Red Deer County

DESIGN GUIDELINES

June 2005

By:

TAGISH ENGINEERING LTD

The Design Guidelines Manual provides information regarding Red Deer County's Standards governing the subdivision design, servicing standards, the design and construction approval process, and the as-constructed drawing submission requirements

The primary focus of this document is to aid the Consulting Engineer in the preparation of Construction Drawings. It is the responsibility of the Consulting Engineer to ensure that the design conforms to these Guidelines and to notify The County if any deviations from County Standards are being requested. The County has some areas which might require unique solutions to development, such as low impact development. These location of these areas are to be decided by the County's Development Department.

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

This Manual does not attempt to set rigid policies, but rather provides the Developer with a guide outlining the County's requirements. Where unusual or complicated design situations arise, good engineering judgement should prevail. The County 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 Manual will be updated 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: 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, etc.

Section 5: Servicing Study

Requirements for the preparation and approval of site grading, servicing and roadway design for the 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

Red Deer Development Department 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 **Construction Drawings** shall mean those Engineering Plans and Profiles prepared by the Consulting Engineer, showing the details of the installation of the various Municipal Improvements within the Development using standard engineering symbols and forms, and conforming to the Design Guidelines.

.2 **Construction Specifications** shall be the documents prepared by the Consulting Engineer specifying the legal, administrative, and technical aspects of the Municipal Improvements, all of which shall conform to the minimum requirements as outlined in The County's Design Guidelines and The County's Detailed Contract Specifications.

.3 **Consulting Engineer** shall mean a Professional Engineer who is an authorized officer of a Consulting Engineering firm, retained by the Developer, who has designed the Municipal Improvements and/or supervised the installation of the same within the Development according to the approved plans and specifications.

.4 **County** shall mean the Corporation of Red Deer County in the Province of Alberta.

.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 County specifying legal, administrative, and technical requirements of the Developer.

.8 **Development Officer** shall mean the person or persons appointed and acting on behalf of the county to regulate the orderly development of subdivisions and properties

.9 **Electrical Specifications** shall mean The Current Electrical Power Distributor's Construction Specifications to which the power and lighting portions of the Municipal Improvements must conform.

.10 **Engineer** shall mean the Development Officer 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, and establishing turf; all in accordance with The County's current Design Guidelines and Standard Specifications.

.12 **Level Two Landscaping** means the work included in planting shrubs, trees, or other plant amenities, all in accordance with The County's current Design Guidelines and Standard Specifications.

.13 **Level Three 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 County's current Design Guidelines and Standards Specifications.

.14 **Level Four Landscaping** means the work included in supplying and installing optional/enhanced amenities (e.g. Ornamental structures, sculptures, feature walls, fountains, spray pools, enhanced plantings, etc.) all in accordance with The County's current Design Guidelines.

.15 **Municipal Improvements** shall mean all improvements within the Development, including, but not restricted to:

.1 paved roadways, including pavement marking;

.2 sidewalk, curb and gutter;

.3 paved or gravel lanes;

.4 water, sanitary, and storm sewer mains;

.5 water, sanitary, or storm service connections;

.6 shallow utilities, including electrical distribution (excluding service

leads), street lighting, natural gas, telephone, and cable television;

.7 landscaped boulevards, medians, municipal reserves, and public utility lots;

.8 paved, concrete, and/or shale walkways;

.9 park and recreation amenities (e.g. playground equipment, benches, etc.); and

.10 traffic control, street name, subdivision information (including updates) signs.

.16 **Professional Engineer** shall mean a licensed member of The Association of Professional Engineers, Geologists, and Geophysicists of Alberta;

.17 **Rural Development** shall mean the development of low density, low level of service in a rural setting

.18 **TAC** refers to the Transportation Association of Canada.

.19 **Urban Development** shall mean the development of high density, high level of service in an urban setting

2. DEVELOPMENT AGREEMENTS

2.1 General

The construction of Municipal Improvements within a subdivision is subject to the terms and conditions of a Development Agreement, together with the special clauses, including all financial, construction, maintenance, and security requirements of the Developer.

Following the approval of the preliminary Construction Drawings, the Developer shall request, in writing, that Red Deer County proceed with the preparation of the Development Agreement.

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 Engineer and copies of all relevant drawings and reports as listed

in Section 5 have been provided to the County.

Revisions to the Servicing Study must be provided when the 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.

2.3 Power, Gas, Telephone and Cable TV Alignment Approvals

The Developer is responsible for coordinating the location of the power, gas, telephone and cable TV, including obtaining alignment approvals. Shallow Utility drawing requirements are included in Section 2.

2.4 Submissions

.1 Construction Drawings and Specifications

The Developer shall provide the following information to Red Deer County 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 Red Deer County's 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 Red Deer County, along with their initial request for preparation of the Development Agreement.

.1 Name and address of Developer,

.2 Off-site Levy Payment Option as follows:

.1 Developer has elected to pay the total Off-site Levy Payment amount on signing the Development Agreement, or

.2 The Developer has elected to pay 25% of the Off-site Levy Payment amount on signing the Development Agreement, and to defer payment of the remaining 75% for one year.

Note: Interest at the rate noted in the current Development Agreement will be applied to the Deferred Payment Amount.

.3 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.).

.4 Letter from County Planning Department outlining the Conditions of Subdivision set by the Subdivision Committee,

including any money due in place of reserve dedication. The land value for money in place of reserve dedication will be determined by the Land and Economic Development Department.

.5 Cost estimates for the following Municipal Improvements, when applicable:

.1 Power distribution and streetlighting costs,

.2 Cost estimate for Pavement Marking and Signage,

.3 Cost estimate for Connections to Existing Mains,

.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 Four Landscaping – Enhanced Amenities (i.e. decorative cairns, fencing on County 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 Arterial roadways by the Developer on behalf of The County. Separate estimates for expressway and 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 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 provide 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 Red Deer County

.1 Letters from the Shallow Utility Companies approving the proposed alignments and utility right of way plan(s).

.2 Letter from the Development Department granting approval of landscape plans required for the Development, prepared by the Consulting Engineer in conformance with Section 14.

.3 Proposed Development Schedule,

.4 Letter and plan from Canada Post illustrating proposed community mailbox locations within the Development,

.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 Copy of the Letter of Authorization,

.10 Copies of the following Alberta Environmental Protection Act documents:

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

.2 Copy of "Letter of Authorization for Storm Drainage Treatment Facilities", and /or

.3 A copy of "Amendment to the appropriate Red Deer County's Wastewater and Storm Drainage Permit".

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

.13 Copies of applicable approved Crossing, Proximity, Ground Disturbance and/or Encroachment Agreements.

.14 Water Distribution System Flushing Drawing,

.15 Electrical Servicing Plans conforming to the requirements of Section 12,

.16 Pavement Marking and Signage Drawings,

.17 Landscape Drawings approved by the Development Department,

2.5 **Performance and Maintenance Security**

The Engineer 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 Engineer will issue a preliminary "Notice to Proceed" once The County 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, if applicable.

.3 Provide an Original Irrevocable Letter of Credit in accordance with the Development Agreement.

.4 Provide an Original Certificate of Insurance in accordance with 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 Red Deer County named as Certificate Holder and additional insured.

.6 Two copies 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 County.

3. COMMUNITY MAILBOXES

3.1 General

The Consulting Engineer shall submit a copy of the Neighbourhood Area Structure Plan and a copy of the current subdivision plan along with a request for mailbox locations to:

Delivery Planning
Canada Post Prairie Region
Suite 400, 9828-104Avenue NW
Edmonton, Alberta T5J 4Y4

Telephone Number 780-944-3084

3.2 **Location Criteria**

Canada Post has prepared a document entitled "Postal Delivery Standards Manual, Planning for Postal Service" which is available at the following address:

Manager, Delivery Planning and Postal Code Management
Address Management
Suite N0813 – 2701 Riverside Drive
Ottawa, Ontario K1A 0B1

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

Upon receipt of the mailbox location plan from Canada Post, the Consulting Engineer shall ensure that the community mailbox locations conform to the requirements noted in the Postal Delivery Standards Manual and the following Red Deer County criteria, wherever possible.

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

.2 Next to an open space or playground.

.3 On the predominantly homecoming side of the street, so that people can pick up their mail on the way home without crossing the street.

.4 On the County boulevard, close to the sidewalk, to avoid creating grass areas that are difficult to cut.

.5 Not along County major thoroughfares, since no parking is allowed on these roads.

.6 Not closer than 10 m from a fire hydrant or bus stop.

.7 Not on a utility easement or over a utility trench (deep or shallow).

.8 Not too close to streetlight standards, street name poles or any raised utility boxes such as a transformer.

.9 The location of the boxes shall not impede the pedestrian and vehicular sight distances.

.10 Community mailboxes are normally installed within public road rights of way. Multiple unit developments, such as townhouses or condominiums, may have the community mailboxes installed within the boundaries of said private development lands. The Developer must enter into a Delivery Services Agreement/License with Canada Post if this type of delivery is desired or required. The Developer should contact Canada Post for further information.

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

Following approval of the sites by Canada Post, the Developer shall prepare a dimensioned drawing, similar to the Building Grade Certificate Drawing, and forward it to the Delivery Planning Manager at the above noted address.

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

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

The purpose of this publication is to provide Standards and Guidelines for Municipal Water Supply, Wastewater, and 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 County's Design Guidelines, and the minimum requirements of each must be met.

5. ALBERTA ENVIRONMENT APROVALS

5.1 General

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

The following Acts govern construction activities:

.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.

Until notification is received from the Director responsible for Alberta Environment, the following documents are to be submitted to Alberta Environment:

1. Letter of Authorization for extension to the appropriate waterworks, wastewater or storm drainage system,

2. An amendment to the appropriate Red Deer County's Wastewater and Storm Drainage Permit. Please Note that the Permit amendment must be posted for a 30-day appeal period. The permit amendment will be issued following the appeal period.

5.2 Wastewater and Storm Drainage Regulations 119/93

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

"Storm drainage treatment facility", as defined in the Regulations, means any structure or thing used for the physical, chemical or biological treatment of storm drainage, and includes any of the storage or management facilities that buffer the effects of the peak runoff.
Note: The Regulations do not apply to 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.

Red Deer County will not allow construction to proceed until the required EPEA and/or Water Act approvals have been received.

5.3 Codes of Practice

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

.1 Code of Practice for a Waterworks System Consisting Solely of a Waterworks Distribution System

The above noted Code is made under 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.

The Waterworks Code states, in part, as follows:

3.1.3 In addition to the information required under the Act and the regulations, an application for a registration shall contain, at a minimum, the following information:

(a) written confirmation that the person applying for the registration has prepared, or caused to be prepared an operations program;

(b) engineering drawings signed and stamped by a professional engineer, for the proposed water distribution system or proposed changes to the water distribution system, including the design capacity of the proposed water distribution system or proposed change;

(c) a statement, signed and stamped by a professional engineer, indicating whether the design of the project complies with the design requirements of:

(i) this Code of Practice, and

(ii) the regulations under the Act; and

(d) in cases in which a design requirement in clause (c) is not met, a statement, signed and stamped by a professional engineer, identifying and justifying the deviation.

.2 Code of Practice 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 and the Wastewater and Storm Drainage Regulation, A.R. 119/93.

The Wastewater Code states, in part, as follows:

3.1.1 An application for a registration of a wastewater collection system shall contain, at a minimum, all of the following information:

(a) engineering design drawings and specifications for the wastewater system, including the design capacity, stamped and signed by a professional engineer;

(b) for low pressure wastewater collection systems or vacuum wastewater collection systems, the written opinion of a professional engineer regarding the adequacy of the design of the wastewater system, based, at a minimum, on the designed hydraulic capability of the wastewater system;

(c) a statement, signed and sealed by a professional engineer:

(i) indicating whether the design of the project complies with all design requirements of this Code of Practice, and the regulations, and

(ii) in cases in which a design requirement is not met, identifying and justifying the deviation; and

(d) any other information required by the Director in writing.

.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.

Red Deer County will not allow construction to proceed until copies of the required Code notices have been received.

.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].

.5 Alberta Environment Web Site

The various Acts, Regulations and Codes of Practice can be viewed

and downloaded at the following website:

www.qp.gov.ab.ca/display_codes.cfm

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

6.1 General

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

.1 oil or gas pipelines,

.2 overhead or underground telecommunications lines,

.3 overhead or underground power lines,

.4 creeks and rivers,

.5 streets or highways,

.6 railways, and/or

.7 other registered rights of way.

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 County 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 Red Deer County.

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

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.

7. ROAD CLOSURES AND DETOURS

7.1 General

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

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

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

All signing must be in accordance with Red Deer County Contract Specification – Sections 01570 and 02890.

7.2 Application Preparation and Submission

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

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

The application shall be prepared as follows:

.1 A covering letter requesting approval to close all or part of a roadway.

.2 Three copies of drawings (11″ x 17″ or 8 1/2″ x 11″) clearly marking in **RED** the location of the proposed crossing or detour.

8. DEVELOPER'S SUBDIVISION SIGNS

8.1 Detention Pond Warning Signs

Detention Pond Warning Signs shall be installed near the boundary of the detention pond site indicating where the public may obtain information related to the detention pond operation.

Sign locations shall be shown on the Engineering Drawings.

8.2 Street Name Signs

Streets name signs shall ordered and installed by the Public Works Department and paid for by the Developer.

8.3 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 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.

9. SUITABILITY OF LOTS FOR DEVELOPMENT – COUNTY RESIDENTIAL

9.1 Hydrogeological Report

A Hydrogeological Report shall be provided by the developer, prepared by a competent consultant engineer. This report is to indicate an adequate

aquifer exists to accommodate the individual wells required for the development and that the development will not have an adverse affect on the aquifer of adjacent wells. Each lot shall have tests performed for water table levels and percolations.

The hydrogeological survey is to locate any areas with the groundwater level less than two (2) meters below the ground surface. These areas are to be considered not developable, unless the Developer can satisfactorily fill the area and achieve the water table clearance necessary to change the classification to developable. Alternate sewage treatment and disposal systems may be considered. Reclassification from not developable to developable will require approval of the county.

9.1 **Developable Area**

The developer must, prior to the registration of the Subdivision Plan, identify, on a separate plan, a suitable building site and sewage disposal ground for each proposed lot. This plan is to include:

.1 The area of land, within the proposed lot, which is classified as developable.

.2 The relationship of developable land to the rest of the lot area, in percentages

.3 The relationship in elevation difference, between the proposed building site and sewage disposal site.

.4 The permeability or percolation of the soils at the proposed sewage disposal site.

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 - Design Drawings

2. GENERAL CONSTRUCTION DRAWING REQUIREMENTS

2.1 General

.1 Individual Plan Drawings are to be prepared for each Municipal Improvement being constructed.

.2 Street names shall be shown on all drawings for reference purposes.

.3 The "Limits of Construction" shall be shown on all Plan Drawings.

2.2 Sheet Size

Drawing sheet sizes to be as follows:

.1 560 mm x 864 mm (A1) preferred

.2 610 mm x 914 mm acceptable

.3 707 mm x 1000 mm (B1) acceptable

2.3 Sheet Material

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

2.4 Title Block

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

2.5 North Arrow

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

2.6 Dimensions

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

2.7 Lettering

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

2.8 Drawing Scale

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

.1 A scale of 1:1000 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 County map showing project location,

.4 Index plan showing street names and limits of each Plan/Profile Drawing,

.5 List of drawings.

3.2 Clearing and Grading Drawing(s)

.1 General Drawing Requirements

.1 Identify the owners of all lands adjacent to or within the clearing and grading area,

.2 Identify intended clearing and grading on adjacent lands, including details of edge conditions, back sloping requirements, and areas where topsoil is to be placed and/or seeded until natural conditions are restored,

. 3 Show Phase boundaries: indicate the area expected to be developed during the current year and the type of soil stabilization proposed for areas to be developed in following years,

.4 Any unusual site conditions,

.5 Existing utility rights of way (easements),

.6 Existing survey control stations and markers,

.7 Existing ground contours,

.8 Proposed ground contours,

.9 Test hole locations and original ground elevations at test hole location,

.10 Identify natural features that are to be preserved and/or removed,

.11 Details of topsoil stockpiles; include height, width, length and volumes,

.12 Location of all existing (e.g. water, sanitary sewers, storm sewers, gas, electrical, etc.),

.13 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"),

.2 Cross-section designation,

.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 Paraplegic ramps,

.19 Berms complete with top of berm grades,

.20 Temporary access roads and/or turnarounds,

.21 Walkways, including bollard locations,

.22 Typical cross sections for all roadway designations,

.23 Community Mailboxes, and

.24 Subdivision Entrance Signs,

3.4 **Traffic Control and Signage Drawing**

.1 Traffic Signs,

.2 Pavement Markings,

.3 Street Name Identification Signs,

.4 Detention Pond Warning Signs.

3.5 **Water Distribution Drawing**

.1 Invert elevation at all P.I.'s,

.2 Distance, pipe size, pipe material (general note acceptable), and grade between P.I.'s,

.3 Main alignments,

.4 Hydrants and hydrant identification numbers,

.5 Valves and valve identification numbers,

.6 Fittings,

.7 Temporary Air release/Flushing Chamber.

3.6 **Water Distribution Disinfection and Flushing Drawing**

.1 Show proposed sequence of flushing, including valve opening and closing sequence,

.2 Show receiving sanitary sewer manholes.

3.7 **Sanitary Sewer Drawing**

.1 Invert elevation at all manholes,

.2 Distance, pipe size, pipe material (general note acceptable), and grade between manholes,

.3 Main alignments,

.4 Direction of pipe flow,

.5 Manholes and manhole identification numbers,

.6 Identify Drop Manholes (interior/exterior).

3.8 **Storm Sewer Drawing A – Major/Minor System**

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

.1 Phase/Project boundary,

.2 Major drainage routes,

.3 Location of trapped lows,

.4 Minor drainage catchment areas,

.5 Minor drainage main alignments,

.6 Direction of minor drainage pipe flow,

.7 If applicable, a Stage, Area, Volume and Discharge Table.

3.9 **Storm Sewer Drawing B – Minor System**

.1 Invert elevation at all manholes,

.2 Distance, pipe size, pipe material (general note acceptable), and grade between manholes,

.3 Main alignments,

.4 Direction of pipe flow,

.5 Manholes, catchbasin manholes, and manhole identification numbers,

.6 Catchbasin type and identification numbers,

.7 Catchbasin leads.

.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,

.4 All utility rights of way (easements).

3.11 **Building Grade Drawing**

.1 The Building Grade Drawing shall be drawn at a scale of 1:500 or 1:750 to better illustrate all of the requested information,

.2 Legal description (Lot and block number) for each parcel of land,

.3 Civic (Municipal) Address,

.4 Back of walk elevations at lot lines,

.5 Lane/public utility lot elevations at lot lines,

.6 Service locations and invert elevations,

.7 Recommended lowest top of footing elevation,

.8 Recommended ground (landscape) elevation at house,

.9 Location of power, telephone, and television service,

.10 Location of hydrants, streetlights, transformers, switch gear cubicles, URD's, telephone pedestals, and cable television pedestals,

.11 Location of community mailboxes,

.12 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, topography, and encumbrances,

.4 Show adjacent land uses and roads,

.5 Show proposed layout of park, school and recreational facilities including playgrounds, baseball diamonds, sports fields, buildings, pathways, rinks, tennis courts, etc., including appropriate grades,

.6 Show conceptual tree and shrub planting.

