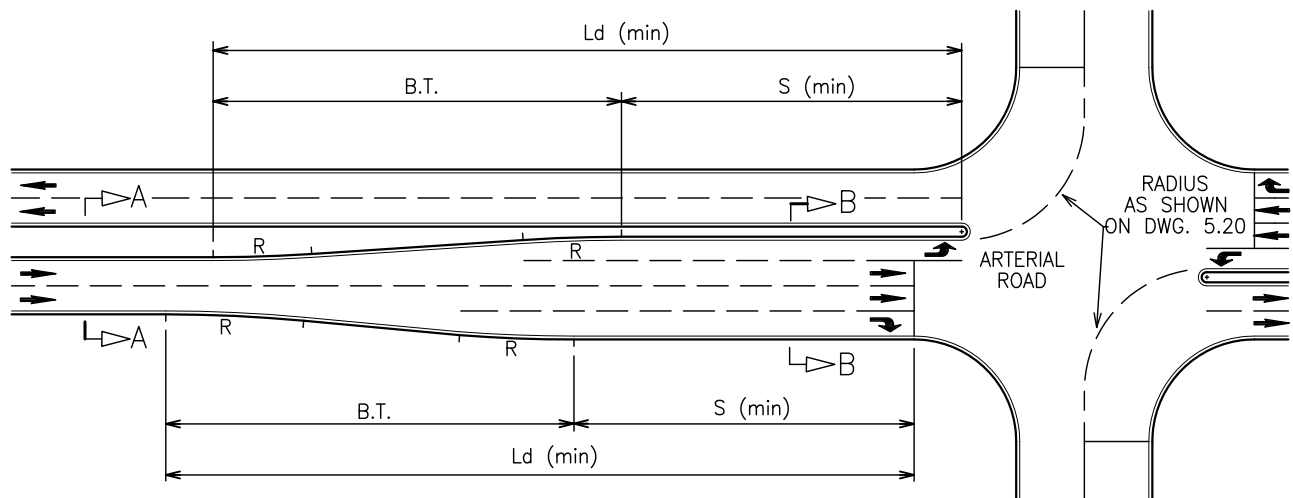


ARTERIAL TO ARTERIAL

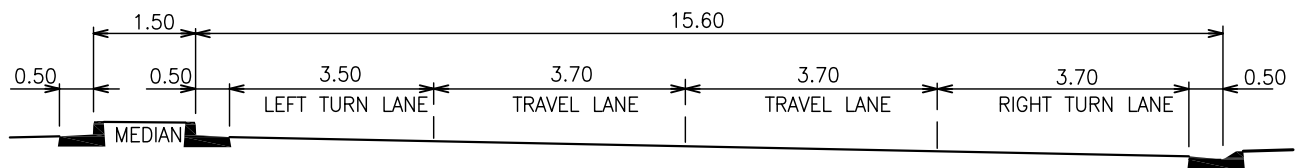


ARTERIAL TO COLLECTOR

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	SIDEWALK ALIGNMENT AND PEDESTRIAN BARRIER LOCATION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.32
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:



SECTION 'A - A'




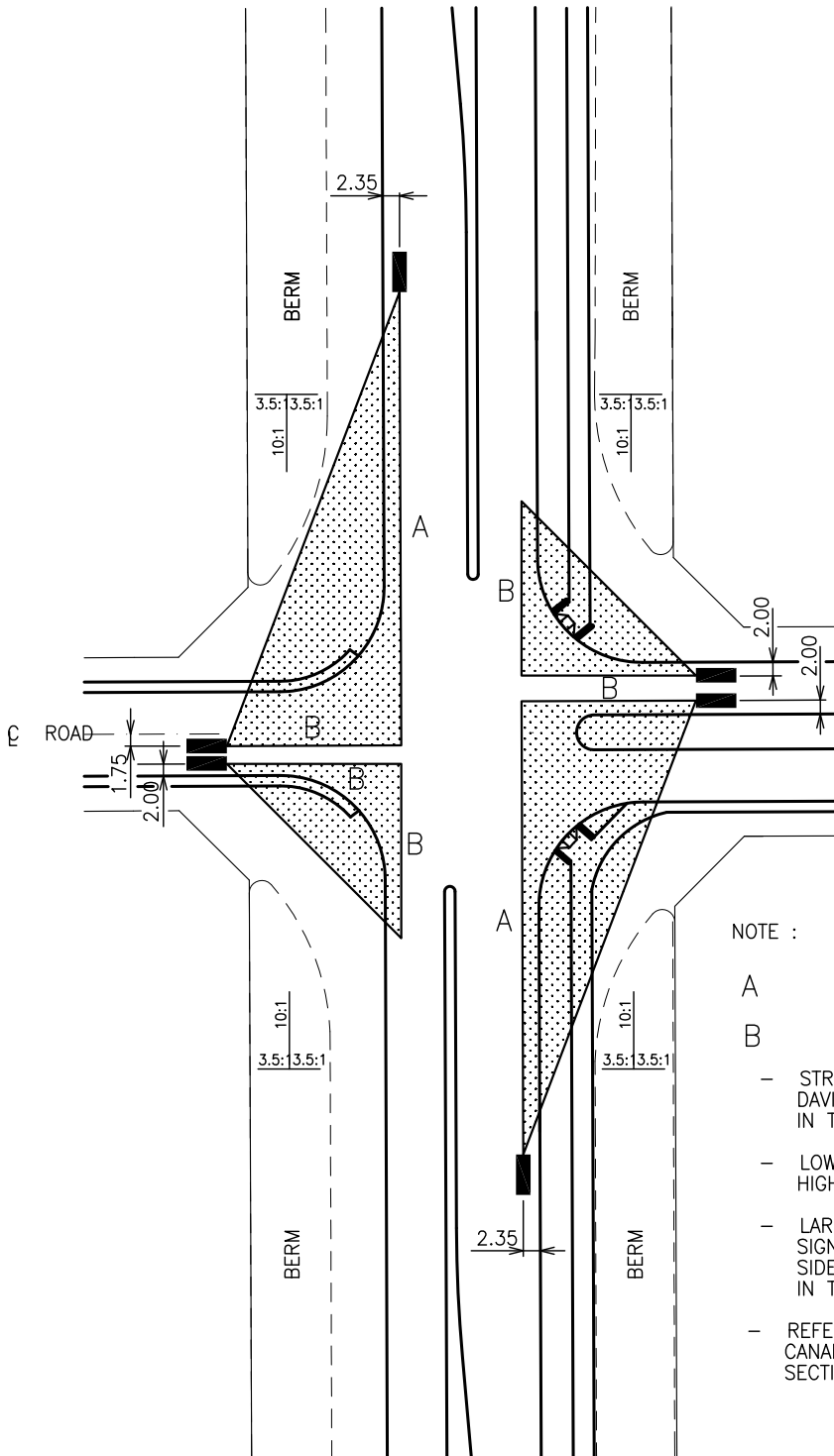
SECTION 'B - B'

DESIGN SPEED km/h	APPROACH DIMENSIONS (m)			
	Ld (min)	B.T.	R (F.O.C.)	S (min)
60	90	50	150	40
70	110	60	220	50
80	130	70	280	60

NOTES :

- DESIGN TO BE BASED ON BAY TAPER - SYMETRICAL REVERSE CURVES.
- SEE TAC (1999 EDITION) - FIGURES 2.3.8.4 AND 2.3.8.8.
- STORAGE LENGTH(S) SHOULD BE DETERMINED BASED ON TRAFFIC VOLUMES, SIGNALIZATION, ETC. TO PROVIDE THE FULL STORAGE LENGTHS REQUIRED.

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	LEFT & RIGHT TURN LANE DESIGN		
-	-	-			
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		5.33
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-		Drawn:	



NOTE :

A (FOR 70 KM/HR) = 60 METERS
(FOR 80 KM/HR) = 65 METERS

B = 25 METERS

- STREETLIGHT POLES, POWER POLES, TRAFFIC DAVITS & TRAFFIC SIGNS WILL BE PERMITTED IN THE VISIBILITY TRIANGLE.
- LOW GROWING SHRUBS LESS THAN 1.00 METER HIGH WILL BE PERMITTED
- LARGE TREES (DECIDUOUS & CONIFEROUS), SIGNS, TRAFFIC CONTROL CABINETS, BERM SIDESLOPES, ETC. WILL NOT BE PERMITTED IN THE VISIBILITY TRIANGLE.
- REFERENCE : GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (1999 EDITION)
SECTION 2.3.3 : SIGHT DISTANCE.

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

ARTERIAL ROADWAY
VISIBILITY TRIANGLE

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

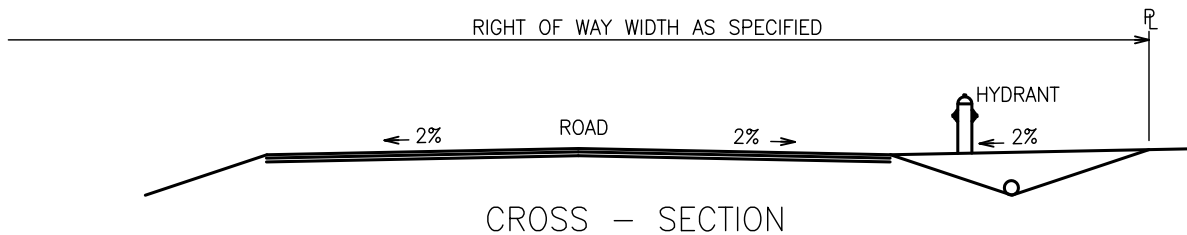
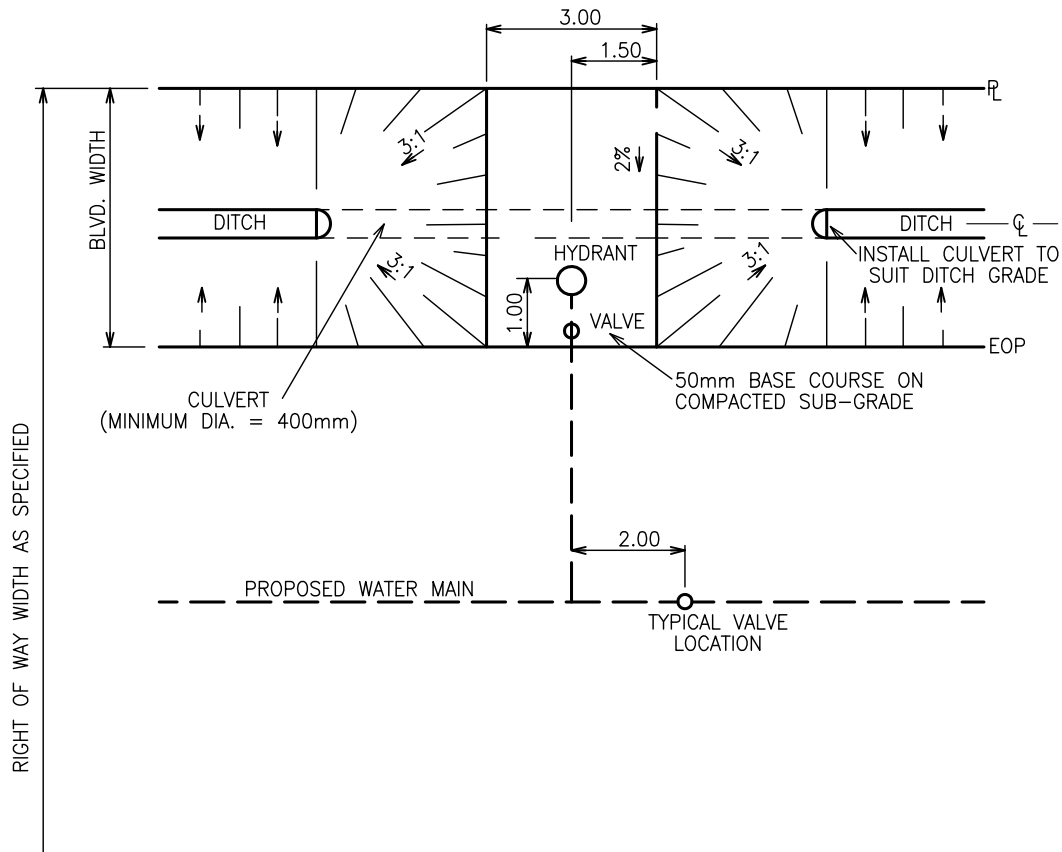
Checked


Date: 11.02.05

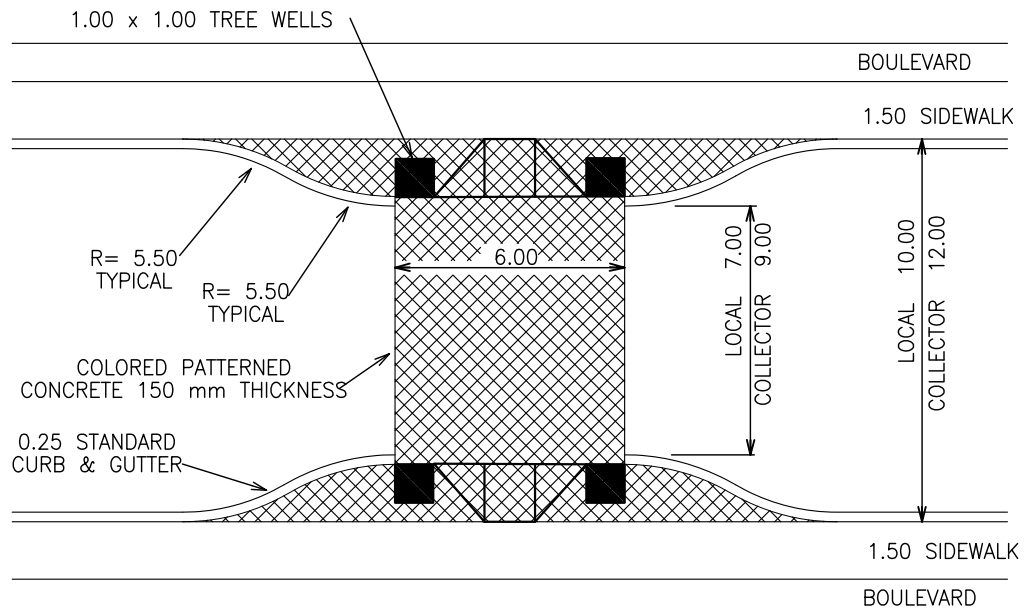
Scale: NTS

Drawn:


5.34

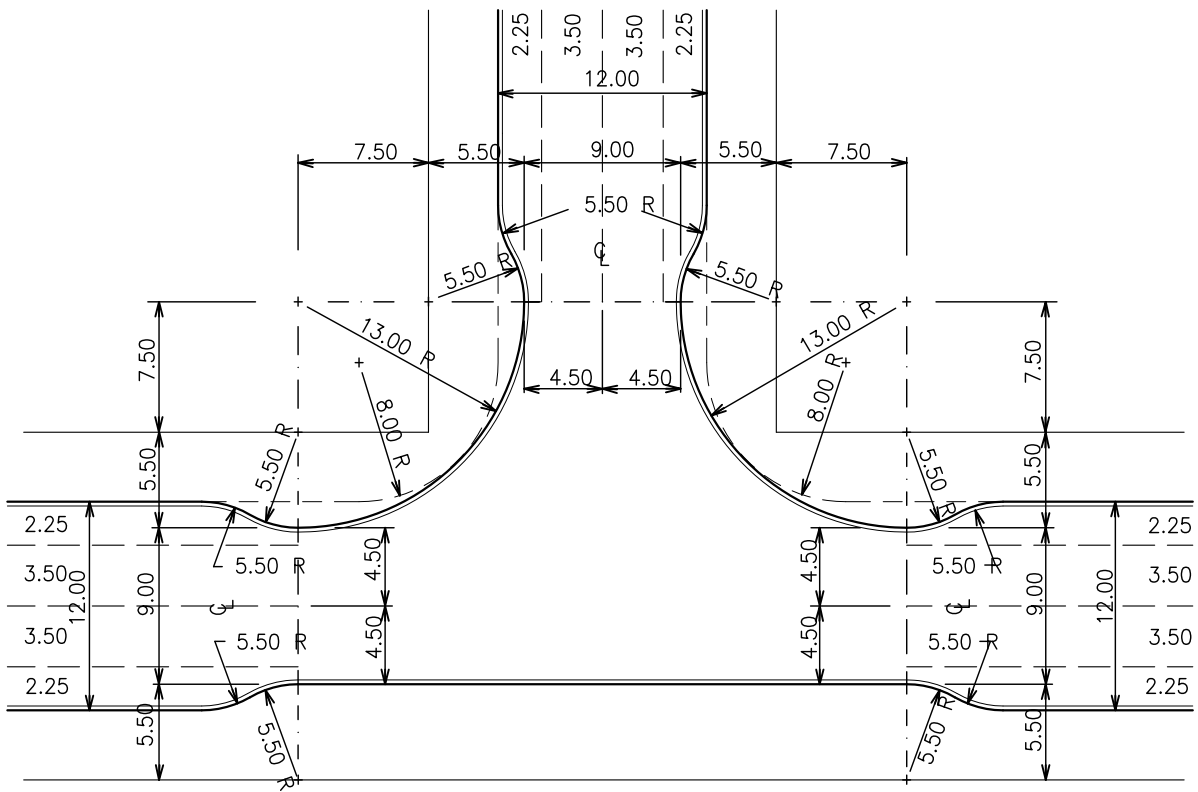


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	RURAL CROSS SECTION HYDRANT ACCESS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.35
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		




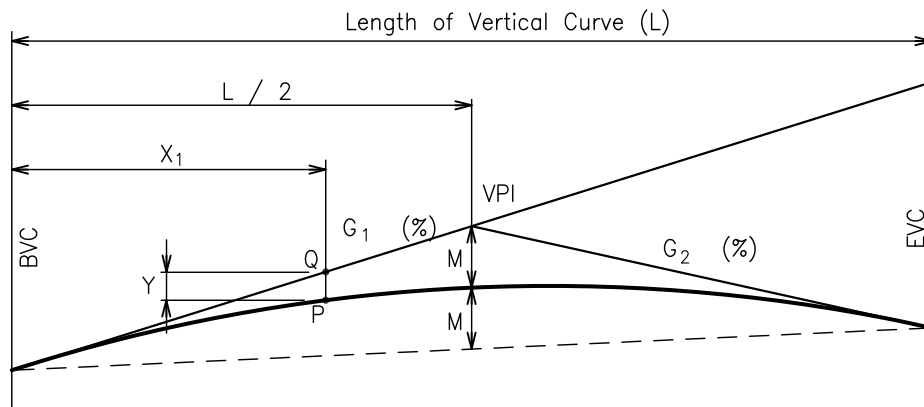
NOTE:
WRITTEN APPROVAL FROM THE DIRECTOR OF INFRASTRUCTURE AND
PROPERTY SERVICES IS REQUIRED FOR ALL ROADWAY NARROWING.

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	ROADWAY NARROWING FOR PEDESTRIAN ACCOMMODATION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.35
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

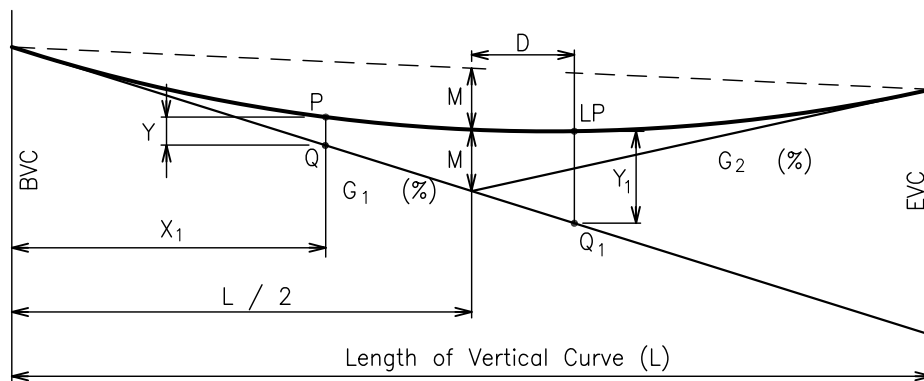


COLLECTOR TO COLLECTOR CALMING

REVISIONS				TOWN OF BLACKFALDS TRAFFIC CALMING		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		5.37
-	-	-		Date: 11.02.05	Scale: NTS	
				Drawn:		



CREST VERTICAL CURVE



SAG VERTICAL CURVE

Length of Vertical Curve (L) = K x A where

A = Algebraic change in grade, and

K = Vertical Curve Calculation Factor (see Table 13.1 for K factors)

Mid ordinate offset (M) = A x L / 8

Calculate elevation " P " at various stations along the Vertical Curve

First determine distance " X " from BVC

Calculate elevation at point " X " along G

Solve for " Y " where $Y = (X \times A / 100) / (2 L)$

Calculate elevation at " P " where $P = Q + Y$ or $P = Q - Y$

Sag Vertical Curve Low Point (LP) distance from VPI $D = (L / 2) - G_{\text{lessor grade}} \times L / A$

REVISIONS

Date	Details	Drawn
	-	-
-	-	-
-	-	-
-	-	-
-	-	-

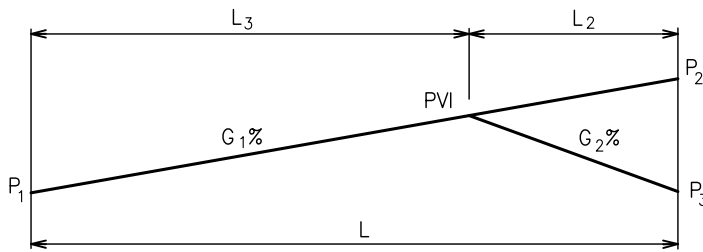


TOWN OF BLACKFALDS

VERTICAL CURVE CALCULATIONS

Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:

5.38



CASE 1

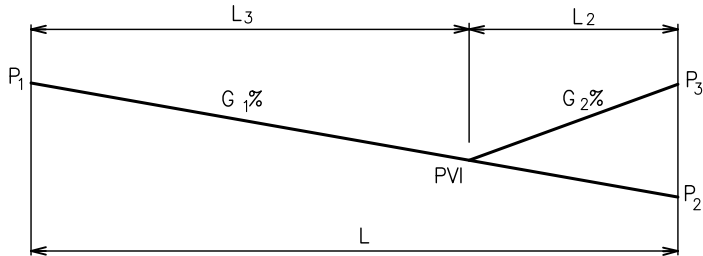
Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.

$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

$$\text{Length of } L_2 = (P_2 - P_3) \times 100 / (G_1 + G_2)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

$$L_3 = L_2 - L$$



CASE 2

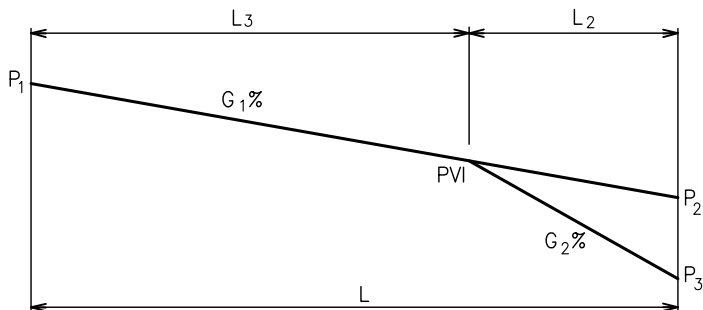
Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.

$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

$$\text{Length of } L_2 = (P_3 - P_2) \times 100 / (G_1 + G_2)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

$$L_3 = L - L_2$$



CASE 3

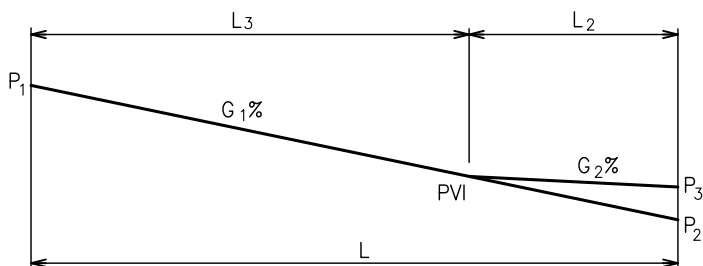
Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.

$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

$$\text{Length of } L_2 = (P_2 - P_3) \times 100 / (G_2 - G_1)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

$$L_3 = L - L_2$$



CASE 4

Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.


$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

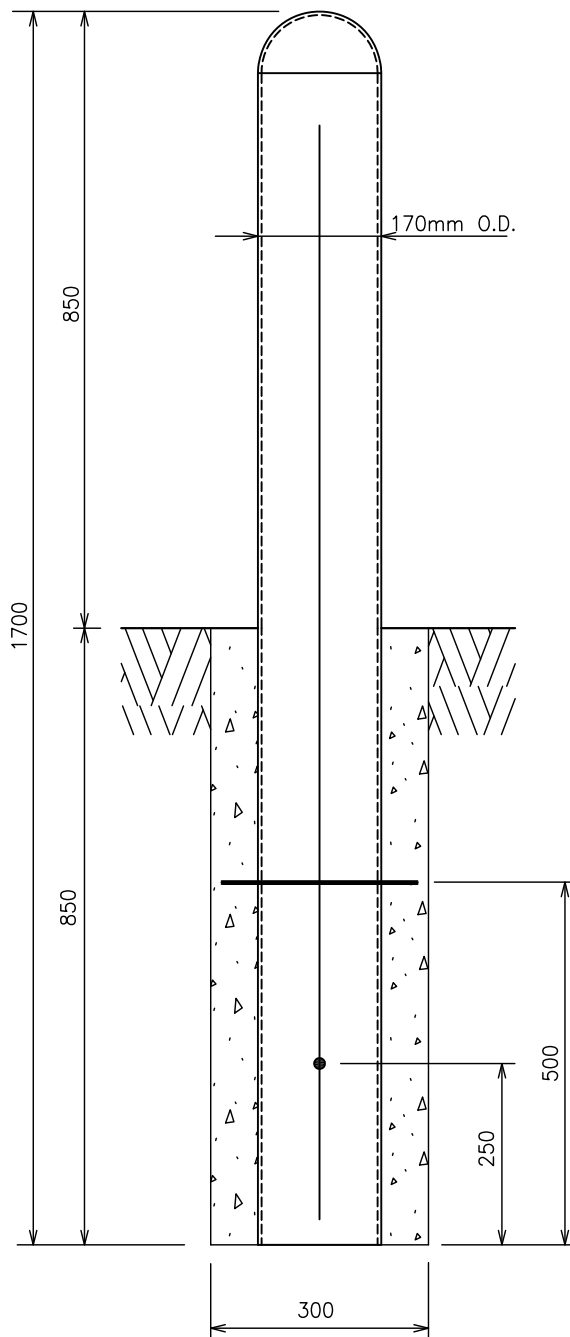
$$\text{Length of } L_2 = (P_3 - P_2) \times 100 / (G_1 - G_2)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

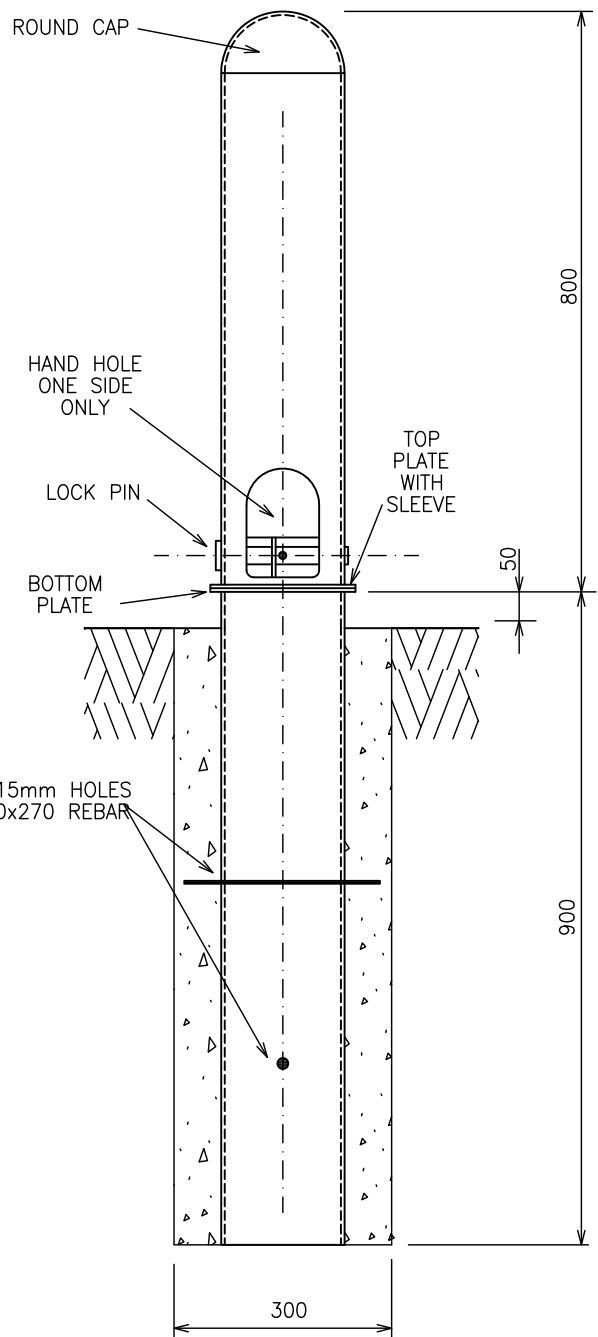
$$L_3 = L - L_2$$

REVISIONS

Date	Details	Drawn	 TOWN OF BLACKFALDS			
	-	-	V.P.I. LOCATION CALCULATION			
-	-	-				
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked			5.39
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:	




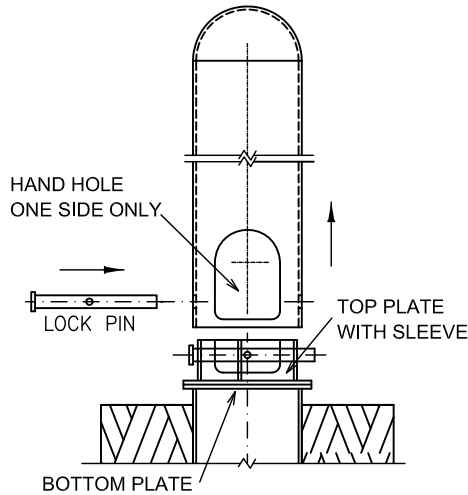
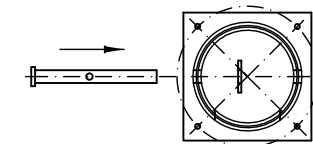
FIXED BOLLARD



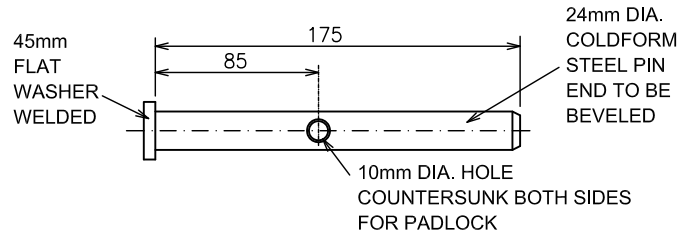
KNOCKDOWN BOLLARD

NOTE: CONCRETE TO HAVE 25mm AGGREGATE, MINIMUM 20 MPa

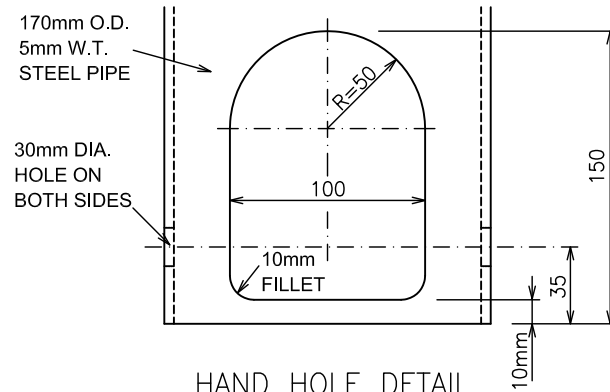
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	BOLLARD ASSEMBLY		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.40
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	Drawn:		