.7 Streetlights, mailboxes, and other street furniture, etc.

4. PLAN PROFILE CONSTRUCTION DRAWING REQUIREMENTS

4.1 General

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

4.2 Top Plan View – Surface Improvements

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

.1 Street and/or Lane Name (e.g. Lane "A"),

.2 Cross-section designation,

.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 Berms complete with top of berm grades,

.22 Temporary access roads and/or turnarounds,

.23 Walkways, including bollard locations,

.24 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 County Development Department,

.2 County Operations Department,

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

.1 One set of the corrected Construction Drawings marked “Issued for Construction”.

5.2 Power, Gas, Telephone and Cable TV Alignment Approvals

A copy of the detailed Shallow Utility Plan is to be forwarded to each utility company for approval of their alignments. Following a review of their alignments, each utility company is required to submit an approval letter for inclusion in the Development Agreement. 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 County.

The Consulting Engineer shall submit revised Construction Drawings 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 shall be identified on the original Approved Construction Drawings by crossing out the original information and adding the revised information (similar to the method used for preparing "As-constructed" Drawings). A new drawing may be submitted if significant changes are being made.

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

7. AS-CONSTRUCTED DRAWINGS

7.1 General Requirements for As-constructed Drawings

Digital files and hard copies of the revised Construction Drawings are required, as follows:

.1 Digital drawings shall be submitted with each major Construction Completion Certificate application as follows:

.1 Water, sanitary and storm digital files,

.2 Concrete work and gravel/paved roadways,

As-constructed files for paved roadways are to be submitted with the Construction Completion Certificate for curb,

gutter, and sidewalk as the grades and cross section dimensions will have been established at this stage of construction.

.4 Gravel and/or paved lanes.

The Timeline for submission of the As-constructed Drawing for all improvements will be within one month of submission of the Construction Completion Certificate.

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 (red lining).

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 Roadway As-constructed Drawings are to be submitted on completion of all concrete work. As-constructed elevations are to be provided at the Lip of Gutter (L.O.G.)/Edge of Pavement (E.O.P.) at the following locations and shown on the **Plan/Profile** as-constructed drawings 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.

7.4 **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.

7.6 Building Grade Plan

.1 Revised lowest top of footing elevation.

.2 Revise Back of Walk (B.O.W.) and Lane/PUL elevations if variance from design is greater than 10mm.

.3 Complete a Service Location Report for each serviced lot. Included at the end of this Section, as Appendix A, is a sample report.

7.7 Subdivision Entrance Signs

.1 Detailed Construction Drawings of the sign(s) are to be provided. These drawing will be used for the future maintenance and repair of the Entrance Signs.

.2 The footprint of the Subdivision Entrance Signs is to be shown on all as-constructed plan drawings to identify any conflicts with underground utilities and roadway site triangles.

7.8 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 County the relevant Building Grade Certificates for each lot in the Development.

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

.2 Building Grade Information

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

.1 Water, 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 15, Drawing 4.11 - New Residential Building Grade Certificate.

7.9 Completion Date

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

SERVICE LOCATION REPORT

Subdivision	*Country Meadows 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*	*Y*
b. Killed	(Y/N)	*N*	*N*	*N*
c. Main Stop	(Y/N)	*Y*	N/A	N/A
d. Insulated	(Y/N)	*N*	*N*	*N*
e. Riser	(Y/N)	N/A	*Y*	*Y*
f. Service into Manhole	(Y/N)	N/A	*N*	*N*
g. Inspection Chamber	(Y/N)	N/A	*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.* (Consulting Engineer) *Month dd, yyyy* (Date)

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 County 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 Engineer.

2. CONSULTING ENGINEER/COUNTY RELATIONSHIP

2.1 Private Developments

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

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

Should the Developer for any reason not fulfill the obligations of the Development Agreement, abandon the Project, not complete the works, or elect not to correct the deficiencies identified by the Engineer or the Consulting Engineer, the Consulting Engineer shall not be held responsible to complete the Project. In order to complete the obligations of the Development Agreement, the County 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 **County Projects**

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

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

3. DOCUMENTS AND SCHEDULES

.1 The Consulting Engineer, prior to commencement of construction, shall be completely familiar with:

.1 Red Deer County Design Guidelines.

.2 Red Deer County General Construction Specifications.

.3 The Development Agreement for the Project.

.4 The Engineering Agreement (for County Projects).

.2 The Consulting Engineer shall notify the Engineer when and where all work, construction, and maintenance on underground utilities, overland drainage facilities, parks, and other surface improvements are to be performed and shall advise the Engineer of all changes to the Work schedule.

.3 Notification by the Consulting Engineer shall be by letter, fax (403-350-2160) or e-mail (jmurphy@reddeercounty.ab.ca) 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), 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 as the work is in progress for the purpose of addressing ongoing coordination items as applicable and shall maintain recorded minutes of these meetings.

5. DOCUMENTATION

5.1 General

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

.1 Private Developments

Construction Completion and Final Acceptance Certificates for private developments are to be submitted as detailed in the Development Agreement. Copies of the Certificates are available at Red Deer County Development Department.

.2 County Projects

Substantial Completion Certificates, Construction Completion Certificates, and Final Acceptance Certificates for County Projects are to be submitted. Copies of the Certificates are available at Red Deer County Development Department.

5.2 Reporting of Deficiencies by the Engineer

Any deficiencies observed by the Engineer during construction are to be brought to the attention of the 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 Red Deer County General Construction Specifications.

If the Contractor proposes to use materials not approved in the current Construction 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 Engineer.

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

6. CONSTRUCTION INSPECTION

6.1 General

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

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

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

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

7. POST CONSTRUCTION SERVICES

7.1 Activity Prior To Issuance of a Construction Completion Certificate

.1 The Consulting Engineer shall inspect the Work with the Contractor, record any deficiencies, and advise the Contractor to repair any deficiencies. After the Contractor has repaired the

deficiencies, the Consulting Engineer shall arrange for a joint inspection with the Contractor and the Engineer. Prior to forwarding any Construction Completion Certificates to the Engineer, all related outstanding change orders are to be resolved and any omissions to be approved by the Engineer. Construction Completion Certificates for Landscaping (Levels One – Four and Collector Roadway tree planting) must also be approved by the Operations Manager or his Representative.

.2 The Construction Completion Certificate application 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).

.2 As-constructed drawing.

.3 Copy of video and inspection log reporting deficiencies and corrective action taken.

.2 Surface Improvements

.1 As-constructed drawing.

.2 Letter of compliance covering compaction and materials testing including all results.

.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 will respond to any "complaint" calls forwarded by The County.

7.3 Activity Prior to Issuance of a Final Acceptance Certificate

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

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

The Engineer shall prepare a list of the deficiencies, if further deficiencies are noted, and submit the list to the Consulting Engineer.
When the additional deficiencies have been corrected, the Consulting Engineer shall then, within a reasonable period of time, request from the Engineer, a re-inspection for only the inspection of deficient items.

RED DEER COUNTY
PRIVATE DEVELOPMENT AGREEMENT
CONSTRUCTION COMPLETION CERTIFICATE

Subdivision Name: _____ Developer:

Development Agreement Dated: _____ Contractor:

Municipal Improvement(s):_____
_____
_____
_____

Date of Application: _____

I, _____ of the Firm _____
"Consulting Engineers", hereby certify that the Municipal Improvements noted herein are complete as defined by the Development Agreement, and constructed as far as can be practically ascertained according to Red Deer County's Design Guidelines and the Construction Drawings and Specifications.

I hereby recommend Red Deer County accept the Municipal Improvement noted herein and issue this Construction Completion Certificate.

STAMP _____ Date _____
Project Engineer (Consulting Engineer)

_____ Date _____
Authorized County Inspector

Date Maintenance Period to Start: _____

Date Maintenance Period to Expire: _____

Approved/Rejected: _____ Date: _____
Director of Engineering Services

Remarks: _____
_____
_____
_____
_____
_____

RED DEER COUNTY
PRIVATE DEVELOPMENT AGREEMENT
FINAL ACCEPTANCE CERTIFICATE

Subdivision Name: _____ Developer: _____

Development Agreement Dated: _____ Contractor: _____

Municipal Improvement(s): _____

_____

_____

Date of Application: _____

I, _____ of the Firm _____
"Consulting Engineers" , hereby certify that as of the above date, the Municipal Improvements noted herein meet all of the requirements for final acceptance as specified by Red Deer County's Development Agreement, and I hereby recommend these Municipal Improvements for final acceptance by Red Deer County.

_____ Date: _____
STAMP Project Engineer (Consulting Engineer)

_____ Date: _____
Signing Officer, Consulting Engineer

_____ Date: _____
STAMP Authorized County Inspector

Approved/Rejected _____ Date: _____
Director of Engineering Services

NOTE: The Consulting Engineer is to submit a new Final Acceptance Certificate when cause(s) for rejection have been corrected. See attached report for causes(s) for rejection.

I hereby certify that all items listed as reasons for rejection have been corrected.

_____ Date: _____
Project Engineer (Consulting Engineer)

1. GENERAL

Developers are responsible for preparing a detailed Area Structure Plan as a pre-condition for subdivisions of larger land areas (i.e. quarter section).

The following must be considered when preparing the Area Structure Plan:

.1 Major Area Structure Plan.

.2 Natural, historical, and constructed features.

.3 Lane versus laneless subdivision.

.4 Street classification and layout.

.5 Traffic, rail, industrial, and/or commercial noise.

.6 Traffic volume, capacity, and control.

.7 Servicing boundaries, capacities, and constraints.

.8 Drainage routing and detention.

.9 Municipal Reserve parcels.

.10 Development phasing.

.11 Community mailboxes.

.12 Subdivision entrance signs.

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 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.

.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.

.6 An Environmental site assessment of the development area completed in accordance with the applicable Canada Standards Association and other standards

4. STREET CLASSIFICATION AND LAYOUT

4.1 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 Rural Roadways

.1 Arterial Roadways,
.1 Undivided Arterial

.2 Collector Streets,
.1 Minor Residential
.2 Major Residential

.3 Local Streets,
.1 Residential Cul-de-sac
.2 Residential
.3 Commercial/Industrial

.4 Lanes.

.2 UrbanRoadways

.1 Arterial Roadways,
.1 Arterial

.2 Collector Streets,
.1 Residential
.2 Commercial/Industrial

.3 Local Streets,
.1 Residential
.2 Commercial/Industrial

.4 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 County. Geometric design standards are summarized in Section 15 and described in the following Clauses.

4.2 **Road Characteristics**

.1 Arterial Roadways

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 local and collector roads, frontage roads, or auxiliary lanes.

.2 Collector Roadways

Collector roadways provide both traffic service and land service. 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.

.3 Local Roadways

Local roadways provide land access and connections to 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.

.4 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. The lane layout should not encourage shortcutting between streets.

4.3 **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.

.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.

.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).

4.4 Street Intersection Spacing

.1 Arterial Roadways

The desirable intersection spacing along arterials is 400 m to 800 m.

.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.

4.5 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.

4.6 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.

4.7 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.

4.8 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 15 for standard details.

4.9 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).

4.10 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 and Emergency Services Department. A gravel surface turnaround suitable for SU-9 vehicles shall be provided at the end of any temporary dead-end street or lane.

4.11 Expanded Bulb Corners

Expanded bulb corners, as illustrated in Section 15, may be used on local streets.

4.12 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. TRAFFIC STUDY

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

5.1 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 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.

5.2 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.

5.3 **Issues That May Affect the Traffic Study**

.1 The Developer is to obtain background information that may have an impact on the Traffic Study.

5.4 **Information Available**

.1 Traffic counts will be made available upon request.

6. 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 Power, telephone, cable, and natural gas systems,

.5 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 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

7. 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 6.0 m wide with a 2.0 m easement on each side of the utility lot for a total right of way width of 10.0 m.

Where the corridor is only required for routing of utility mains, it should be contained in an easement. The easement is normally 10 m wide with 8.0 m on one lot and 2.0 m on the adjacent lot. 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 County 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 prospective lot purchaser.

8. 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.

9. COMMUNITY MAILBOXES

The Developer shall forward copies of the proposed Area Structure Plan to Canada Post for comments and the tentative location of community mailboxes for the provision of postal service in the new neighbourhood. The criterion to be used to determine the mailbox locations is included in Section 1.

10. SUBDIVISION ENTRANCE SIGNS

If the Developer wishes to include a sign or feature at the entrance to a subdivision, space should be provided outside of the standard road right of way. The criterion to be used to determine the sign location is included in Section 1 and as shown on Drawings in Section 15.

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 Servicing Study Report.

Specific requirements for the Geotechnical Report and the Erosion and Sediment Control reports are detailed in Clauses 4 and 5 of this Section.

The Servicing Study, including the Clearing and Grading Plan, must be approved by the County prior to any clearing, stripping and grading work

being undertaken. In addition, Development Agreements will not be issued until the Engineer has approved all Servicing Study issues.

Revisions to the Servicing Study must be provided when the 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,

.9 Community mailboxes.

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

3.2 Erosion Control, Sediment Control and 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.

.4 Geotechnical Information

.1 Testhole 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 and 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 County must approve the Servicing Study prior to any clearing and grading work being undertaken.

3.3 **Roadway Grading Plan**

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

.1 Proposed contours,

.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.

3.4 **Water Distribution System**

The purpose of the Water Plan is to establish the water main sizes to ensure that the proposed water system conforms to the County'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.

3.5 Sanitary Sewer System

The purpose of the sanitary sewer system plan is to establish the contributory sanitary service area(s) and discharge points to the existing system based on topographic considerations and downstream transmission capacities. This may include existing system analysis in terms of planned and projected flows, and assessment and monitoring of existing system capacities and flows. Future growth areas beyond the limits of the 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.

3.6 Major Drainage System

Generally, the Outline 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.

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 Stage - 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*

Design Parameter	Elevation	Pond/ Water Surface Area (ha	Pond Volume (m^3)	Outlet Discharge (l/sec.)	Notes
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.

3.7 Minor Storm Sewer System

Planning and design for the storm sewer system must always address provision of both the minor system of surface drainage, gutters, inlets, and enclosed pipes and the major system. The purpose of the storm sewer system plan is to establish the contributory storm service area(s) and discharge points for the 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 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.

3.8 Shallow Utility Systems

The purpose of the Shallow Utilities Plan is to establish the proposed system requirements. Temporary facilities (e.g. overhead power or telecommunication lines), if required due to the proposed subdivision phasing, should be shown on the plan. 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.

3.9 Community Mailboxes

The Developer shall forward copies of the proposed Roadway Grading Plan for approval of the Community Mailbox locations as shown on the approved Neighbourhood Area Structure Plan. The criterion to be used to determine the mailbox locations is included in Section 1. The proposed mailbox locations shall be shown on the Roadway Grading Plan and Shallow Utilities Plan.

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 Area Structure Plan.

The plan should show the following:

.1 Areas of existing wetlands, trees, and vegetation to be removed or retained,

.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 other street furniture, hydrants, etc.

.10 All existing and proposed easements.

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 Red Deer County Operations Department,

.2 Red Deer County Development Department,

.3 Red Deer County Assessment Department,

.4 Power Distribution Company,

.5 Gas Company,

.6 Telephone Company, and

.7 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 Engineer for review and comments.

Following approval of the drawings and the report, submit three copies of the report and one complete set of drawings to the Engineer.

Provide one complete set of drawings to the Operations Department.

Provide one copy of the Shallow Utilities Plan to the Power Distribution Company, Gas Company, Telephone Company, and 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 Slope Stability

A Slope Stability Geotechnical Report is required for all sites where, in the opinion of the Engineer, slope stability is a concern.

4.4 Final Report

Three copies of the report shall be submitted to The County's Development 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. EROSION AND SEDIMENT CONTROL REPORTS

The Erosion and Sediment Control Report must address the following issues:

.1 Location and Site Characteristics

.1 Describe the location of the proposed development, including a legal description of the site and a reference to adjacent properties and landmarks.

.2 Describe the existing land use:

.1 General topography (slope and slope lengths within the site).

.2 Vegetation

.3 Soil types (particle sizes, erodibility).

.4 Extent and nature of development.

.5 Drainage patterns.

.6 Critical areas within the proposed development site that have the potential for serious erosion or sediment problems.

.3 Identify neighbouring areas such as streams, lakes, residential, commercial and/or industrial areas, environmental and/or municipal reserves, escarpments, and/or roads that may be affected by the land disturbance.

.2 Proposed Development

.1 Provide a general description of the proposed development with a brief description of the land disturbing activity.

.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.

.3 **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.

.3 Identify permanent and temporary control methods for each phase of development.

.4 Determine the impact on the receiving water bodies 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.

.4 **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.

1. EROSION AND SEDIMENT CONTROL OBJECTIVES

Soil erosion is the removal and loss of soil by the actions of wind, rainfall and runoff. In construction activities, soil erosion is caused by the force of falling and flowing water, resulting in the detachment and transport of soil particles. Erosion is a temporary phenomenon that has the potential to carry significant amounts of sediment into storm sewers and watercourse during and immediately after rainstorm events.

Sedimentation is the settling out process of soil particles transported by water. Sedimentation can occur in slower moving, quiescent water bodies or in treatment facilities such as stormwater ponds.

The main objective of erosion and sediment control is to prevent sediment pollution in the various watercourses. Secondarily, it is to prevent nuisance airborne dust or tracked-on dirt to county roadways and surrounding neighbourhoods. The majority of these concerns related to urban development are as a result of construction activities. An Erosion and Sediment Control (ESC) Plan is to be approved by the County prior to the start of any site clearing and grading.

Erosion and sediment control techniques are part of Best Management Practices (BMP's). BMP's operate by trapping stormwater runoff and detaining it until unwanted pollutants such as sediment, phosphorous and other harmful contaminants are allowed to settle out or be filtered through underlying soils. The trapped pollutants are then removed through regularly scheduled maintenance.

Therefore, any preventative measures that will reduce erosion and sedimentation are beneficial.

2. REFERENCE MATERIAL

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

Alberta Transportation - Design Guidelines for Erosion and Sediment Control for Highways.

Alberta Transportation - Fish Habitat Manual

Alberta Transportation - Navigable Waters Protection Act Manual

3. REGULATORY REQUIREMENTS

Erosion from land surfaces can contribute large quantities of sediment to watercourses. There are a number of federal and provincial acts and regulations governing activities that cause, or can cause harm to the environment, including construction projects that result in erosion and/or sedimentation. Regulatory agencies also publish codes of practice, guidelines and standards that set out requirements for undertaking certain types of activities. Most legislation and other types of regulatory tools make reference to preventing the release of harmful or deleterious substances, including silt, to the environment.

The Federal Department of Fisheries and Oceans (DFO) operates in Alberta to enforce relevant federal legislation. Alberta Environment enforces relevant provincial legislation in collaboration with DFO enforcement of federal legislation.

3.1 Federal Legislation

.1 Navigable Water Protection Act

The Navigable Water Protection Act, R.S.C.1985, c. N-22 applies to in-stream work involving construction or placement in, on, over, under, through or across any navigable water. "Navigable waters" includes a canal and any other water created or altered as a result of construction of any work. Section 22 of the Act states:

"No person shall throw or deposit or cause, suffer or permit to be thrown or deposited any stone, gravel, earth, cinders, ashes or other material or rubbish that is liable to sink to the bottom in any water, any part of which is navigable or that flows into any navigable water, where there are not at least twenty fathoms of water at all times, but nothing in this section shall be construed so as to permit the throwing or depositing of any substance in any part of a navigable water where that throwing or depositing is prohibited by or under any other Act."

.2 Fisheries Act

The Fisheries Act, R.S.C. 1985, c. F-14, Sections 34 to 42 exists to protect fish and fish habitat. 36(3) of the Act states, in part:

"No person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water".

Silt is amongst the most common types of deleterious substances.

Section 38(4) of the Act states:

"Where, out of the normal course of events, there occurs a deposit of a deleterious substance in water frequented by fish or a serious and imminent danger thereof by reason of any condition, and where any damage or danger to fish habitat or fish or the use by man of fish results or may reasonably be expected to result, therefore, any person who at any material time

a. owns the deleterious substance or has the charge, management or control thereof, or

b. causes or contributes to the causation of the deposit or danger thereof,

shall, in accordance with any regulations applicable thereto, report such occurrence to an inspector or such other person or authority as is prescribed by the regulations."

Furthermore, Sections 35(1) and 53(2) state as follows:

1) No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat.

2) No person contravenes subsection (1) by causing the alteration, disruption or destruction of fish habitat by any means or under any conditions authorized by the Minister or under regulations made by the Governor in Council under this Act.

Fish habitat is defined in Section 34(1) as follows:

"Fish habitat" means spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes."

The Fisheries Act is enforced by DFO. Under administrative agreement with DFO, Alberta Environment acquired certain responsibility for enforcement of Section 36 and related provisions. DFO operates in the Province of Alberta to enforce relevant federal regulations in collaboration with Alberta Environment on enforcement of provincial regulations.

3.2 **Provincial Legislation**

.1 Environmental Protection and Enhancement Act (EPEA)

The Environmental Protection and Enhancement Act, R.S.A, C. E-12 exists to support and promote the protection, enhancement and wise use of the environment. Sections 108 and 109 state as follows:

108(1) No person shall knowingly release or permit the release of a substance into the environment in an amount, concentration or level or at a rate of release that is in excess of that expressly prescribed by an approval or the regulations.

(2) No person shall release or permit the release of a substance into the environment in an amount, concentration or level or at a rate of release that is in excess of that expressly prescribed by an approval or the regulations.

(3) For the purposes of this section, if there is a conflict between an approval and the regulations as to an amount, concentration, level or rate of release of a substance, the most stringent requirement prevails.

109(1) No person shall knowingly release or permit the release into the environment of a substance in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect.

(2) No person shall release or permit the release into the environment of a substance in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect.

(3) Subsections (1) and (2) apply only where the amount, concentration, level or rate of release of the substance is not authorized by an approval or the regulations.

(4) No person may be convicted of an offence under this section if that person establishes that the release was authorized by another enactment of Alberta or Canada.

Sections 110 and 111, as follows, address the reporting requirements under the EPEA.

110 (1) A person who releases or causes or permits the release of a substance into the environment that may cause, is causing or has caused an adverse effect shall, as soon as that person knows or ought to know of the release, report it to:

(a) the Director,

(b) the owner of the substance, where the person reporting knows or is readily able to ascertain the identity of the owner,

(c) any person to whom the person reporting reports in an employment relationship,

(d) the person having control of the substance, where the person reporting is not the person having control of the substance and knows or is readily able to ascertain the identity of the person having control, and

(e) any other person who the person reporting knows or ought to know may be directly affected by the release.

(2) The person having control of a substance that is released into the environment that may cause, is causing or has caused an adverse effect shall, immediately on becoming aware of the release, report it to the persons referred to in subsection (1)(a), (b), (c) and (e) unless the person having control has reasonable grounds to believe that those persons already know of the release.

(3) A police officer or employee of a local authority or other public authority who is informed of or who investigates a release of a substance into the environment that may cause, is causing or has caused an adverse effect shall immediately notify the

Director of the release unless the police officer or employee has reasonable grounds to believe that it has been reported by another person.

111 (1) A person who is required to report to the Director pursuant to section 110 shall report in person or by telephone and shall include the following in the report, where the information is known or can be readily obtained by that person:

(a) the location and time of the release;
(b) a description of the circumstances leading up to the release;
(c) the type and quantity of the substance released;
(d) the details of any action taken and proposed to be taken at the release site;
(f) a description of the location of the release and the immediately surrounding area.

(2) In addition to a report under subsection (1), the person shall report in writing where required by the regulations.

(3) A person who reports under subsections (1) and (2) shall give to the Director any additional information in respect of the release that the Director requires.

Sections 112 of the EPEA deals with the remedial actions to be taken, as follows:

112 Where a substance that may cause, is causing or has caused an adverse effect is released into the environment, the person responsible for the substance shall, as soon as that person becomes aware or ought to have become aware of the release,
(a) take all reasonable measures to
(i) repair, remedy and confine the effects of the substance, and
(ii) remove or otherwise dispose of the substance in such a manner as to effect maximum protection to human life, health and the environment and
(b) restore the environment to a condition satisfactory to the Director.

Sections 118 deals with the failure to report the release of a substance, as follows:

118 Where a remediation certificate is issued, no environmental protection order requiring the doing of further work in respect of the same release of the same substance may be issued under this Act after the date prescribed or determined for the purposes of this section in accordance with the regulations.

4.0 PENALTIES FOR CONTRAVENTION OF ENVIRONMENTAL LEGISLATION

4.1 Navigable Water Protection Act

The following is a summary of the offences and penalties include in Section 28 of the Act:

Offence	Penalties	
	Summary Conviction	Indictable Offence
Section 22 - *deposit any stone, gravel, earth, etc.*	Fine not exceeding $5,000	N/A

4.2 Fisheries Act

The following is a summary of the offences and penalties include in Section 40 of the Act:

Offence	Penalties	
	Summary Conviction	Indictable Offence
Subsection 35(1) - *harmful alteration, disruption or destruction of fish habitat*	1st. Offence - $300,000 Subsequent Offences - $300,000 and/or 6 months in prison	1st. Offence - $1,000,000 Subsequent Offences - $1,000,000 and/or 3 years in prison
Subsection 36(1) and (3) - *deposit of a deleterious substance*	1st. Offence - $300,000 Subsequent Offences - $300,000 and/or 6 months in prison	1st. Offence - $1,000,000 Subsequent Offences - $1,000,000 and/or 3 years in prison
Subsection 37(1) and (2) - *failure to provide plans, specifications, studies, etc.*	1st. Offence - $200,000 Subsequent Offences - $300,000 and/or 6 months in prison	N/A
Subsection 38(4) - *failure to report*	1st. Offence - $200,000 Subsequent Offences - $300,000 and/or 6 months in prison	N/A
Subsection 38(5) - *failure to take any reasonable measures*	1st. Offence - $200,000 Subsequent Offences - $300,000 and/or 6 months in prison	N/A
Subsection 38(6) - *failure to comply with directions of an inspector*	1st. Offence - $200,000 Subsequent Offences - $300,000 and/or 6 months in prison	N/A

4.3 Environmental Protection and Enhancement Act (EPEA)

The following is a summary of the offences and penalties include in Section 228 of the Act:

Offence	Penalties	
	Individual	Corporate
Section 108(1)- *knowingly release or permit the release of a substance into the environment in excess of an approval or the*	$100,000 and/or 2 years in prison	$1,000,000

regulations.		
Section 108(2)- *release or permit the release of a substance*	$50,000	$500,000
Section 109(1)- *knowingly release substance into the environment that causes or may cause a significant adverse effect*	$100,000 and/or 2 years in prison	$1,000,000
Section 109(2)- *knowingly release substance into the environment of a substance that causes or may cause a significant adverse effect.*	$50,000	$500,000
Section 110(1) and (2) – *failure to report the release of a substance into the environment that causes or may cause a significant adverse effect.*	$50,000	$500,000
Section 112) – *failure to take remedial measures after the release of a substance*	$50,000	$500,000

4.4 Continuation of a Contravention

Where a contravention is committed or continued on more than one day, each day is considered a separate offence.

4.5 Release Information

The Environmental Protection and Enhancement Act and the Release Reporting Regulation deal with the release of substances into the environment and set out what must be reported, when, how and to whom reports must be made. Additionally, individual approvals and Codes of Practice may have requirements for the reporting of contraventions of the terms and conditions of the approval or the sections of the Code of Practice.

Where the incident, release or contravention triggers a requirement to immediately report, then this report should be made to the **Environmental Service Response Centre** as follows:

.1 Verbal Reports can be phoned to **780-422-4505** or **1-800-222-6514** (on a 24 hour basis).

.2 A reference number will be provided at the time of the verbal report to confirm that the report of the release was made.

.3 Written reports can be faxed to **780-427-3178**; or mailed to Environmental Service Response Centre, Alberta Environment, 6th floor, Oxbridge Place, 9820-106 Street, Edmonton, Alberta T5K 2J6.

4.6 Due Diligence

Most environmental legislation provides for "due diligence" (defined simply as "the exercise of reasonable care") as a defence to the majority of environment offences. By ensuring due diligence is exercised, the responsible party may prevent the occurrence of a violation altogether.

5.0 EROSION AND SEDIMENT CONTROL (ESC) PLANS

5.1 Goals and Objectives

The main objective of erosion and sediment control is to protect our watercourses from pollution, primarily sediment pollution.

5.2 Responsibilities

Erosion and sediment control is the responsibility of the Developer.

5.3 Elements of an Effective ESC Plan

The following elements are to be considered in the preparation of an effective ESC plan:

.1 Minimize Needless Clearing And Grading.

Some areas of a development site should never be cleared or graded, or these activities should be restricted. This includes stream buffers, forest conservation areas, wetlands, springs, highly erodible soils, steep slopes and environmental areas.

.2 Protect Waterways And Stabilize Drainage Ways

Streams and waterways are particularly susceptible to sedimentation. Clearing adjacent to a waterway should not be permitted, and a silt fence should be installed along the perimeter of the buffer. Existing drainage ways should be identified; as these will likely be the major routes that eroded sediments will take to reach streams, rivers, and storm sewers. Drainage ways are also prone to erosion due to the high velocity of runoff. Erosion should be minimized.

.3 Phase Construction To Limit Soil Exposure

Large areas of grading should be avoided since this maximizes erosion potential. Construction phasing, where only a portion of the site is disturbed at one time, minimizes sediment load potential.

.4 Stabilize Exposed Soils Immediately

To provide soil stabilization, it is important to establish ground cover over the denuded area within a short period of time with the soils being exposed. Covers such as grass, mulch, erosion control blankets, hydro seeding and/or plastic sheeting can be used to achieve this.

.5 Protect Steep Slopes And Cuts

Steep slopes are the most highly erodible surfaces within construction sites. Steep slopes are generally defined as 6H:1V or greater. Where possible, clearing and grading of steep slopes should be avoided. Otherwise, special techniques, such as uphill flow diversion and silt fencing, should be used to prevent uphill runoff from flowing down the slopes.

.6 Install Perimeter Controls To Filter Sediment

Perimeter controls should be implemented at the edge of the construction site to retain or filter runoff before it leaves the site. Silt fences and earth dikes or diversion are two of the more common control methods.

.7 Employ Advanced Sediment Settling Controls

Even when the best ESC measures are employed, high concentrations of sediments may be discharged during larger storms. Therefore, the ESC plan should include some sediment traps or basins to allow captured sediments to settle out. To improve the trapping efficiency, these basins should be designed to incorporate such features as larger storage volumes, use of baffles, skimmer's and other outlet devices, and multi-cell construction. Regular inspection and maintenance are also critical to the operation of these practices.

.8 Ensure Contractors Are Trained On ESC Plan Implementation, Inspection, Maintenance and Repairs.

The most important element in the implementation of an ESC Plan is the training and experience of the contractors, as they are usually responsible for the installation and maintenance of the practices. In the end, everyone is responsible for the erosion and sediment control. Therefore, training and education is important for everyone, from the **Developer** to the **Homebuilder**. Everyone is working towards the same goal of protecting our waterways.

.9 Adjust ESC Plan At Construction Site

For an effective ESC Plan to be effective, it may have to be modified due to discrepancies between planned and as-constructed grades, weather conditions, altered drainage and unforeseen requirements. Regular inspections by the Consulting Engineer are needed to ensure that the ESC controls are working properly. Inspections should be conducted every seven days and following heavy rainstorms or snowfall events.

.10 Assess ESC Practices After Rainstorms Or Snow Melt Events

After a rainstorm or snow melt, it is usually clear whether an ESC Plan worked or not. If the event was unusually large or intense, it is likely that many of the controls will require repair, clean out or reinforcement. Therefore, a quick response to assess and correct damages of the control is required.

5.4 Design of an Erosion and Sediment Control Plan

An Erosion and Sediment Control Plan must be prepared for all construction projects. Best Management Practices should be indicated on the construction drawings.

General principles should consider the following:

.1 Prevent pollutant release. Source control BMP's should be selected as the first line of defense.

.2 Erosion and sediment control measures, or other BMP's, should be selected based on the site characteristics and the construction plan.

.3 Site drainage and soil conditions should be reviewed to determine the most significant factors for the site and planned construction.

.4 Runoff should be diverted away from exposed areas where possible.

.5 Existing vegetation should be preserved.

.6 The extent of clearing and phased construction should be limited.

.7 Natural drainage features should be incorporated when possible. Adequate buffers should be used to protect areas where flows enter the drainage system. Keep clean water clean.

.8 Minimize slope length and steepness.

.9 Runoff velocities should be reduced to prevent channel erosion.

.10 Prevent tracking of sediment off-site.

.11 Select appropriate control measures for the control of pollutants other than sediment.

5.5 **Erosion and Sediment Concerns and Practices**

1. There are many erosion and sedimentation concerns that arise due to construction activities. These include, but are not limited to the following:

   .1 Mud tracking from construction sites onto adjacent properties and roadways,

   .2 Silt and debris washed into existing storm sewer (drainage) system,

   .3 Silt and debris transported to receiving watercourse by surface runoff and the sewer system,

   .4 Wind blown dust.

2. Good maintenance practices will help to minimize erosion and sediment concerns, and should be considered when preparing the

construction schedule. While some may be impractical under certain conditions, others should be considered based on suitability, practicality and cost effectiveness.

.1 Stockpiles should be located away from watercourses, environmentally sensitive areas, drainage courses, and existing adjacent developments. The stockpiles should be stabilized against erosion immediately following stripping operations. Stabilization can include, but is not limited to establishment of a cover crop or hydro seed matrix consisting of seed, fiber bond and tackifier.

.2 All construction traffic should leave the site at a designated point or points. Gravelling or paving (where practical) of frequently used access roads will help ensure that minimal material such as mud is tracked off-site. The access road should consist of a bed of non-erodible material (i.e. gravel) of sufficient length to ensure that a minimum of material (mud) is tracked off-site onto adjacent municipal roadways. Internal haul roads and/or track packs can also be designated and maintained to help reduce off-site tracking.

.3 When storm sewers have been installed or are existing, measures should be undertaken to ensure sediment and debris does not get into the municipal storm sewer system. Both catch basins and manholes should be protected. This may be accomplished by sealing the openings, setting up sumps or weirs inside the structure, or by providing appropriate inlet protection (filter fences, sediment traps, etc.). A temporary drainage system should be used with appropriate velocity controls and temporary storage areas for sediment control. This will ensure that sediment and debris do not get into the municipal storm sewer system and into the downstream waterways. Diligent efforts must be taken to ensure that the temporary drainage system does not flood adjacent properties.

.4 Where on-site or downstream detention facilities are provided, use can be made of a quality control facility (through placing temporary weirs or check dams) for sediment control during construction. **All temporary and permanent detention facilities must be constructed prior to**

the installation of any services to the site or the commencement of earth moving operations.

.5 Dust control measures should be implemented to prevent wind transport of dust from disturbed soil surfaces. This may be accomplished several ways:

.1 Vegetate, hydro seed, or mulch areas that won't receive vehicular traffic,

.2 Construct windbreaks or screens,

.3 Site may be sprinkled with water or a chemical dust suppressant to control dust (care must be taken to prevent tracking of mud that may result), or

.4 A combination of the above noted methods.

.6 All accumulated sediment and debris should be removed as required. Once construction activities are complete, all related materials and temporary structures must be removed and properly disposed of.

6. BEST MANAGEMENT PRACTICES (BMP's) FOR EROSION AND SEDIMENTATION CONTROL

6.1 General

BMP's for erosion and sedimentation control are various methods that have been proven to work on past construction sites when they are properly planned and constructed.

These measures reduce erosion potential by stabilizing exposed soil or reducing surface runoff flow velocity. There are generally two types of erosion control BMP's that can be used in conjunction with the minimum requirements. They are as follows:

.1 source control BMP's for the protection of exposed surfaces; and

.2 Conveyance BMP's for control of runoff.

These measures reduce off-site sedimentation potential by promoting sedimentation before surface water flows leave the construction site. There are generally two types of BMP's that can be used in conjunction

with the minimum requirements of an erosion control plan. They are as follows:

.1 Filtering and Entrapment BMP's; and

.2 Impondment BMP's

It is the Consultant's responsibility to ensure that BMP's are appropriate for the site conditions.

6.2 Suggested BMP's For Erosion and Sediment Control

The following BMP's are described in detail in Appendix C of the Alberta Transportation - Design Guidelines for Erosion and Sediment Control for Highways manual with respective BMP Number shown in brackets.

Each BMP lists all or some of the following information:

.1 Description and Purpose,

.2 Application,

.3 Advantages,

.4 Limitations,

.5 Construction (see waiver note),

.6 Construction Considerations,

.7 Inspection and Maintenance, and

.8 Similar Measures.

All work is to be completed in accordance with Red Deer County Construction Specifications.

Acceptable erosion control methods include:

.1 Seeding (BMP # 22),

.2 Mulching (BMP # 23),

.3 Hydroseeding (BMP # 24),

.4 Hydromulching (BMP # 24),

.5 Topsoil placement (BMP # 25),

.6 Sodding (BMP # 26),

.7 Planting trees and shrubs (BMP # 27), and

.8 Placing erosion control blankets (BMP # 13).

Acceptable sedimentation control methods include:

.1 Silt fences (BMP # 1),

.2 Gabions (BMP # 2),

.3 Rock filter berms (BMP # 3),

.4 Continuous (earth –filled geotextile) berm (BMP # 4),

.5 Earth dyke barrier (BMP # 5),

.6 Storm drain inlet sediment barrier (BMP # 6),

.7 Storm drain inlet sediment trap (Layfield Geosynthetics or equal) (not illustrated in manual),

.8 Rock check dam (BMP # 7),

.9 Sandbag check dam (BMP # 8),

.10 Synthetic permeable barrier (BMP # 10),

.11 Straw bale check dam (BMP # 11), and

.12 Straw bale barrier (BMP # 12)

.13 Stabilized Worksite Entrances (BMP # 33)

.14 Other methods illustrated in the manual may be utilized in unique situations.

.15 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 1/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 Red Deer County.

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

The County 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 product.

1. GENERAL

The Developer shall not do any fieldwork, including site clearing, stripping and/or grading prior to execution of a Development Agreement that includes Clearing and Grading construction activities.

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. Detailed Clearing and Grading Plan are included in Section 2.

The Engineer 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.

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 County 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

Prior to the commencement of site clearing and grading, the Developer shall:

.1 Notify the Engineer 48 hours in advance and arrange a site meeting with the Consultant Engineer 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 Approval is required from the Engineer, where the Developer proposes to establish a haul route which crosses an existing roadway.