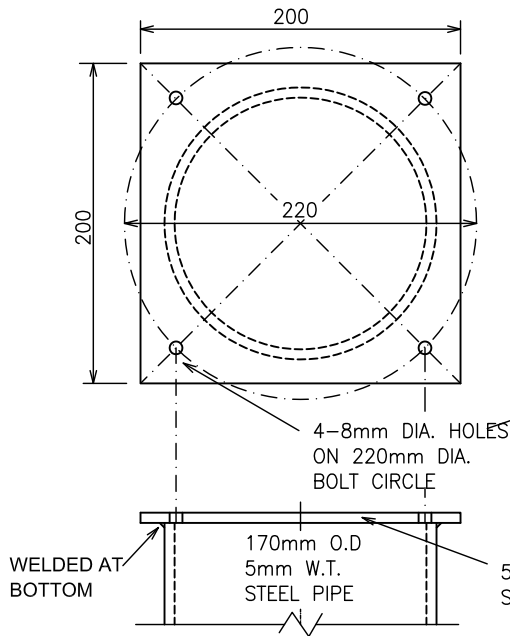
ASSEMBLY DRAWING



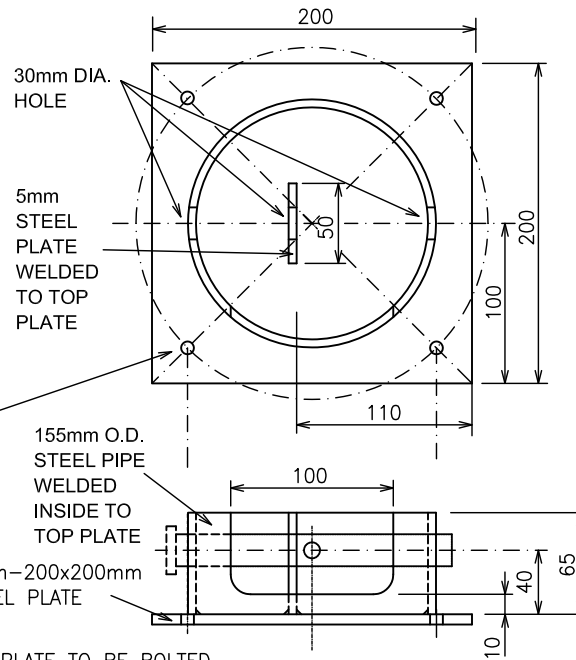
LOCK PIN DETAIL



HAND HOLE DETAIL



BOTTOM PLATE DETAIL



TOP PLATE WITH LOCKING SLEEVE DETAIL

TOP & BOTTOM PLATE TO BE BOLTED
BY 4- 6mm x 20mm LONG BOLTS

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

KNOCKDOWN BOLLARD DETAIL

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

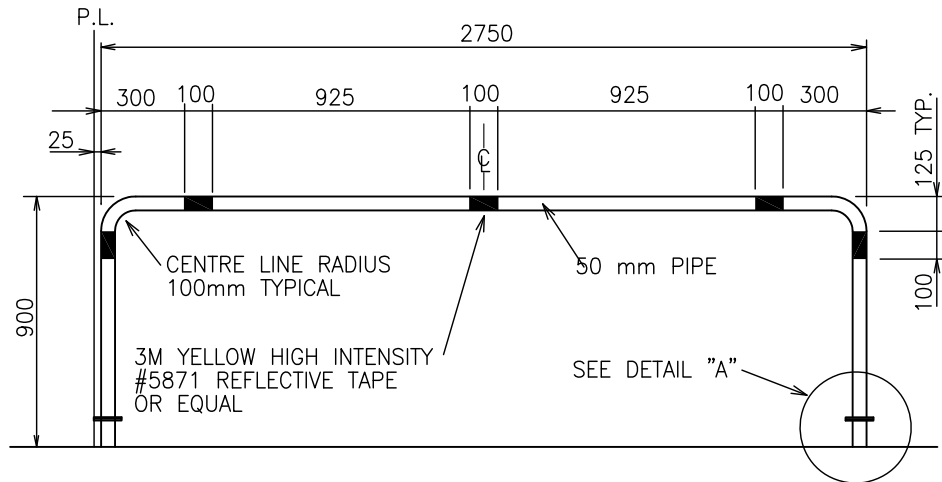
Checked

Date: 11.02.05

Scale: NTS

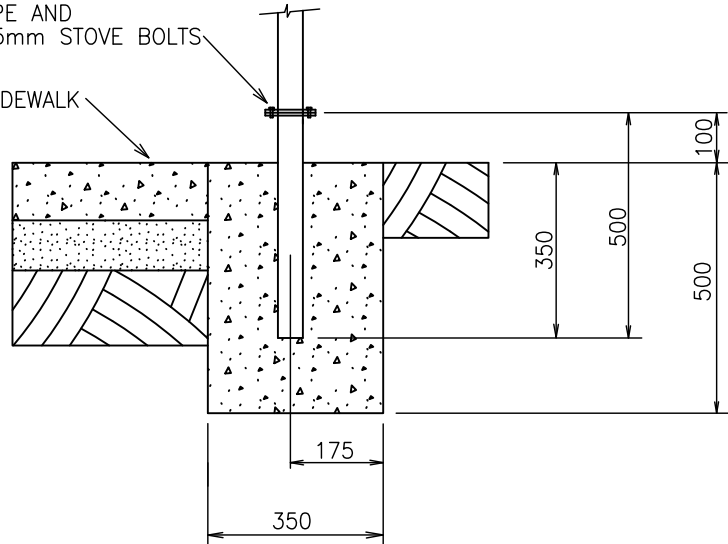
Drawn:

5.41




2-100mm x 100mm x 6mm PLATE
WELDED TO 50mm PIPE AND
FASTENED WITH 4 - 5mm STOVE BOLTS

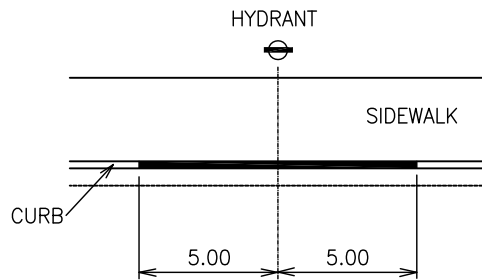
CONCRETE SIDEWALK



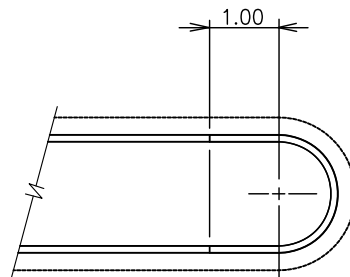
DETAIL "A"

NOTE:
REQUIRED ON SIDEWALKS AT ARTERIAL INTERSECTIONS
AND COLLECTOR TO ARTERIAL INTERSECTIONS

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	PEDESTRIAN BARRIER		
-	-	-			
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		5.42
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

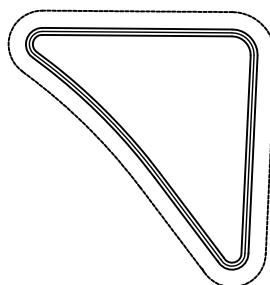


HYDRANT

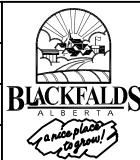



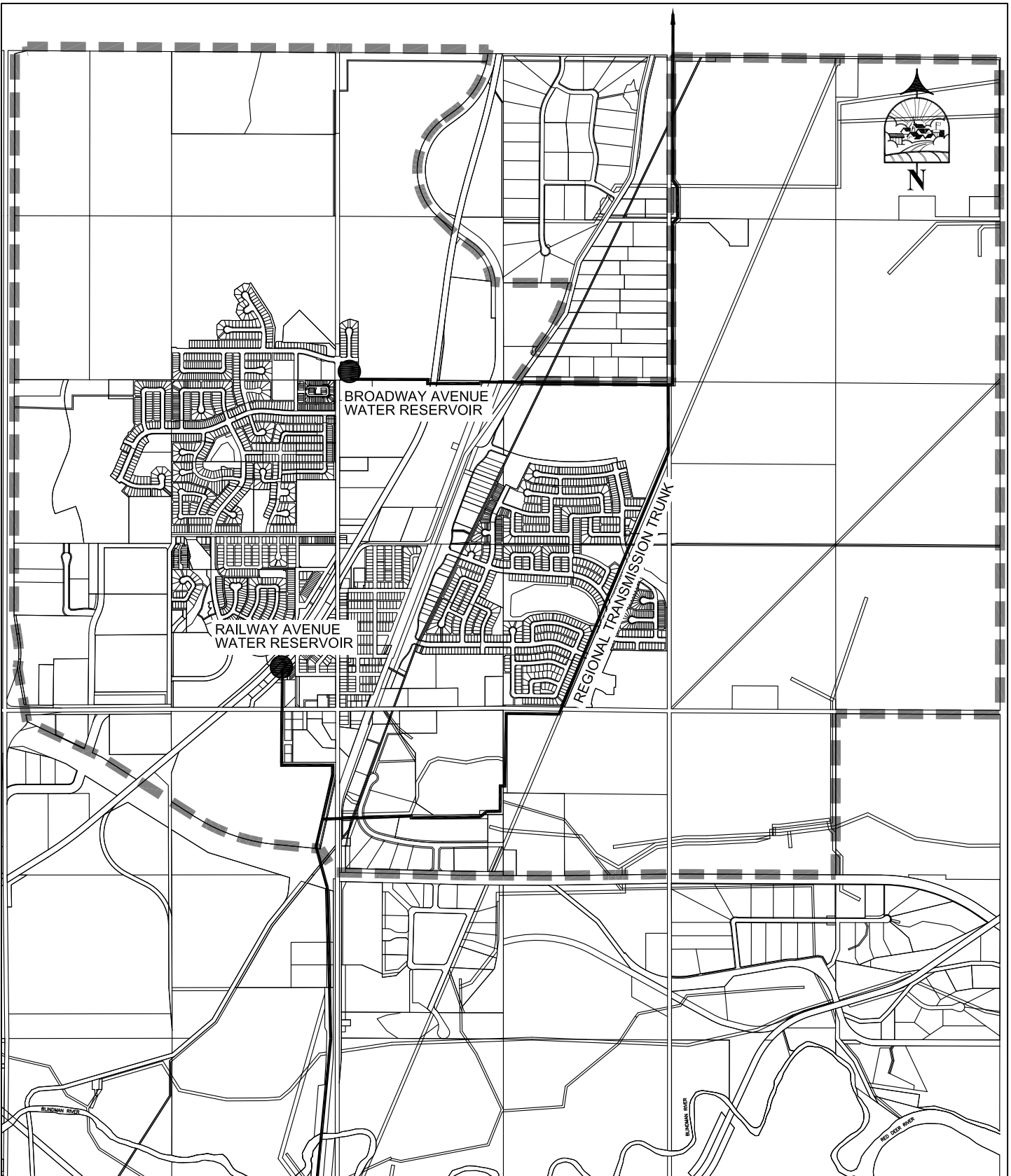
MEDIAN


TOTAL CURB AROUND
PERIMETER OF ISLAND
TO BE PAINTED

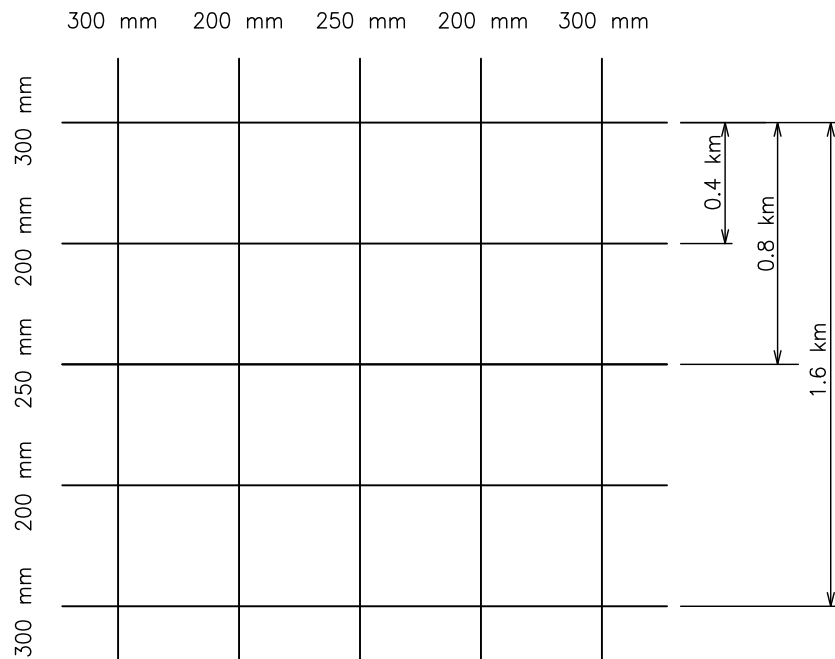




TRAFFIC
ISLAND

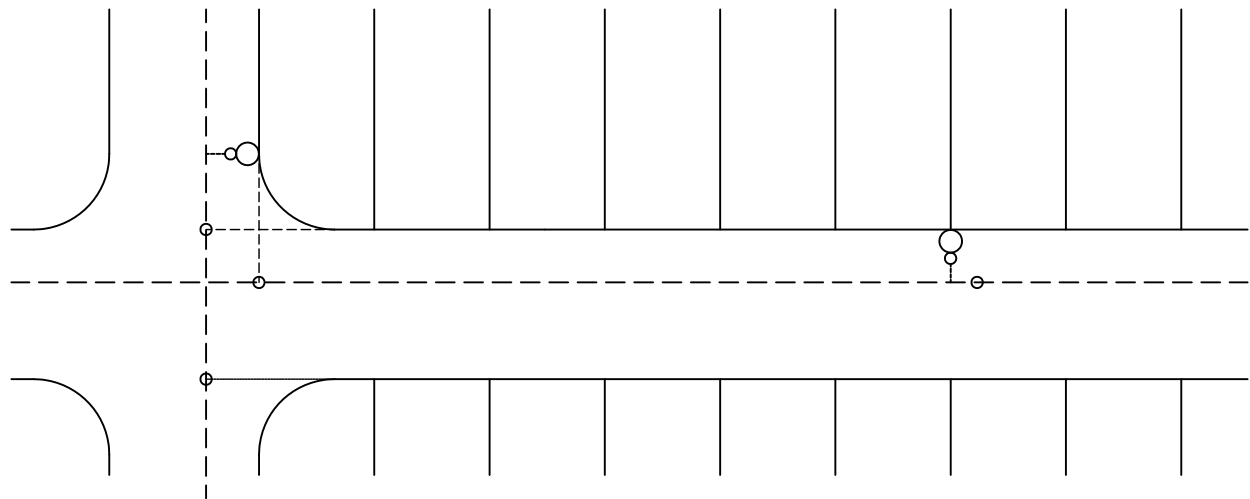
REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn		YELLOW CURB PAINTING		
	–	–				
–	–	–				
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.	
–	–	–	Checked		6.01	
–	–	–	Date: 11.02.05	Scale: NTS		Drawn:



REVISIONS			 BLACKFALDS ALBERTA	TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		WATER SYSTEM FACILITIES & PRESSURE ZONES		
–	–	–				
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
–	–	–	Checked			1.01
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	



REVISIONS				TOWN OF BLACKFALDS BASIC WATERMAIN GRID		
Date	Details	Drawn				
	-	-		TOWN OF BLACKFALDS BASIC WATERMAIN GRID		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked			1.02
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:	




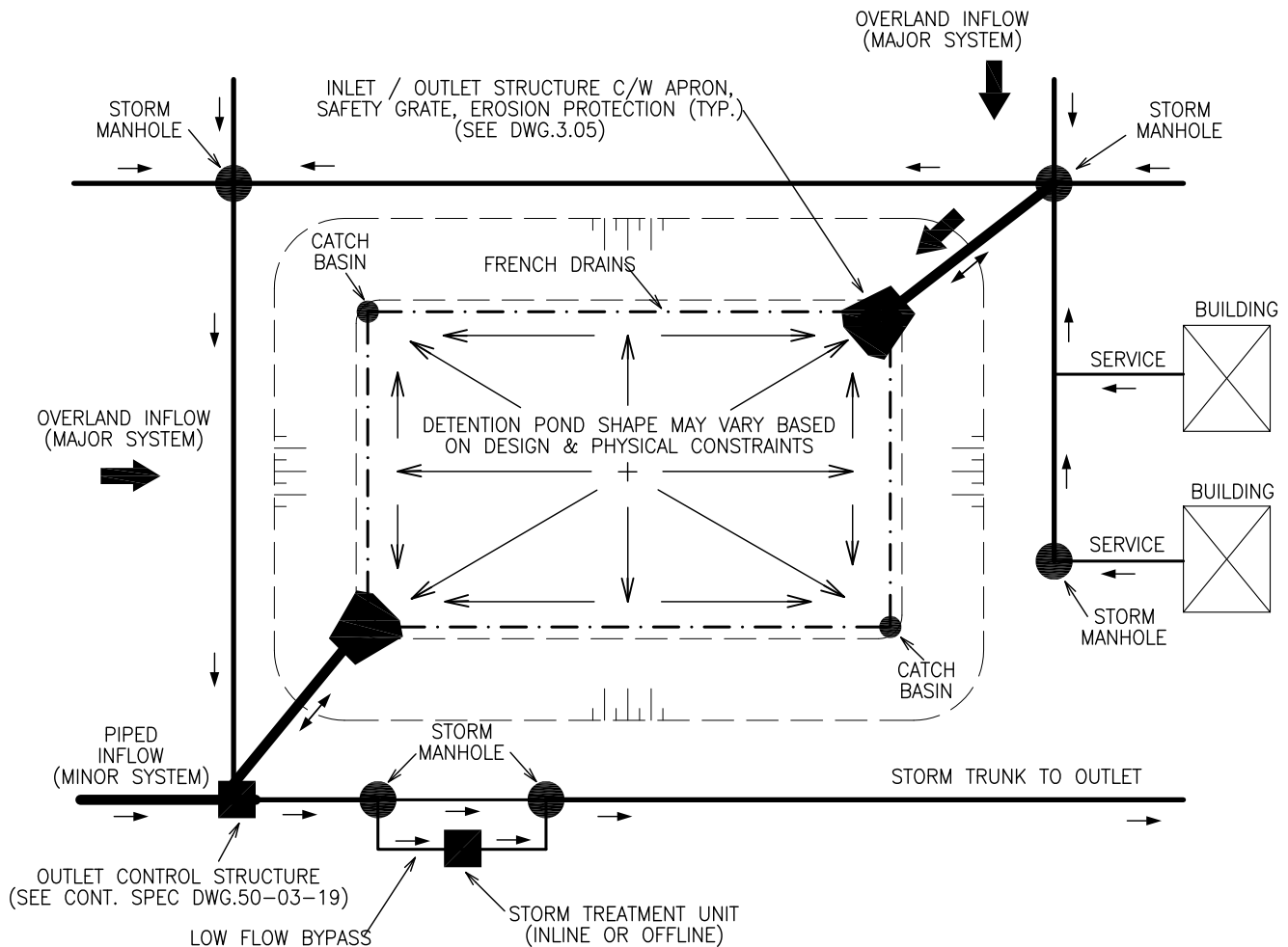
ROAD SERVICING


- — VALVE
- — HYDRANT
- — HYDRANT AND VALVE

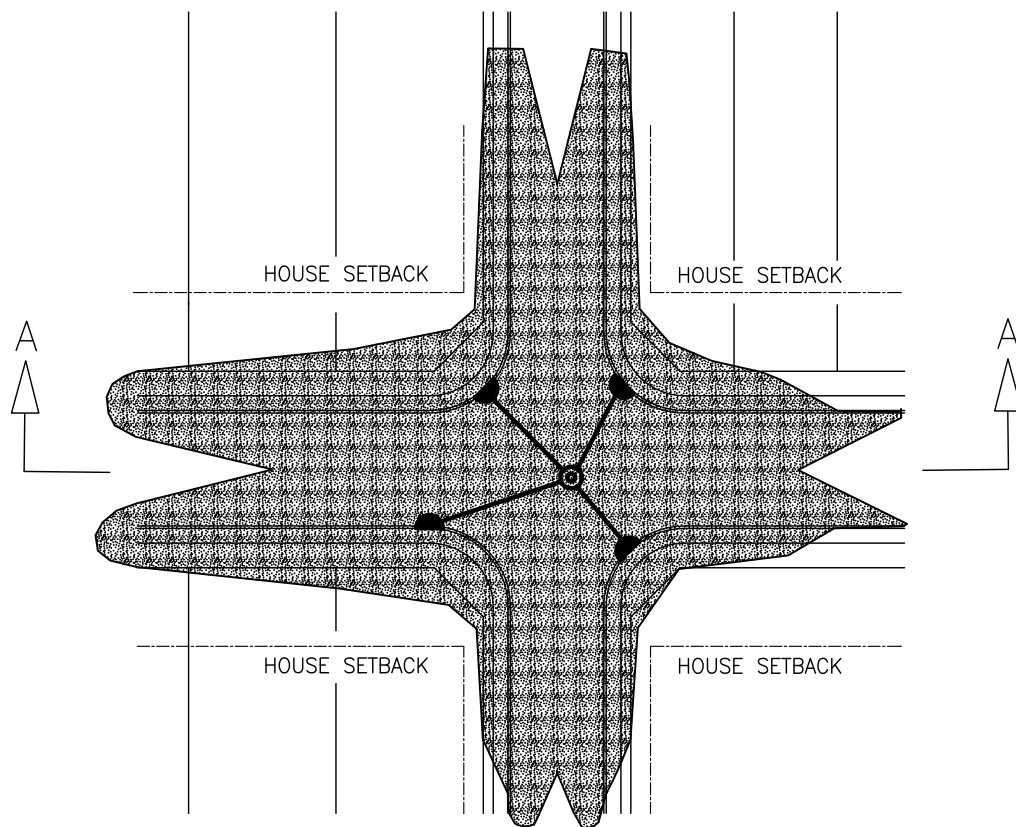
NOTE :

- AVOID USE OF EASEMENTS WHERE A STREET OR LANE ALIGNMENT IS AVAILABLE.
- HYDRANTS NORMALLY TO BE LOCATED NEAR STREET INTERSECTIONS.
- VALVES TO BE LOCATED OPPOSITE PROPERTY LINES AS ILLUSTRATED.

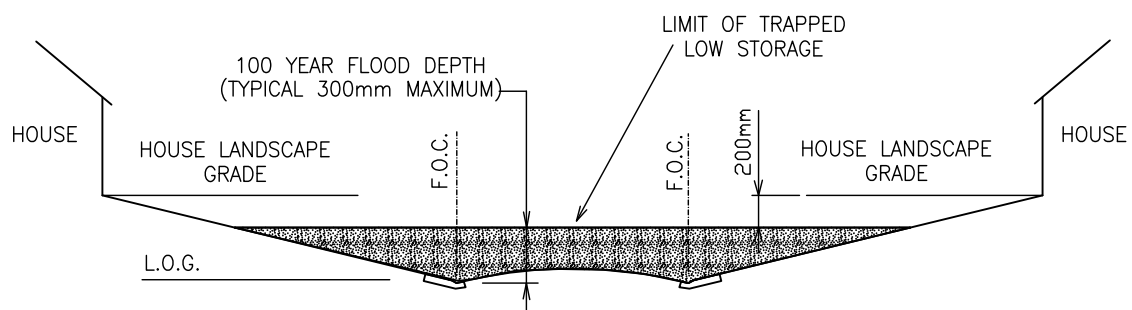
REVISIONS				TOWN OF BLACKFALDS TYPICAL VALVE AND HYDRANT LOCATIONS		
Date	Details	Drawn				
	—	—		Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
—	—	—				
—	—	—				
—	—	—				
—	—	—				
				DWG. NO. 1.03		




REVISIONS			 TOWN OF BLACKFALDS DRY STORMWATER STORAGE FACILITY		
Date	Details	Drawn			
	-	-	Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
-	-	-			
-	-	-	DWG. NO.		
-	-	-	3.02		

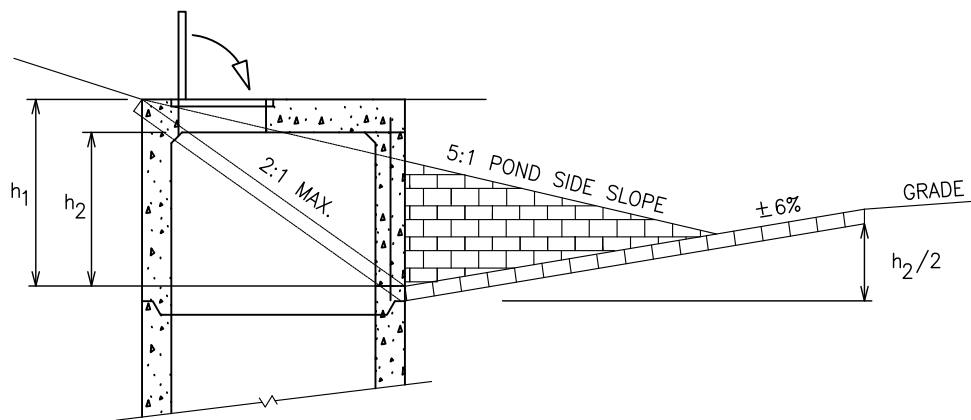
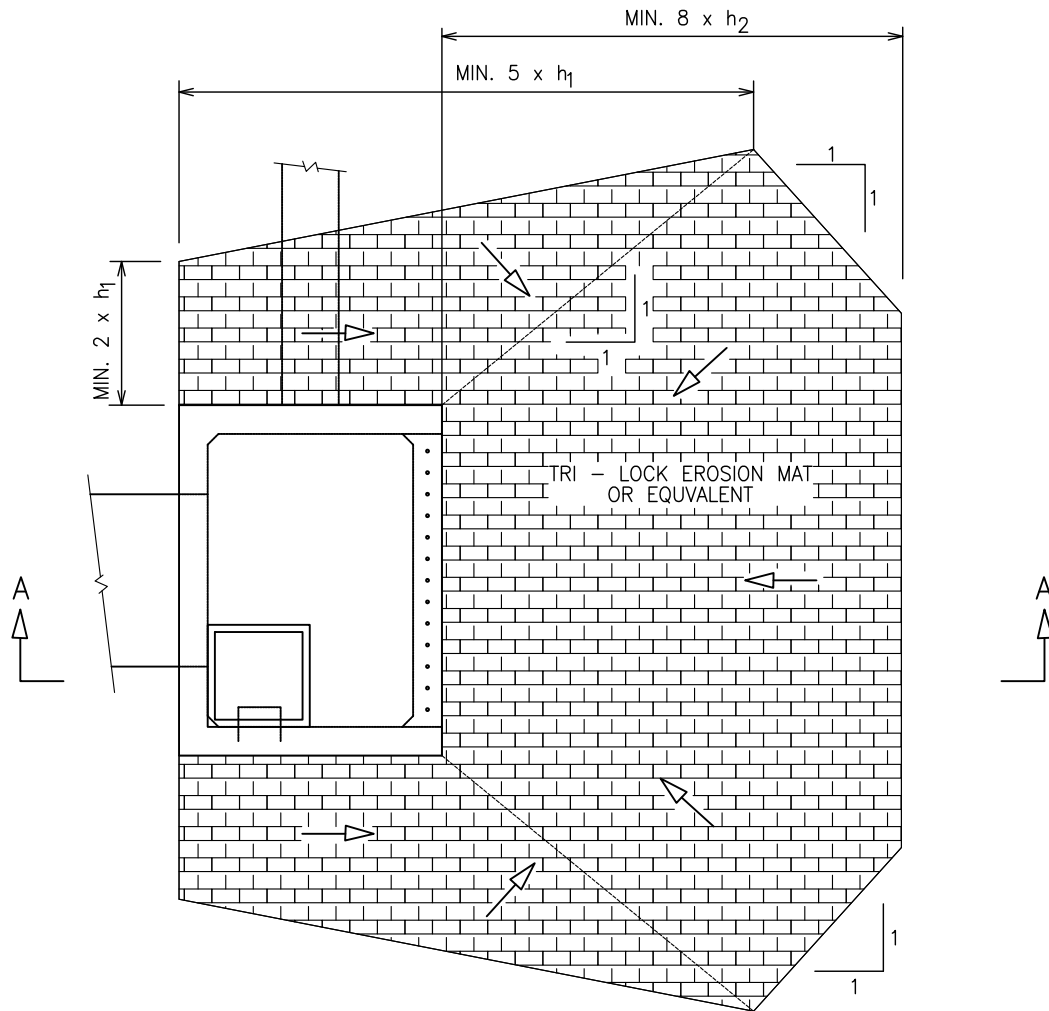


PLAN




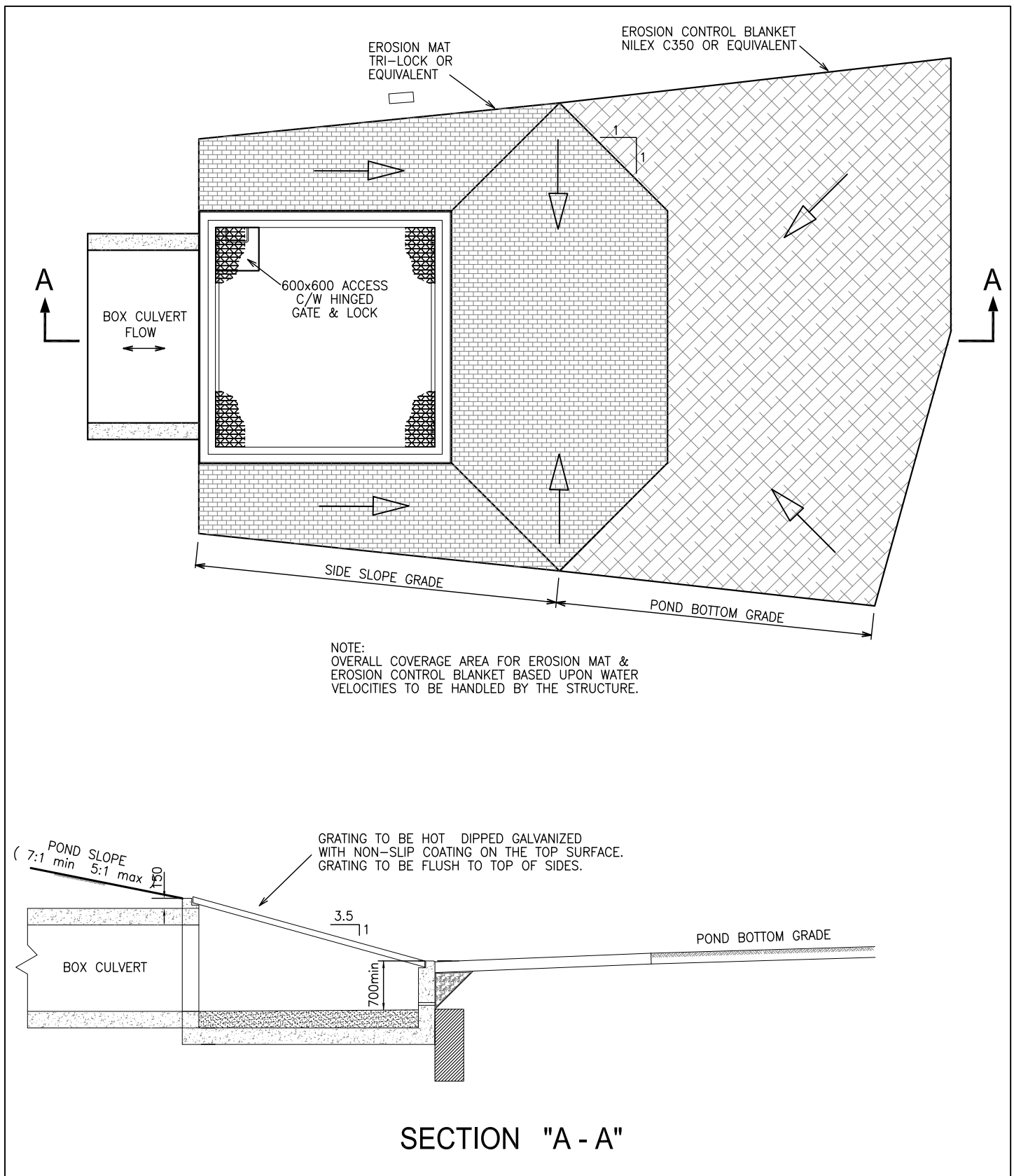
SECTION 'A - A'

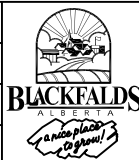
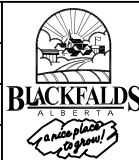
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	TYPICAL TRAPPED LOW STORAGE AREA		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		3.03
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

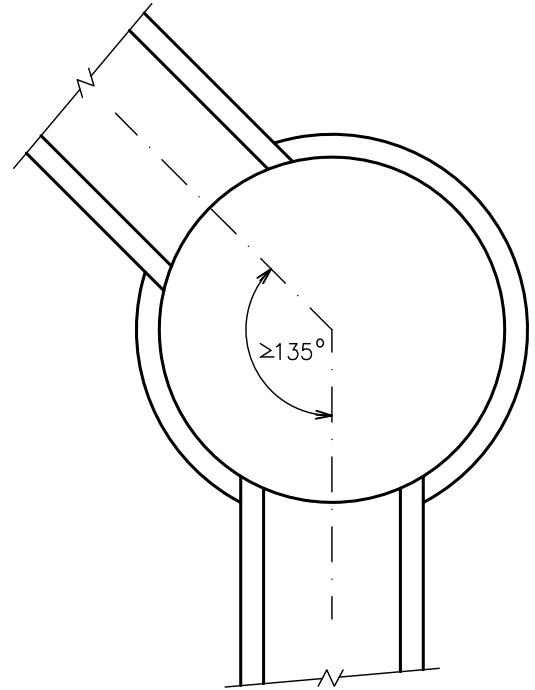
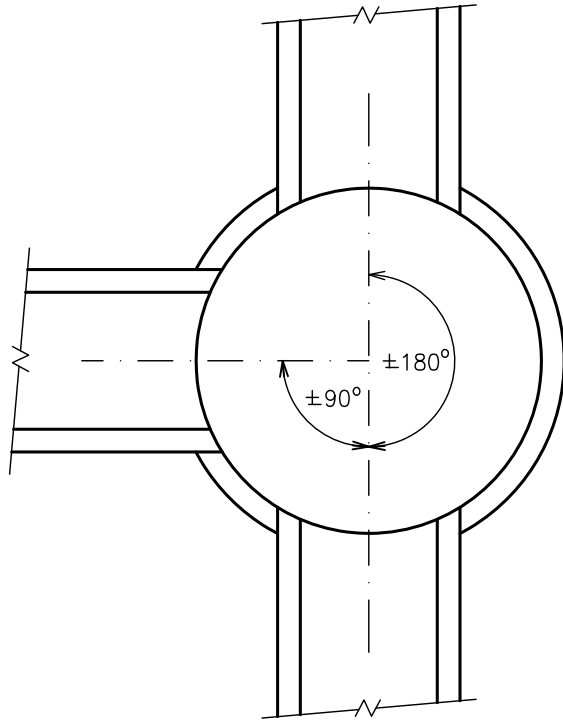


SECTION 'A - A'


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	INLET / OUTLET STRUCTURE APRON		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		3.04
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:



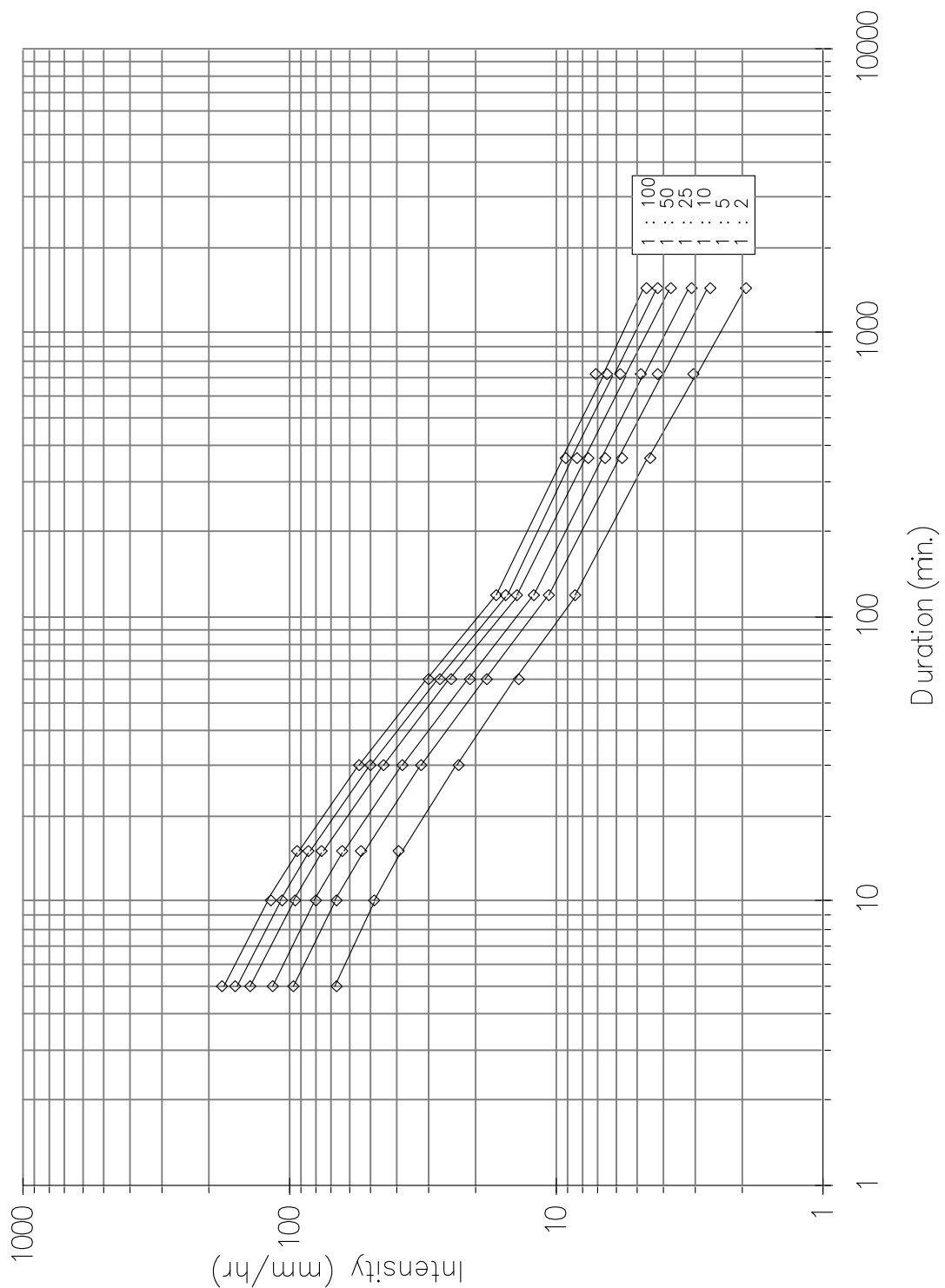
REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		LOW PROFILE INTEL / OUTLET STRUCUTRE APRON		
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
–	–	–	Checked			3.05
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	





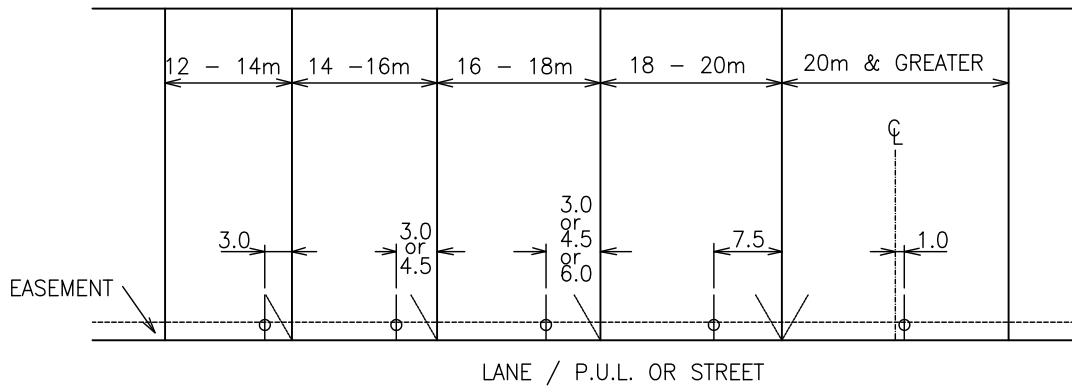
MANHOLE NOMINAL INSIDE DIAMETER	INLET / OUTLET PIPE SIZE		
	DEFLECTION ANGLE		
	±90°	≥135°	±180°
1200	600mm CONC. (765mm MAX. O.D.)	675mm CONC.	750mm CONC. 750mm PVC (940mm MAX. O.D.)
1500	750mm CONC. (940mm MAX. O.D.)	750 & 900mm CONC.	900mm CONC. (1120mm MAX. O.D.)
1800	900mm CONC. (1120mm MAX. O.D.)	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.)

REVISIONS				TOWN OF BLACKFALDS MANHOLE INLET / OUTLET PIPE DESIGN CONSIDERATIONS		
Date	Details	Drawn				
	-	-		<div>Approved PGW (TOWN OF BLACKFALDS)</div> <div>DWG. NO.</div> <div>3.07</div>		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
			<div>Checked</div> <div>Date: 11.02.05</div>	<div>Scale: NTS</div>	<div>Drawn:</div>	

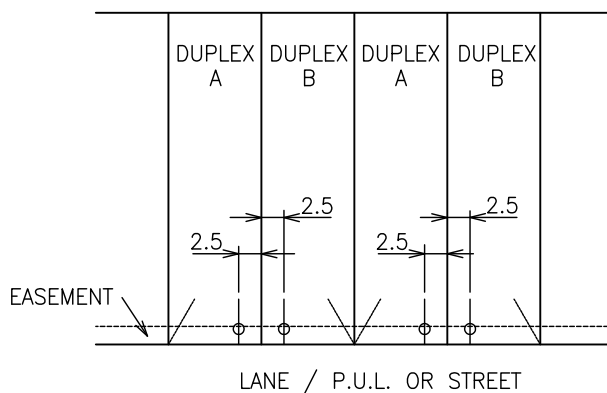
IDF – Red Deer (1964–1999 Data)



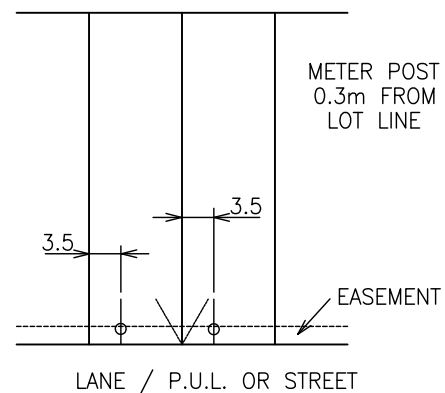
REVISIONS			 TOWN OF BLACKFALDS 2003 STATISTICAL CURVES FOR RAINFALL INTENSITY-DURATION-FREQUENCY		
Date	Details	Drawn			
	-	-	 Approved PGW (TOWN OF BLACKFALDS)		
-	-	-			
-	-	-	Checked		
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:
			DWG. NO. 3.01		



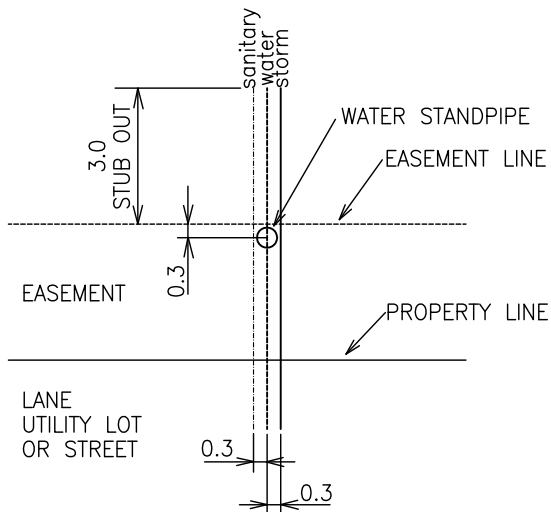
SINGLE FAMILY DWELLING



DUPLEX



MANUFACTURED HOME



SERVICE DETAIL

LEGEND

- SANITARY SEWER, STORM SEWER & WATER SERVICE
- ELECTRICAL SERVICE

NOTE :

1. STANDPIPE & CURB STOP TO BE LOCATED 0.30m FROM EASEMENT LINE.
2. MINIMUM CLEARANCE FROM EDGE OF EL&P TRANSFORMER TO CENTRE OF WATER SHALL BE 3.30m.
3. EASEMENT WIDTH AS REQUIRED.

REVISIONS

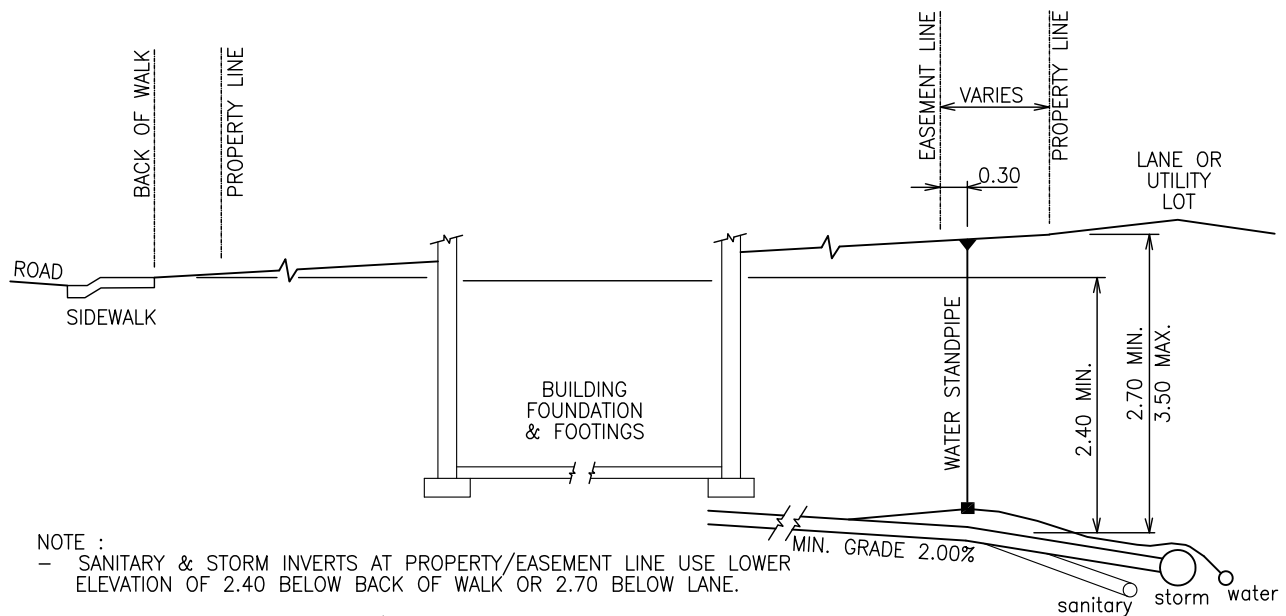
Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



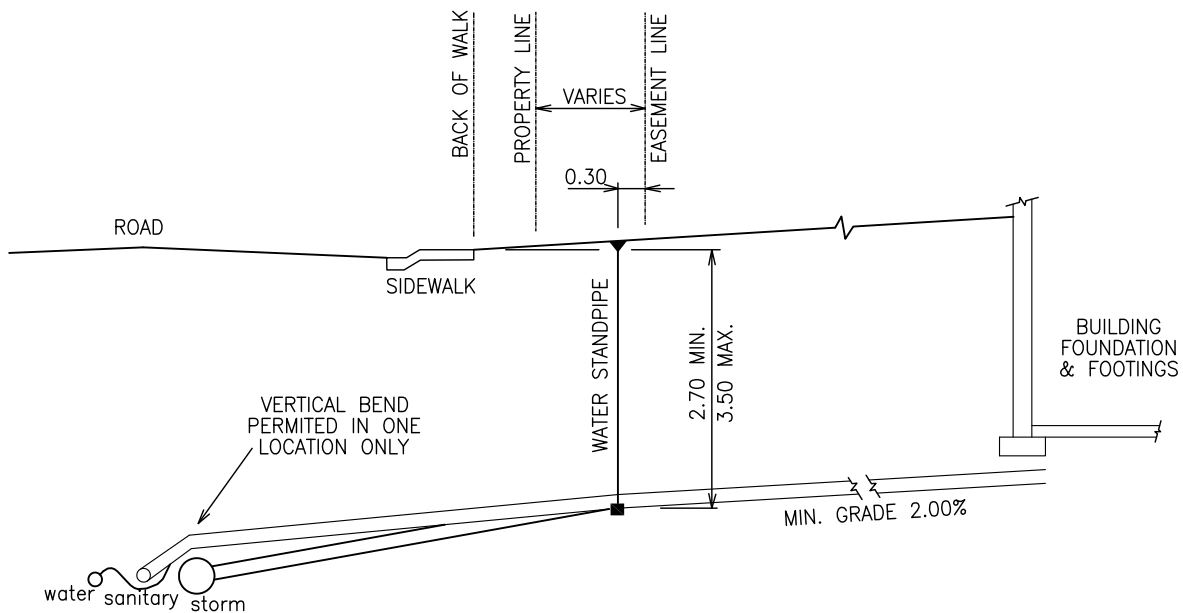
TOWN OF BLACKFALDS

SERVICE LOCATIONS


Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		4.02
Date: 11.02.05	Scale: NTS	Drawn:



REAR YARD SERVICE CONNECTION

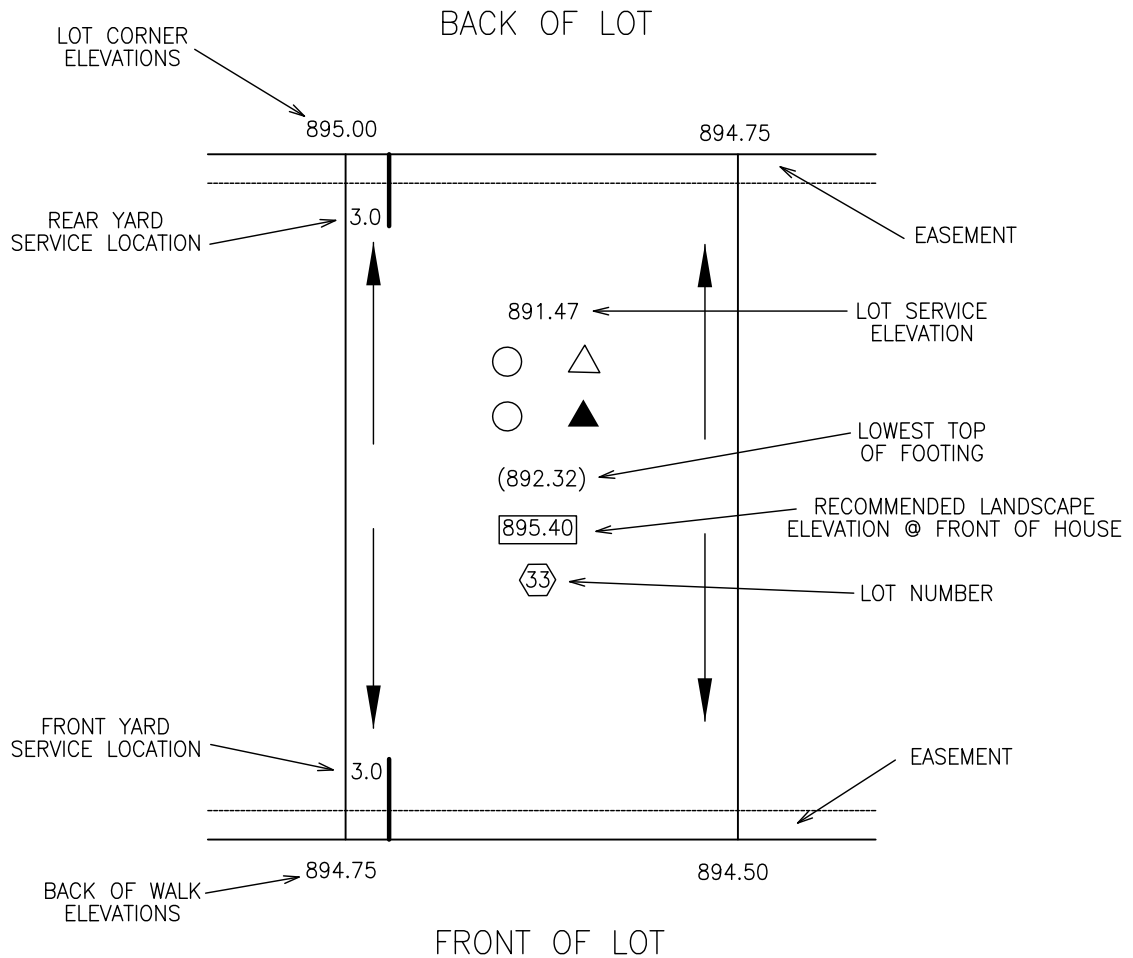


FRONT YARD SERVICE CONNECTION

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	TYPICAL SERVICE CROSS SECTIONS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.03
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	Drawn:		



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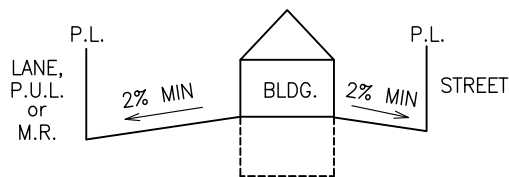
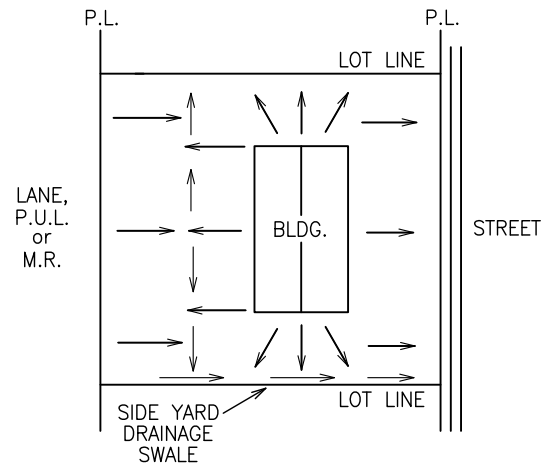
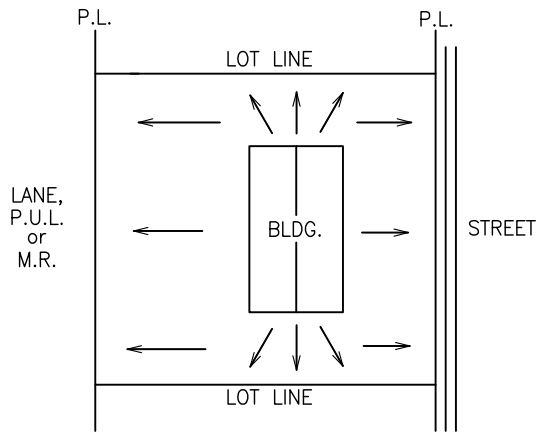
LEGEND :

- SINGLE WATER & SANITARY SERVICE
- DUAL WATER & SANITARY SERVICE
- △ SINGLE WATER, SANITARY & STORM SERVICE
- ▲ DUAL WATER, SANITARY & STORM SERVICE
- ← DRAINAGE PATTERN

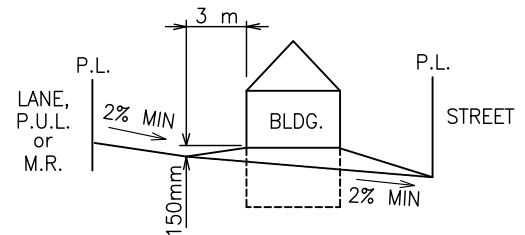
NOTE :

- EASEMENT WIDTHS VARY
- SERVICE LOCATION DIMENSIONS VARY (SEE DWG.S 4.01 & 4.02)

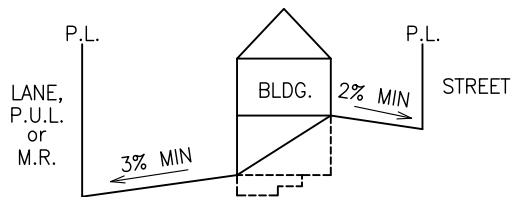
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	TYPICAL LOT SERVICE REQUIREMENTS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.05
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		




SPLIT DRAINAGE

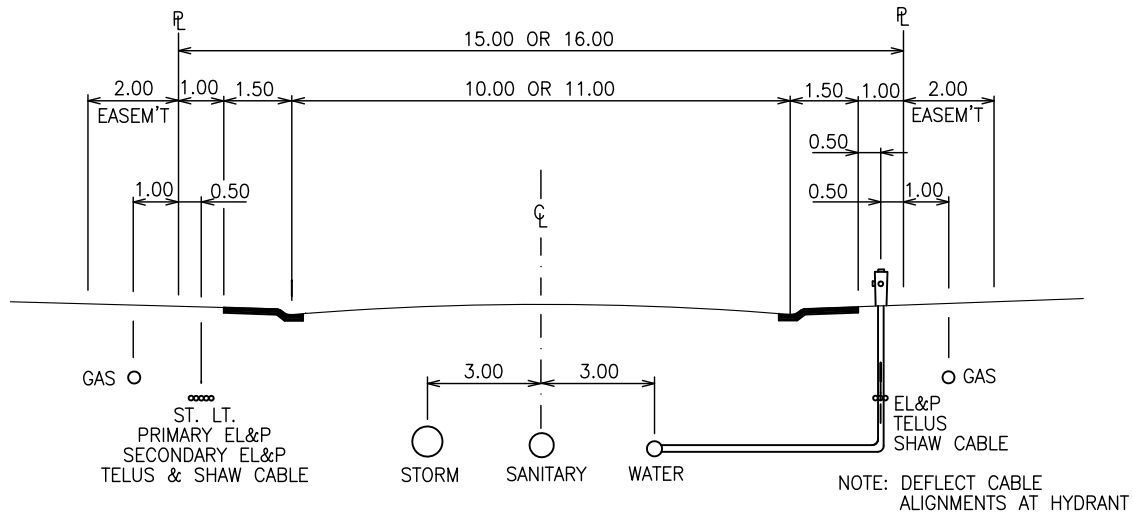


BACK TO FRONT DRAINAGE

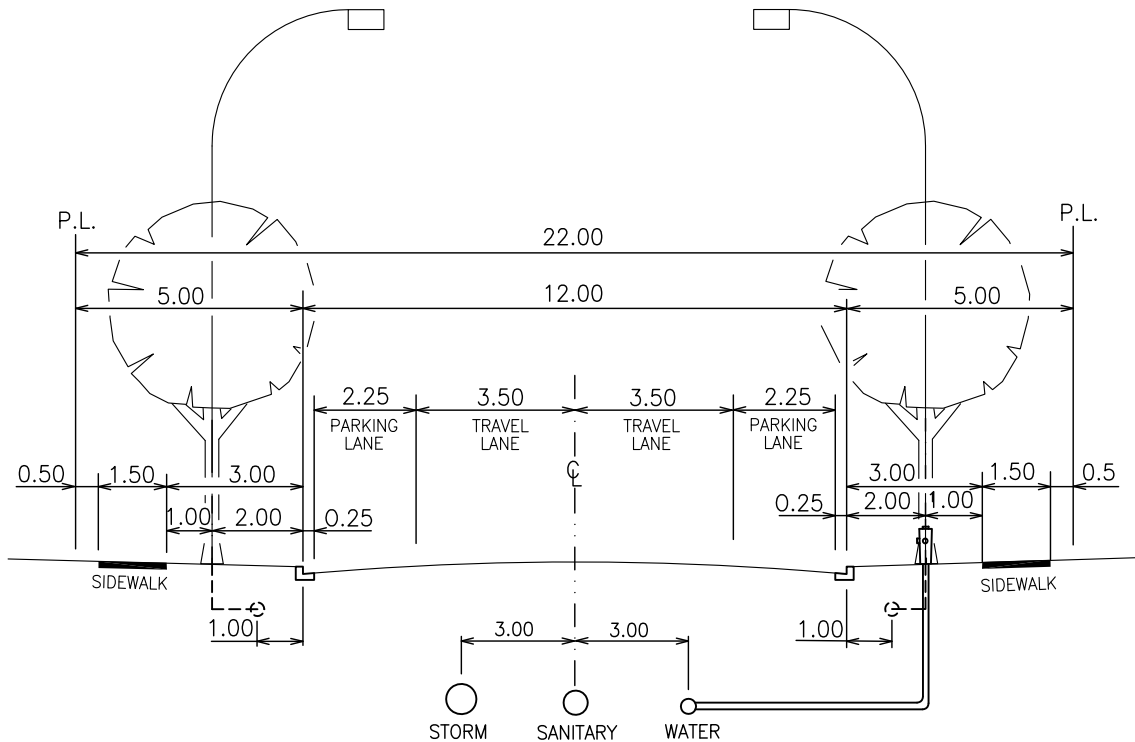


REARYARD BASEMENT WALKOUT
SPLIT DRAINAGE


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	TYPICAL LOT GRADING		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.06
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

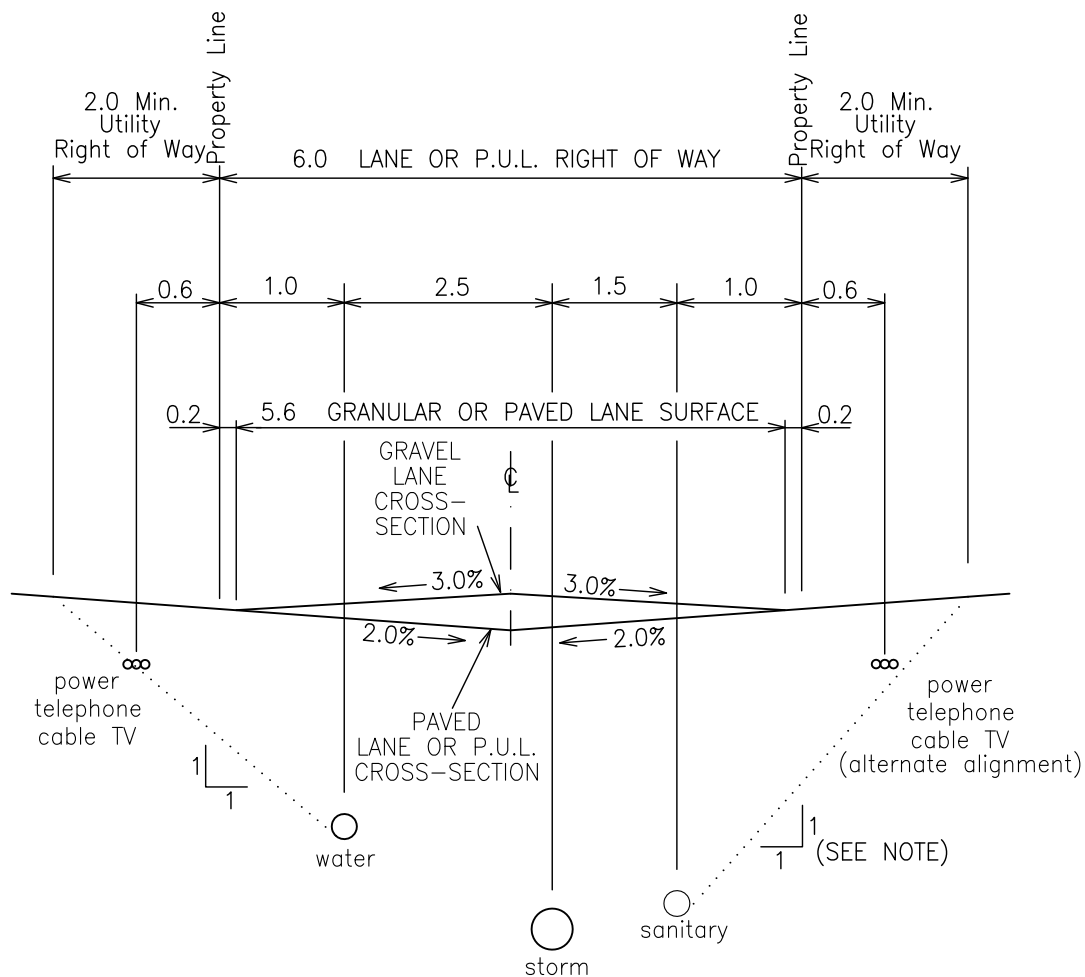


RESIDENTIAL LOCAL ROAD




COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK

REVISIONS				TOWN OF BLACKFALDS	
Date	Details	Drawn			
	-	-		TYPICAL FRONT	
-	-	-		SERVICING ALIGNMENTS	
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		4.07
-	-	-	Date: 11.02.05	Scale: NTS	
				Drawn:	




NOTE :

- 1:1 SIDESLOPE SHOWN IS TO BE USED AS A GUIDELINE FOR ESTABLISHING EASEMENT REQUIREMENTS TO PROVIDE A MINIMUM SETBACK FOR EXISTING REAR YARD BUILDINGS (EG. GARAGE, STORAGE SHED).
- ACTUAL TRENCH SIDESLOPES ARE TO BE BASED ON OCCUPATIONAL HEALTH & SAFETY GUIDELINES (SEE C.R.D. SPECIFICATION DRAWING: UTILITY TRENCH BACKFILL REQUIREMENTS CLASS B BEDDING)

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	CURRENT LANE / P.U.L. SERVICING ALIGNMENT		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		4.08
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

SIZE OF MAIN	SIZE OF SANITARY SERVICE							
	150 mm	200 mm	250 mm	300 mm	375 mm	450 mm	525 mm	600 mm
200 mm	MANHOLE NOT REQUIRED					SERVICE LARGER THAN MAIN NOT PERMITTED		
250 mm								
300 mm								
375 mm								
450 mm								
525 mm								
600 mm				MANHOLE REQUIRED				
675 mm								
750 mm								
825 mm								
900 mm								
1050 mm								
1200 mm								
1350 mm								

SIZE OF MAIN	SIZE OF STORM SERVICE								
	100 mm	150 mm	200 mm	250 mm	300 mm	375 mm	450 mm	525 mm	600 mm
200 mm							SERVICE LARGER THAN MAIN NOT PERMITTED		
250 mm									
300 mm									
375 mm									
450 mm									
525 mm									
600 mm									
675 mm	MANHOLE NOT REQUIRED						MANHOLE REQUIRED		
750 mm									
825 mm									
900 mm									
1050 mm									
1200 mm									
1350 mm									

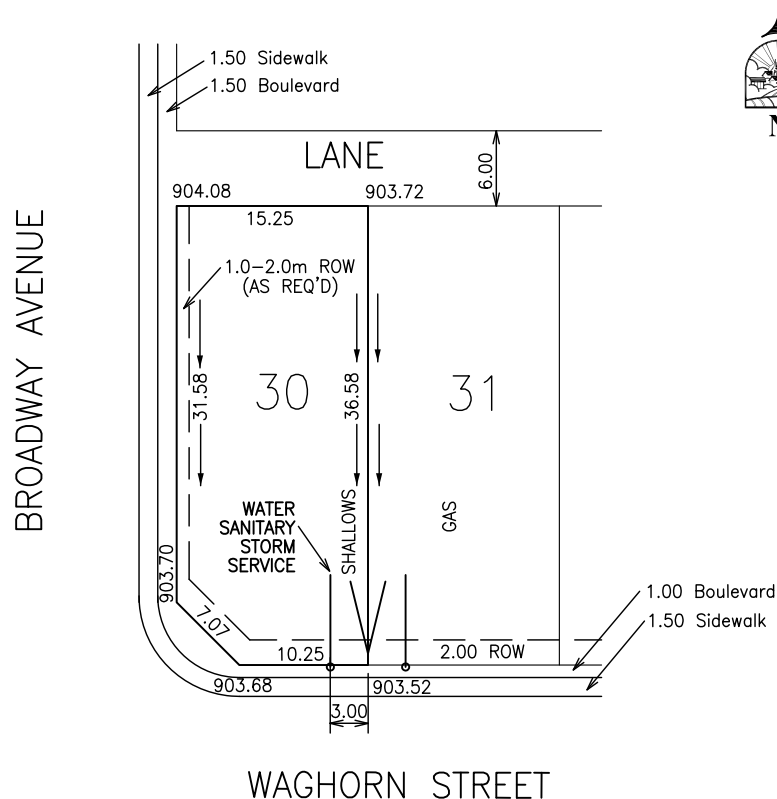
REVISIONS				TOWN OF BLACKFALDS SAN & STORM MANHOLE REQUIREMENTS FOR SERVICE CONNECTIONS	
Date	Details	Drawn			
	-	-			
-	-	-			
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		4.09
-	-	-	Date: 11.02.05	Scale: NTS Drawn:	

BUILDING GRADE CERTIFICATE

TOWN OF BLACKFALDS

Issued by: No.