4.2 Environment Protection

.1 All work associated with clearing and grading the work shall be completed in accordance with Section 01561 – Clause 1.2 of the Contract Specifications.

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 Section 02231

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.

Where a Development is located adjacent to an Expressway and/or Arterial Roadway, the Developer shall construct or complete the construction of the sound attenuation berm to the design cross sections illustrated in Section 15, utilizing waste excavation material and/or surplus topsoil.

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, and the adjacent arterial roadway berms. Stockpile side slopes shall be no steeper than 3:1 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 Parks and Recreation 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 and/or Neighbourhood Park site, 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 County, 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.

1. GENERAL

The water system consists of the Groundwater Supply wells, reservoirs, booster stations, trunk water mains, distribution mains, and appurtenances.

In general, water mains 350 mm and larger will be designated "Trunk Water Mains" and the cost of these mains are included in the current Water Off-site Levy Rate. The current Trunk Water Mains are identified in the most recent Council approved Off-site Levy Report. Services should not be connected to Trunk Water Mains.

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

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. DESIGN FACTORS

2.1 Hydraulic Analysis Requirements

The Developer shall perform a hydraulic network analysis using a method acceptable to the County 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 County with the subdivision design drawings. It is preferable that the Developer completes a WaterCad model for their development with the boundary information supplied as requested.

2.2 Design Parameters

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

.1 Hazen-Williams Coefficient (C)

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

.2 Distribution Main Sizes

The minimum size of Distribution Mains shall be as follows:

.1 Residential = 150 mm diameter

.2 Industrial = 200 mm diameter

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

.3 Consumption Rates

.1 Residential per capita consumption rates:

.1 Maximum Day Demand: 750 litres (165 imp. gal.) per capita per day.

.2 Peak Hour Demand: 1500 litres (330 imp. gal.) per capita per day.

.2 Non-residential consumption rates:

For non-residential developments, the minimum water consumption rate shall be equal to 0.2 litres per second per hectare. The applied peaking factor shall be $P_F = 10Q^{-0.45}$ to a maximum of 25 and a minimum of 2.5 where Q is in litres per second. In addition, water demand for large developments should be evaluated based on site specific service requirements as well as fire flow requirements.

.4 Design Population

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

.5 Fire Flow Requirements

Fire flow requirements shall be in accordance with the

recommendations of the Fire Underwriters Survey for the type of development being considered. The minimum fire flow used for single family residential subdivisions shall be 4,500 litres/minute (1000 igpm) and for Industrial subdivisions shall be 9,000 litres/minute (2000igpm).

.6 Pressure

.1 Minimum residual line pressure under maximum day plus fire flow conditions shall be 150 kPa at ground level of any point in the system. Minimum residual line pressure under peak hour flow conditions shall be 300 kPa.

.2 Minor pressure losses through valves and fittings must be accounted for.

.7 Velocity

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

3. DISTRIBUTION MAINS

3.1 General

The 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.

3.2 Alignments

Water mains shall be located on the standard alignment shown on Drawing 4.07 for streets and 4.09 for lanes and public utility lots. A minimum separation of 3.0 m from sanitary and storm sewers shall be provided in all instances, unless approved otherwise by the Engineer. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

3.3 Depth of Cover

Water mains shall be installed with a minimum depth of cover of 2.7 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 2.7 m, the main/service is to be insulated as specified in Drawing 1.03 of the Construction Specifications.

3.4 Oversize

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

4. HYDRANTS

4.1 Spacing

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

4.2 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 1.45 m back of face of curb. Where a hydrant is installed at the corner of an intersection, it shall be installed at the beginning or end of the curb return.

4.3 Hydrant Type

Hydrants shall have plugged drain holes and be manufactured by an approved hydrant manufacturer listed in Red Deer County's Contract Specifications.

4.4 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.

5. VALVES AND FITTINGS

5.1 Alignment and Placement

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

The design standard shall be two valves at a tee and three valves at a cross, unless approved otherwise by the Engineer. A valve and one length of pipe shall be installed at interim limits of construction. See Section 15 for typical valve locations.

5.2 Protection

Where required by the Engineer, 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.

5.3 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 Red Deer County's Contract Specifications.

6. WATER MAIN FLUSHING AND DISINFECTION PROCEDURES

6.1 The following procedures will be followed when installing water mains

connected to The County's water distribution system:

.1 Basic procedures to meet the standards outlined in AWWA C651-86, "Disinfecting Water Mains" and Red Deer County's Contract Specifications.

Note: The Consulting Engineer must collect all water samples.

.2 Consulting Engineer to submit proposed disinfection/flushing procedures to The County for review with engineering design drawings.

.3 All water lines to be flushed again after streets are constructed and before issuance of building permits.

7. GROUNDWATER

7.1 Groundwater Supply

There are two basic groundwater supply alternatives in rural areas of Alberta, these include:

.1 Private groundwater supply system (based on a central well with a piped water distribution system)

An application must be submitted under the Water Act to the appropriate regional office of The Water Administration Branch of Alberta Environment. The direction and evaluation of aquifer testing for wells requiring a license under this act will require the assistance of a person competent in ground water evaluations.

.2 The use of privately owned household water supply system where each lot has its own system.

7.2 Well Drilling

Wells used for water supply must be drilled by an Alberta licensed water well driller.

7.3 Groundwater Specialist

A Groundwater Supply Evaluation Report may be required by the Subdivision Authority. This report is to be prepared by a Groundwater

Geologist (Hyrogeologist) or Professional Engineer whose area of competence encompasses groundwater evaluations. The household groundwater supply potential should be evaluated by using the following criteria:

.1 The potential of one or more aquifers, if present, to provide a sufficient supply of groundwater to meet the needs of any existing development and proposed unserviced residential subdivision within a quarter section during peak demand periods and over the long term (an aquifer is a water bearing formation which is capable of transmitting and yielding water in usable quantities).

.2 The extent to which each aquifer is continuous beneath the proposed development area (if discontinuous, each proposed parcel may not be able to have privately owned household well).

.3 The potability of each aquifer's water in its current state considering its natural quality and possible existing anthropogenic contamination (anthropogenic refers to the impact of man on nature; existing contamination may be from agricultural, industrial activities, etc.; refer to the Local Health Unit's criteria for potable water).

.4 Feasibility of treating groundwater if needed.

.5 The susceptibility of each aquifer to potential contamination taking into account aquifer depth, overlaying low permeability layers such as clay and shale, and the presence of fractures, fissures or cracks in these fine textured layers. Each parcel within an unserviced residential subdivision is serviced by an onsite private sewage disposal system, therefore, the potential for contamination by sewage effluent is of primary concern.

7.4 Quantity of Water

A central well should be capable of meeting the household requirements of all the existing and proposed lots within a quarter section.

1. GENERAL

The sanitary system must be designed with consideration for the service area boundaries established by the County 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", and the cost of these mains are included in the current Sanitary Off-site Levy Rate. The current Trunk Sanitary Mains are identified in the most recent Council approved Off-site Levy Report.

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)

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} = 0.20 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

Peak Dry Weather Flow, Q_{PDW} = Pf x Q_{AVE}

2. 3 **Extraneous Flow Allowances - All Land Uses**

For Red Deer County, 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 Engineer.

3.2 Minimum Slope

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

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

The hydraulic capacity of a gravity sanitary sewer shall be based on such factors as projected in-service roughness coefficient, slope, pipe material, and actual in-service flows. Sewers larger than the minimum size required shall be chosen so that the minimum velocity at the peak flow is

not less than 0.6m/s for self-cleaning purposes.

3.3 **Pipe 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.

3.4 **Curved Sewer**

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

.1 The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m.

.2 Manholes shall be located at the beginning and end of the curve and at intervals of not less than 90 m along the curve unless approved otherwise by the Engineer.

.3 The curve shall run parallel to the centre line of the right of way.

.4 The minimum grade for sewers on curves shall be 50% greater than the minimum grades noted in Clause 3.2 of this Section.

3.5 **Alignment**

Sanitary mains shall be located on the standard alignment shown on Drawing 4.07 for streets and 4.09 for lanes and public utility lots. A minimum separation of 3.0 m from water mains shall be provided in all instances, unless approved otherwise by the Engineer. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

3.6 **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; but not shallower than 2.7 m, unless otherwise approved by the Engineer. Where existing conditions dictate that the depth of buries be less than 2.7 m, the main/service is to be insulated as specified in Drawing 1.03 of the

Construction Specifications.

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 that 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, where a maximum of 5 services are allowed to enter a dead end manhole and a maximum of 4 services are allowed to enter a flow through manhole.

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.

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

5. OVERSIZE

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

6. LOW PRESSURE SEWAGE SYSTEMS

The requirements listed herein include components to be installed on private property and public rights-of-way. The limits of responsibility must be determined by the Developer at the commencement of the planning and design stage.

.1 Septic tanks and pumps - all properties to be serviced shall have an adequately sized two-compartment septic tank. The pump shall have an open impeller design suitable for handling septic tank effluent.

.2 Sewer mains shall be either p.v.c. or polyethylene and shall be capable of operating at a continuous pressure level of 875 kpa at 23°C. The minimum pipe size for sewer mains shall be 50 mm I.D.

.3 Service pipes shall be 1 ½ inch series 160 polyethylene or polybutylene tubing.

.4 Fittings and joints - p.v.c. fittings for use with p.v.c. pipe shall be a rubber gasket joint manufactured for the type of pipe used in the mains. Polyethylene pipe shall be jointed by the butt fusion method and connected to fittings as recommended by the pipe manufacturer.

.5 Fittings shall be schedule 40 p.v.c. or cast iron conforming to A.W.W.A. C110. Fittings shall be designed for a working pressure of 900 kpa. Where flanged joints are used the bolts shall be manufactured from stainless steel.

.6 Service tees for use on 50 mm diameter mains shall be tapped to accept 37 mm or adapters. Only bronze reducing bushings shall be used to decrease the size of threaded opening in P.V.C. tees down to 37 mm.

Service tees on pipes 75 mm diameter or larger shall be made using Smith Blair Service Saddles as follows:

1. Smith Blair Style 342 for 75 mm and 100 mm mains.
2. Smith Blair Style 352 for 150 mm and larger mains.

Only bronze reducing bushings shall be used to reduce the opening in the service saddle to 37 mm.

.7 Corporation stops for plastic service tubing shall have a compression joint. Stainless steel stiffeners of the correct size shall be used at all compression joints on polyethylene and polybutylene service tubing.

.8 Curb stops for plastic pipe shall have a compression type joint. The curb stop shall be of the ball valve type. Curb stops shall be equipped with an extension type valve box suitable for 3.0 meters bury in the extended position. Stainless steel stiffeners of the correct size shall be used at all compression joints on polyethylene or polybutylene pipe.

.9 Valves - ball valve curb stops shall be used as valves on 50 mm diameter pipe and shall be supplied with an extension type valve box suitable for 3 meter bury. Valve boxes shall be protected against damage. Joints shall be of the compression type for both outlets.

For 75 mm and larger pipe, valves shall be Epoxy lined water works gate valves conforming to A.W.W.A. specification C500.

.10 Valve boxes for 75 mm and larger valves shall be Norwood Foundry Type A or approved equivalent.

.11 Testing - the low pressure sewerage system shall be subjected to, and pass, a leakage test for 1hour at 875 kpa pressure. The allowable leakage shall not exceed the pipe manufacturers recommended allowance.

.12 The use of repair clamps will not be permitted when making repairs to the pipe of the low pressure sewerage system. Regardless of the pipe being used, the bedding shall be placed to provide a minimum of 150 mm of sand bedding over the pipe.

7. SEWAGE LAGOONS

Sewage lagoons are to be constructed in accordance with the **requirements of Alberta Environmental Protection.**

The lagoon shall be designed to include the following *additional requirements:*

.1 Overflow and drain lines shall have a minimum I.D. of 200 mm. Pipes shall be oversized as required for future expansion of the lagoon.

.2 Overflow and drain lines shall be fabricated entirely from a minimum of Series 80 Polyethylene pipe. All joints between pipes or pipes and fittings shall be made by the butt fusion method approved by the pipe manufacturer.

.3 The fence shall be constructed using creosote treated posts 125 mm minimum diameter and at a maximum spacing of 3.6 meter. Corner and gate posts shall be no smaller than 175 mm diameter and shall be adequately braced. Four strands of heavy gauge, barbed, four point, double strand barbed wire at a spacing of 250 mm shall be used for the fencing material. The fence shall be located a minimum of 3.0 meter outside the outside toe of the berm.

.4 The access gate shall be a double swing gate complete with adjustable hinges and chain locking device.

.5 The access road shall be adequately drained for all weather use with a minimum shoulder to shoulder width of 5.0 meter. The top foot of the roadway shall be compacted to 100% Standard Proctor Density at optimum moisture content and the wearing surface shall be 100 mm of well graded ¾ inch crushed gravel.

.6 The entire area between the fence and the high water level will be seeded to grass, by the Developer.

8. PUMPING STATIONS

Pumping stations shall be of a permanent nature, whether long-term or short-term (replaced by either a future gravity system or permanent pumping station). They are to be constructed from reinforced concrete, unless otherwise approved by the County, and in conformance with standard engineering practice.

Sewage Lift Stations must be so located as to be readily accessible by road, with sufficient area immediately adjacent for vehicle parking to facilitate any required work or maintenance, and enclosed as required by the County.

Sewage lift stations shall be of the wet well/dry well type. Adequate provisions shall be made in the design of the structures to facilitate removal of pumps and motors.

Two sewage pumps, each capable of handling more than the peak design flow shall be installed.

9. PERCOLATION TESTING AND METHODS

Percolation testing should not be done without first determining the depth to the shallow water table, as per the guidelines. The guidelines relevant to percolation testing are fully explained in the "Interim Guidelines for the Water Table Conditions and Soil Percolation Rate for Unserviced Residential Subdivisions" published by the **Standards and Guidelines Branch, Alberta Environmental Protection.**

A brief procedure for Percolation Tests is provided in Section 8.3.8 of the "Alberta Private Sewage Treatment and Disposal Regulations" published by Alberta Labour.

Caution is advised when interpreting results after conducting percolation tests in fine grained soils. Evaluation of the suitability of the soils for on-site sewage disposal may require professional assistance.

If a proposed subdivision is not to be served by a municipal wastewater system, then according to subsection 4(5)(c) and (e) of the Subdivision and Development Regulation, the Municipal Government Act, the Subdivision Authority may require an application for subdivision to submit:

c) *"an assessment of subsurface characteristics of the land that is to be subdivided, including but not limited to, susceptibility to slumping or subsidence, depth to water table and suitability for any proposed on-site sewage disposal system;"*

e) "…information supported by the report of a person qualified to make it, respecting the intended method of providing sewage disposal facilities to each lot in the proposed subdivision".

Each report shall include all pertinent information and recommendations of a qualified professional engineer. This report will contain:

- proposed septic field sites;

- accurate location of the above;
- location of any existing septic fields;
- any water wells and their locations;
- methodology;
- results;
- conclusions and recommendations;
- sealed sewer holding tanks are not accepted unless in extra ordinary circumstances and the system is approved.

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 County for each storm trunk system. All pertinent data regarding the subdivision should be discussed with the Engineer prior to design proceeding.

In general, storm mains 1200 mm or greater, as well as stormwater storage facilities and associated outlet piping, will be designated "Trunk Storm Mains", and the cost of these mains are included in the Storm Off-site Levy Rate. The current Trunk Storm Mains are identified in the most recent Council approved Off-site Levy Report.

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 Red Deer County.

1.2 Stormwater Management

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

The main objectives of stormwater management are as follows:

.1 Ensure that the hydraulic capacities of existing pipe systems and/or watercourses are not exceeded.

.2 Reduce to acceptable levels (1:100 year probability of occurrence, where reasonably attainable), the potential risk of property damage from flooding within 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 Engineer.

1.3 Major/Minor System

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

The minor system, comprised of pipes, manholes, catch basins, stormwater storage facilities, and outfall structures, shall convey run-off from snowmelt and rainfall events to an adequate receiving stream 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 Engineer.

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 Engineer.

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	$144\ (t+4.2)^{-0.67}$ **	$446\ (t+64.6)^{-0.83}$ **

2002 Extrapolated IDF Formulas (con't) (1964 – 1999 Data)		
Frequency	**Average Intensity (mm/hr.)**	
	(5 Minute - 2 Hour Time Interval)	**(2 - 24 Hour Time Interval)**
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 Engineer. 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 (m^3/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.

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 County along with computer model input and output and a design summary report.

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

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

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

1.7 **Service Connections**

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

Connections from roof leaders shall not be made to the storm sewer system. Roof drainage from residential housing units, apartments, commercial, and industrial buildings shall discharge to grassed or pervious areas except where building density makes this impractical (e.g. central business district).
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 a County storm sewer system are generally 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 Engineer.

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 County, the allowable capacity for the development will be based on the following formula:

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

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 County 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 Red Deer County 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 County easement to direct the drainage to a street. Concrete swales are to be constructed with continuous grade lines with a minimum 0.8% slope to convey rear lot drainage to a catch basin located in a street or utility right of way.

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

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

2. STORM SEWER MAINS (MINOR SYSTEM)

2.1 General

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

2.2 Flow Capacity

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

2.3 Pipe Strength

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

2.4 Depth of Cover

All sewers shall be designed so that the top of the main shall be located at the minimum depth required to meet the conditions of Section 11, Clause 3, but not shallower than 1.5 m, unless otherwise approved by the Engineer. 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 Construction Specifications.

2.5 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%.

2.6 Minimum Slopes

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

2.7 Curved Sewers

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

.1 The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m.

.2 Manholes shall be located at the beginning and end of curves, and at intervals not greater than 90 m along the curve unless approved otherwise by the Engineer.

.3 The curve shall run parallel to the street centre line.

.4 The minimum grade for sewers on curves shall be 50% greater than the minimum grade required for straight runs of sewer.

2.8 Alignment

Storm sewers shall be located on the standard alignment shown on Drawing 4.07 for streets and 4.09 for lanes and public utility lots. A minimum separation of 3.0 m from water mains shall be provided. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

2.9 Manholes

Manholes shall be installed at the end of each line, at all changes in size, grade, or alignment, at all junctions, and at a spacing of no greater than 150 m along the length of the sewer.
To maintain a continuous energy gradient through manholes, the obvert (crown) elevation of the lowest upstream pipe shall be equal to or higher than the obvert of the downstream pipe. Where a bend in pipe alignment occurs in a manhole, the invert elevation of the downstream pipe shall be at least 50 mm below that of the lowest upstream pipe.

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

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

Standard 1200 mm diameter precast manhole shall be used on mains 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.

2.10 Catch Basins and Catch Basin Manholes

.1 General

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

.2 Catch Basin Leads

Catch basin leads shall connect directly to a manhole. 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-33	75	10	30

F-39	80	15	40
F-49	105	20	50

* based on 100 mm depth of ponding
** based on 50 mm depth on 1% slope

.4 Types of Catch Basins and Catch Basin Manholes

Catch basins shall be built with a 900 mm barrel. Catch basin manholes shall be built with a 1200 mm barrel. Catch basins and catch basin manholes shall be built with a 250 mm deep sump.

The type of inlet assembly, as illustrated in the 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-4 catch basin is to be used in conjunction with rolled monolithic sidewalk construction,

.4 Type K-6 catch basin assemblies may be used to drain landscape areas and swales,

.5 Type SK-7 and Type DK-7 catch basin assemblies are to be used for arterial roadways, and

.6 CRD trash grate may be used to drain ditches.