1. WHEN EXCAVATING IN A RIGHT OF WAY (EASEMENT), CHECK FOR UTILITIES.
 2. STANDING AT THE WATER SHUTOFF AND FACING THE BUILDING, THE SANITARY SERVICE (PAINTED RED) IS ON THE LEFT SIDE OF THE WATER SERVICE; STORM SERVICE (PAINTED GREEN) IS ON THE RIGHT SIDE OF THE WATER SERVICE.
 3. ALL DIMENSIONS ARE IN METRES AND DECIMALS THEREOF. ELEVATIONS ARE IN METRES ABOVE GEODETIC MEAN SEA LEVEL.
 4. ELEVATIONS NOTED ON THIS CERTIFICATE ARE WITHIN 100mm OF ACTUAL.
 5. THE BUILDER MUST CONSTRUCT TO WITHIN 100mm OF THE DESIGN LANDSCAPE ELEVATION AND ILLUSTRATED DRAINAGE PATTERNS UNLESS OTHERWISE APPROVED BY THE DEVELOPMENT OFFICER.
- IF THE INFORMATION ON THIS CERTIFICATE HAS BEEN PREPARED BY A PRIVATE DEVELOPER OR HIS AGENT, THE TOWN OF BLACKFALDS ACCEPTS NO RESPONSIBILITY FOR ITS ACCURACY.



TOP OF FOOTING:
MAX. DEPTH BELOW AVERAGE SIDEWALK = 1.92
LOWEST ELEVATION = 875.78

SEWER INVERT ELEVATIONS:
SANITARY AT RIGHT OF WAY LINE = 874.87
STORM AT RIGHT OF WAY LINE = 874.88

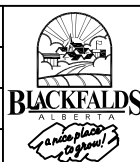
CIVIC ADDRESS: 75 WAGHORN STREET
LOT: 30 BLOCK: 11 PLAN No.: 972 9999
DEVELOPER: ABC Developments Ltd. SCALE: 1:500
DRAWN BY: XYZ Consulting Ltd. DATE: YY.MTH.DD
APPROVED BY: _____ DATE: _____
RECEIVED BY: _____ DATE: _____

FRONT DESIGN LANDSCAPE GRADE = 878.05
REAR DESIGN LANDSCAPE GRADE = 878.25

I CERTIFY THAT THE FINAL LANDSCAPE GRADE WILL BE: _____
SIGNATURE OF OWNER OR REPRESENTATIVE: _____

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

NEW RESIDENTIAL BUILDING GRADE CERTIFICATE

Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:

4.10

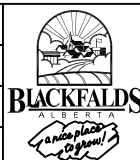


LEGEND

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

REVISIONS

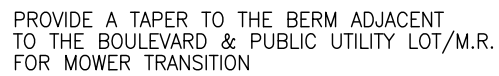
Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

RELATIONSHIP OF STREET CLASSIFICATIONS

Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:
		5.01



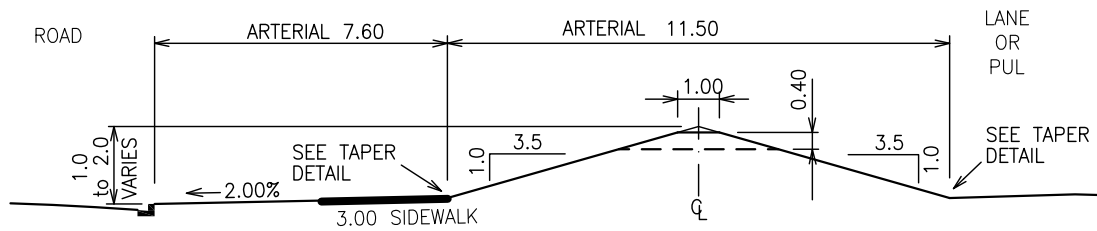
BERM TAPER DETAIL



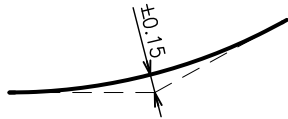
BERM PLAN VIEW



W:\AUTOCAD DWGS\DRAWINGS\2011_design_guideline_dwgs\5.02A.dwg

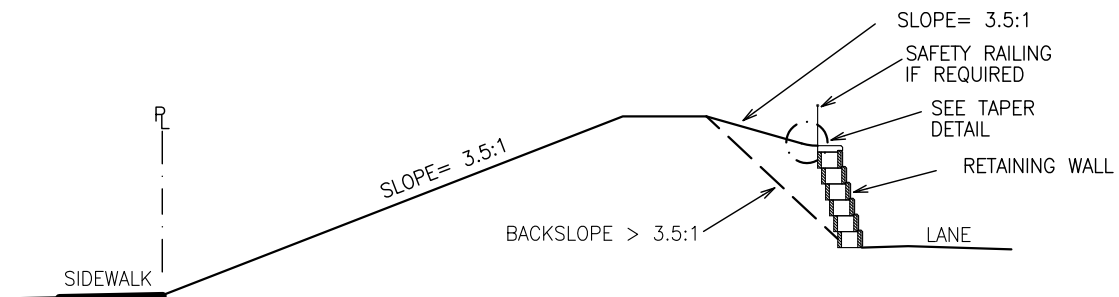


NORMAL BERM CROSS SECTION



NOTE :
PROVIDE A TAPER TO THE BERM ADJACENT
TO THE BOULEVARD & PUBLIC UTILITY LOT/M.R.
WHERE APPLICABLE

BERM TAPER DETAIL




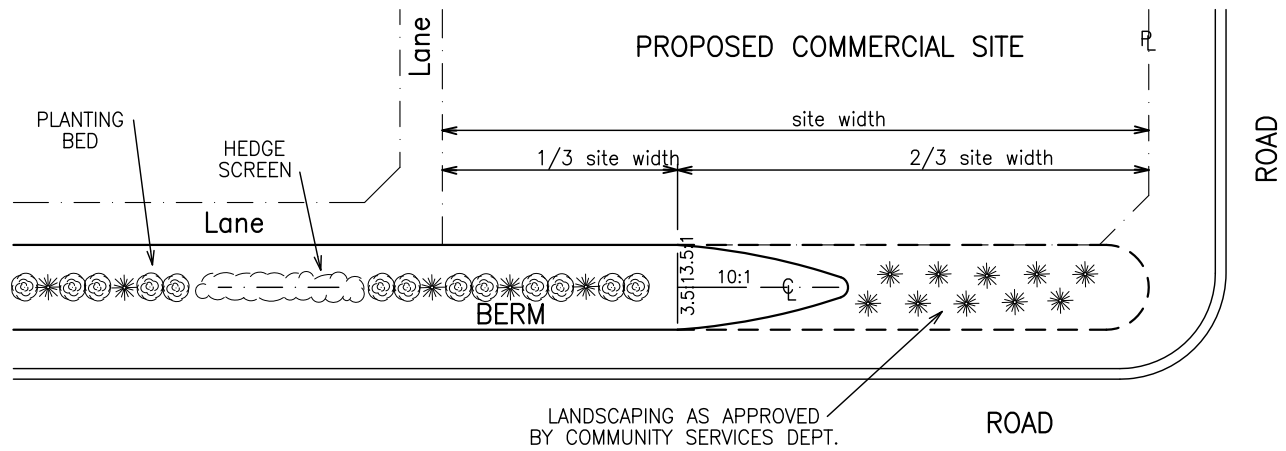
BACKSLOPE CROSS SECTION



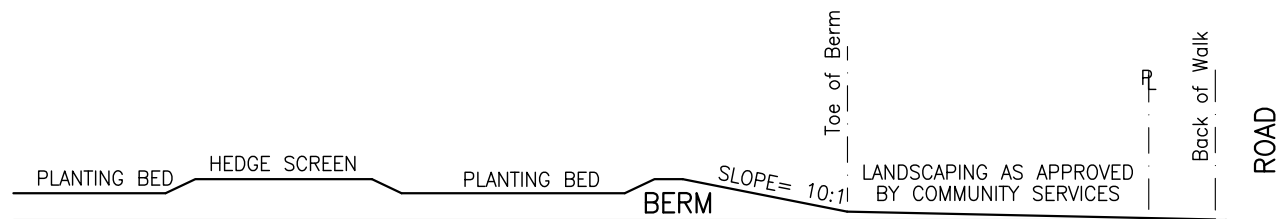
FORESLOPE CROSS SECTION

NOTE :
RETAINING WALLS, INCLUDING END TREATMENT, MUST BE DESIGNED ON A SITE-SPECIFIC
BASIS IN ACCORDANCE WITH THE MANUFACTURERS DESIGN SPECIFICATIONS.


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	BERM SIDE SLOPE / RETAINING WALL REQUIREMENTS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.02B
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

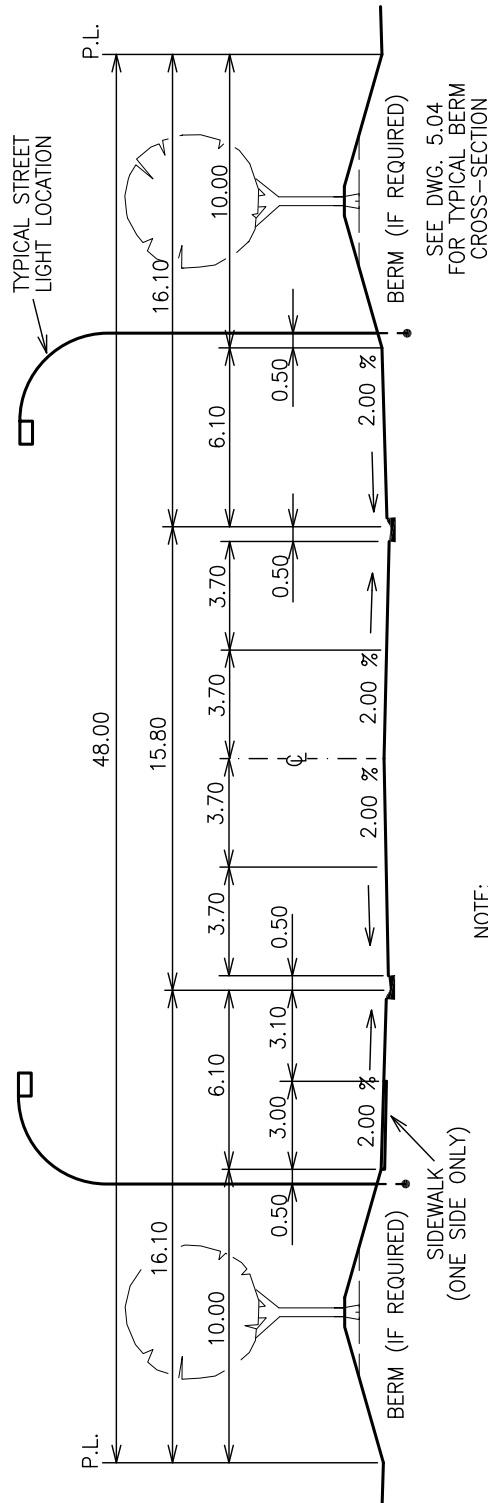


BERM PLAN VIEW



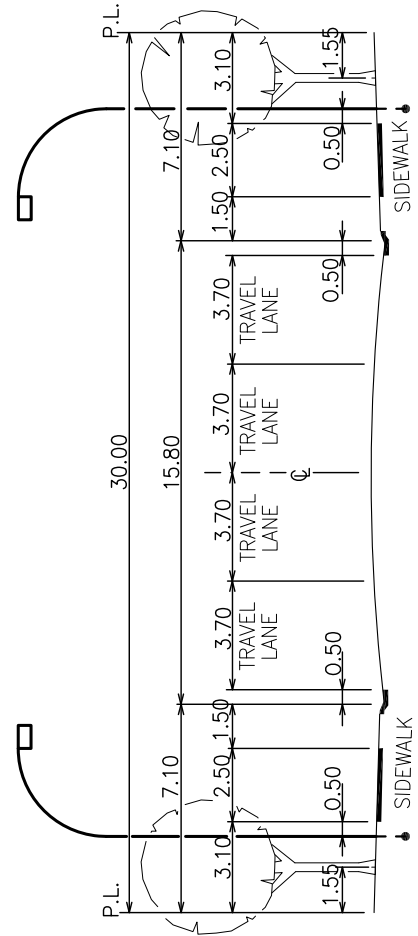
BERM ELEVATED VIEW

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	BERM HEIGHT REDUCTION NEXT TO COMMERCIAL SITE		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.02C
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		



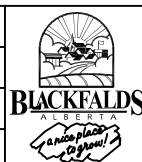
NOTE:
RIGHT OF WAY TO BE WIDENED AT MAJOR
INTERSECTIONS TO PROVIDE FOR LEFT TURN
CHANNELIZATION.

SEE DWG. 5.04
FOR TYPICAL BERM
CROSS-SECTION



REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

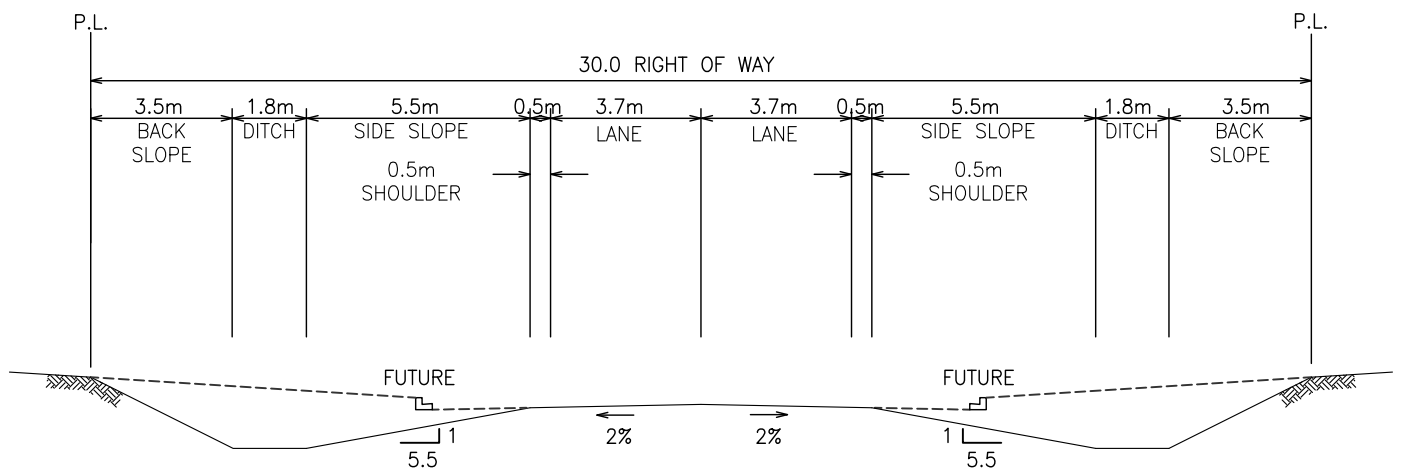


TOWN OF BLACKFALDS


UNDIVIDED ARTERIAL ROADWAY

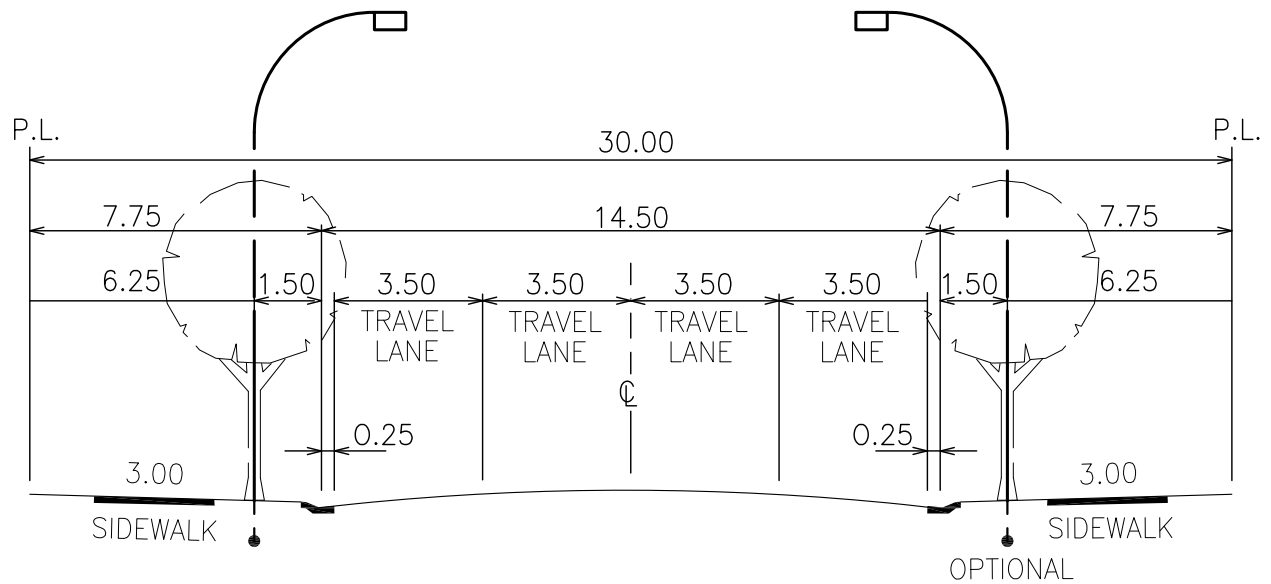
Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:

5.03

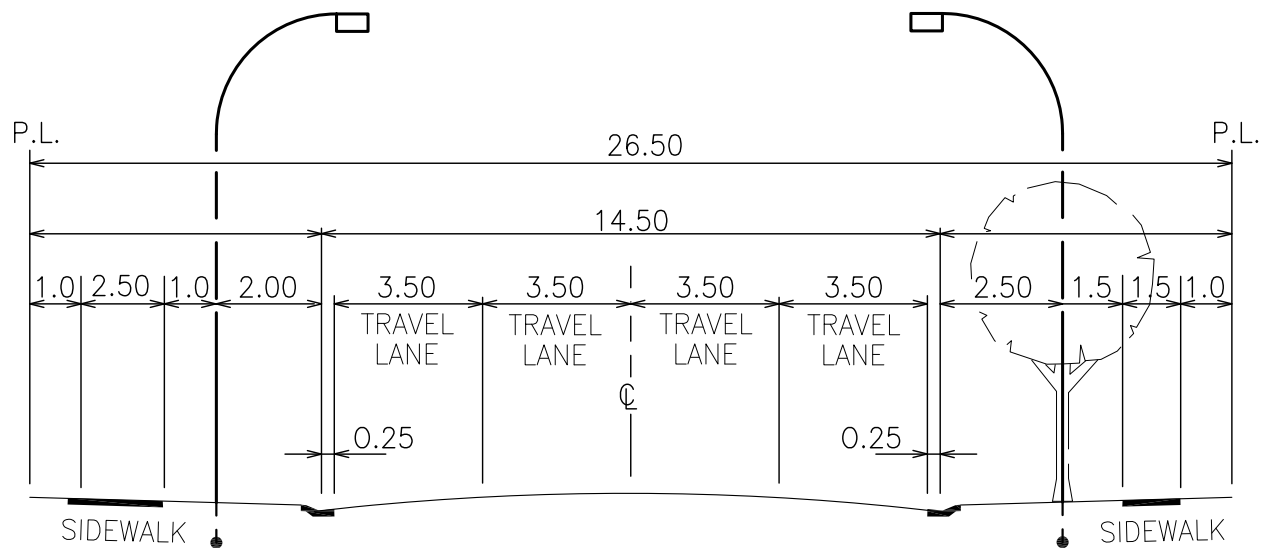


NOTES:
 ENSURE THAT ROAD PROFILE IS DESIGNED
 TO ACCOMMODATE FUTURE CURB AND
 GUTER DRAINAGE. (ie. MINIMUM GRADE
 ALONG GUTTER LINE 0.5%).


REVISIONS			 TOWN OF BLACKFALDS STAGED ARTERIAL CONSTRUCTION		
Date	Details	Drawn			
	-	-	Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
-	-	-			
-	-	-			
-	-	-	DWG. NO. 5.04		

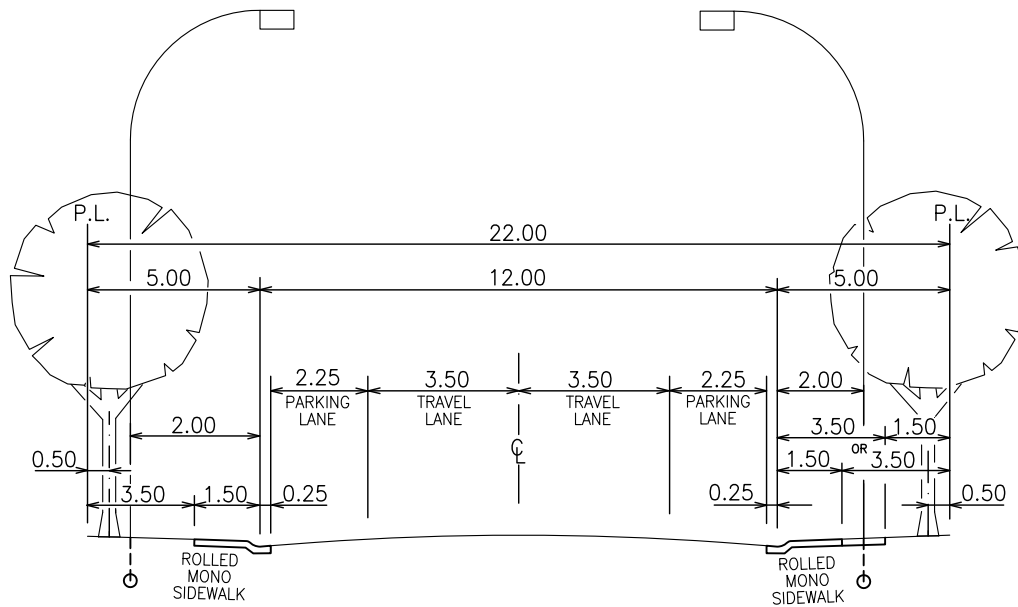


COLLECTOR ROADWAY WITH SEPERATE WALK

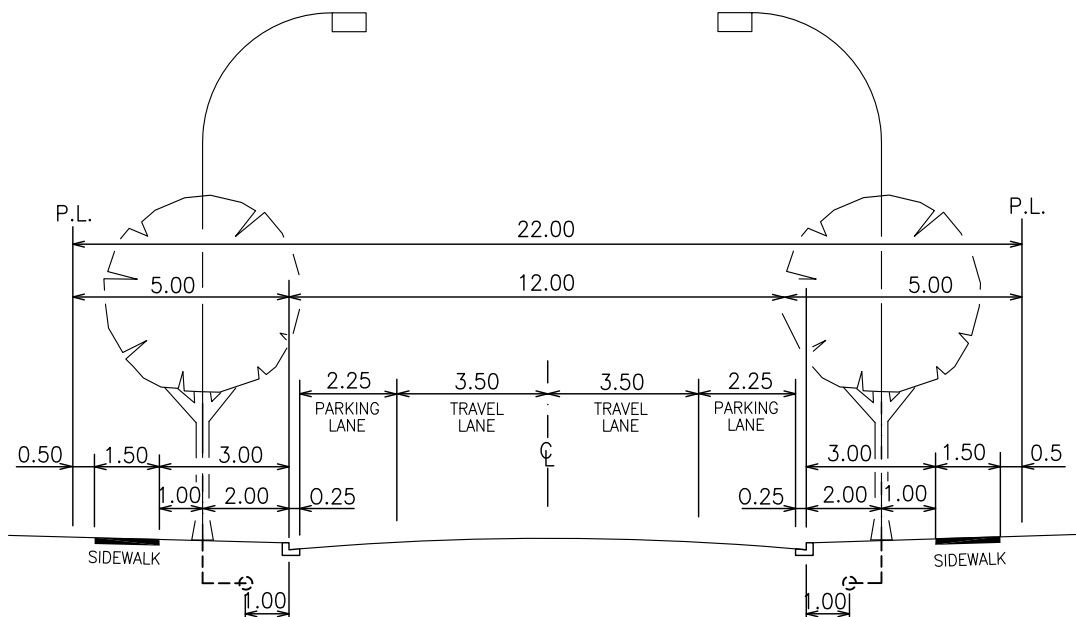


MODIFIED COLLECTOR ROADWAY WITH SEPERATE WALK



REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	RESIDENTIAL UNDIVIDED COLLECTOR ROADWAY		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.05
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:

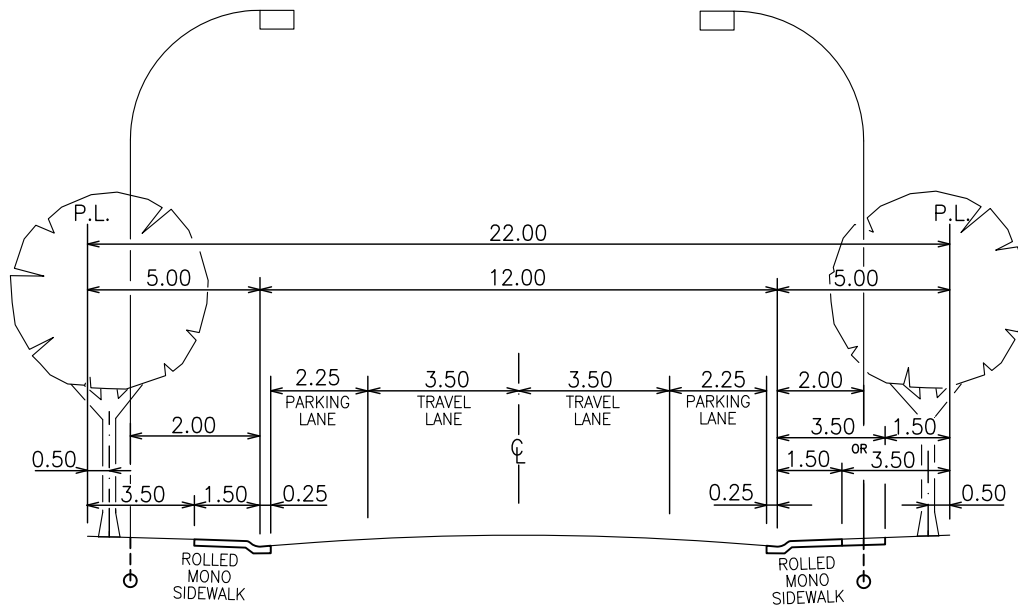


STANDARD COLLECTOR ROADWAY
WITH MONO SIDEWALK

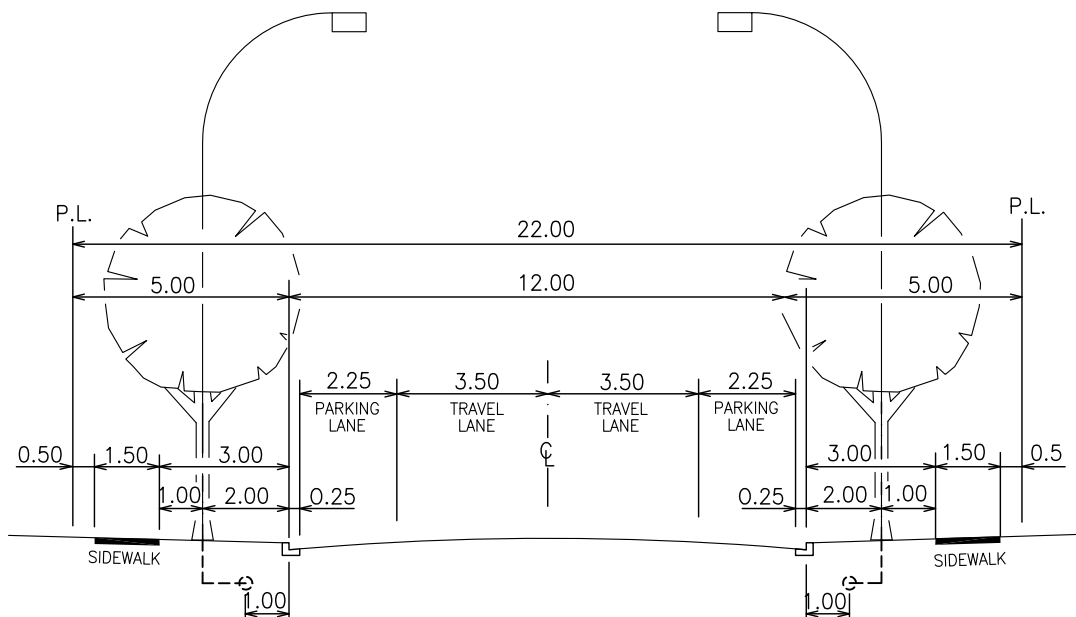


COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK

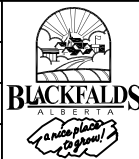
REVISIONS				TOWN OF BLACKFALDS 12m UNDIVIDED LOCAL ROADWAY		
Date	Details	Drawn				
-	-	-		Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
			DWG. NO. 5.06			

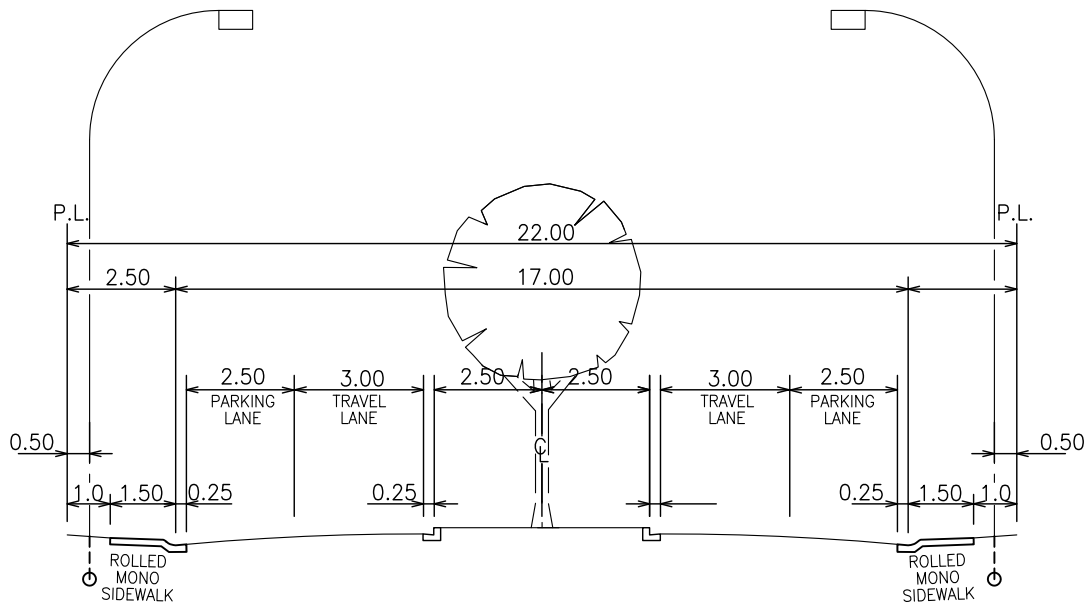


STANDARD COLLECTOR ROADWAY
WITH MONO SIDEWALK

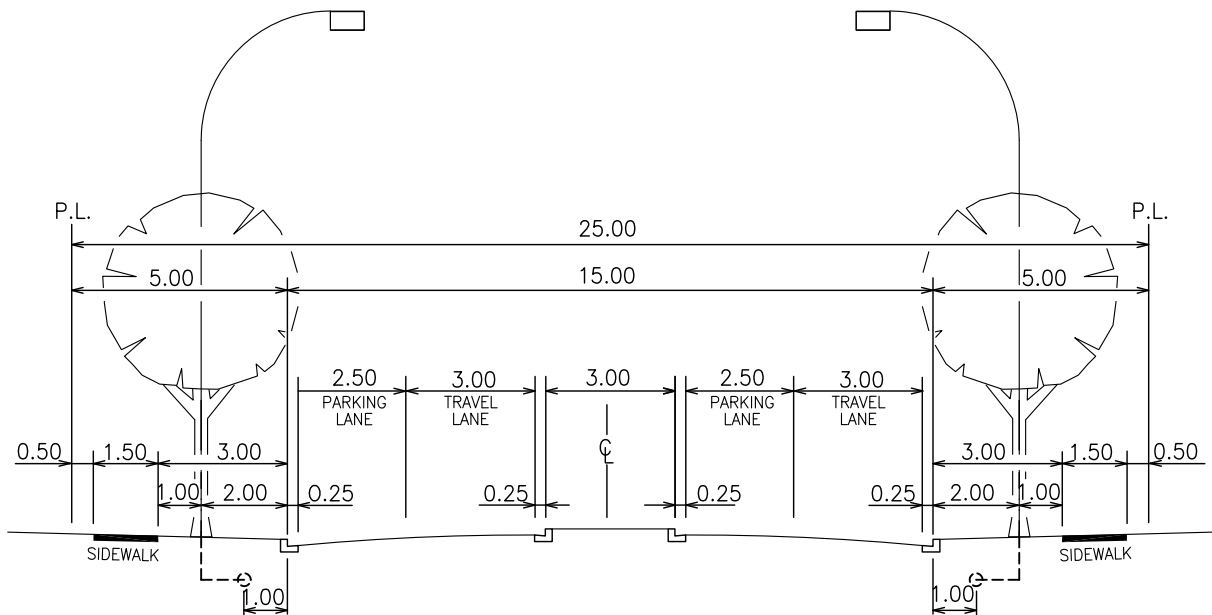


COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK


REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		12m UNDIVIDED LOCAL ROADWAY		
–	–	–				
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.	
–	–	–	Checked		5.06A	
–	–	–	Date: 11.02.05	Scale: NTS		Drawn:

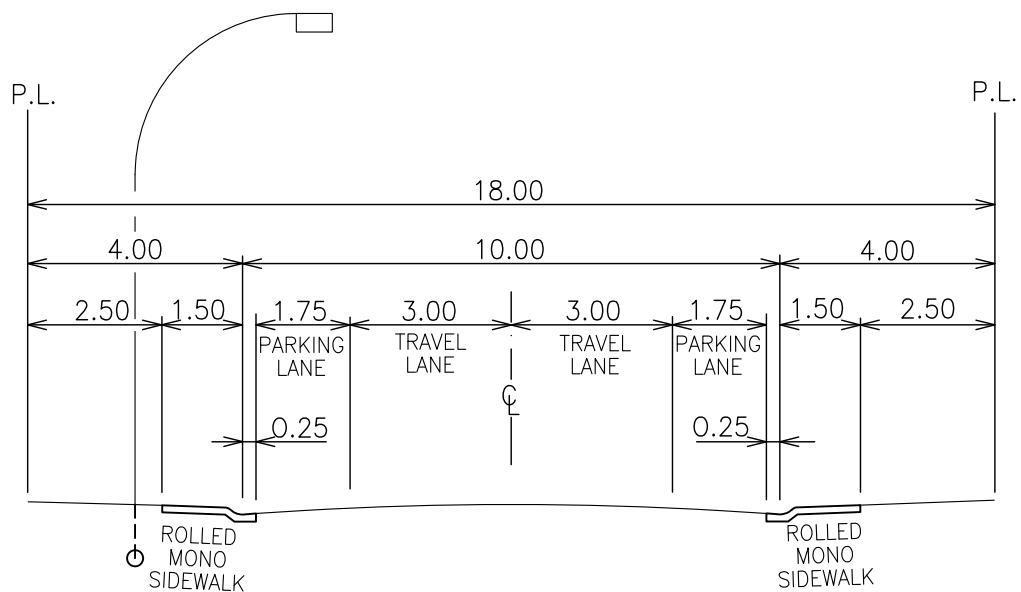


12m LOCAL DIVIDED ROADWAY
WITH MONO SIDEWALK




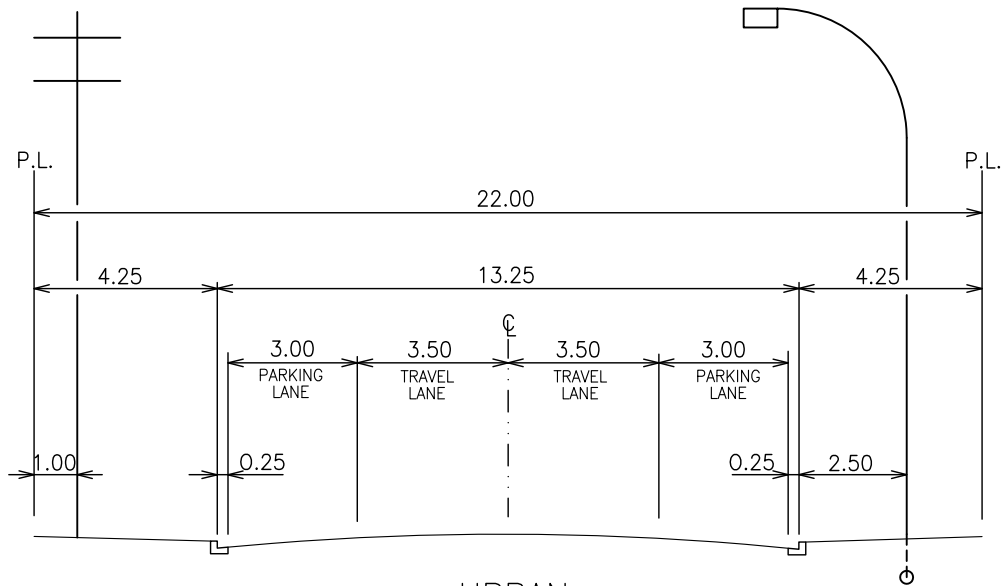
15m DIVIDED COLLECTOR ROADWAY
WITH SEPARATE SIDEWALK

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	STANDARD DIVIDED ROADWAYS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		
-	-	-	Checked		
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:
			DWG. NO. 5.06B		

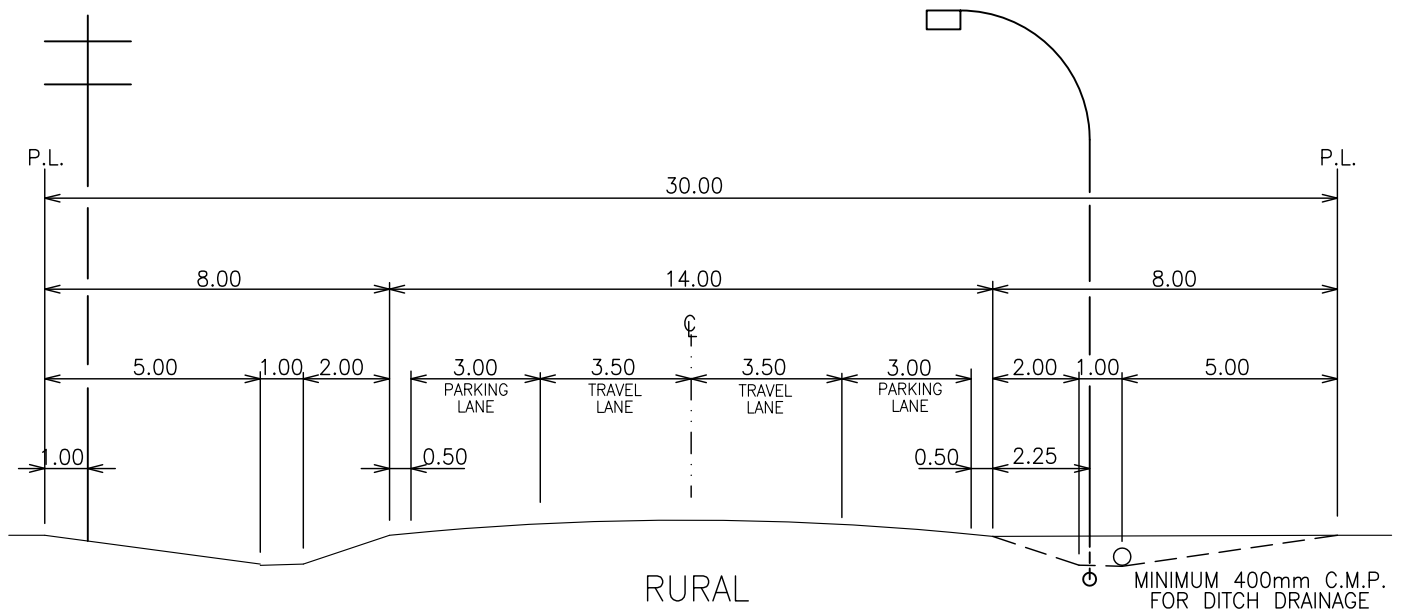


UNDIVIDED LOCAL ROADWAY


REVISIONS				TOWN OF BLACKFALDS 10m UNDIVIDED LOCAL ROADWAY		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
				DWG. NO. 5.07		

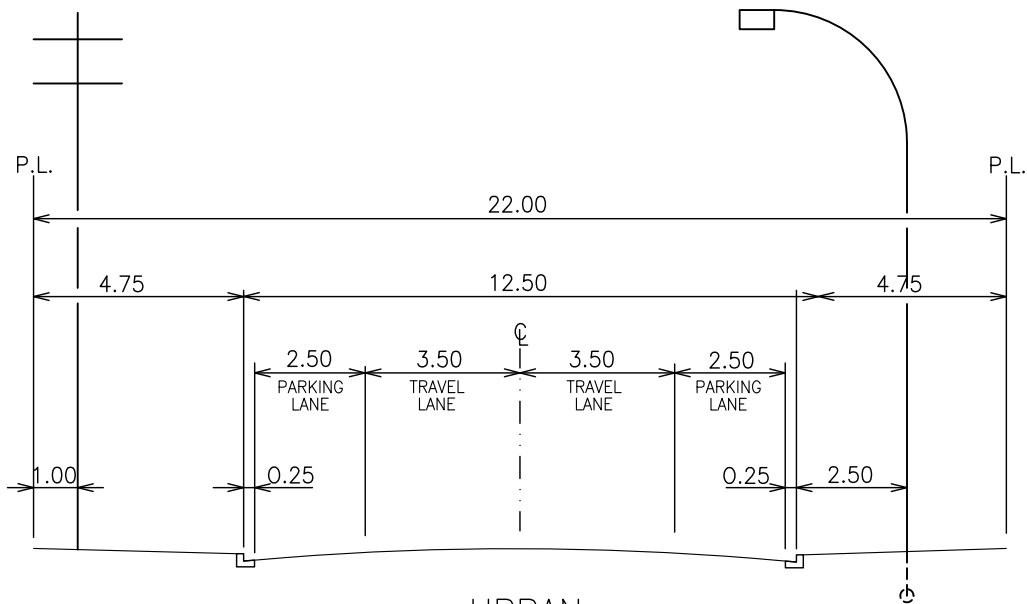


URBAN
UNDIVIDED INDUSTRIAL
COLLECTOR ROADWAY

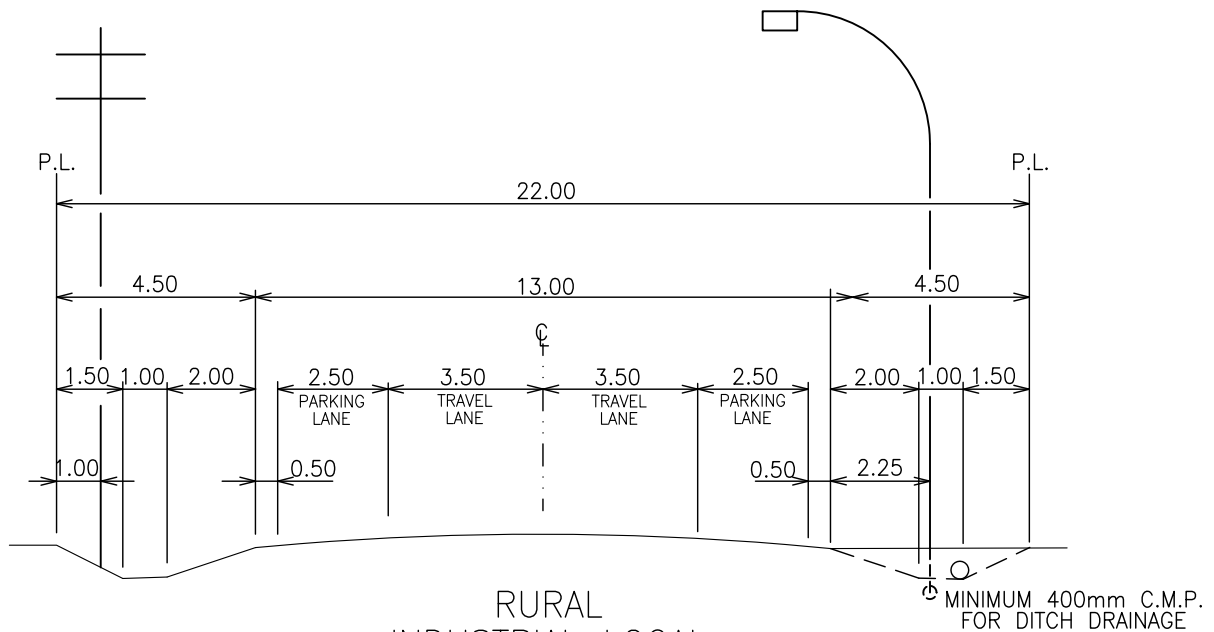


RURAL
UNDIVIDED INDUSTRIAL
COLLECTOR ROADWAY


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	RURAL & URBAN UNDIVIDED INDUSTRIAL COLLECTOR ROADWAY		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.08
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

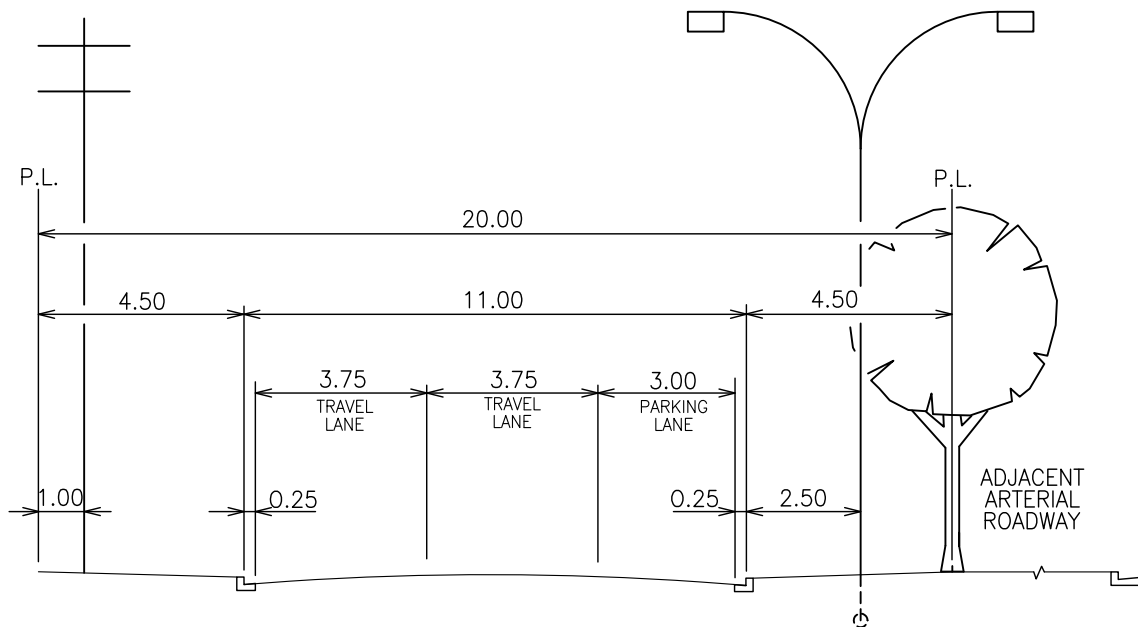


URBAN
INDUSTRIAL LOCAL
ROADWAY

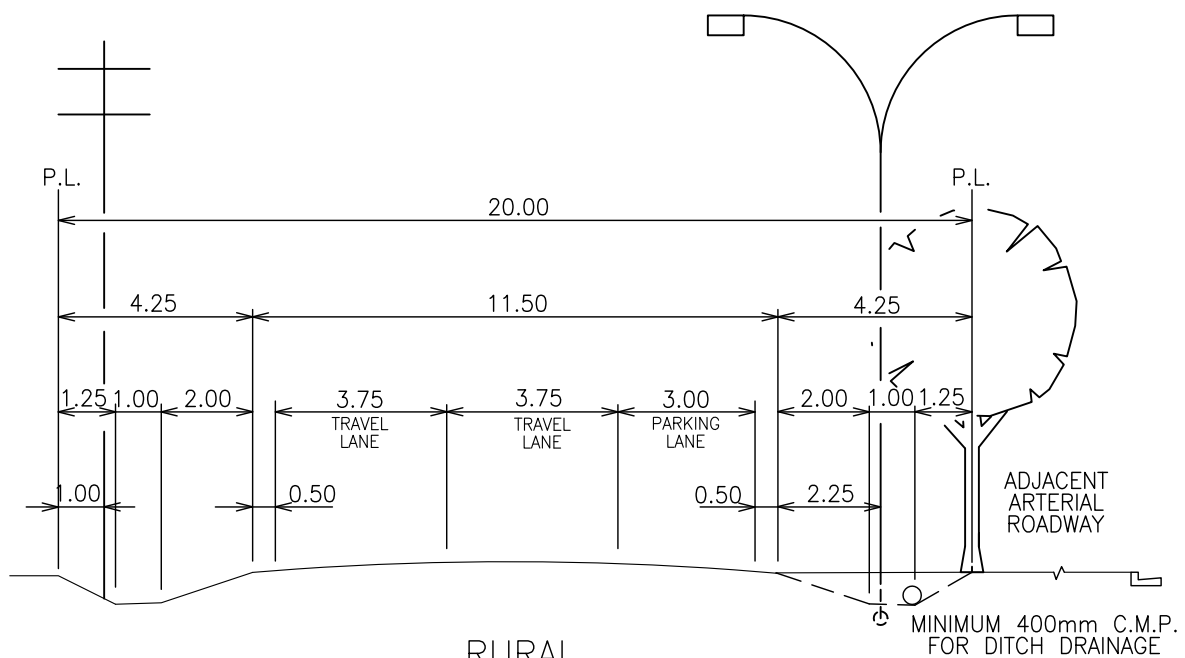


RURAL
INDUSTRIAL LOCAL
ROADWAY


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	RURAL & URBAN INDUSTRIAL LOCAL ROADWAY		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		
-	-	-	Checked		
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:
					DWG. NO.
					5.09

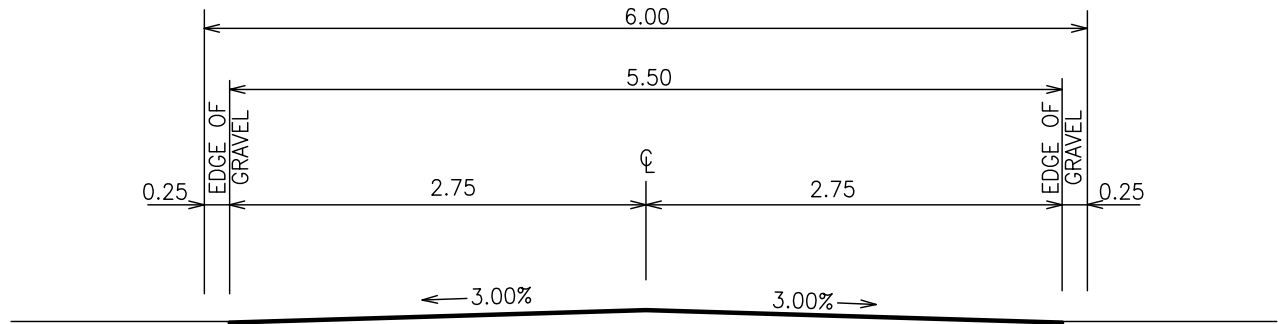


URBAN
SERVICE ROAD

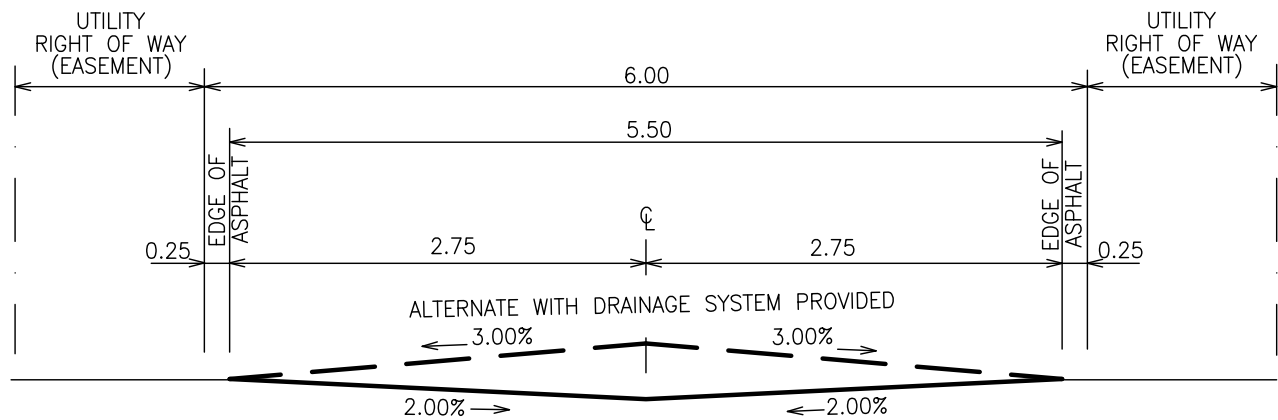


RURAL
SERVICE ROAD

REVISIONS				TOWN OF BLACKFALDS RURAL & URBAN SERVICE ROAD ADJACENT TO ARTERIAL ROADWAY		
Date	Details	Drawn				
	-	-		<div>Approved PGW (TOWN OF BLACKFALDS)</div> <div>Checked</div> <div>Date: 11.02.05 Scale: NTS Drawn:</div>		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
			<div>DWG. NO.</div> <div>5.10</div>			




GRAVEL LANE

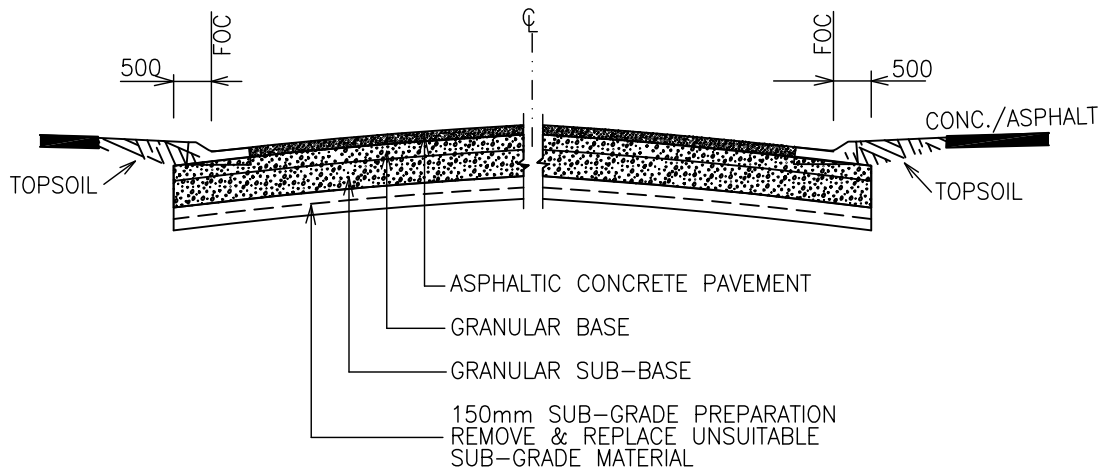


PAVED LANE

NOTE :

- LANE TO BE PAVED ADJACENT TO MULTI-FAMILY AND COMMERCIAL DEVELOPMENTS WHERE LANE ACCESS IS PROVIDED.


REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	GRAVEL AND PAVED LANES		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.11
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

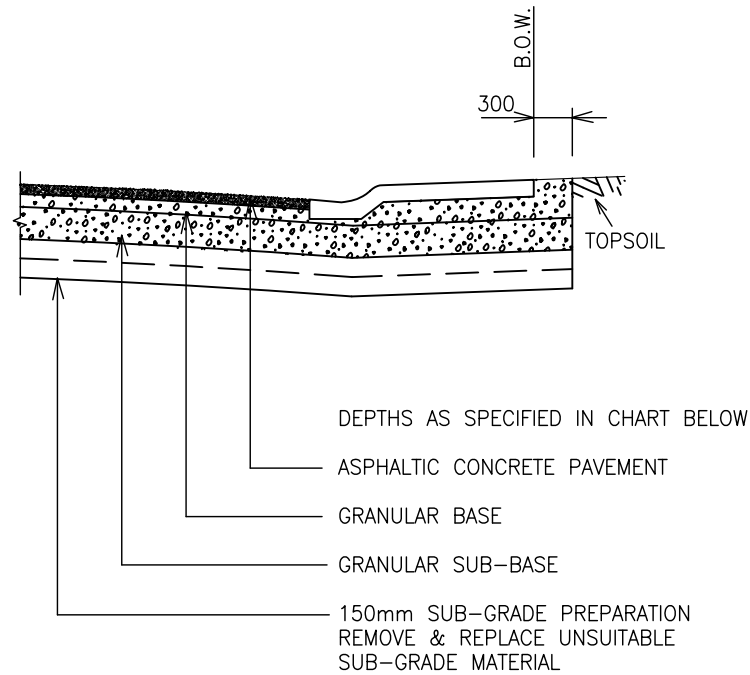


UNDIVIDED ARTERIAL ROADWAY

MINIMUM* DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
ARTERIAL	125	200	350	675

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS



REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	ARTERIAL ROADWAY PAVEMENT STRUCTURE CROSS SECTION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.12
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	Drawn:		

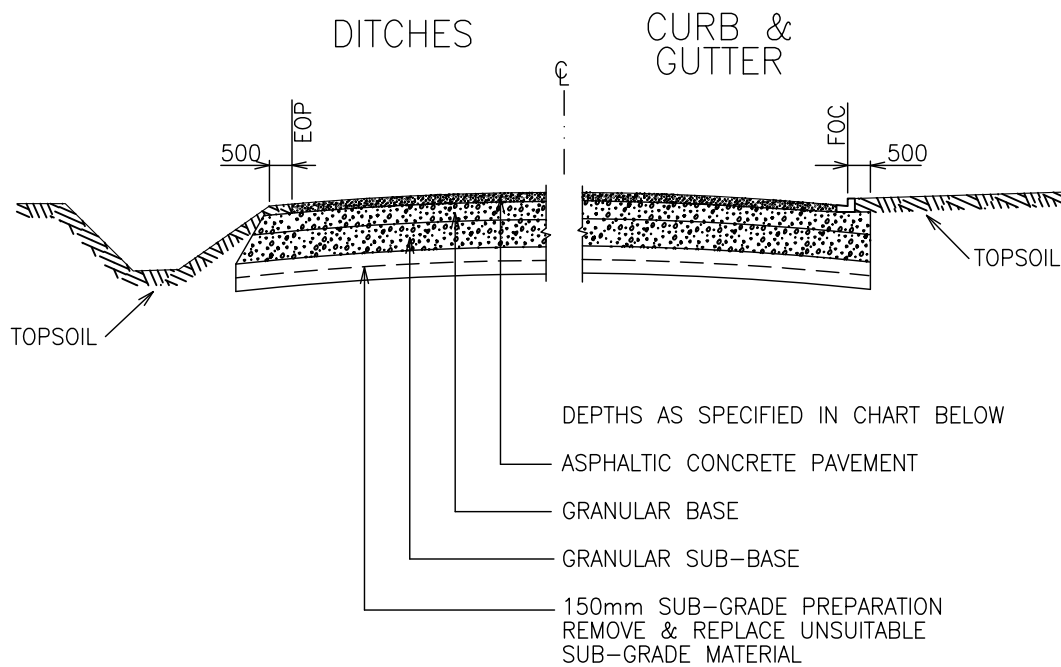


STANDARD RESIDENTIAL LOCAL & COLLECTOR ROADWAY

MINIMUM* DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
RESIDENTIAL LOCAL	75	100	250	425
RESIDENTIAL COLLECTOR	100	150	300	550

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS


REVISIONS			 TOWN OF BLACKFALDS RESIDENTIAL ROADWAY PAVEMENT STRUCTURE CROSS SECTION		
Date	Details	Drawn			
	-	-	 TOWN OF BLACKFALDS RESIDENTIAL ROADWAY PAVEMENT STRUCTURE CROSS SECTION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.13
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	Drawn:		

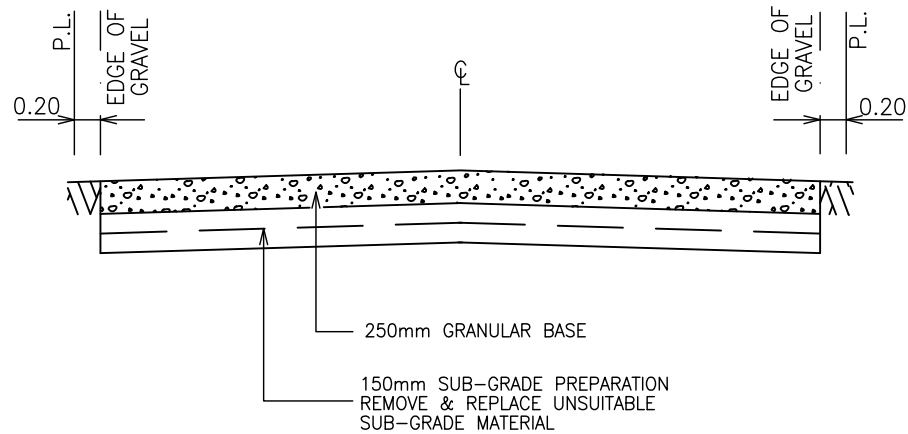


INDUSTRIAL LOCAL / COLLECTOR ROADWAY

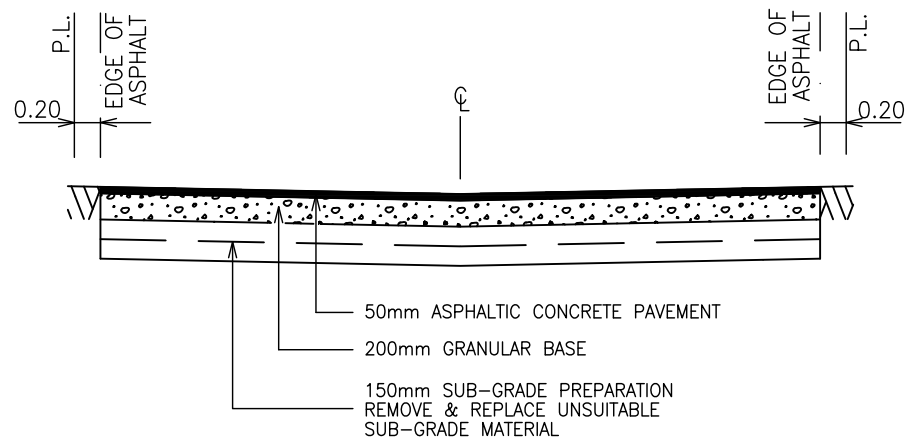
MINIMUM* DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB-BASE (mm)	TOTAL DEPTH (mm)
INDUSTRIAL LOCAL	90	150	300	540
INDUSTRIAL COLLECTOR	100	200	300	600

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS

REVISIONS				TOWN OF BLACKFALDS INDUSTRIAL ROADWAY PAVEMENT STRUCTURE CROSS SECTION		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
						5.14




GRAVEL LANE

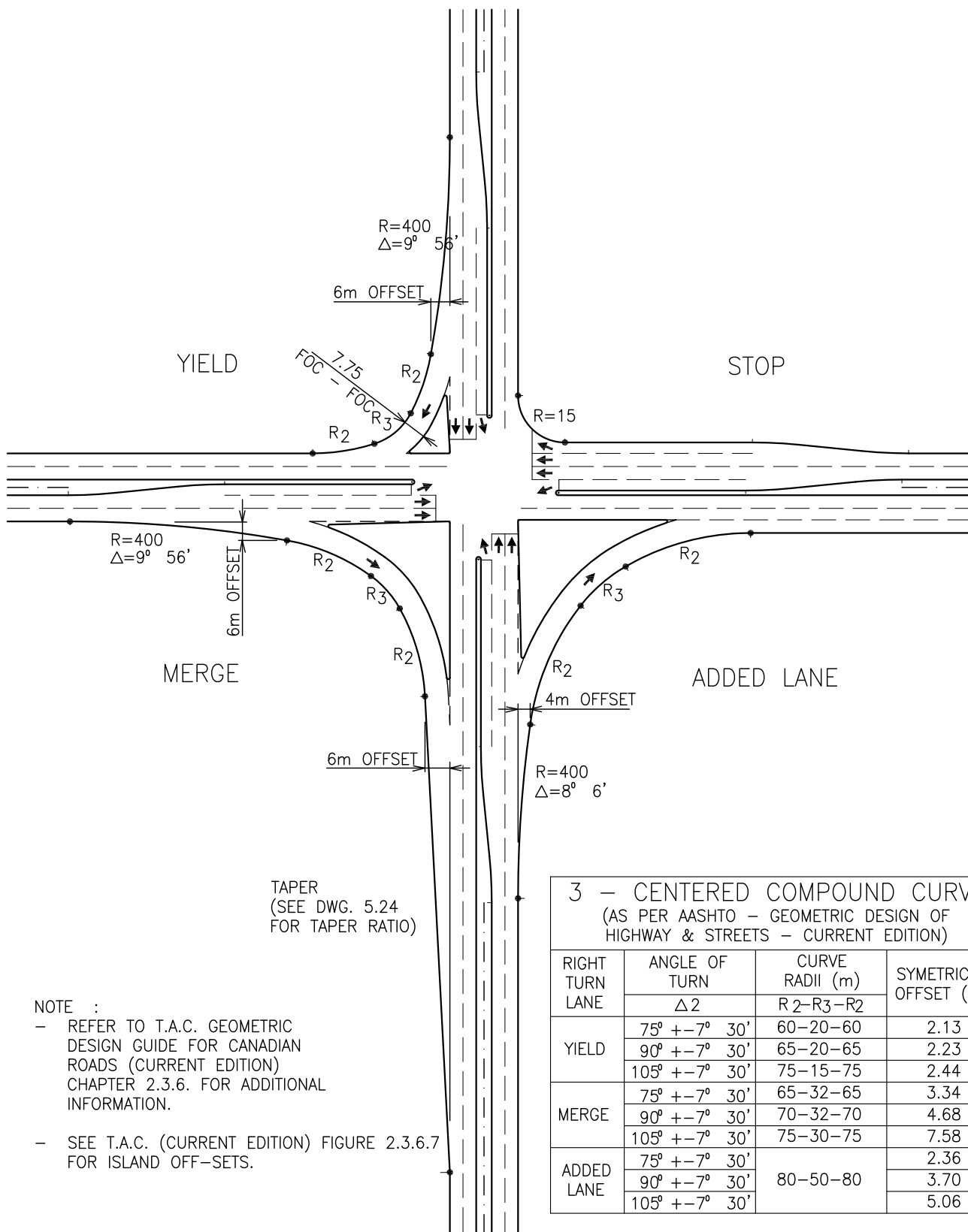


PAVED LANE

MINIMUM* 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

*GEOTECHNICAL ENGINEER TO CONFIRM MINIMUM DESIGN STRUCTURE FOR ALL ROADS

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	GRAVEL / PAVED LANE PAVEMENT STRUCTURE CROSS SECTION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.15
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

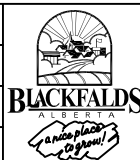


NOTE :

- REFER TO T.A.C. GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (CURRENT EDITION) CHAPTER 2.3.6. FOR ADDITIONAL INFORMATION.
- SEE T.A.C. (CURRENT EDITION) FIGURE 2.3.6.7 FOR ISLAND OFF-SETS.