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 curb side 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 15.

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

4. STORMWATER MANAGEMENT (SWM) FACILITIES

4.1 Design Requirements Common to Stormwater Management Storage Facilities

.1 General

The use of stormwater storage facilities may be required to reduce peak flow rates to downstream sewer systems and/or watercourses, or to provide a temporary receiving area for peak major drainage flows. Their approximate location and size must be identified at the time of the Subdivision Outline Plan approval to avoid conflicts with adjacent land uses. The effects of the maximum pond water levels shall be considered in the design of the minor system and lot grading. If possible, the crown elevations of the pipes in the first manhole upstream of a pond shall be at or above the maximum pond level during the five-year storm event.

Stormwater storage facilities could be used to supplement water for irrigation of lawns and gardens.

.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 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 proposed release rates are to be confirmed 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 Landscaping Requirements

Detention pond landscaping requirements are detailed in Section 14.

.9 Detention Pond Development Costs

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

.10 Signage for Safety

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

4.2 Dry Detention Ponds

.1 General

Dry ponds should have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the subdivision. Where possible, 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 County's Operations Department should be contacted to provide input to the design of detention facilities from the concept stage through to detailed design and construction.

.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 Red Deer County Operations 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).

4.3 Wet Detention Ponds (Residential Subdivision)

Their use may be approved by Council. If approved, the Developer will be responsible for all construction costs in excess of the cost to construct the original dry pond facility. The Developer will also be required to 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.

.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.

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 Culverts and Bridges

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

1. GENERAL

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

2. SERVICE SIZES AND LOCATIONS

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

Water	25 mm
Sanitary	150 mm
Storm	100 mm

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

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 15.

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

3. 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 15.

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.

4. ALIGNMENT

The sanitary, water, and storm services shall be laid in a single trench. When facing the lot being serviced, the water service shall be laid along the centre of the service alignment, the sanitary service 0.30 m to the left of the water service, and the storm service 0.30 m to the right of the water service. The services shall

intersect the property line at an angle as near to 90° as possible, unless otherwise approved by the Engineer.

The curb stop and standpipe shall be located on property line.

To aid in locating the service, temporary markers shall be installed at the end of the service stub as shown on Contract Specification Drawing 4.01.

5. WATER CURB STOP AND SERVICE BOX

The service box is to be installed at the time of service installation. The service should extend approximately 3 m past the easement line into the lot. The service box is to be located 300mm from the property line into the road right of way. The sanitary sewer reducer shall be installed at the end of the service stub.

6. RISERS

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

7. SERVICE CONNECTION RESTRICTIONS

Large sanitary and storm service connections may require the installation of a manhole at the main.

8. BENDS

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

9. 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

1.1 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.

1.2 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 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.
10450 – 178 Street
Edmonton, Alberta T5S 1S2

.4 The Power distributor, 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.

1.3 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 ATCO Gas, Shaw CableSystems and Telus Communications.

.1 Copies of the roadway and deep utilities plan drawings,

.2 Copy of the approved power distribution and streetlighting 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

2.1 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 the following:

.1 Have an Electrical Consulting Engineer prepare the design in accordance with the Guidelines and have a qualified contractor complete all electrical installations in accordance with the Power Distributor's Contract Specifications. The design of the power system must be approved by the current Power Distributor prior to installation. The installation must also be inspected by the current Power Distributor. Energization of the system will be done by the current Power Distributor once they have accepted the system.

2.2 **Electric System Drawings**

.1 General Drawing Specifications

The electrical servicing plan shall conform to the current Power Distributor's 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 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.

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:

Rural

- Arterial Roadways
  - Undivided Arterial
- Collector Streets
  - Minor Residential
  - Major Residential
- Local Streets
  - Residential Cul-de-Sac
  - Residential
  - Commercial/Industrial

Urban

- Arterial Roadways
  - Arterial
- Collector Streets
  - Residential
  - Commercial/Industrial
- Local Streets
  - Residential
  - Commercial/Industrial
- Lane

The County is the final arbiter of whether a development is to be classed as Urban or Rural.

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:

TAC Geometric Design Guide for Canadian Roads

TAC Metric Curve Tables

A Policy on Geometric Design of Highways and Streets, AASHTO

Turning Vehicle Templates, TAC

Manual of Uniform Traffic Control Devices for Canada

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 - 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 3.7 m.

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 $SSD = 0.278tV + d$ (TAC Formula 2.1.5)

Where $d = V^2/254f$ (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 $K_{(Crest)} = SSD^2 / 200 (h_1^{-0.5} + h_2^{-0.5})^2$ (TAC Formula 2.1.24)

Where $h_1 = 1.05$ m and $h_2 = 0.38$ m

.3 Sag "K" Factor based on Comfort Control

$K_{(Sag)} = V^2 / 395$ (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
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

- Expressway Street L>50m
- Arterial Street L>40m
- Collector Street L>30m
- Local Street L>20m

.2 Sag vertical curves are not required for any roadway if L is less than 15 m.

.3 $M = A \times L / 800$

Where "M" is the mid-ordinate difference in elevation between V.P.I. elevation and pavement design elevation on the vertical curve,

"A" is the algebraic difference in grades, and

"L" is the length of vertical curve.

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 lll-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 centreline (percent)

Tangent Runout Length = w x 0.02 x 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 x 0.02 x 200 = 42.0 m

3.5 **Design and Posted Speed**

.1 Design Speed

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

4. CURB, GUTTER, AND SIDEWALKS

4.1 General

Curb and gutter will be required on all urban roadways. 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. The Consultant is required to provide written recommendations and/or confirmation of the cross-section for all 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 Count's Operations Department.

4.2 Arterial Roadways

A 2.5 m wide paved trail may be constructed on one side of a Rural roadway.

4.3 Residential Collector Roadways

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

Sidewalk widths should be increased to 2.5 m on one side of collector roadways if designated as part of the trail system by the Operations Department.

4.4 Residential Local Roadways

A 1.5 m monolithic with standard or rolled curb, and 0.25 m gutter is normally required along one side of residential local roadways. The requirement for sidewalk may be waived by the Engineer 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.

5. PARAPLEGIC RAMPS

Paraplegic ramps shall be placed at the midpoint of the curb return at all intersections involving existing, new, or future sidewalk crossings.

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 be installed at sag points in the roadway to drain the subgrade during construction.

7. ROADWAY CONSTRUCTION

7.1 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	Asphaltic Concrete Depth (mm)	Granular Base Depth (mm)	Granular Subbase Depth (mm)	Total Depth (mm)
Expressway and Arterial	125	200	350	675
Industrial Collector	100	200	300	600
Residential Collector	100	150	300	550
Industrial Local	90	150	300	540
Residential Local	75	100	250	425
Paved Lanes	75	100	200	375
Gravel Lanes	-	100	200	300

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.

7.2 Subgrade Preparation and Improvement

Based on experience, the level of subgrade support available after site grading and intermixing of surficial soils is expected to be equivalent to a soaked CBR value in the order of 2 to 5. Subgrade support at this level will be slightly below the design levels. In areas where the water levels

are close to the existing surface grades, there will be the potential for groundwater to be pumped up into the subgrade soils by surface vibrations from construction traffic. This rise in groundwater and subgrade moisture content will be accompanied by a significant loss of strength in the subgrade soils.

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

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

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

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. CONSTRUCTION OF LANES

9.1 Paved Lanes

Paved lanes are required where adjacent to commercial and multi-family lots. They are also required where the longitudinal design slope exceeds 6%.

10. STANDARD ROAD CROSS SECTIONS

Standard roadway cross-section drawings are included in Section 15.

11. PAVEMENT MARKING AND TRAFFIC CONTROL SIGNS

11.1 Pavement Marking Materials

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

11.2 Pavement Marking and Signage Drawing Approval Process

The 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 Engineer for review. Consultant to revise the drawings in accordance with the Engineer's comments and resubmit for final review.

.2 The Consultant is to arrange for the ordering and installation of traffic signs and pavement markings.

12. POST AND CABLE FENCING

Post with or without cable fencing may be required along all lanes adjacent to public utility lots, municipal reserves, environmental reserves, and public open space areas as specified by the Engineer.

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.

Knockdown 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 Two Landscaping as required by the Operations 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 15.

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 for designated roadways.
Level Two 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.

.2 The median shall be finished to Level One Landscaping standards where the median width is greater than 3.0 m.

.3 No trees shall be planted in an 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 or paving stone if the median width is 3.0 m or less.

.2 The median shall be capped with concrete, paving stone, or finished to Level One Landscaping standards where the median width is greater than 3.0 m.

.3 No trees shall be planted in collector and/or local roadway median areas where the median width is less than 5.0 m.

.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 15 for standard details.

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 Curb Return Radii (m)			
						Arterial Roadway	Collector Roadway	Local Roadway	Lanes
Undivided Arterial	UAU 70	<20,000	30 m	250 m	75	30 x 30	10 x 10	N/A	N/A
Undivided Residential Collector (See Note)	UCU 60	<10,000	20 m	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	22 m	115 m	75	N/A	5 x 5	5 x 5	N/A
Undivided Residential Local (See Note)	ULU 50	<3,000	17 m	115 m	75	N/A	5 x 5	5 x 5	N/A
Rural Industrial Collector	RCU 60	<10,000	20 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
Lanes Front Servicing	20	<500	6 m	No Permitted	75	N/A	N/A	N/A	5 x 5
Lanes Rear Servicing	20	<500	7 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)		
		Desireable 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 0.20	Reverse Crown 0.20	>	9.00	6.00	0.50	15	8	8
Undivided Residential Collector	UCU 60	Normal Crown 0.20	Reverse Crown 0.20	>	9.00	6.00	0.50	15	8	8
Divided Residential Local	ULD 60	Normal Crown 0.20	Normal Crown 0.20	>	9.00	6.00	0.50	N/A	8	8
Undivided Residential Local	ULU 50	Normal Crown 0.20	Normal Crown 0.20	See Section 13 – Clause 3.3 nad Table 13.1	9.00	6.00	0.50	N/A	8	8
Rural Industrial Collector	RCU 60	Normal Crown 0.20	Reverse Crown 0.20		6.00	6.00	0.50	See Drawing 5.20		
Urban Industrial Collector	UCU 60	Normal Crown 0.20	Normal Crown 0.20		6.00	6.00	0.50			
Rural Industrial Local	RLU 50	Normal Crown 0.20	Normal Crown 0.20	<	6.00	6.00	0.50	N/A	See Drawing 5.20	
Urban Industrial Local	ULU 50	Normal Crown 0.20	Normal Crown 0.20	<	6.00	6.00	0.50	N/A		
				<						
Gravel Lanes	20	N/A	N/A		9.00	6.00	0.80	N/A	N/A	N/A
Paved Lanes	20	N/A	N/A		9.00	6.00	0.60	N/A	N/A	N/A

1. GENERAL

The Developer and The County 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. parkettes, 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 noted by the Development Officer and as specified in the Development Agreement.

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

.1 Area Structure Plans,

.2 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 Area Structure Plans. The plans shall incorporate design information for the following landscape features:

.1 Level One Landscaping,

.2 Level Two Landscaping,

.3 Level Three Landscaping,

.4 Level Four Landscaping,

.5 Collector Roadway Tree Planting,

.6 Development of the all municipal reserves (open space), and/or

.7 Detention Ponds

2. LEVEL ONE LANDSCAPING

.1 The Developer is required to provide Level One Landscaping for all public open space areas (e.g. parkettes, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms, walkways), etc., as specified by the Development Officer. Additional information developing the Neighbourhood Park site(s) is included in Clause 7.

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

.3 Level One Landscaping requirements and cost recoveries for detention pond facilities are included in Clause 8.

3. LEVEL TWO LANDSCAPING

3.1 General

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

.2 The Developer is responsible for providing Level Two Landscaping for designated Neighbourhood Park site(s). Additional information developing the Neighbourhood Park site(s) is included in Clause 7.

.3 Level Two Landscaping requirements and cost recoveries for detention pond facilities are included in Clause 8.

3.2 Planting Guidelines

.1 Deep rooting trees, such as poplars and willows, shall not be planted within 8 m of any utility line, road, or lane.

.2 Shallow rooting trees or shrubs may be planted over deep utility lines (i.e. water, sanitary, or storm), but must be set back at least 1.5 m from shallow utilities (i.e. gas, power, telephone, or cable television); measured horizontally from the 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 2.0 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.

3.3 **Berms**

.1 Berms shall have a side slope not steeper than 3.5:1, have a horizontal crest not less than 1.0 m 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 15 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 shown on drawing in Section 15.

3.4 **Recommended Tree Species**

.1 Red Deer County is located in Hardiness Zone 3 with an overlap of Zones 1 and 2.

.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 Development Officer.

.4 The Developer shall provide trees and shrubs to the minimum standards included in Section 02906 of the Contract Specifications. The minimum size of deciduous trees suitable for arterial roadway, collector roadway, and median tree planting shall be 65 mm (2½ in.) calliper.

4. LEVEL THREE LANDSCAPING

4.1 General

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

.1 Post and cable fences

.2 Bollards

.3 Paved and gravel trails

.4 Site furnishings (e.g. garbage receptacles, benches, etc.)

.5 Tot lots and playschool play structures, and/or

.6 Trail signage.

4.2 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.

.3 At other location specified by the Development Officer.

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 Development Officer.

4.5 **Trails**

.1 The minimum width for walkways shall be 2.5 m wide (unless otherwise approved) and constructed of 12 mm crushed gravel or other approved surface.

.2 Paved trails through linear parks must link to either a major park network or a recreational facility.

4.6 **Tot Lots**

.1 In addition to the playground facilities to be provided in the Neighbourhood Park site(s), the Developer may have designated other sites within the development as Tot Lots. The Developer shall provide the following for these Tot Lots:

.1 A site grading plan showing any berms, etc. for the parcel.

.2 Level One and Level Two landscaping for the parcel.

.3 The following Level Three landscaping facilities and amenities:

.1 A CSA compliant play structure base complete with treated timber surround.

.2 A CSA compliant composite play structure.

.3 One pedestal park bench.

.4 One pedestal picnic table.

.5 Two garbage receptacles.

.6 Loose aggregate (gravel or shale) trails 1.5 m wide.

5. LEVEL FOUR LANDSCAPING

Level Four Landscaping (supplying and installing optional/enhanced amenities (e.g. Ornamental structures, gazeboes, sculptures, feature walls, water features, fountains, spray pools, etc.)) will be at the discretion of Development Department. Level Four Landscaping will only be considered if arrangements for long-term maintenance by the Developer are agreed to at the plan approval stage and agreements are established prior to Development Agreement approval. The Developer will be responsible for any and all capital cost of any permitted optional amenities

6. COLLECTOR ROADWAY TREE PLANTING

6.1 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 Development Officer will approve the tree spacing. Typical tree and streetlight spacing is shown on drawings in Section 15.

.3 Maintenance of trees planted within the road right of way (boulevard) shall be the responsibility of The Developer during the maintenance period.

.4 All boulevard trees planted in a single neighbourhood shall be of the same variety or a combination of varieties as approved by the Development Department.

7. MUNICIPAL RESERVE/PARK SITE(S)

7.1 General

As noted in Section 4, the Developer is to provide municipal reserve land that may be used for various purposes. The land area required for the parks and or school site(s) will be determined as outlined in Section 4.

The cost of developing these lands is the responsibility of the Developer and The County, as follows:

.1 Multi-neighbourhood (High School) Park Sites

The School/Red Deer County

.2 Neighbourhood School/Park Sites

Developer/The School/Red Deer County as noted in Clause 7.2

.3 Neighbourhood Park Sites

Developer/Red Deer County as noted in Clause 7.2

.4 Parkette Sites

Developer

.5 Linear Parks

Developer

.6 Miscellaneous Reserve Parcels

Developer

7.2 **Neighbourhood Park Financing and Construction**

Construction of the Neighbourhood School/Park sites and Neighbourhood Park Sites will be the responsibility of the Developer and Red Deer County as follows:

.1 The Developer will be responsible for completing the following work at his cost:

.1 Topsoil stripping.

.2 Site grading.

.3 Topsoil replacement to rough finished grades.

.4 Grading topsoil to final grades.

.5 Level One and Two Landscaping.

.2 The County will be responsible for completing the following work:

.1 Level Three Landscaping.

.2 Constructing playground facilities, playing fields, multi-purpose pad, parking lot, etc.

.3 Construction responsibility for a detention pond located in the Neighbourhood Park site(s) will be the responsibility of the Developer.

7.3 **Neighbourhood School/Park and Neighbourhood Park Design**

The Developer shall be responsible for the preparation of detailed design drawings for the development of the Neighbourhood School/Park Sites and Neighbourhood Park Sites. The design shall conform to standards established by the Development Department. The design shall include:

.1 Establishing site grades, including grades for a detention pond (if required).

.2 Establishing the area required for an elementary or middle school.

.3 Development of public open space areas.

.4 Construction of play areas and sports fields (In conjunction with the School and the County).

.5 Tree planting.

.6 Preservation of natural features.

7.4 **General Municipal Reserve/Park Development Standards**

As noted in Clause 7.1, the County is responsible for providing the amenities in the Multi-neighbourhood (High School) Park Sites, Neighbourhood School/Park Sites and Neighbourhood Park Sites. The Developer is responsible to provide these amenities for the Parkettes and Linear Parks to the satisfaction of Red Deer County Development Department.

If the Developer wishes to develop parks exceeding the maximum standards, they must apply to the Development Department for approval and enter into a maintenance agreement prior to commencing construction. Also see Clause 5 - Level Four Landscaping.

8. **DETENTION PONDS**

The Developer may be required to construct retention pond facilities in one or

more locations in the Development. A retention pond may be located within the Neighbourhood Park Sites.

8.1 **Detention Pond Financing Responsibility**

.1 Financing responsibility options for construction of a detention pond are as follows:

Option 1:

If the proposed detention pond has been designated a trunk storm off-site levy facility, the Off-site Fund, subject to Council approval, will be used to finance the construction of the detention pond. Responsibility for construction of the detention pond and recovery of the Developer's costs will be included in the Development Agreement.

Option 2:

If the proposed detention pond has not been designated a trunk storm facility, the Developer will be required to finance the construction of the detention pond. Recovery of the Developer's costs will not be applicable.

Responsibility for detention pond costs should be identified in the Area Structure Plan.

8.2 **Detention Pond Construction Responsibility**

Construction of a detention pond will be the responsibility of the Developer and Red Deer County as follows:

.1 The Developer will be responsible for completing the following work:

.1 Topsoil stripping.

.2 Site grading.

.3 Topsoil replacement to rough finished grades.

.4 Grading topsoil to final grades.

.5 Level One landscaping.

.2 In the case of playing fields being constructed in the bottom of detention ponds, The County will work in conjunction with the

Developer to build playing fields through the Development Agreement.

9. LANDSCAPE DRAWING REQUIREMENTS

9.1 General

General Landscape Drawing requirements are listed in Section 2.

9.2 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, 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.

.5 Existing and proposed grades.

9.3 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, 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.

9.4 **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.