REVISIONS

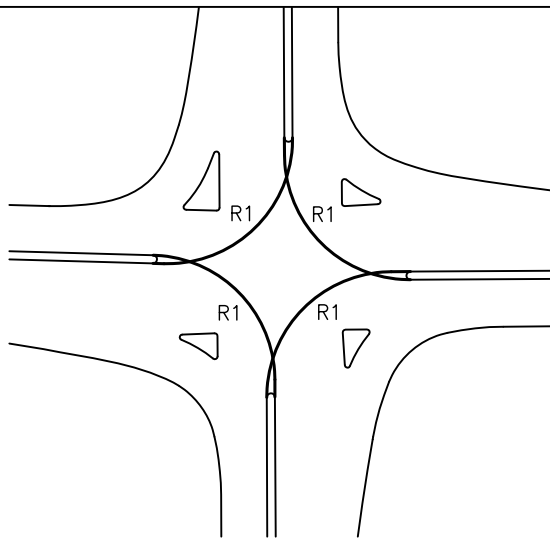
Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



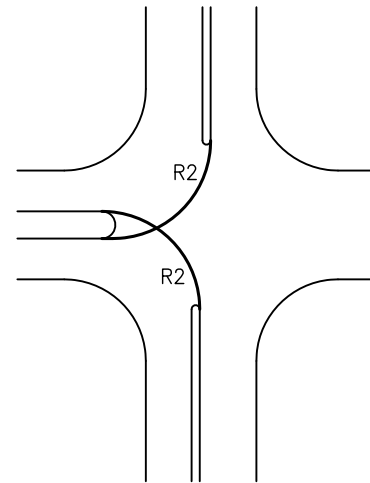
TOWN OF BLACKFALDS

ARTERIAL ROADWAY
RIGHT TURN DESIGNS

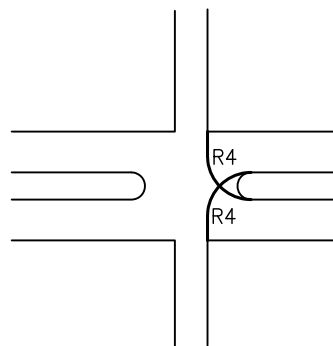
Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		5.16
Date: 11.02.05	Scale: NTS Drawn:	



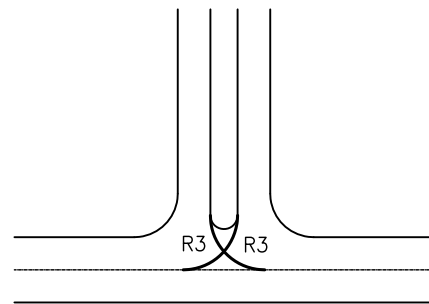
ARTERIAL TO ARTERIAL



ARTERIAL TO COLLECTOR



DIVIDED COLLECTOR OR LOCAL
TO LANE OR DRIVEWAY

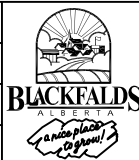
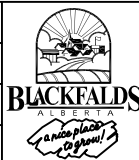


COLLECTOR OR LOCAL
TO COLLECTOR OR LOCAL

TURNING RADII

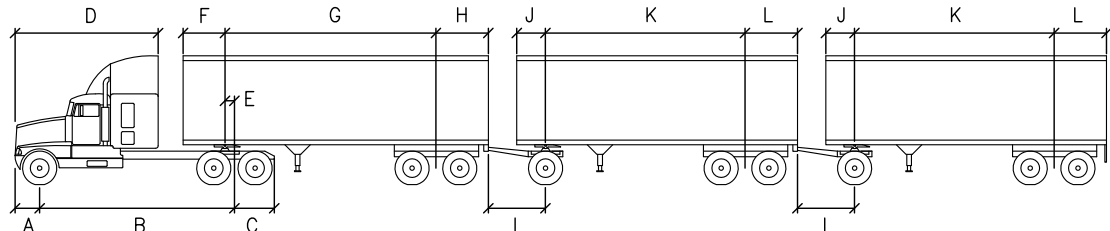
ARTERIAL TO ARTERIAL	R1	22m
ARTERIAL TO COLLECTOR	R2	18m
COLLECTOR TO COLLECTOR	R3	15m
COLLECTOR TO LOCAL	R3	12m
LOCAL TO LOCAL	R3	10m
COLLECTOR / LOCAL TO LANE	R4	8m

REVISIONS

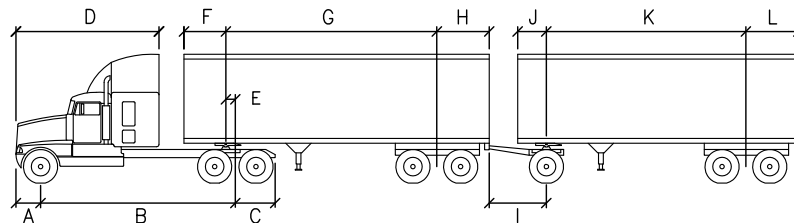
REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		INTERSECTION CENTERLINE CONTROL RADII		
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
–	–	–	Checked			5.17
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	

A side-view diagram of a truck with various dimensions labeled with letters. The truck consists of a cab and a trailer. Dimension A is the wheelbase from the front axle to the first rear axle. Dimension B is the wheelbase from the first rear axle to the second rear axle. Dimension C is the overhang from the second rear axle to the end of the trailer. Dimension D is the length of the cab. Dimension E is the height of the cab roof. Dimension F is the height of the trailer side. Dimension G is the length of the trailer. Dimension H is the total length of the truck from the front bumper to the end of the trailer.

WB-29





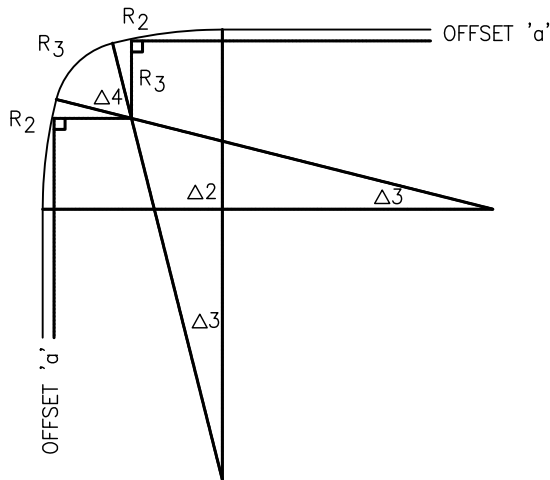
WB-35



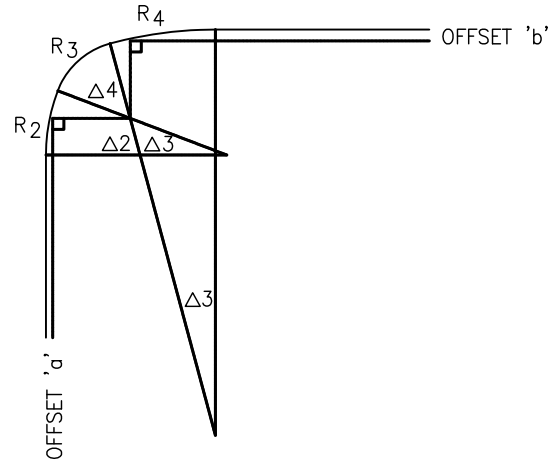
DESCRIPTION	T.A.C. DESIGN VEHICLES				
	WB-15	WB-17	WB-20	WB-29	WB-35
TRACTOR					
A Tractor Front	1.0	1.0	1.0	1.0	1.0
B Tractor Wheelbase	5.5	5.5	5.5	5.5	5.5
C Tractor Rear	1.3	1.3	1.3	1.3	1.3
D Cab Length	3.5	3.5	3.0	3.0	3.0
E Axle to Kingpin	0.0	0.0	0.0	0.0	0.0
FIRST TRAILER					
F Trailor Front	1.3	1.3	1.3	1.3	1.3
G Pin to Trailor Axle	9.1	11.5	14.3	6.3	12.2
H Trailor 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 Trailor Front	N/A	N/A	N/A	0.9	1.2
K Pin to Trailor Axle	N/A	N/A	N/A	6.6	12.2
L Trailor Rear	N/A	N/A	N/A	1.0	1.2

SEE DWG. 5.19 FOR VEHICLE TURNING RADII.

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	–	–		W.B. DESIGN VECHILES	
–	–	–			
–	–	–			
–	–	–	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
–	–	–	Checked		5.18
–	–	–	Date: 11.02.05	Scale: NTS	




3 – CENTRED SYMETRICAL
COMPOUND CURVE

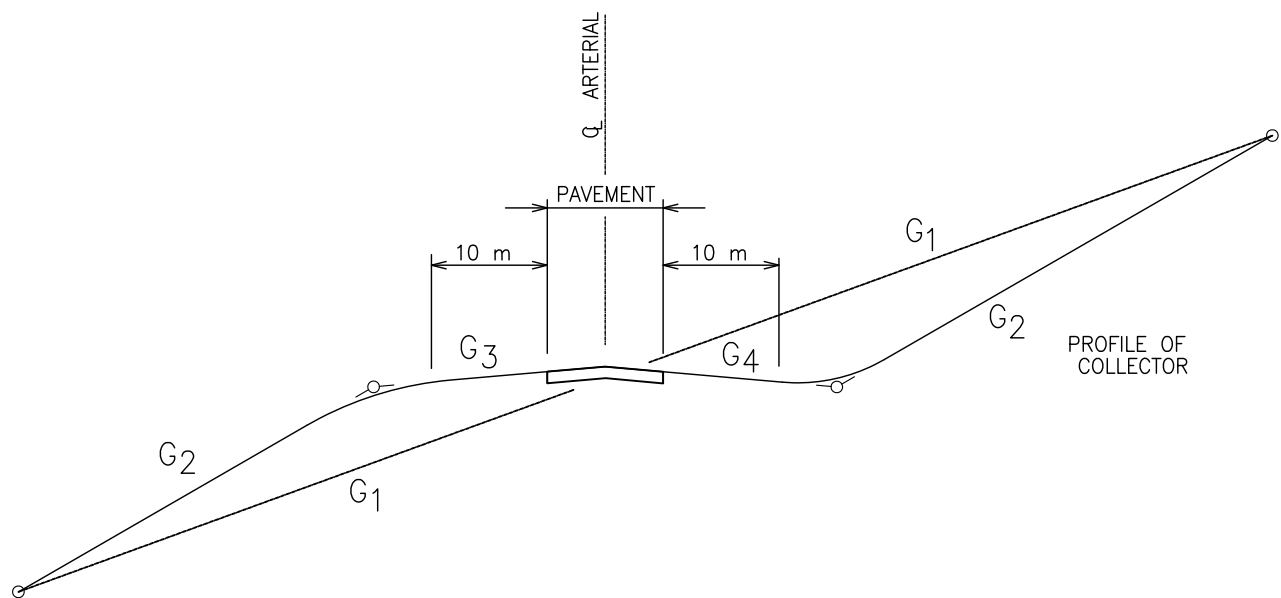


3 – CENTRED ASYMETRICAL
COMPOUND CURVE

NOTE :
Δ3 AND Δ4 TO BE CALCULATED USING
R₂ R₃ 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 ₄	a	b		
WB-15	75°+ – 7° 30'	46	15	46	1.83	46	15	69	0.61	3.05		
	90°+ – 7° 30'	55	18	55	1.83	37	12	61	0.61	3.05		
	105°+ – 7° 30'	55	14	55	2.44	46	12	64	0.61	3.05		
WB-17	75°+ – 7° 30'	61	21	61	2.13	37	18	61	0.61	3.05		
	90°+ – 7° 30'	61	20	61	2.13	30	17	79	0.61	3.05		
	105°+ – 7° 30'	73	15	73	2.44	30	14	152	1.22	3.05		
WB-20	75°+ – 7° 30'	134	23	134	4.57	43	30	165	1.52	3.66		
	90°+ – 7° 30'	122	21	122	3.05	49	21	110	1.83	3.05		
	105°+ – 7° 30'	158	15	158	4.57	110	23	183	1.22	3.20		
WB-29	75°+ – 7° 30'	76	24	76	1.40	30	24	91	0.50	1.50		
	90°+ – 7° 30'	76	21	76	1.40	61	21	91	0.30	1.50		
	105°+ – 7° 30'	76	18	76	1.50	30	18	91	0.50	1.80		
WB-35	75°+ – 7° 30'	213	38	213	2.00	46	34	168	0.50	3.50		
	90°+ – 7° 30'	213	34	213	2.00	46	29	168	0.60	3.50		
	105°+ – 7° 30'	213	29	213	2.40	46	24	152	0.90	4.60		

REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		W.B. VEHICLE COMPUND CURVE TURN DESIGN		
–	–	–				
–	–	–	Approved	PGW (TOWN OF BLACKFALDS)		DWG. NO.
–	–	–	Checked			5.19
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	




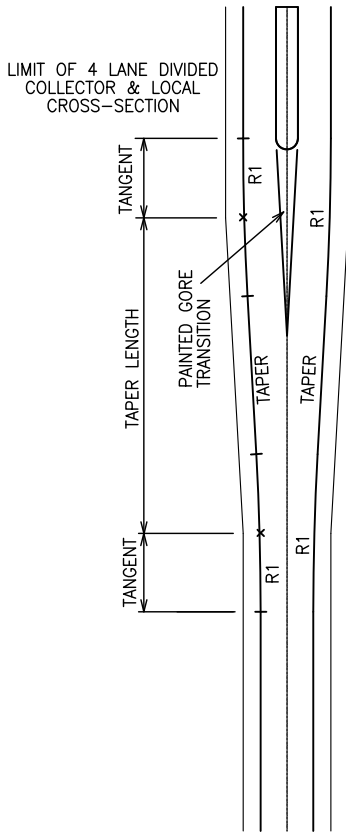
NOTE :

G₁ ORIGINAL GRADE OF MINOR ROAD

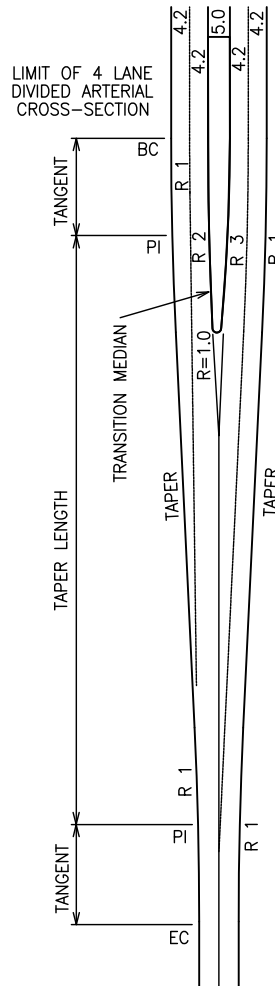
G₂ GRADE INTRODUCED TO ADJUST GRADE AT INTERSECTION

G₃ & G₄ GRADE ON COLLECTOR CONFORMS TO CROSS SLOPE ON ARTERIAL ROADWAY (EG. 0.5% TO 5.0%, NORMAL CROWN TO SUPERELEVATION).

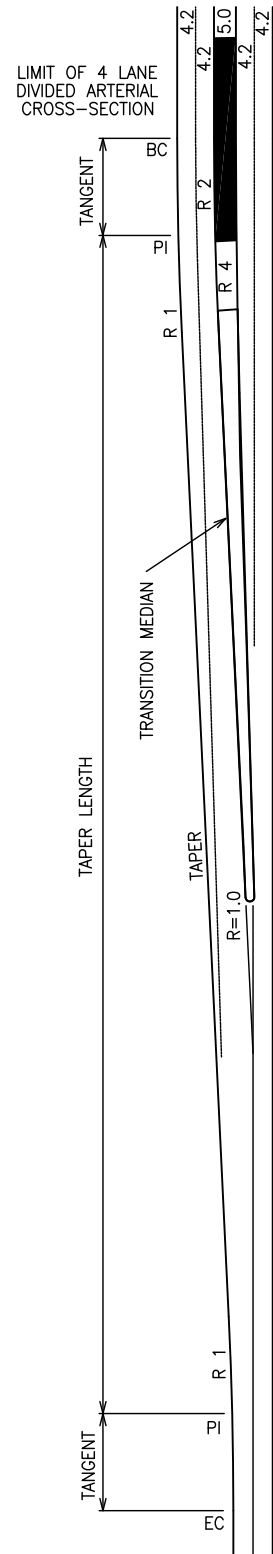
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	INTERSECTION GRADE ADJUSTMENT		
-	-	-			
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		5.20
-	-	-	Date: 11.02.05	Scale: NTS	
				Drawn:	



LOCAL / COLLECTOR CENTRELINE TRANSITION



ARTERIAL CENTRELINE TRANSITION



ARTERIAL OFFSET TRANSITION

OVERALL APPROACH OR DEPARTURE TAPER LENGTHS						
ROADWAY	DESIGN SPEED KM/H	TAPER RATIO	TRANSITION RADII (m)			
			R 1	R 2	R 3	R 4
LOCAL	50	15:1	500	---	---	---
COLLECTOR	60	18:1	700	---	---	---
ARTERIAL	70	21:1	930	921.6	475	2000
ARTERIAL	80	24:1	1200	1191.6	475	2000

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

REVISIONS

Date	Details	Drawn
	-	-
-	-	-
-	-	-
-	-	-
-	-	-

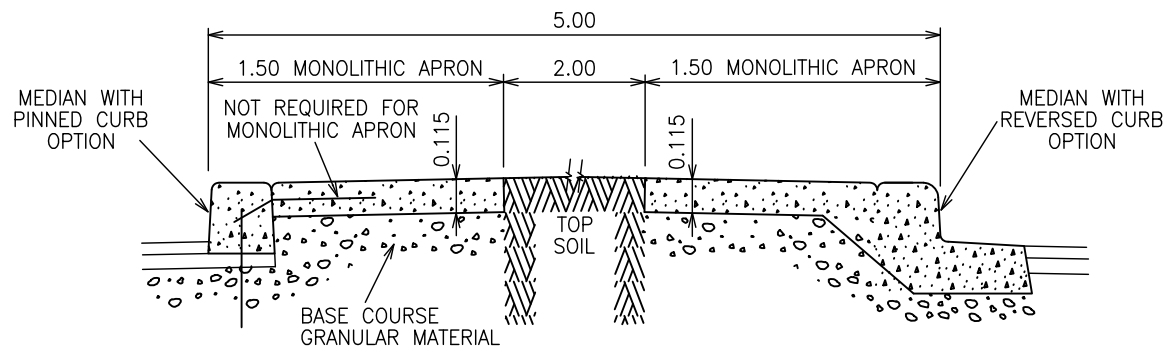
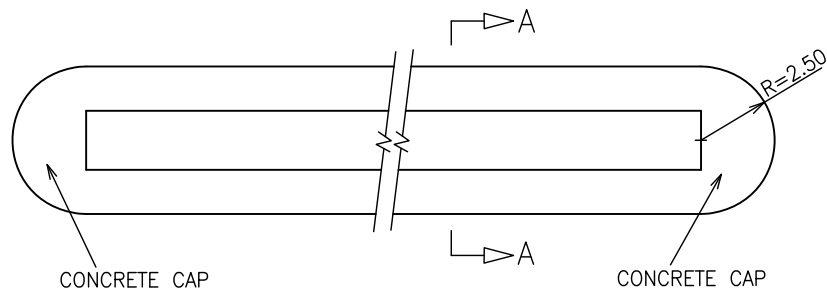
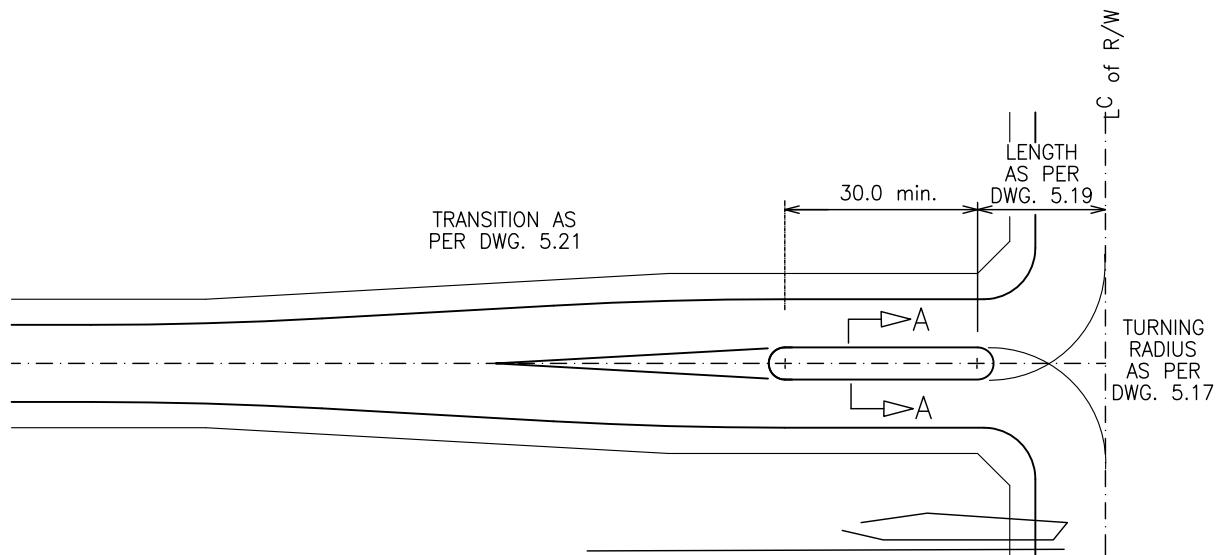


TOWN OF BLACKFALDS

DIVIDED TO UNDIVIDED
ROADWAY TRANSITION


Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		
Date: 11.02.05	Scale: NTS	Drawn:

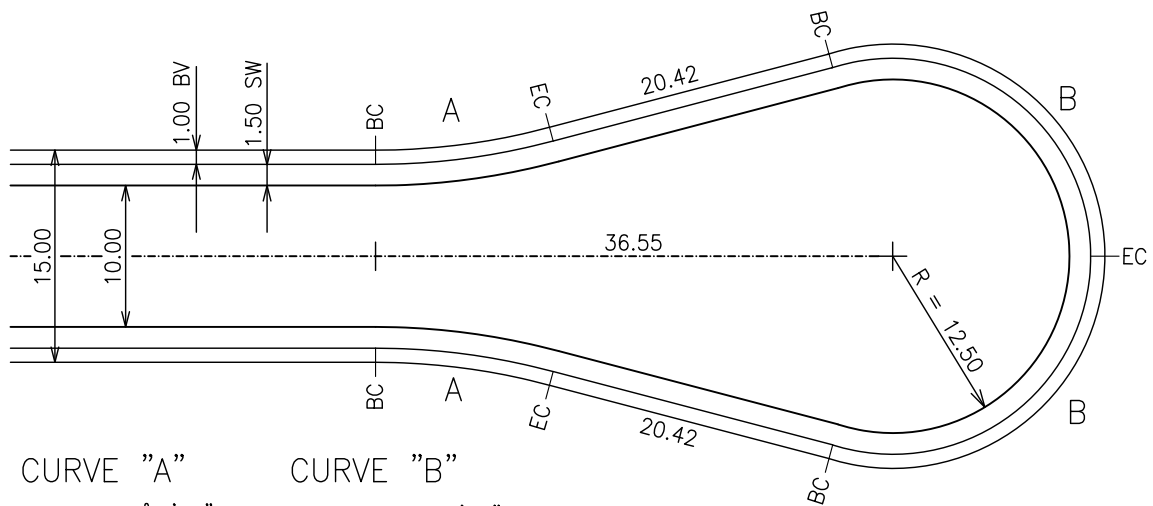
5.21



NOTE :
PATTERNED CONCRETE OR PAVING STONES MUST BE APPROVED BY THE TOWN

SECTION 'A - A'
(AS PER C.R.D. CONTRACT SPECIFICATIONS)

REVISIONS				TOWN OF BLACKFALDS COLECTOR & LOCAL ROADWAY CENTRE ISLAND		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
				DWG. NO. 5.22		

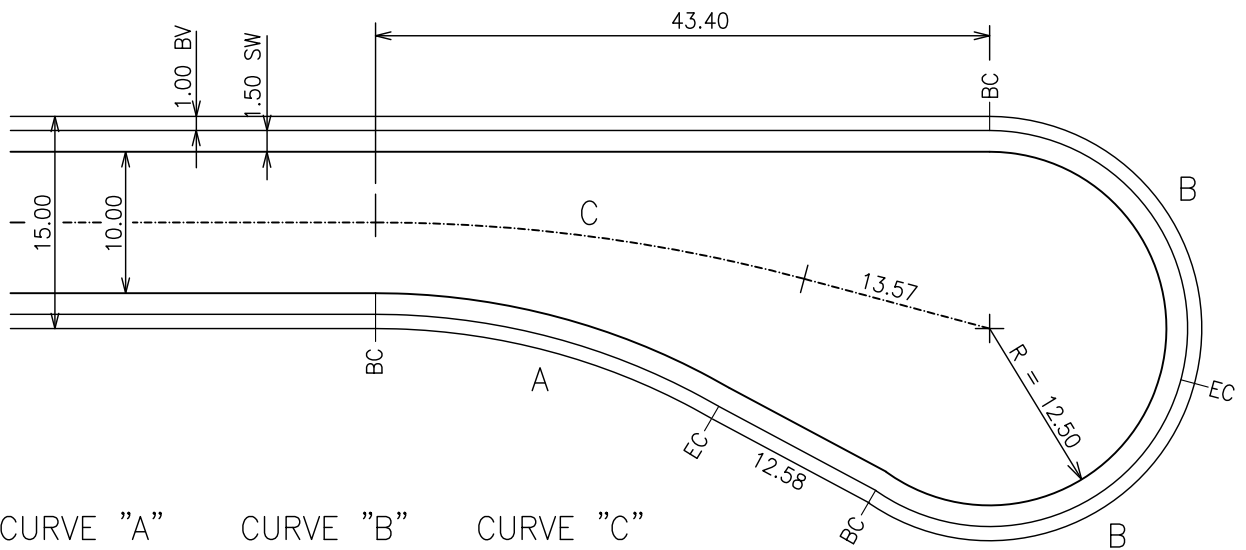


CURVE "A"

$\Delta = 15^\circ 0'00''$
 $R = 50.00$
 $ARC = 13.09$
 $TAN = 6.58$
 (at property line)

CURVE "B"

$\Delta = 105^\circ 0'00''$
 $R = 15.00$
 $ARC = 27.49$
 $TAN = 19.55$
 (at property line)



CURVE "A"

$\Delta = 30^\circ 0'00''$
 $R = 50.00$
 $ARC = 26.18$
 $TAN = 13.40$
 (at property line)

CURVE "B"

$\Delta = 105^\circ 0'00''$
 $R = 15.00$
 $ARC = 27.49$
 $TAN = 19.55$
 (at property line)

CURVE "C"

$\Delta = 15^\circ 0'00''$
 $R = 117.03$
 $ARC = 30.64$
 $TAN = 15.41$

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

15 / 10 LOCAL RESIDENTIAL
CUL - DE - SAC

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

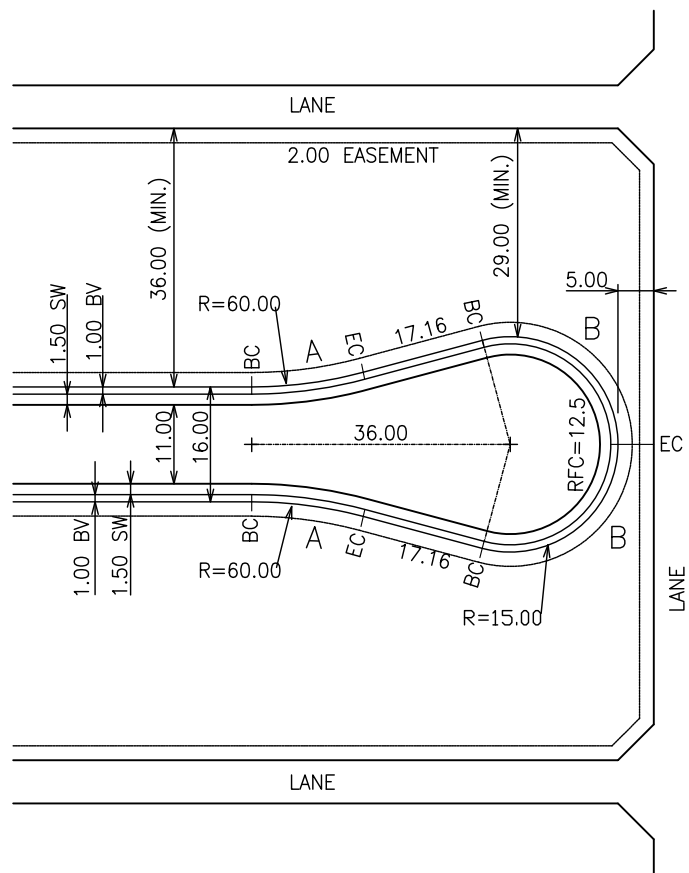
Checked

Date: 11.02.05

Scale: NTS

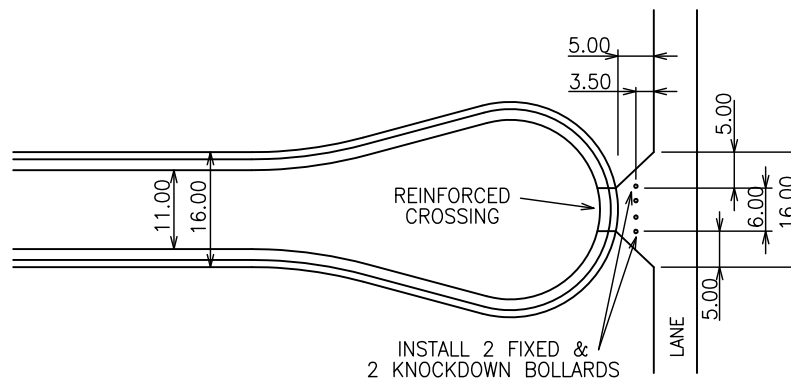
Drawn:

5.23




CURVE "A"
 $\Delta = 15^\circ 0'00''$
 $R = 50.00$
 $ARC = 13.09$
 $TAN = 6.58$

CURVE "B"
 $\Delta = 105^\circ 0'00''$
 $R = 15.00$
 $ARC = 27.49$
 $TAN = 19.55$

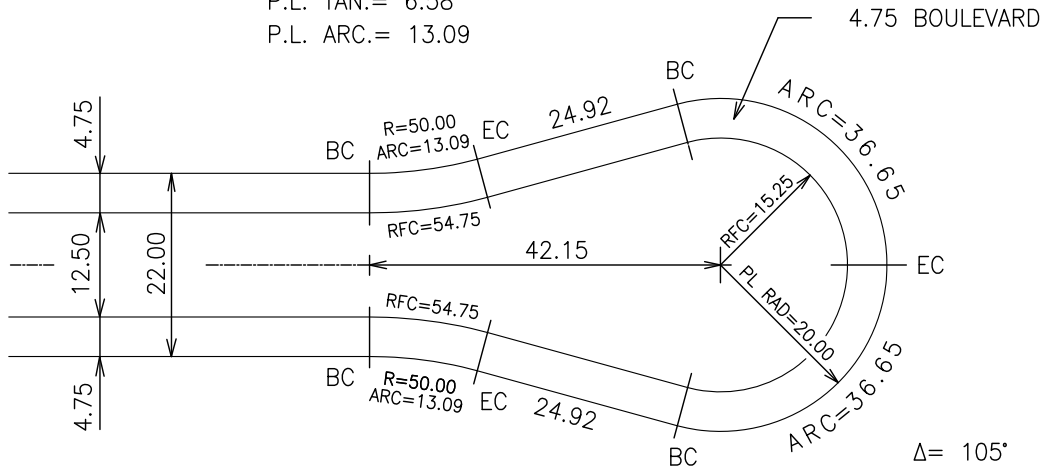


LANE ACCESS

NOTE:
 THIS DESIGN IS TO BE USED FOR DUPLEX,
 R1S AND ROW HOUSING DEVELOPMENTS.

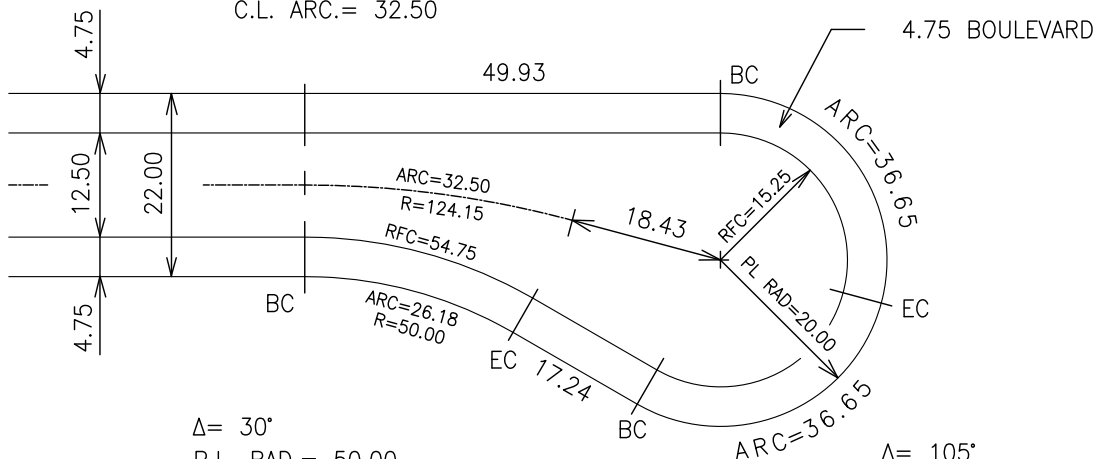
REVISIONS				TOWN OF BLACKFALDS 16 / 11 LOCAL RESIDENTIAL (MULTI-FAMILY) CUL - DE - SAC		
Date	Details	Drawn				
-	-	-	-	Approved PGW (TOWN OF BLACKFALDS)		
-	-	-	-			
-	-	-	-	Checked		
-	-	-	-	Date: 11.02.05	Scale: NTS	Drawn:
			DWG. NO.			5.24

$\Delta = 15^\circ$
 P.L. RAD. = 50.00
 P.L. TAN. = 6.58
 P.L. ARC. = 13.09



$\Delta = 105^\circ$
 P.L. RAD. = 20.00
 P.L. TAN. = 26.07
 P.L. ARC. = 36.65

$\Delta = 15^\circ$
 C.L. RAD. = 124.15
 C.L. TAN. = 16.35
 C.L. ARC. = 32.50

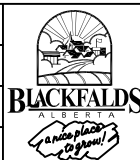


$\Delta = 30^\circ$
 P.L. RAD. = 50.00
 P.L. TAN. = 13.40
 P.L. ARC. = 26.18

$\Delta = 105^\circ$
 P.L. RAD. = 20.00
 P.L. TAN. = 26.07
 P.L. ARC. = 36.65

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

22 / 15 LOCAL INDUSTRIAL
CUL - DE - SAC

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

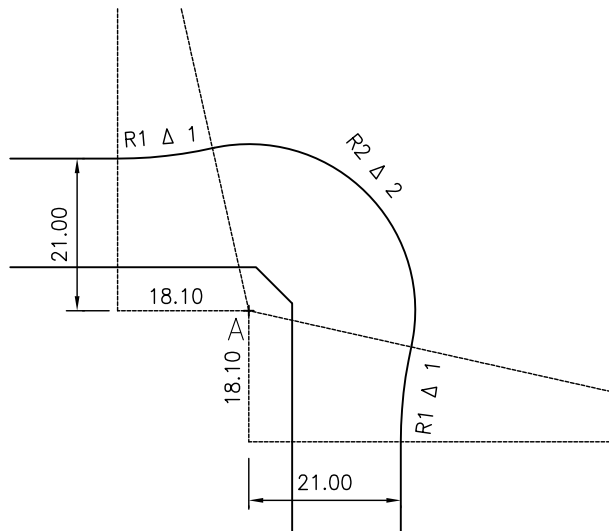
Checked

Date: 11.02.05

Scale: NTS

Drawn:

5.25

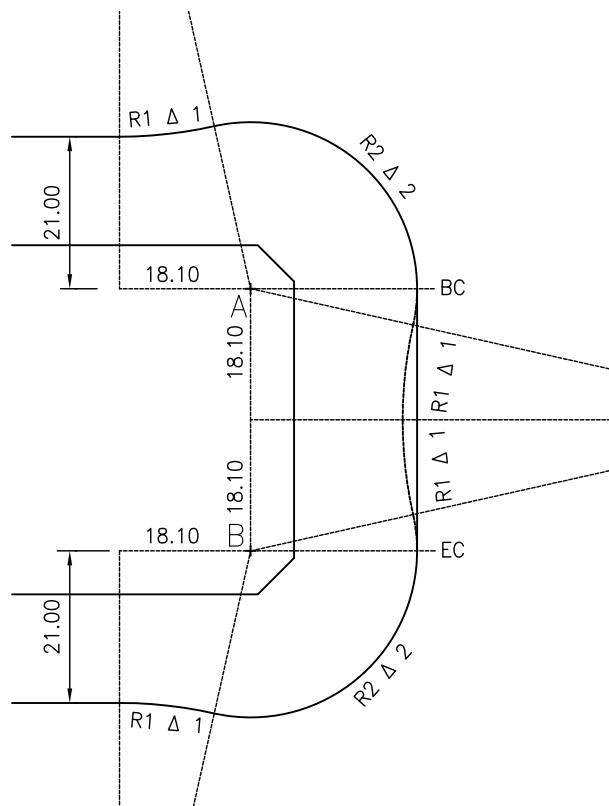


CURVE DATA

R1 = 60.00m
 $\Delta 1 = 12^\circ 36' 12''$
 ARC = 13.20

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

ROAD RIGHT OF WAY WIDTH
 VARIES




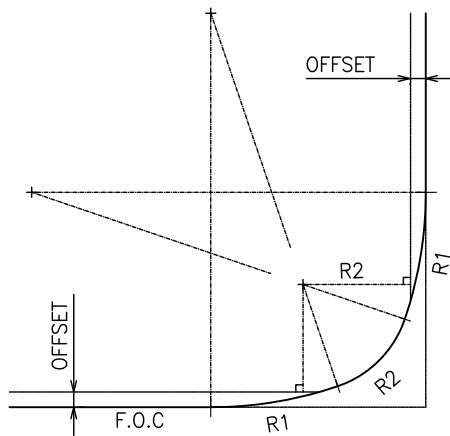
NOTE:

IF THE DISTANCE BETWEEN
 A & B IS LESS THAN 36.20m,
 REPLACE THE 60.00m RADIUS
 CURVES WITH A TANGENT FROM
 B.C. TO E.C.

ROAD RIGHT OF WAY WIDTH
 VARIES

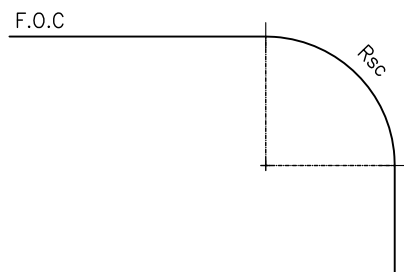
REVISIONS

REVISIONS			 BLACKFALDS ALBERTA <i>a nice place to grow!</i>	TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		LOCAL RESIDENTIAL EXPANDED BULB CORNER		
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
–	–	–	Checked			5.26
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	




ANGLE OF TURN Δ	CURVE RADII R1 - R2 - R1	SYMETRICAL OFFSET FOR R2
FOR 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 - 60	2.44
FOR COLLECTOR TO LOCAL & LOCAL TO LOCAL (SU-9)		
75° ± 7' 30'	40 - 15 - 40	0.65
90° ± 7' 30'	40 - 12 - 40	0.65
105° ± 7' 30'	30 - 11 - 30	0.92

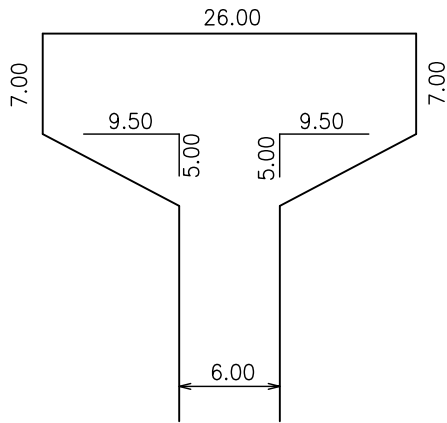
THREE CENTRED COMPOUND CURVE



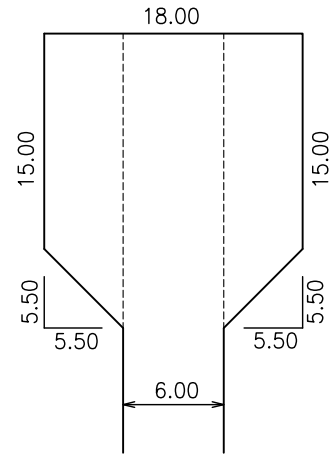
FOR COLLECTOR TO COLLECTOR	18.00
FOR COLLECTOR TO LOCAL	15.00
FOR LOCAL TO LOCAL	13.00

SIMPLE CURVE RADIUS (Rsc.)

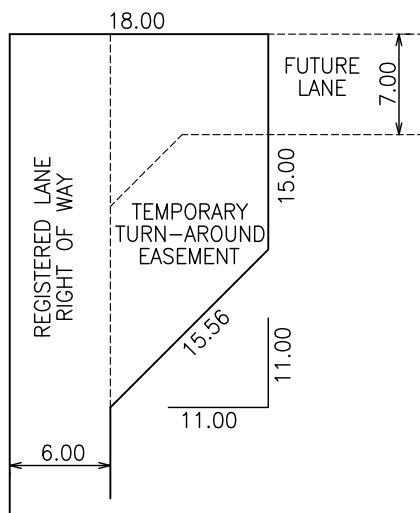
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	INDUSTRIAL ROADWAY CURB RETURN RADII		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.28
-	-	-	Date: 11.02.05	Scale: NTS	Drawn:



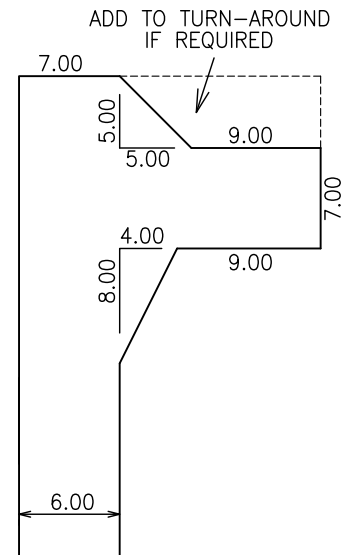
” T ” TYPE




STANDARD TYPE

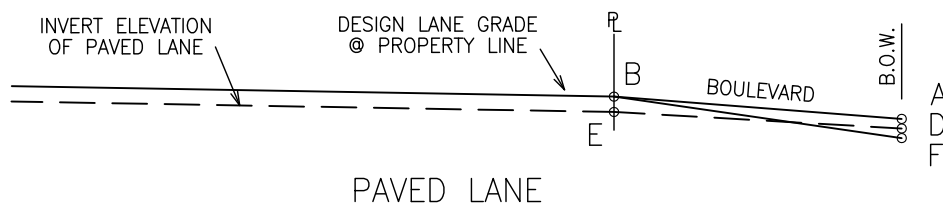
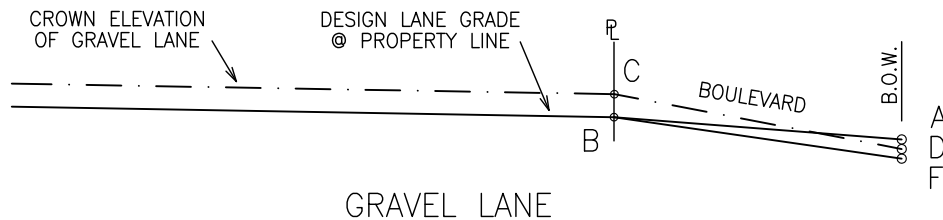
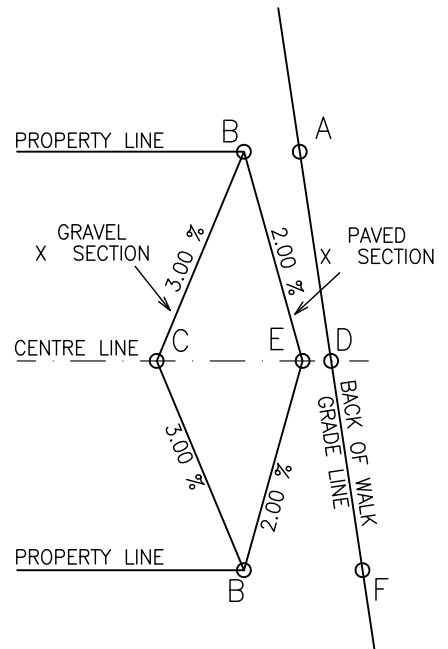
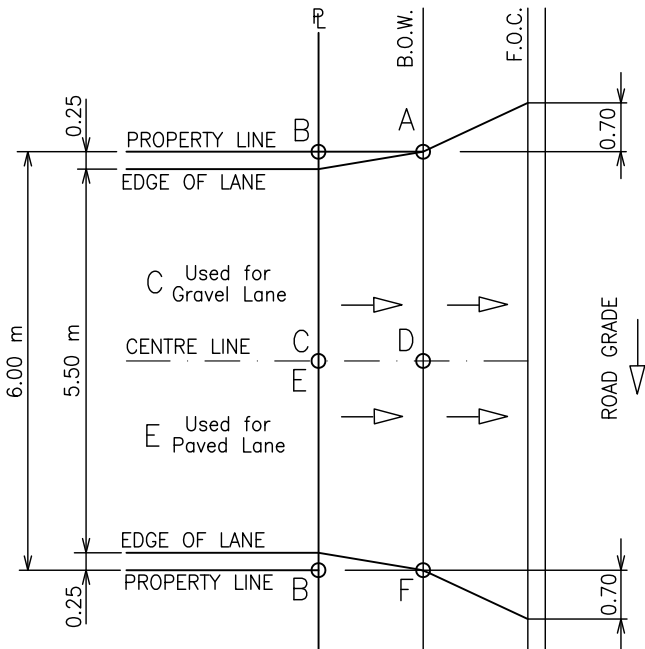


OFFSET TYPE




BRANCH TYPE

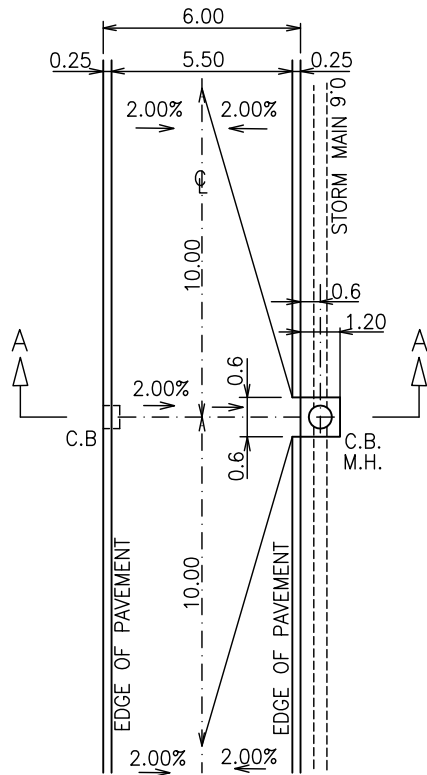
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	LANE TURN - AROUNDS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.29
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		



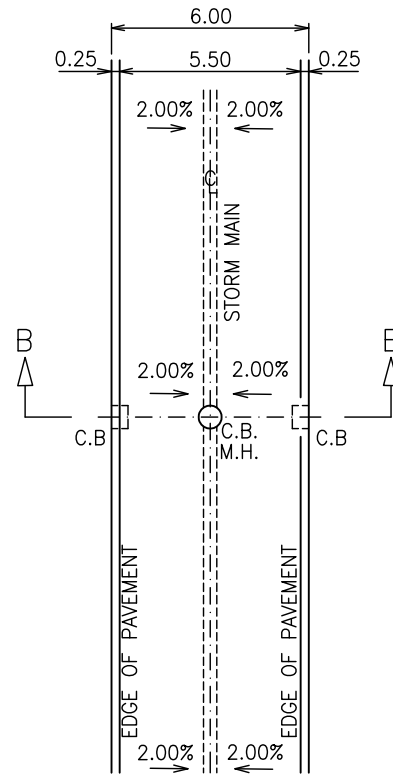
NOTE :

IF LANE ELEVATION (E) IS LOWER THAN BACK OF WALK ELEVATION (D), A DEPRESSED CROSSING AS PER C.R.D. CONTRACT SPECIFICATIONS MAY BE REQUIRED FOR DRAINAGE.

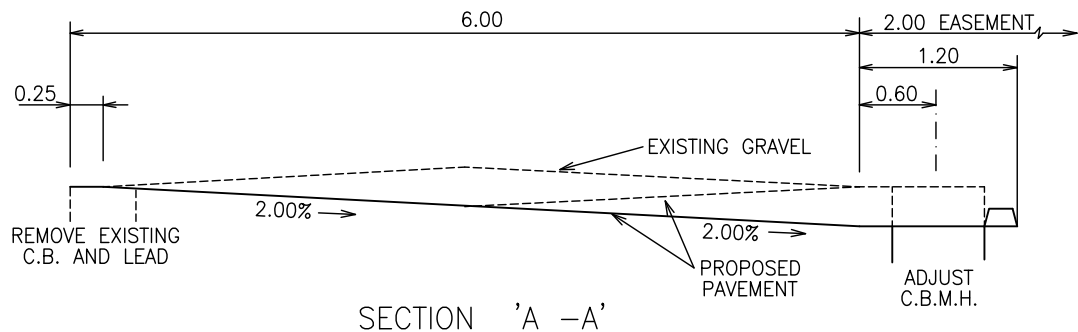
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
-	-	-	LANE GRADE CALCULATIONS		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.30
-	-	-	Date: 11.02.05	Scale: NTS	
-	-	-	Drawn:		



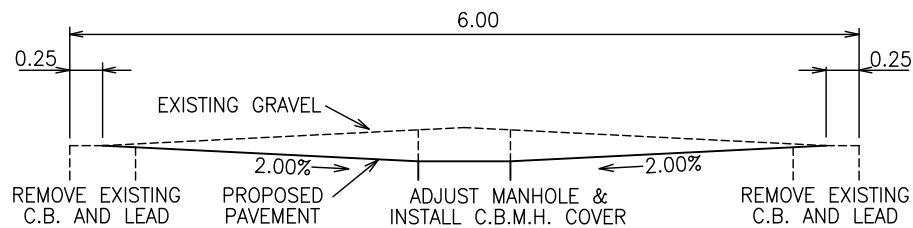
ALTERNATE A



ALTERNATE B



SECTION 'A - A'



SECTION 'B - B'

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

STM DRAINAGE REVISIONS FOR GRAVEL LANE TO PAVED LANE CONSTRUCTION

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

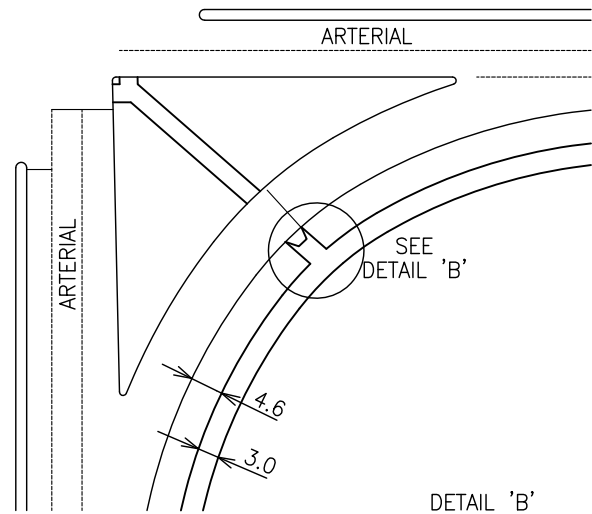
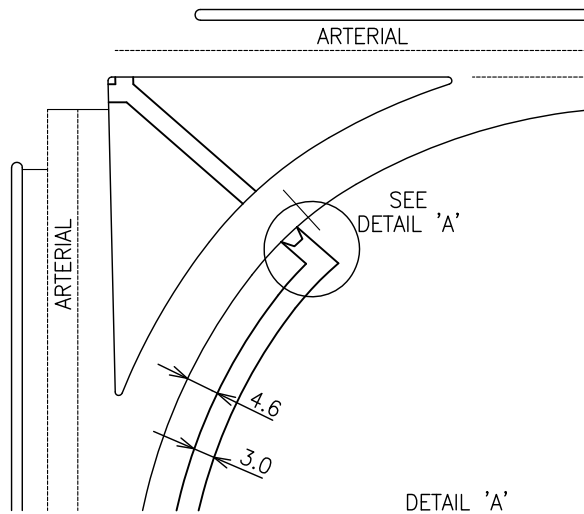
Checked

5.31

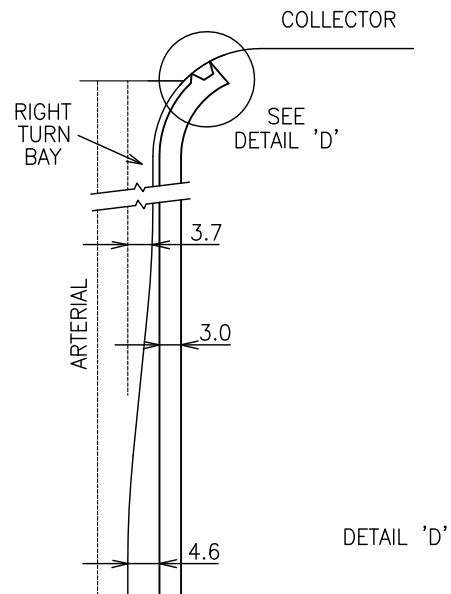
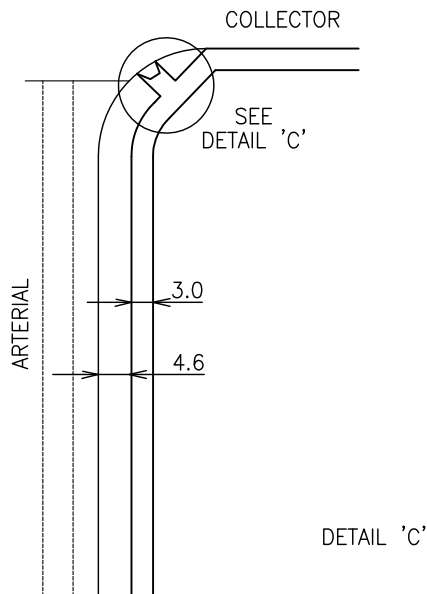
Date: 11.02.05

Scale: NTS



Drawn:

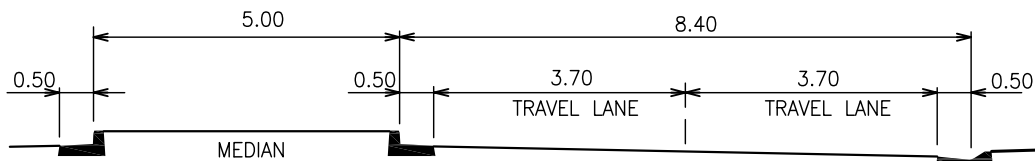
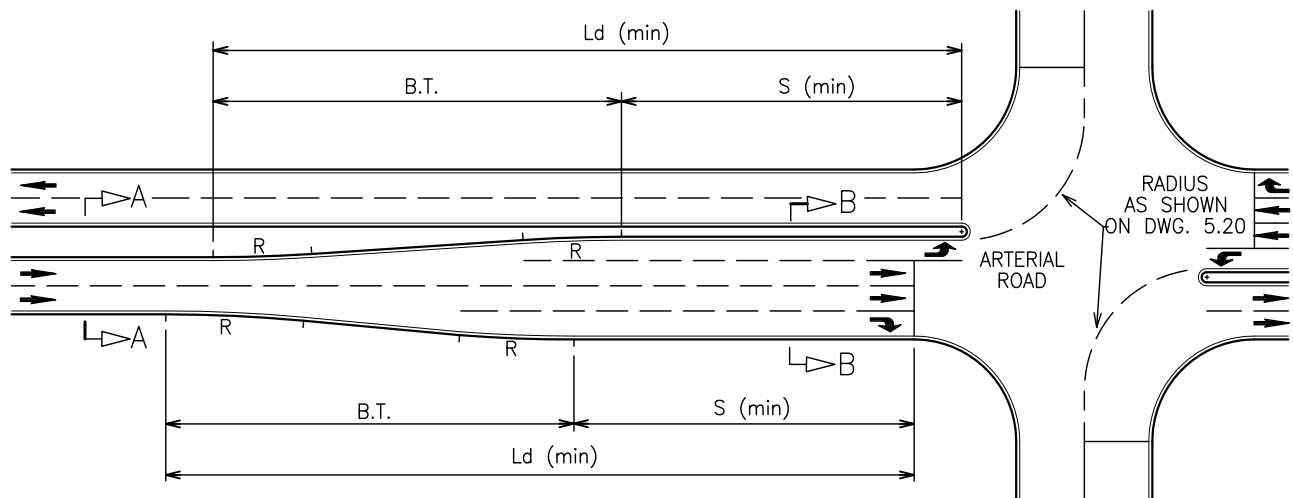


ARTERIAL TO ARTERIAL

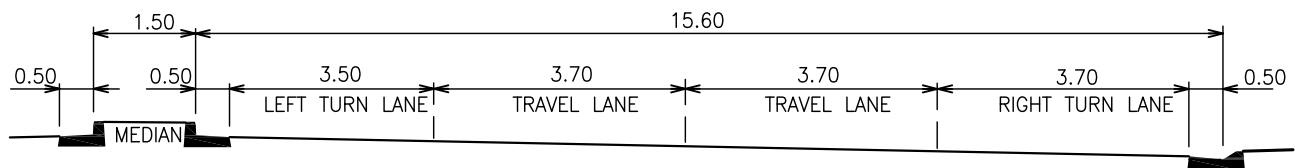


ARTERIAL TO COLLECTOR

REVISIONS				TOWN OF BLACKFALDS SIDEWALK ALIGNMENT AND PEDESTRIAN BARRIER LOCATION		
Date	Details	Drawn				
-	-	-		Approved PGW (TOWN OF BLACKFALDS) Checked Date: 11.02.05 Scale: NTS Drawn:		
-	-	-				
-	-	-				
-	-	-				
-	-	-				
			DWG. NO.			5.32



SECTION 'A - A'




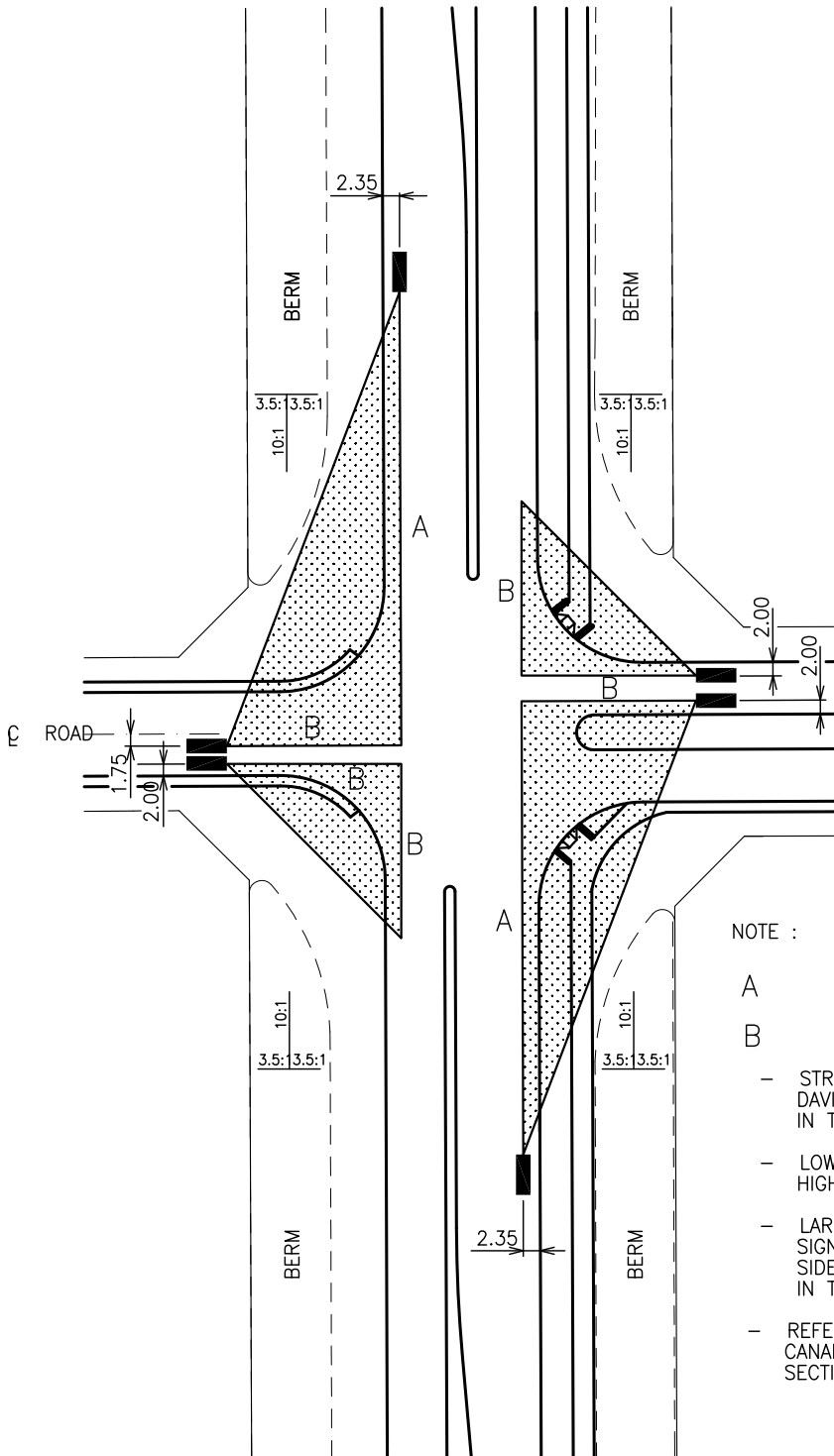
SECTION 'B - B'

DESIGN SPEED km/h	APPROACH DIMENSIONS (m)			
	Ld (min)	B.T.	R (F.O.C.)	S (min)
60	90	50	150	40
70	110	60	220	50
80	130	70	280	60

NOTES :

- DESIGN TO BE BASED ON BAY TAPER - SYMETRICAL REVERSE CURVES.
- SEE TAC (1999 EDITION) - FIGURES 2.3.8.4 AND 2.3.8.8.
- STORAGE LENGTH(S) SHOULD BE DETERMINED BASED ON TRAFFIC VOLUMES, SIGNALIZATION, ETC. TO PROVIDE THE FULL STORAGE LENGTHS REQUIRED.