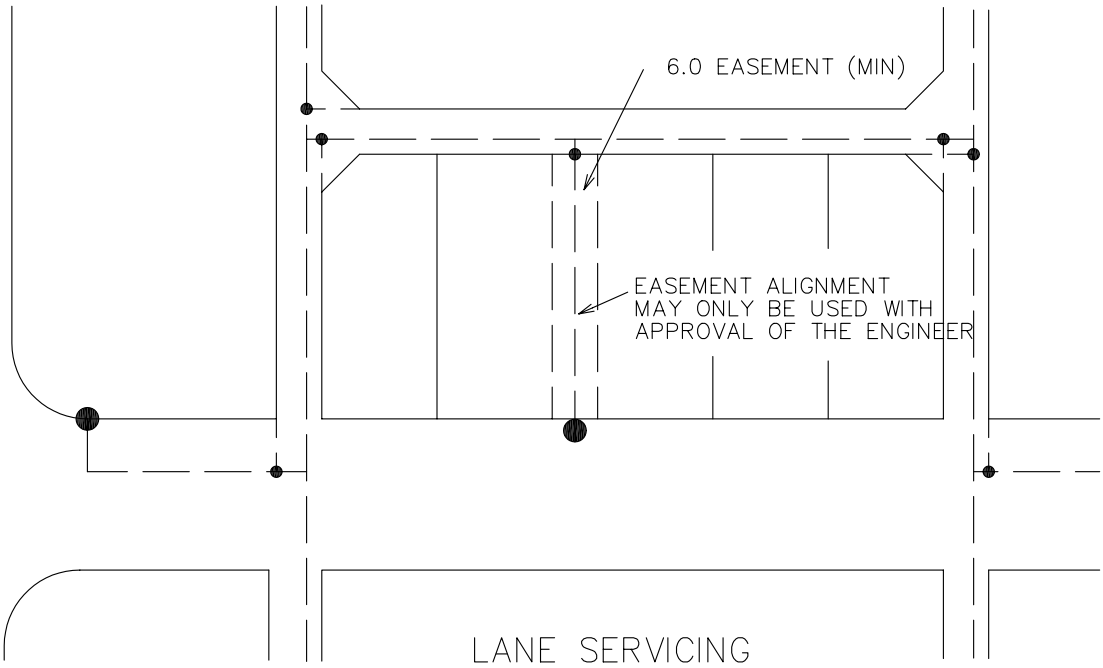
.5 Tree and shrub planting details.

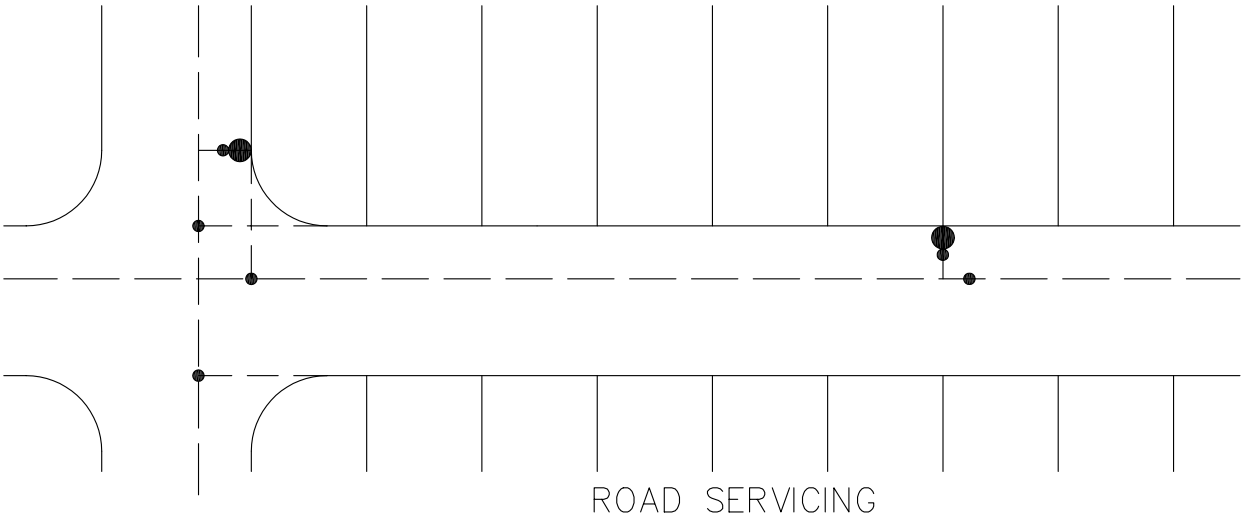
9.5 **Drawing Review**

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

9.6 **Design Revisions**

The Development Officer must approve all revisions to the approved design drawings.





— 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.

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Water Design

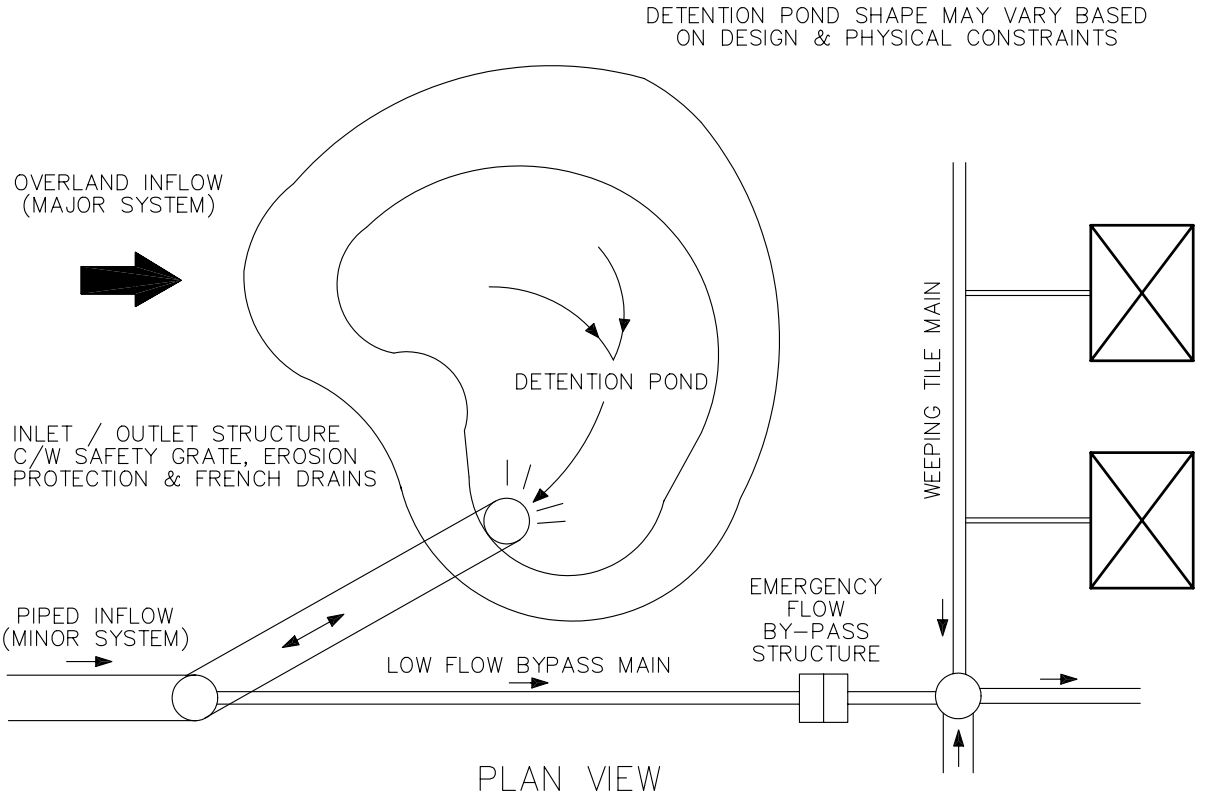
APPROVED BY:

DATE: JUNE/05

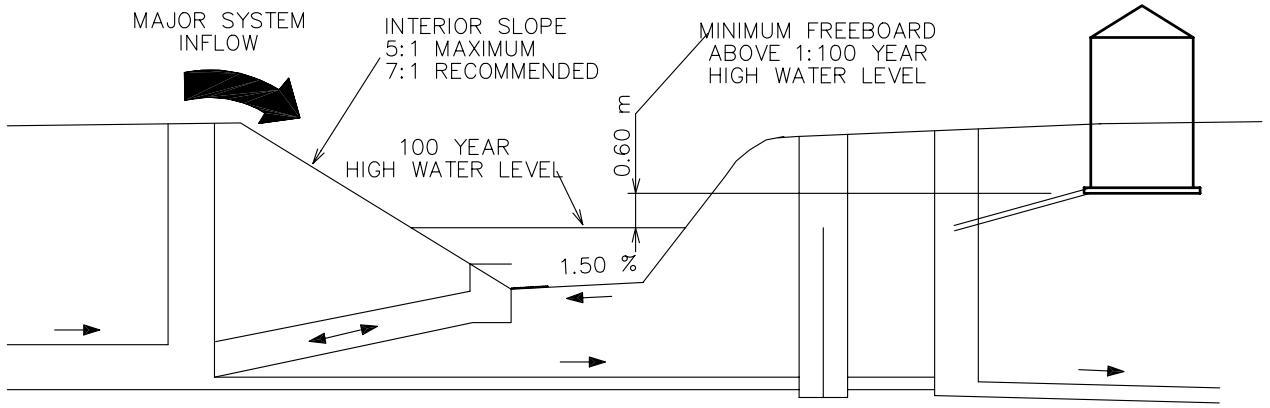
TYPICAL VALVE &
HYDRANT LOCATIONS

SCALE: N.T.S.

DRAWING NO. 1.03



PLAN VIEW



SECTION VIEW

NO.	DATE	REVISION	APP.

RED DEER COUNTY

DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

DRY STORMWATER
STORAGE FACILITY

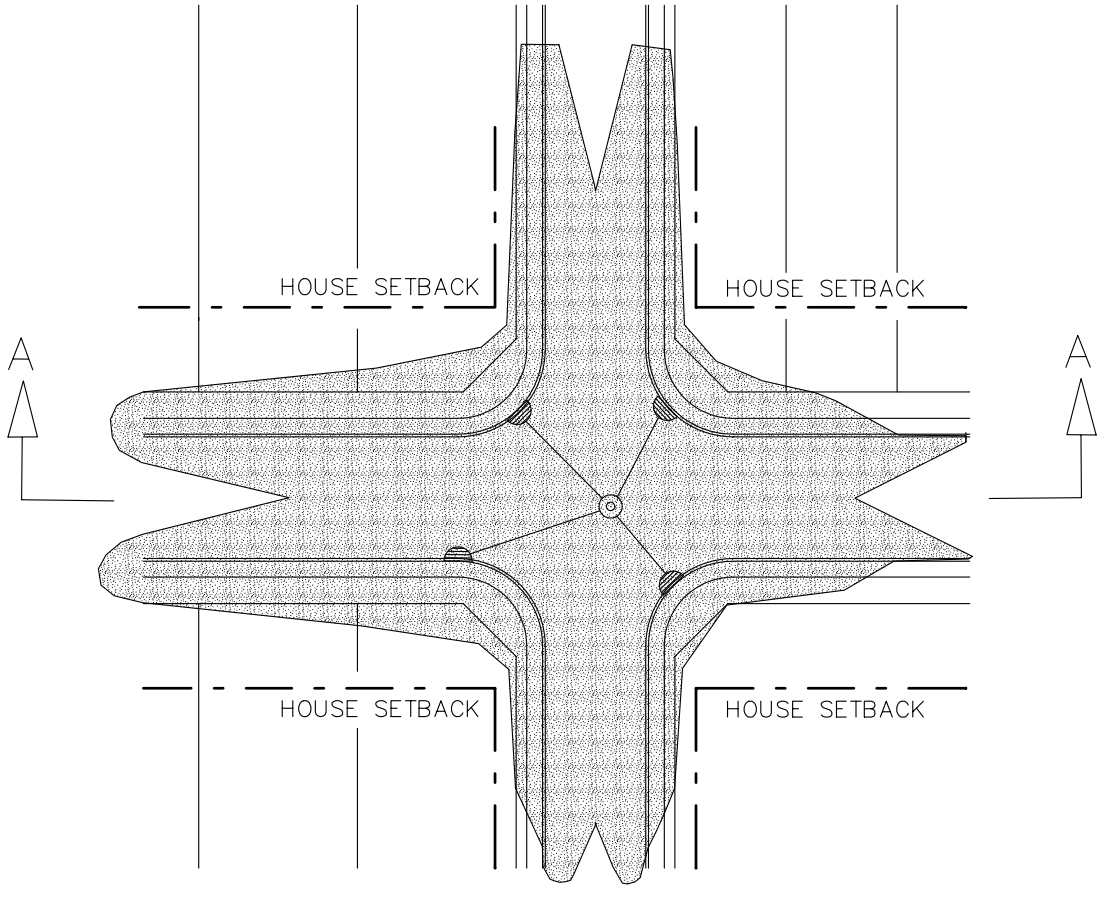
DRAWN BY: N.M.

DATE: JUNE/05

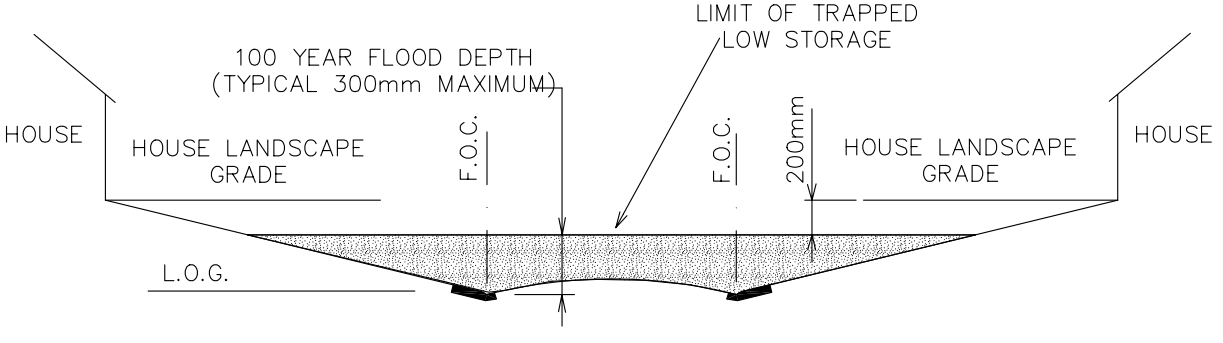
SCALE: N.T.S.

APPROVED BY:

DRAWING NO. 3.03

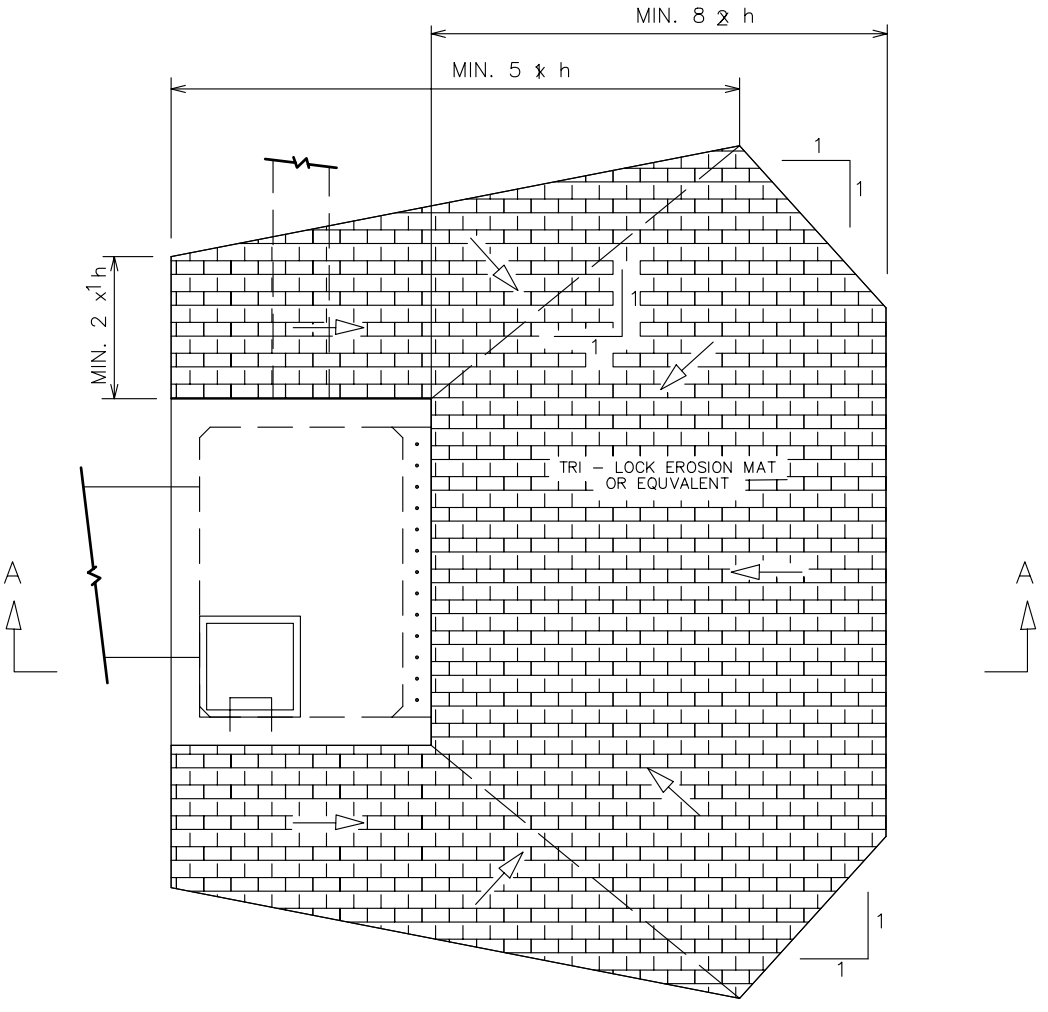


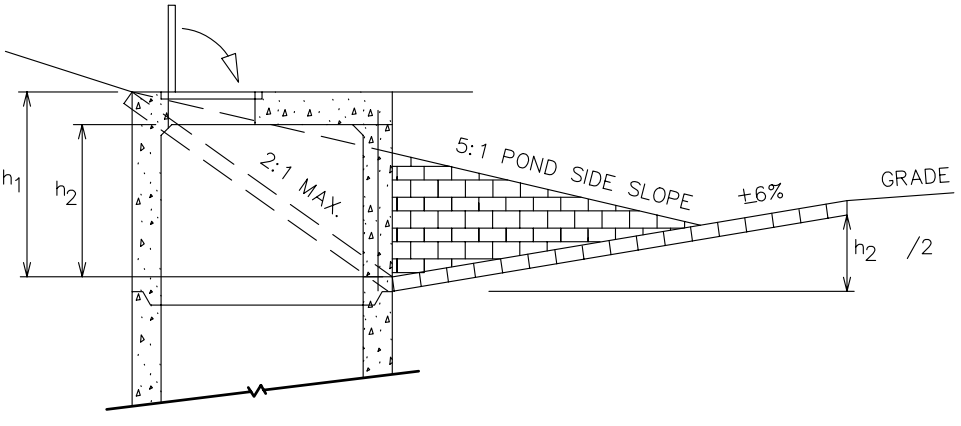
PLAN



SECTION 'A – A'

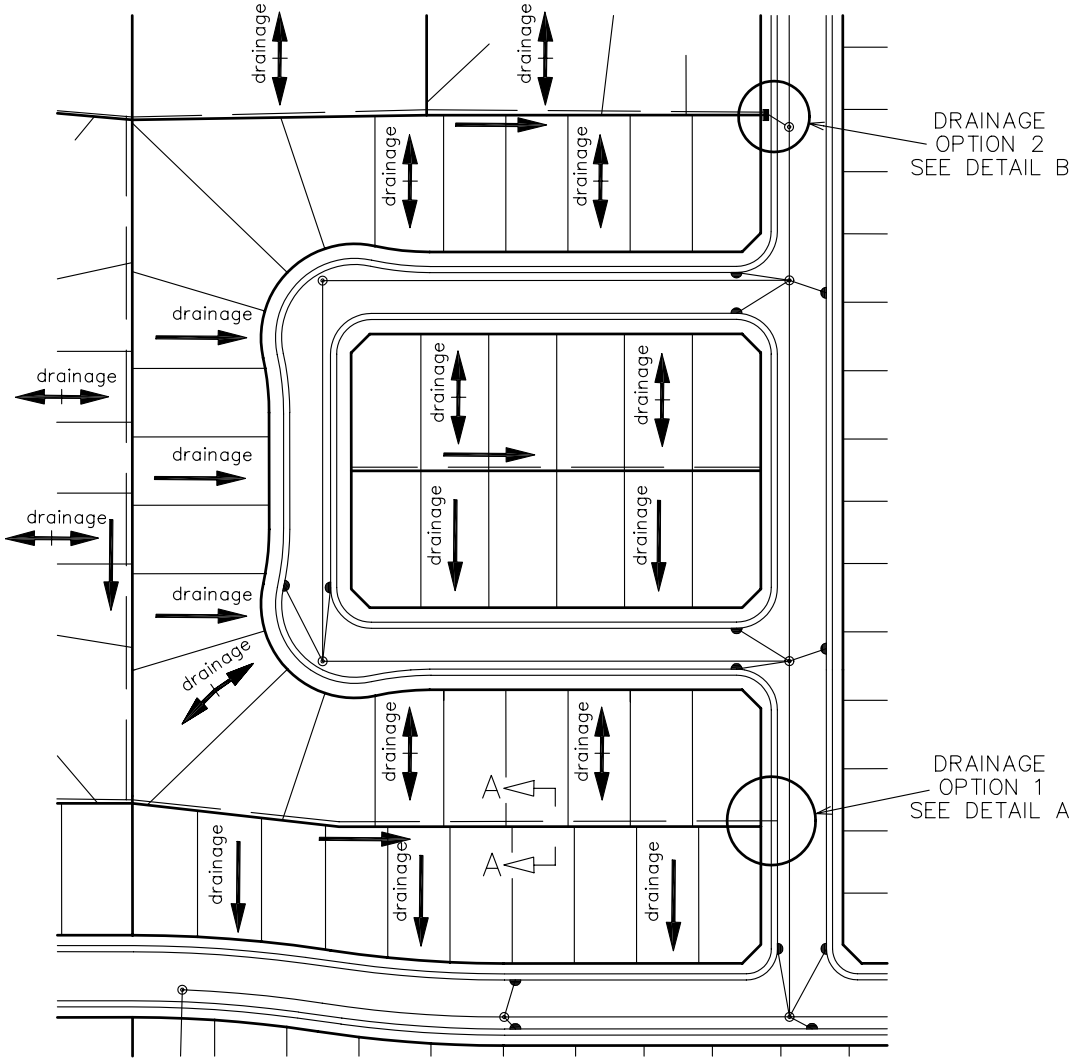
NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Stormwater Management Design	APPROVED BY:
			DATE: JUNE/05	TYPICAL TRAPPED LOW STORAGE AREA	
			SCALE: N.T.S.		DRAWING NO. 3.04

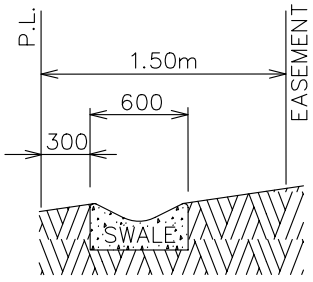




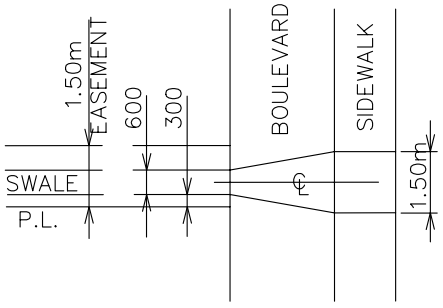
SECTION 'A – A'

NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Stormwater Management Design	APPROVED BY:
			DATE: JUNE/05	INLET / OUTLET STRUCTURE APRON	
			SCALE: N.T.S.		DRAWING NO. 3.05

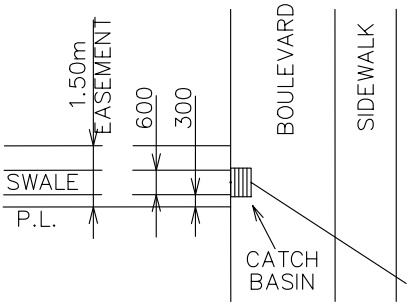




SECTION 'A – A'

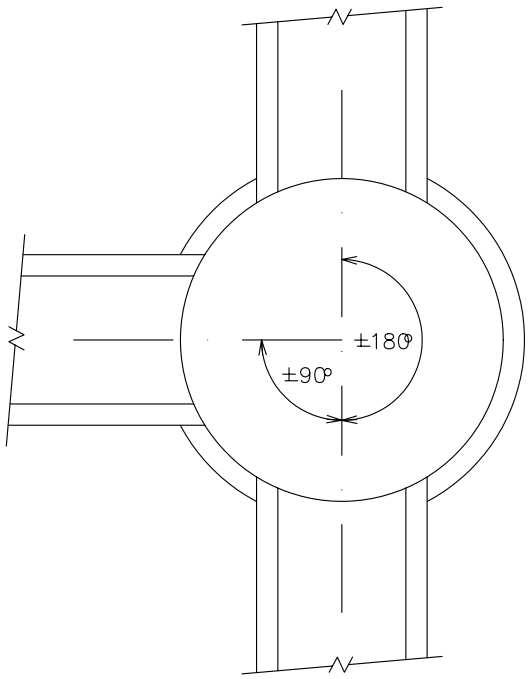


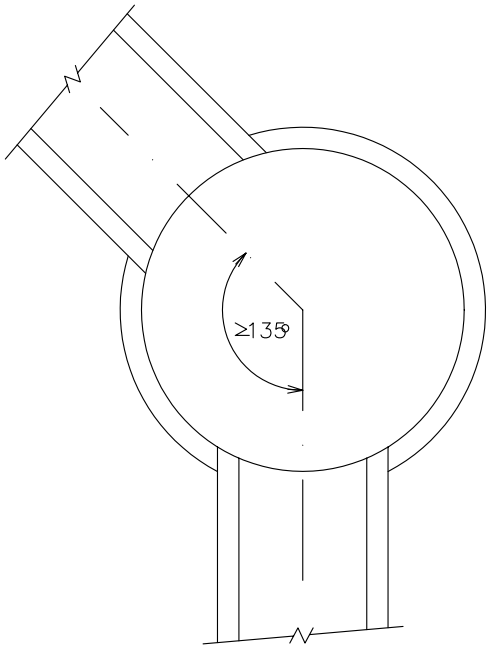
DETAIL A



DETAIL B

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Stormwater Management Design	APPROVED BY:
			DATE: JUNE/05	LANELESS SUBDIVISION DRAINAGE SWALE	DRAWING NO. 3.06
			SCALE: N.T.S.		





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.)

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Stormwater Management Design

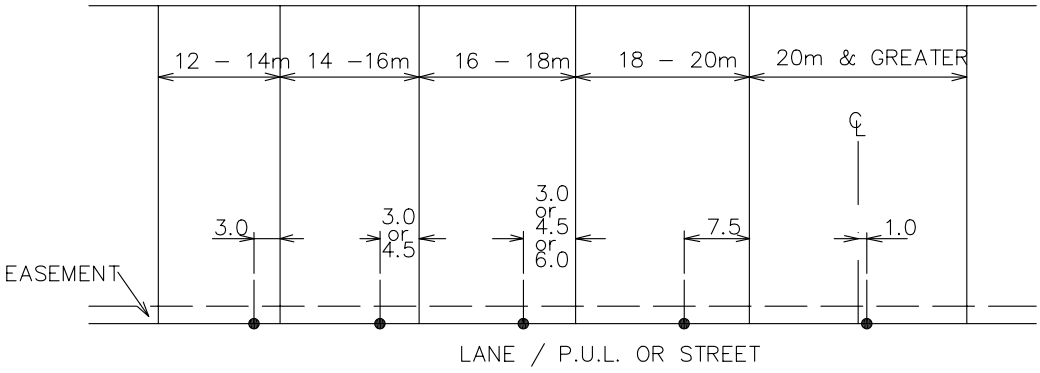
APPROVED BY:

DATE: JUNE/05

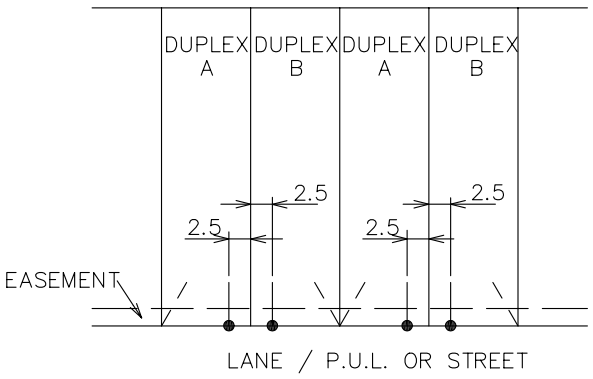
MANHOLE INLET / OUTLET PIPE DESIGN CONSIDERATIONS

SCALE: N.T.S.

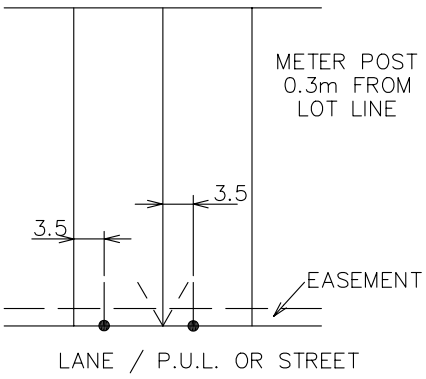
DRAWING NO. 3.07



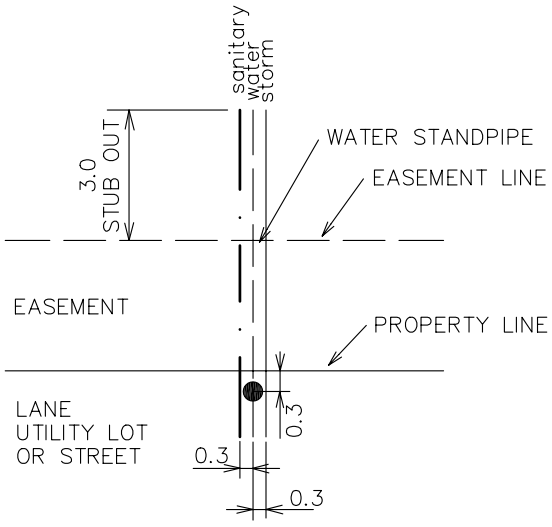
SINGLE FAMILY DWELLING



DUPLEX



MANUFACTURED HOME



SERVICE DETAIL

LEGEND

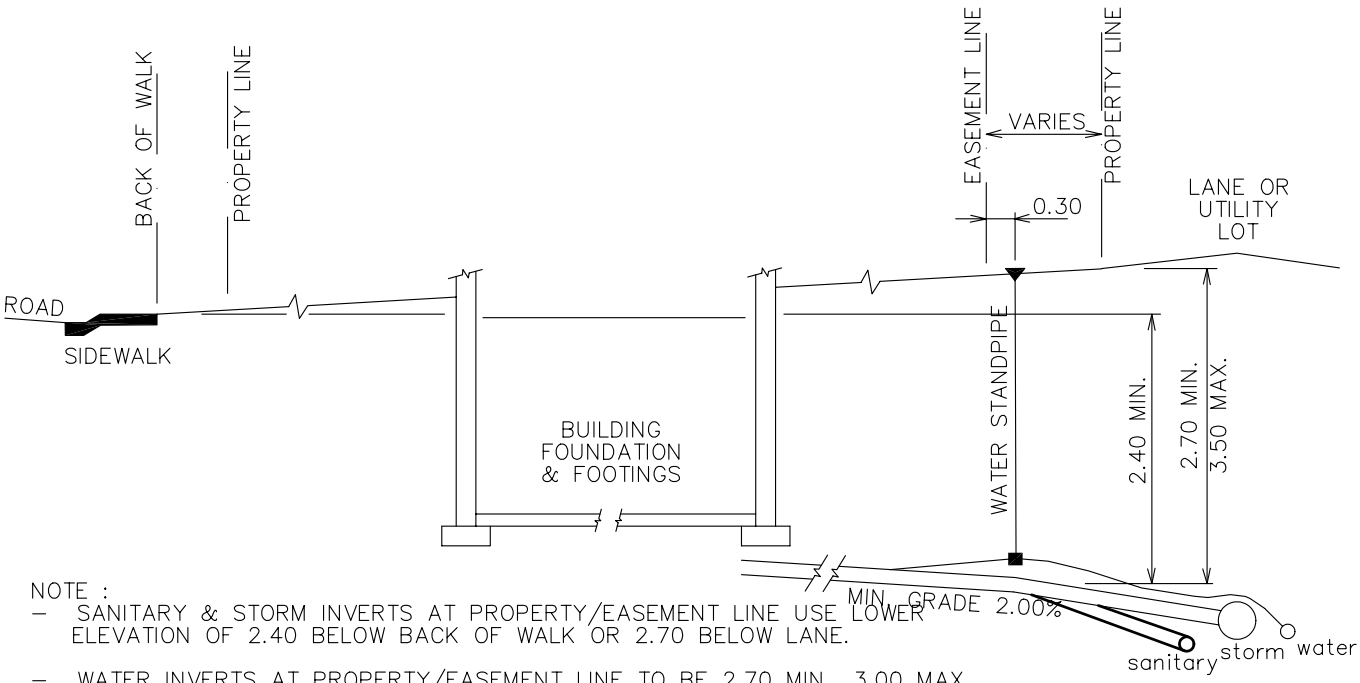
SANITARY SEWER, STORM SEWER & WATER SERVICE

ELECTRICAL SERVICE

NOTE :

1. STANDPIPE & CURB STOP TO BE LOCATED 300mm FROM PROPERTY LINE (OR ON EASEMENT LINE).
2. MINIMUM CLEARANCE FROM EDGE OF ELECTRICAL TRANSFORMER TO CENTRE OF WATER SHALL BE 3.30m.
3. EASEMENT WIDTH AS REQUIRED.

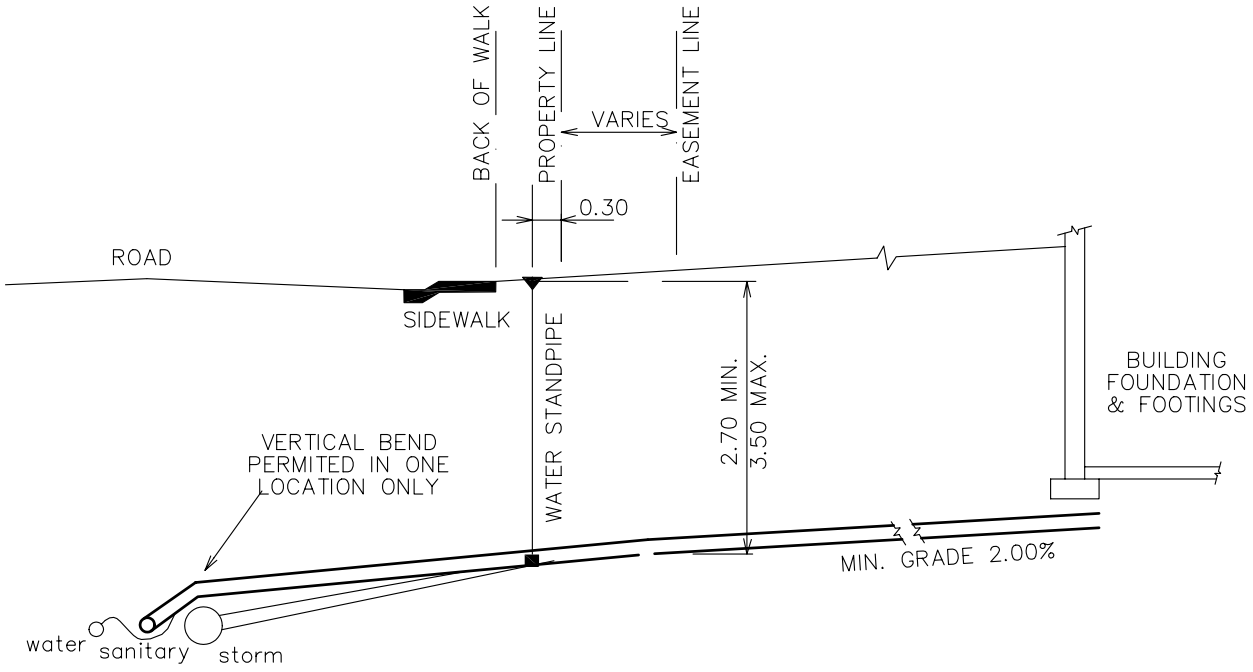
NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
			DATE: JUNE/05	SERVICE LOCATIONS	
			SCALE: N.T.S.		DRAWING NO. 4.02



NOTE :

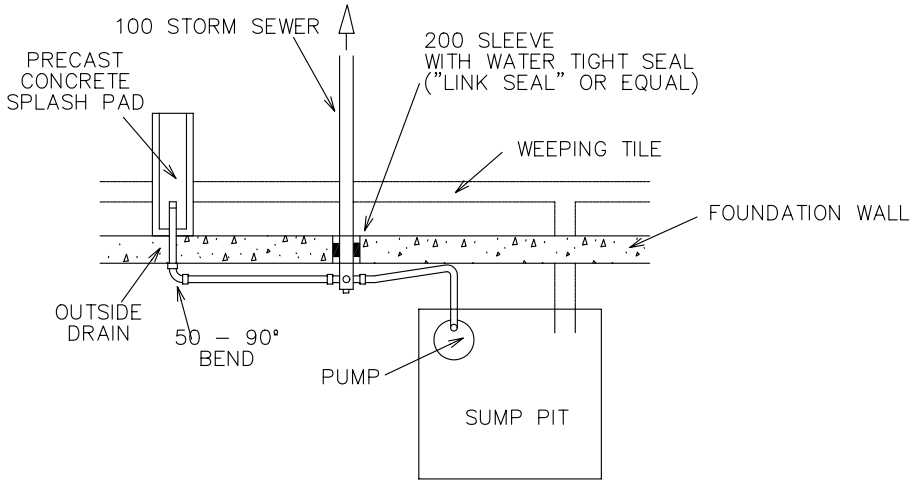
- SANITARY & STORM INVERTS AT PROPERTY/EASEMENT LINE USE LOWER ELEVATION OF 2.40 BELOW BACK OF WALK OR 2.70 BELOW LANE.
- WATER INVERTS AT PROPERTY/EASEMENT LINE TO BE 2.70 MIN., 3.00 MAX. BELOW FINISHED GRADE.

REAR YARD SERVICE CONNECTION

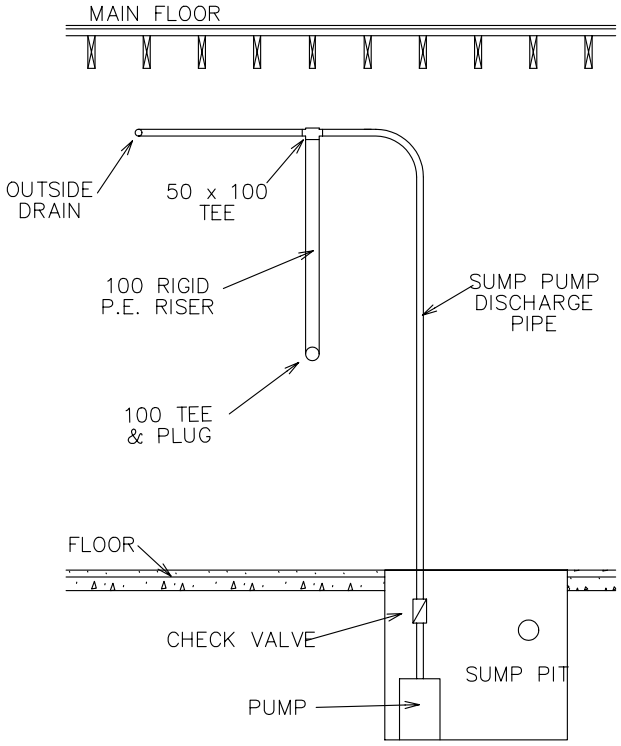


FRONT YARD SERVICE CONNECTION

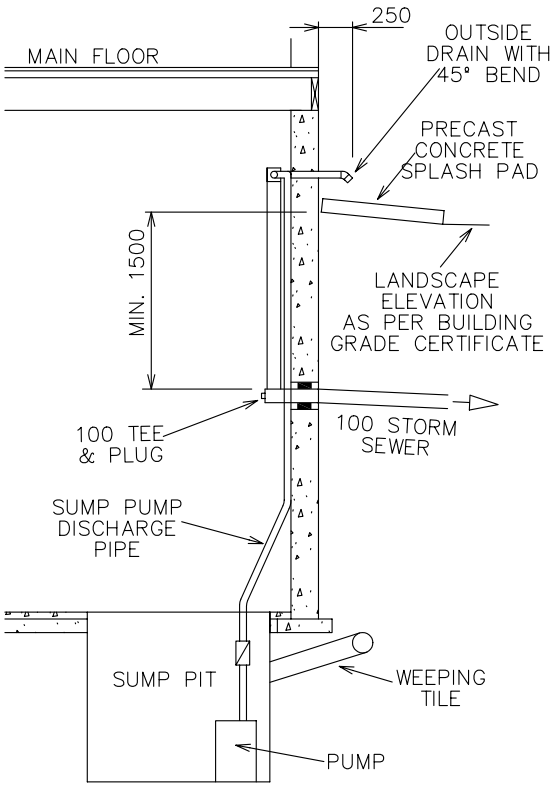
NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
			DATE: JUNE/05	TYPICAL SERVICE CROSS CONNECTIONS	
			SCALE: N.T.S.		DRAWING NO. 4.03



TOP VIEW

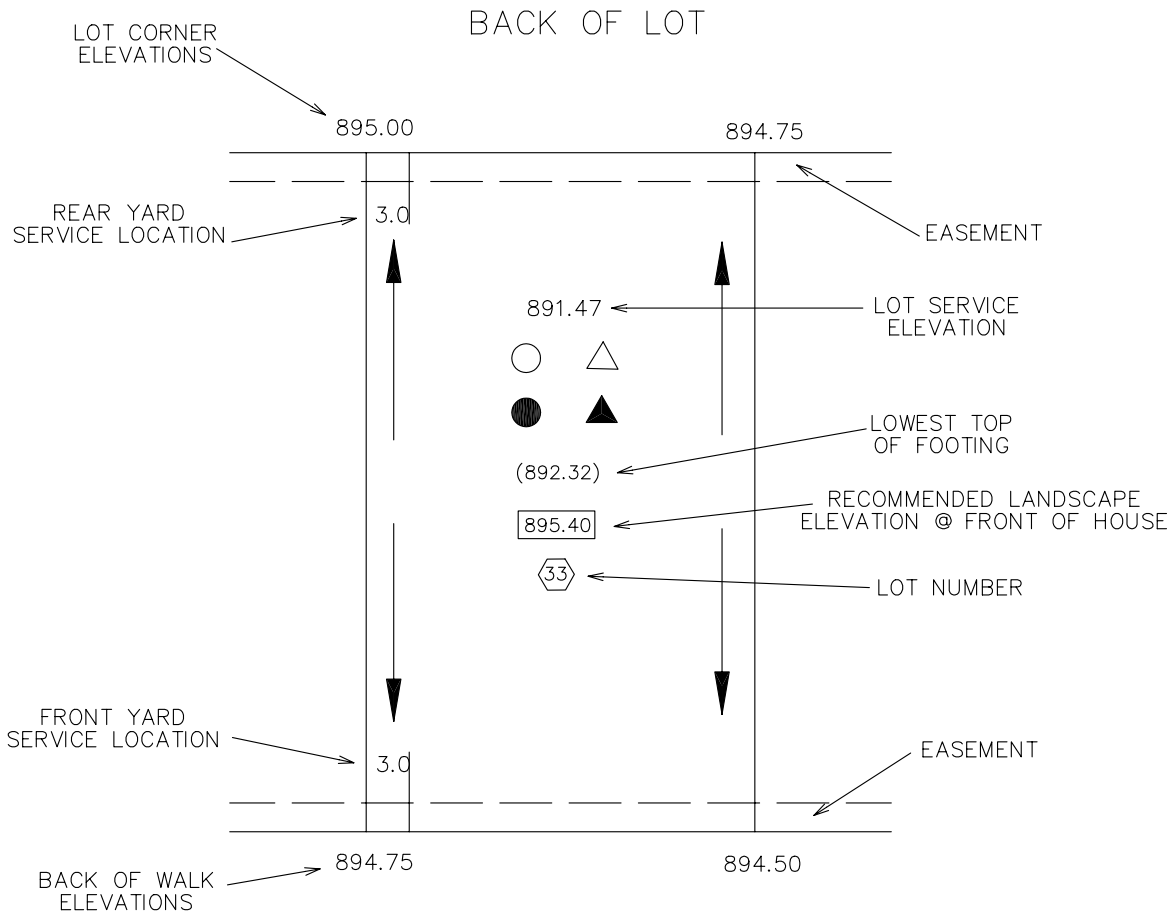


FRONT VIEW



SIDE VIEW

NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
			DATE: JUNE/05	SHALLOW STORM SEWER SERVICE CONNECTION	
			SCALE: N.T.S.		DRAWING NO. 4.04

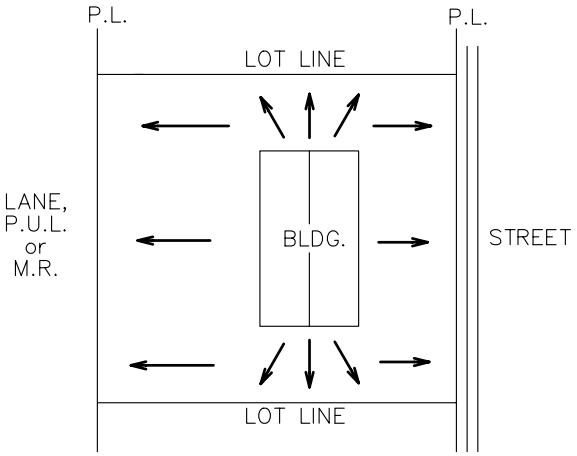


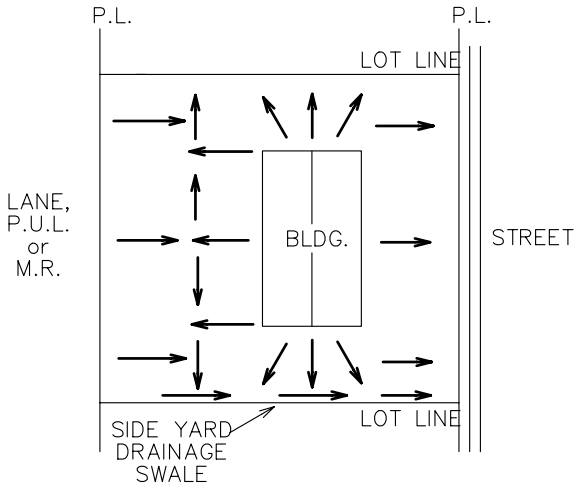
LEGEND :

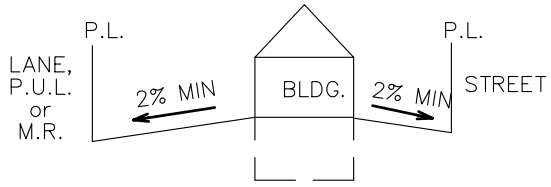
- ○ SINGLE WATER & SANITARY SERVICE
- ● DUAL WATER & SANITARY SERVICE
- △ SINGLE WATER, SANITARY & STORM SERVICE
- ▲ DUAL WATER, SANITARY & STORM SERVICE
- ← DRAINAGE PATTERN

NOTE :
- EASEMENT WIDTHS VARY
- SERVICE LOCATION DIMENSIONS VARY (SEE DWG. 4.02)

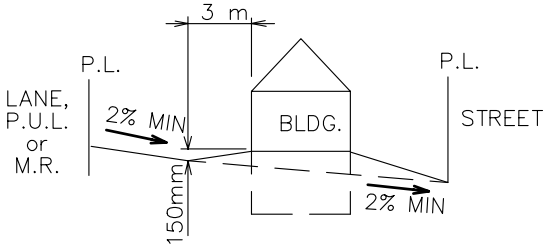
NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
			DATE: JUNE/05	TYPICAL LOT SERVICE REQUIREMENTS	
			SCALE: N.T.S.		DRAWING NO. 4.05



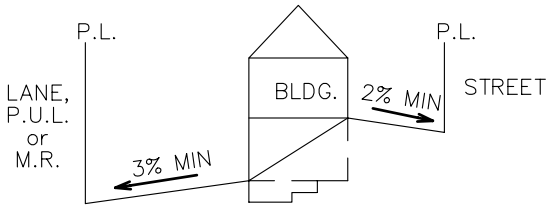




SPLIT DRAINAGE

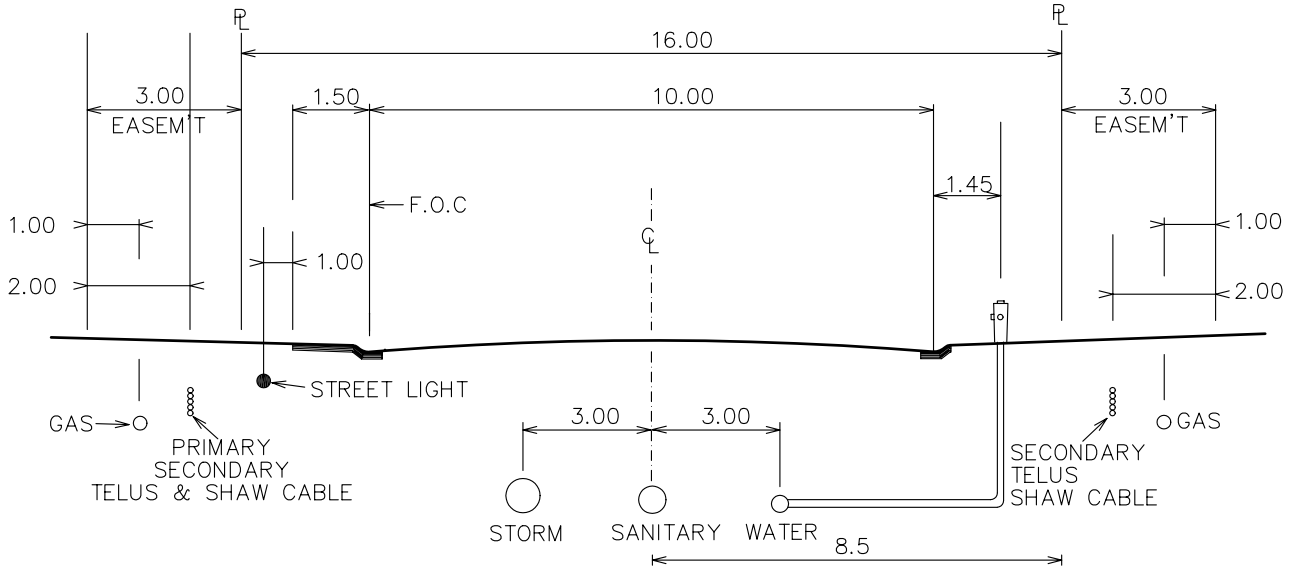


BACK TO FRONT DRAINAGE



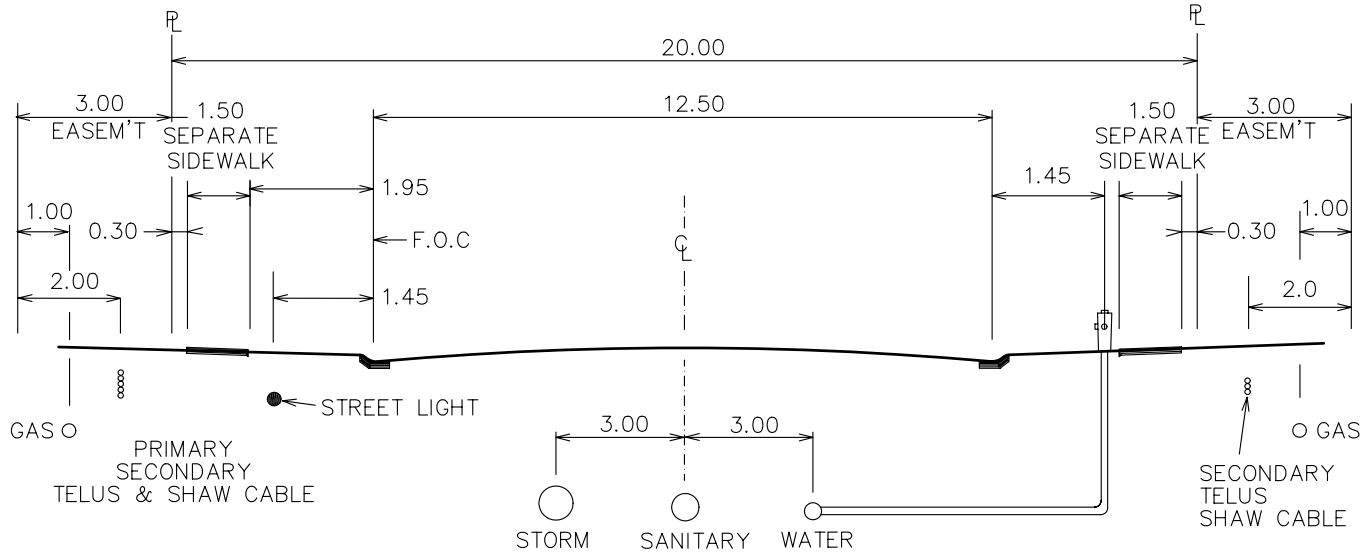
REARYARD BASEMENT WALKOUT
SPLIT DRAINAGE

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
			DATE: JUNE/05	TYPICAL LOT GRADING	DRAWING NO. 4.06
			SCALE: N.T.S.		



RESIDENTIAL LOCAL ROAD

NOTE: DEFLECT CABLE ALIGNMENTS AT HYDRANT



MULTI–FAMILY AND COLLECTOR ROAD

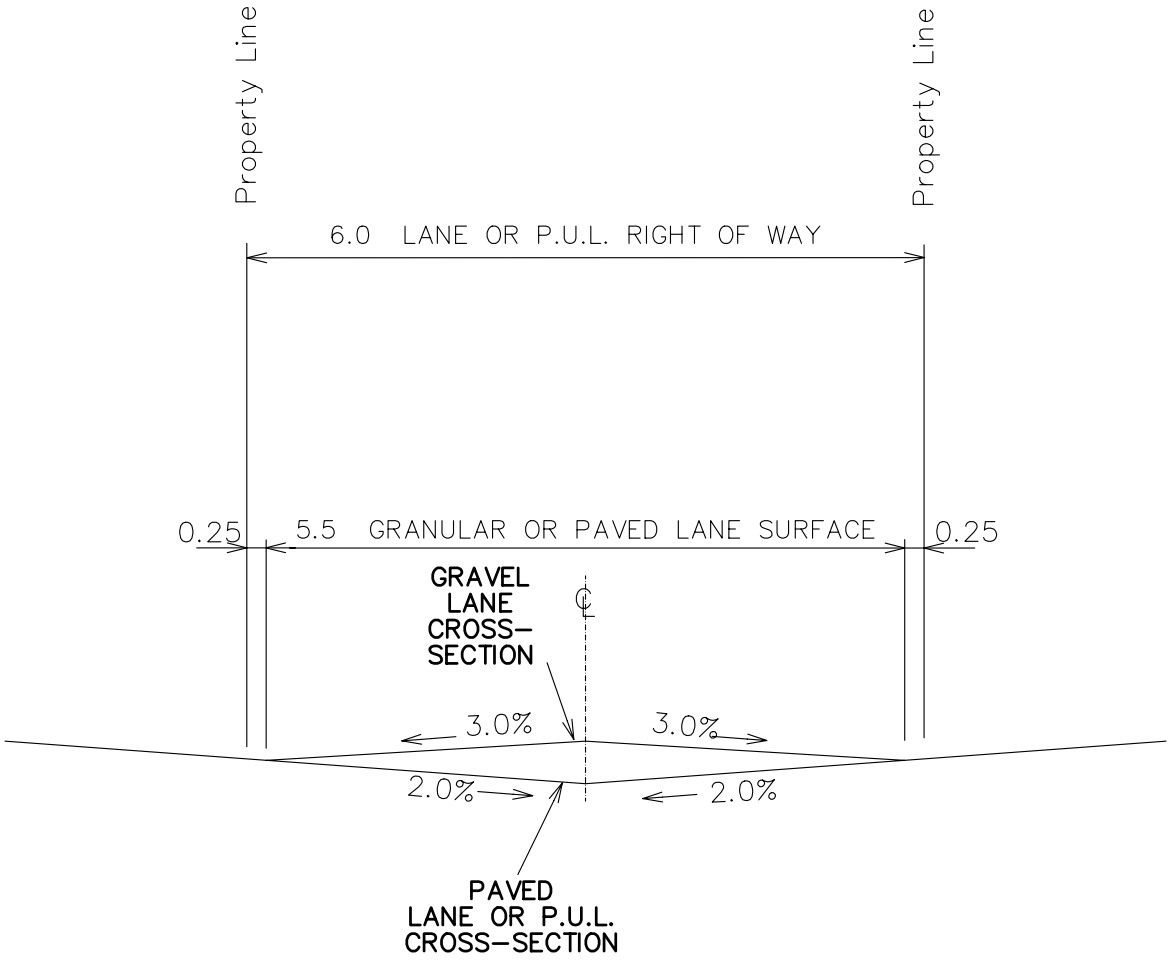
NOTE:

1. Gas may be relocated to common property at rear.
2. Monolithic sidewalk permitted only where existing must be extended in the same block.

NO.	DATE	REVISION

RED DEER COUNTY