REVISIONS				TOWN OF BLACKFALDS LEFT & RIGHT TURN LANE DESIGN		
Date	Details	Drawn				
-	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
				DWG. NO.		
				5.33		



NOTE :

A (FOR 70 KM/HR) = 60 METERS
(FOR 80 KM/HR) = 65 METERS

B = 25 METERS

- STREETLIGHT POLES, POWER POLES, TRAFFIC DAVITS & TRAFFIC SIGNS WILL BE PERMITTED IN THE VISIBILITY TRIANGLE.
- LOW GROWING SHRUBS LESS THAN 1.00 METER HIGH WILL BE PERMITTED
- LARGE TREES (DECIDUOUS & CONIFEROUS), SIGNS, TRAFFIC CONTROL CABINETS, BERM SIDESLOPES, ETC. WILL NOT BE PERMITTED IN THE VISIBILITY TRIANGLE.
- REFERENCE : GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (1999 EDITION)
SECTION 2.3.3 : SIGHT DISTANCE.

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

ARTERIAL ROADWAY
VISIBILITY TRIANGLE

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

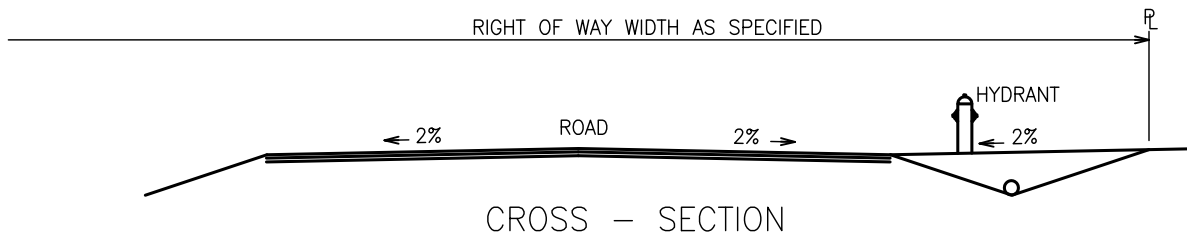
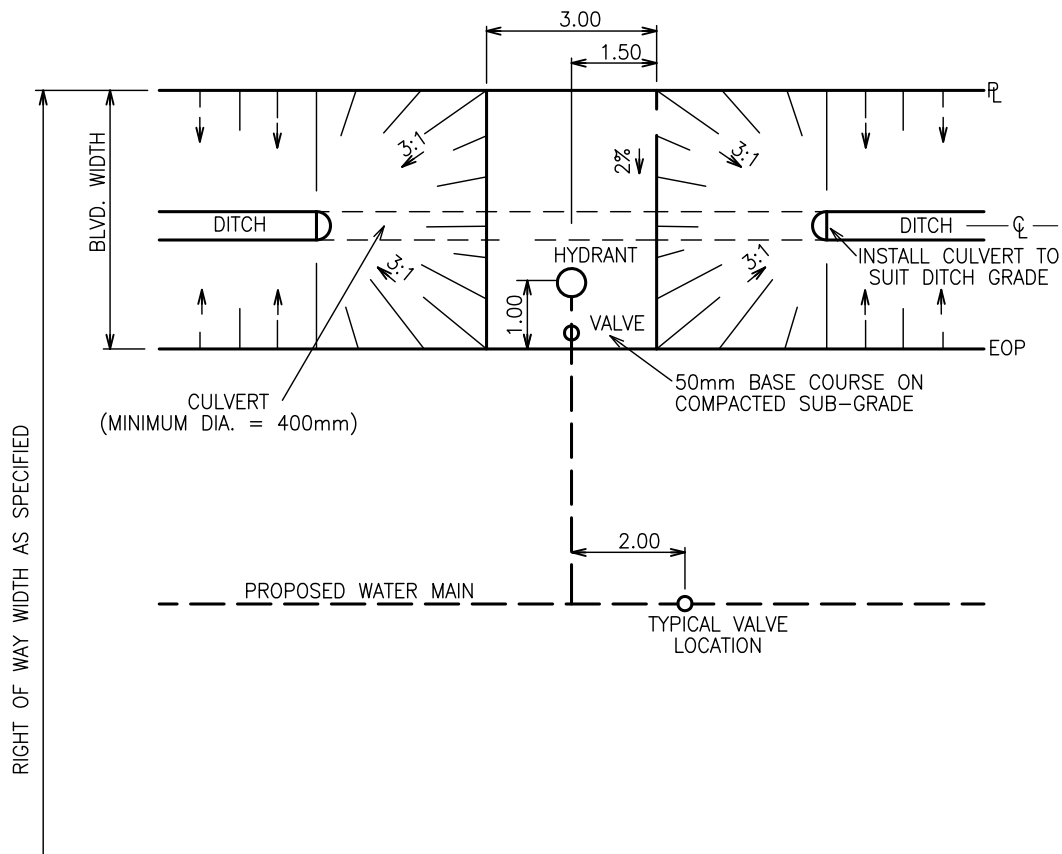
Checked


Date: 11.02.05

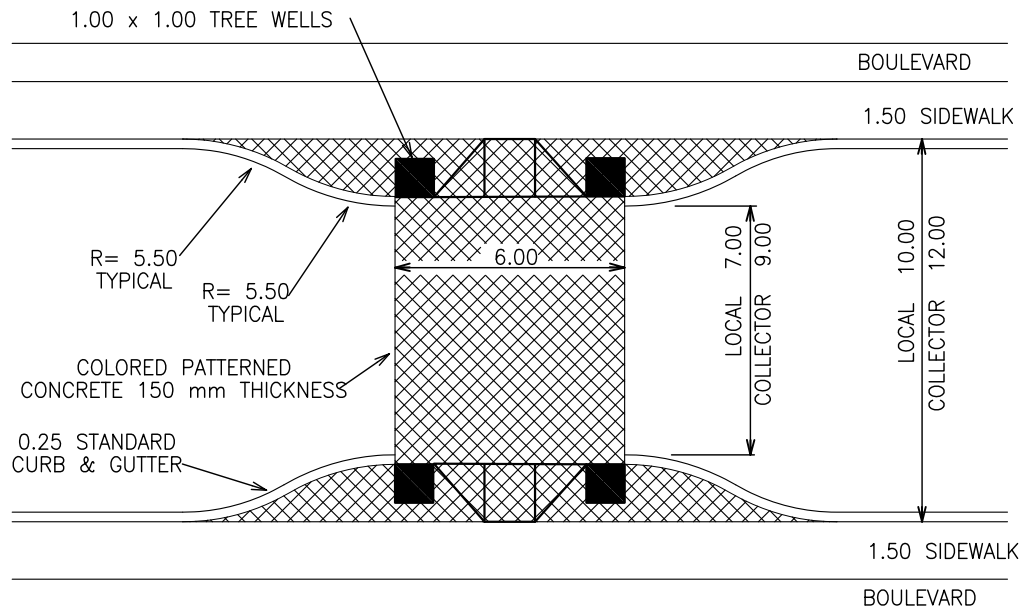
Scale: NTS

Drawn:


5.34

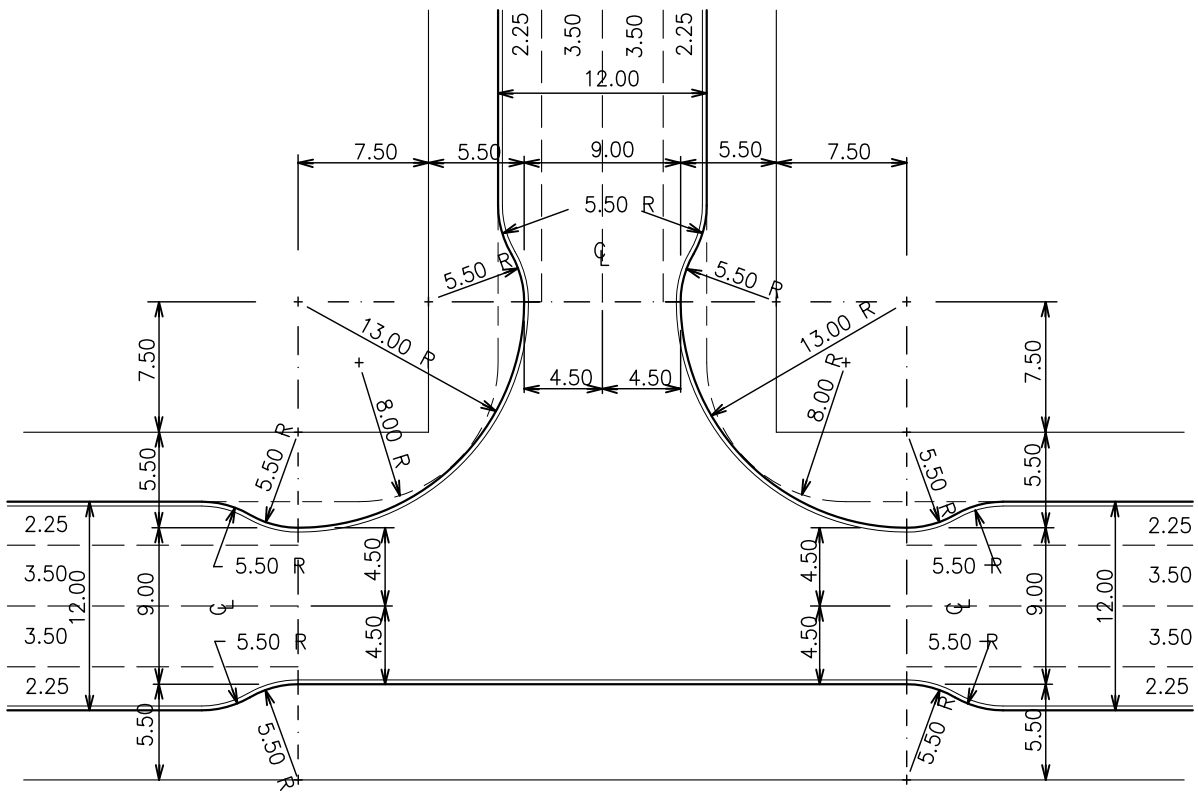


REVISIONS				TOWN OF BLACKFALDS RURAL CROSS SECTION HYDRANT ACCESS		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
						5.35




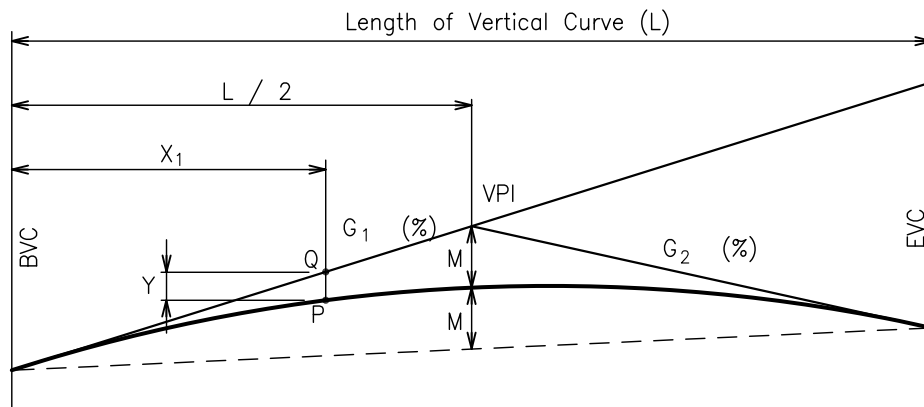
NOTE:
WRITTEN APPROVAL FROM THE DIRECTOR OF INFRASTRUCTURE AND
PROPERTY SERVICES IS REQUIRED FOR ALL ROADWAY NARROWING.

REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	ROADWAY NARROWING FOR PEDESTRIAN ACCOMMODATION		
-	-	-			
-	-	-	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.
-	-	-	Checked		5.35
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		

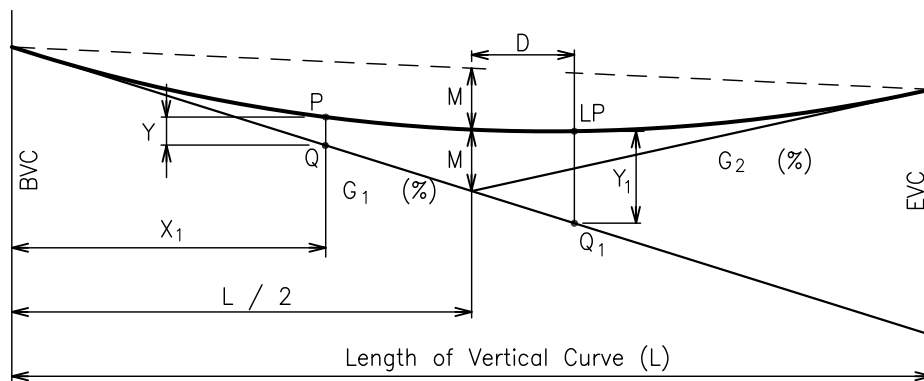


COLLECTOR TO COLLECTOR CALMING

REVISIONS				TOWN OF BLACKFALDS TRAFFIC CALMING		
Date	Details	Drawn				
	-	-		Approved PGW (TOWN OF BLACKFALDS)		
-	-	-				
-	-	-		Checked		
-	-	-				
-	-	-		Date: 11.02.05	Scale: NTS	Drawn:
				DWG. NO. 5.37		



CREST VERTICAL CURVE



SAG VERTICAL CURVE

Length of Vertical Curve (L) = K x A where

A = Algebraic change in grade, and

K = Vertical Curve Calculation Factor (see Table 13.1 for K factors)

Mid ordinate offset (M) = A x L / 8

Calculate elevation " P " at various stations along the Vertical Curve

First determine distance " X " from BVC

Calculate elevation at point " X " along G

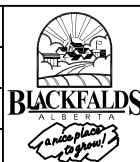
Solve for " Y " where $Y = (X \times A / 100) / (2 L)$

Calculate elevation at " P " where $P = Q + Y$ or $P = Q - Y$

Sag Vertical Curve Low Point (LP) distance from VPI $D = (L / 2) - G \text{ (lessor grade)} \times L / A$

REVISIONS

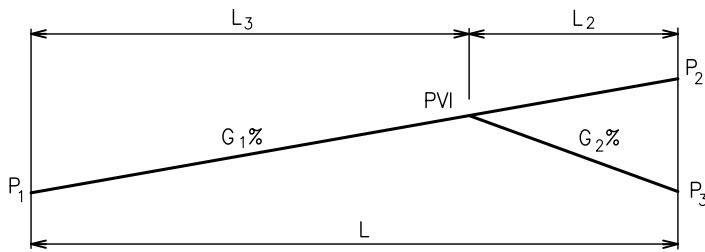
Date	Details	Drawn
	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

VERTICAL CURVE CALCULATIONS

Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
Checked		5.38
Date: 11.02.05	Scale: NTS	Drawn:



CASE 1

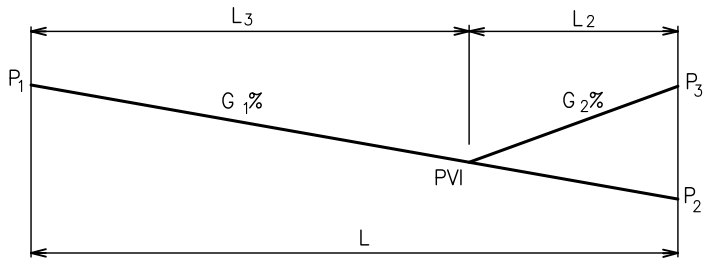
Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.

$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

$$\text{Length of } L_2 = (P_2 - P_3) \times 100 / (G_1 + G_2)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

$$L_3 = L - L_2$$



CASE 2

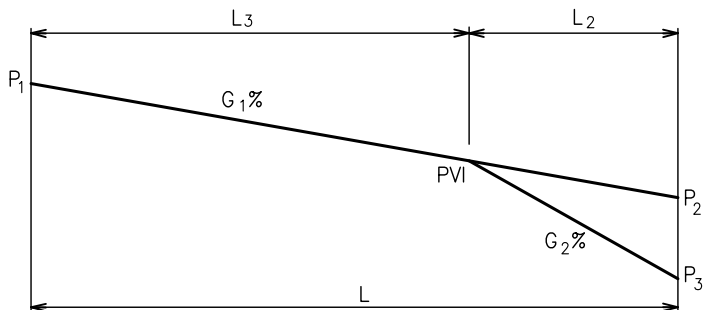
Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.

$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

$$\text{Length of } L_2 = (P_3 - P_2) \times 100 / (G_1 + G_2)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

$$L_3 = L - L_2$$



CASE 3

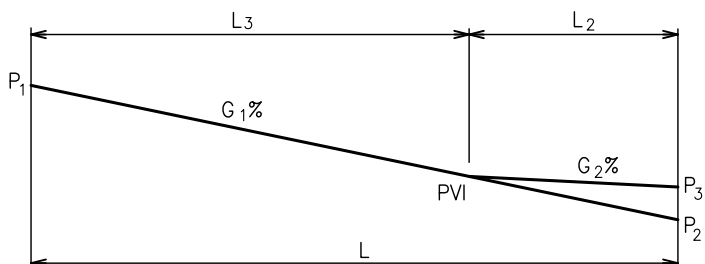
Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.

$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

$$\text{Length of } L_2 = (P_2 - P_3) \times 100 / (G_2 - G_1)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

$$L_3 = L - L_2$$



CASE 4

Calculate the location of VPI ;
where L , P_1 , P_3 , G_1 , and G_2 are known.

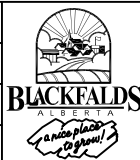
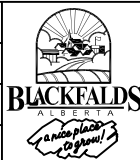
$$\text{Elevation @ } P_2 = P_1 + (L \times G_1 / 100)$$

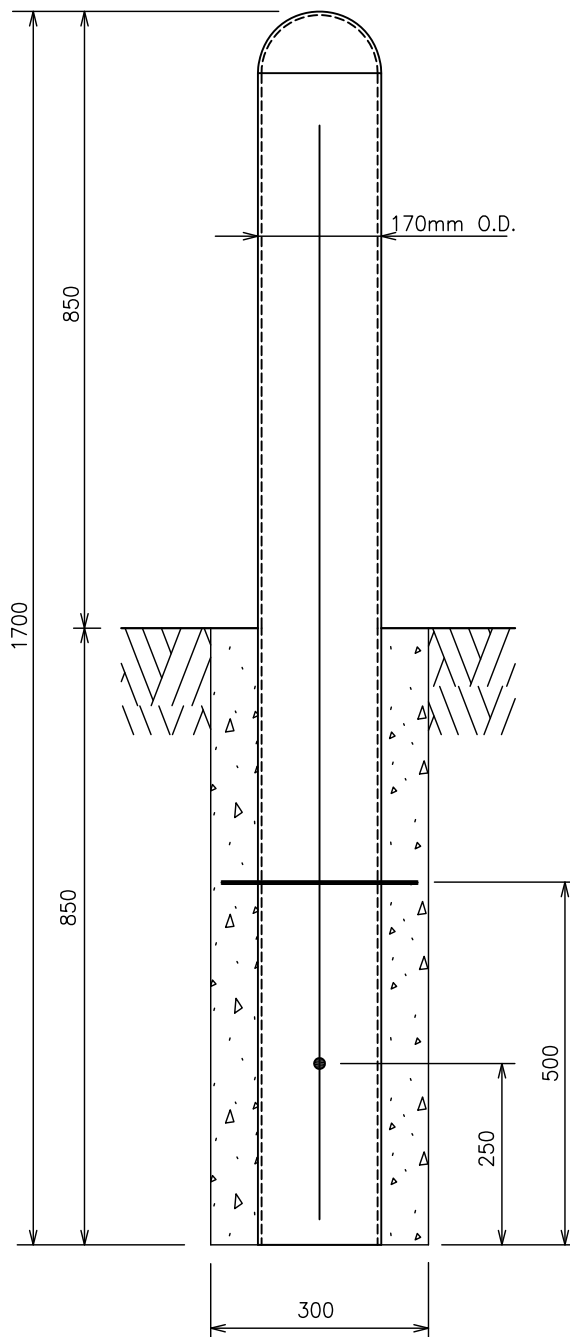
$$\text{Length of } L_2 = (P_3 - P_2) \times 100 / (G_1 - G_2)$$

$$\text{Elevation @ PVI} = P_3 - (L_2 \times G_2 / 100)$$

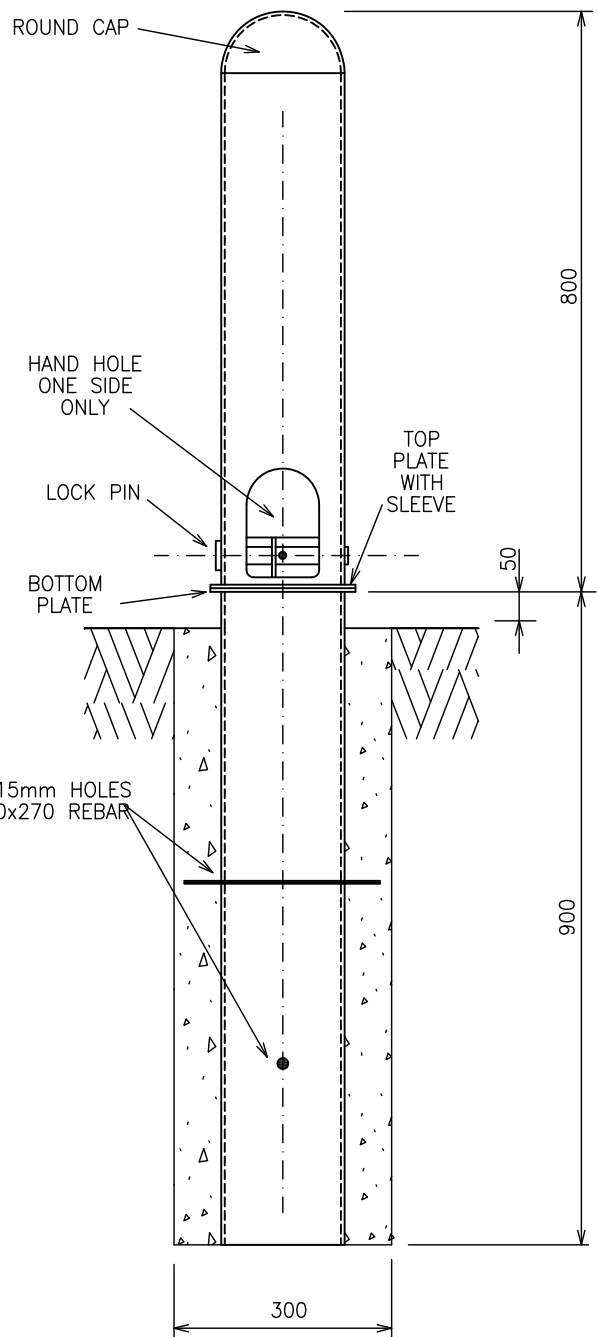
$$L_3 = L - L_2$$

REVISIONS

REVISIONS				TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		V.P.I. LOCATION CALCULATION		
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)			DWG. NO.
–	–	–	Checked			5.39
–	–	–	Date: 11.02.05	Scale: NTS	Drawn:	




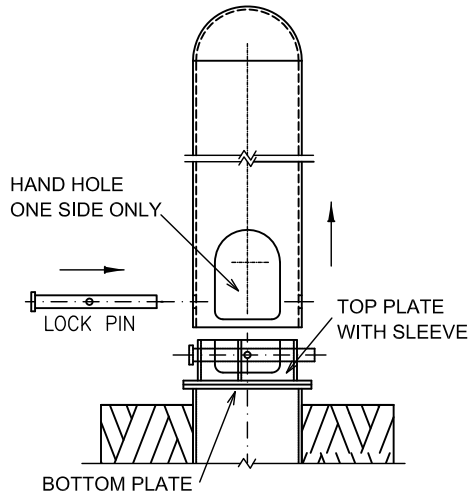
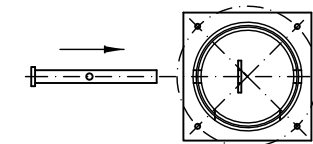
FIXED BOLLARD



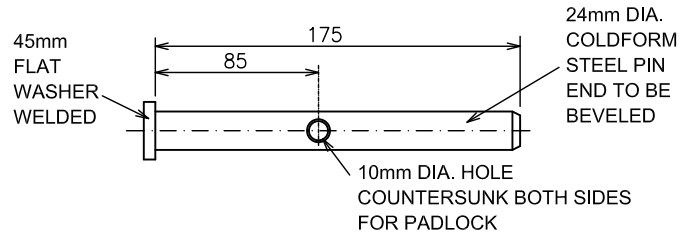
KNOCKDOWN BOLLARD

NOTE: CONCRETE TO HAVE 25mm AGGREGATE, MINIMUM 20 MPa

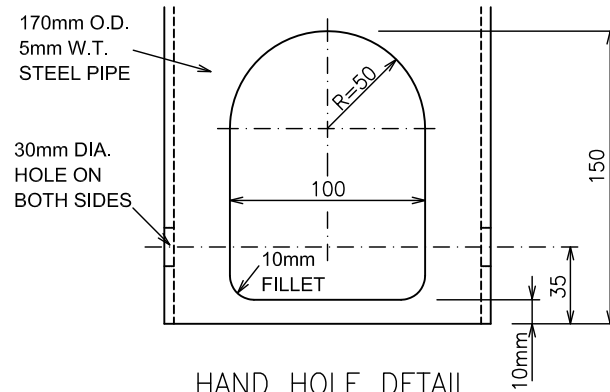
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	BOLLARD ASSEMBLY		
-	-	-			
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		5.40
-	-	-	Date: 11.02.05	Scale: NTS	
				Drawn:	



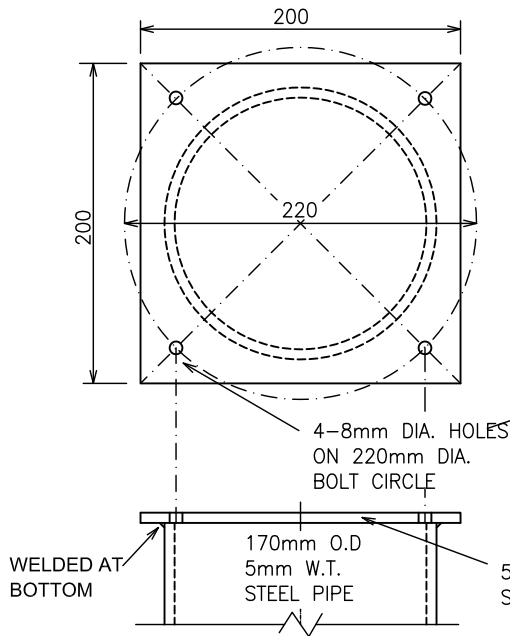
ASSEMBLY DRAWING



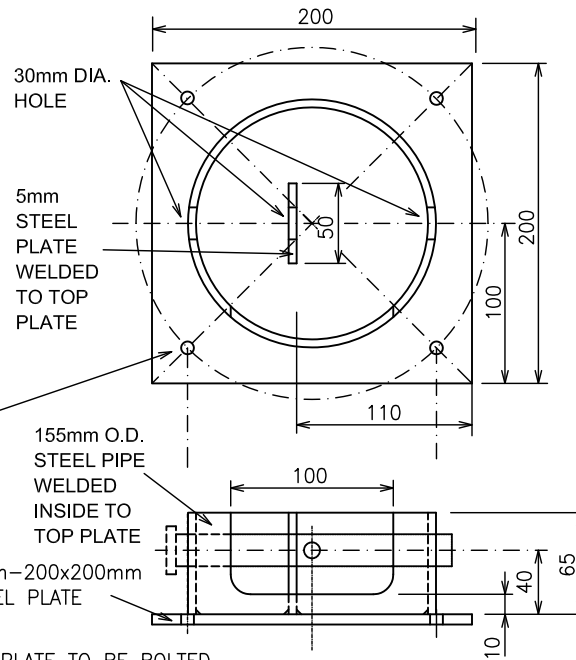
LOCK PIN DETAIL



HAND HOLE DETAIL



BOTTOM PLATE DETAIL



TOP PLATE WITH LOCKING SLEEVE DETAIL

TOP & BOTTOM PLATE TO BE BOLTED BY 4- 6mm x 20mm LONG BOLTS

REVISIONS

Date	Details	Drawn
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-



TOWN OF BLACKFALDS

KNOCKDOWN BOLLARD DETAIL

Approved PGW (TOWN OF BLACKFALDS)

DWG. NO.

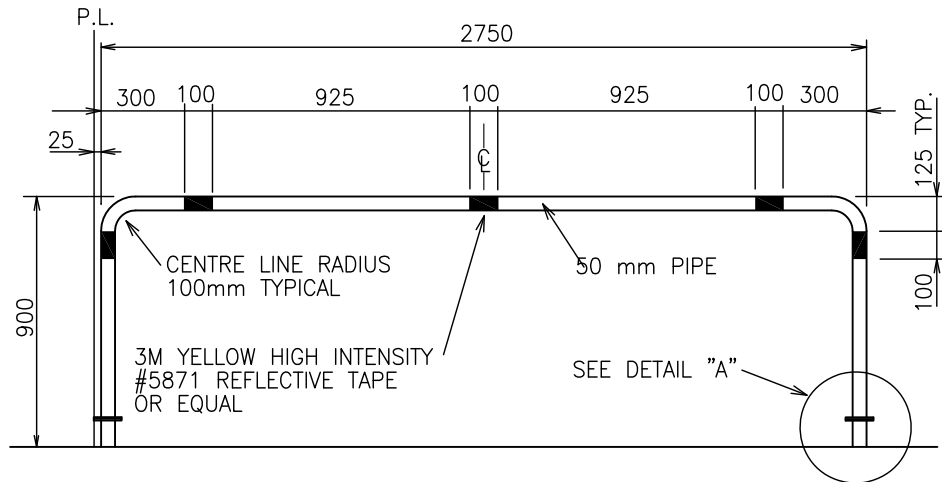
Checked

Date: 11.02.05

Scale: NTS

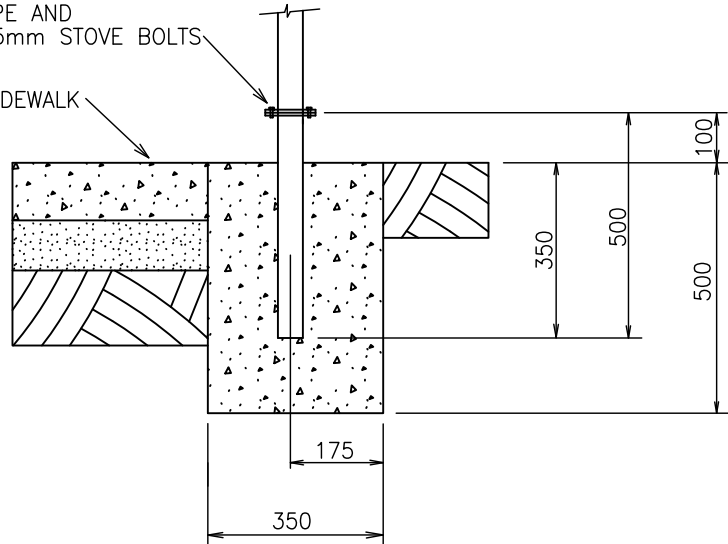
Drawn:

5.41




2-100mm x 100mm x 6mm PLATE
WELDED TO 50mm PIPE AND
FASTENED WITH 4 - 5mm STOVE BOLTS

CONCRETE SIDEWALK



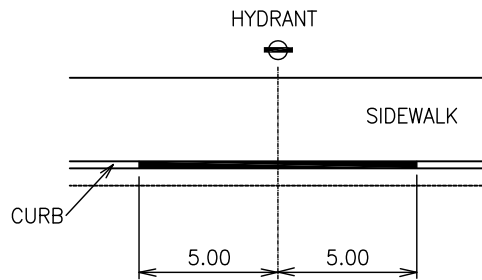
DETAIL "A"

NOTE:
REQUIRED ON SIDEWALKS AT ARTERIAL INTERSECTIONS
AND COLLECTOR TO ARTERIAL INTERSECTIONS

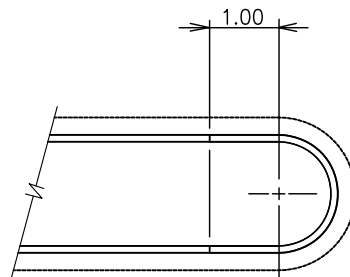
REVISIONS			 TOWN OF BLACKFALDS		
Date	Details	Drawn			
	-	-	PEDESTRIAN BARRIER		
-	-	-			
-	-	-	Approved	PGW (TOWN OF BLACKFALDS)	DWG. NO.
-	-	-	Checked		5.42
-	-	-	Date: 11.02.05	Scale: NTS	
			Drawn:		



W:\AUTOCAD DWGS\DRAWINGS\2011 design guideline dwgs\5.43.dwg

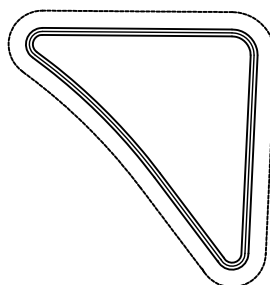


HYDRANT




MEDIAN

TOTAL CURB AROUND
PERIMETER OF ISLAND
TO BE PAINTED



TRAFFIC
ISLAND

REVISIONS			 BLACKFALDS <small>ALBERTA</small> <i>a nice place to grow!</i>	TOWN OF BLACKFALDS		
Date	Details	Drawn				
	–	–		YELLOW CURB PAINTING		
–	–	–				
–	–	–	Approved PGW (TOWN OF BLACKFALDS)		DWG. NO.	
–	–	–	Checked		6.01	
–	–	–	Date: 11.02.05	Scale: NTS		Drawn: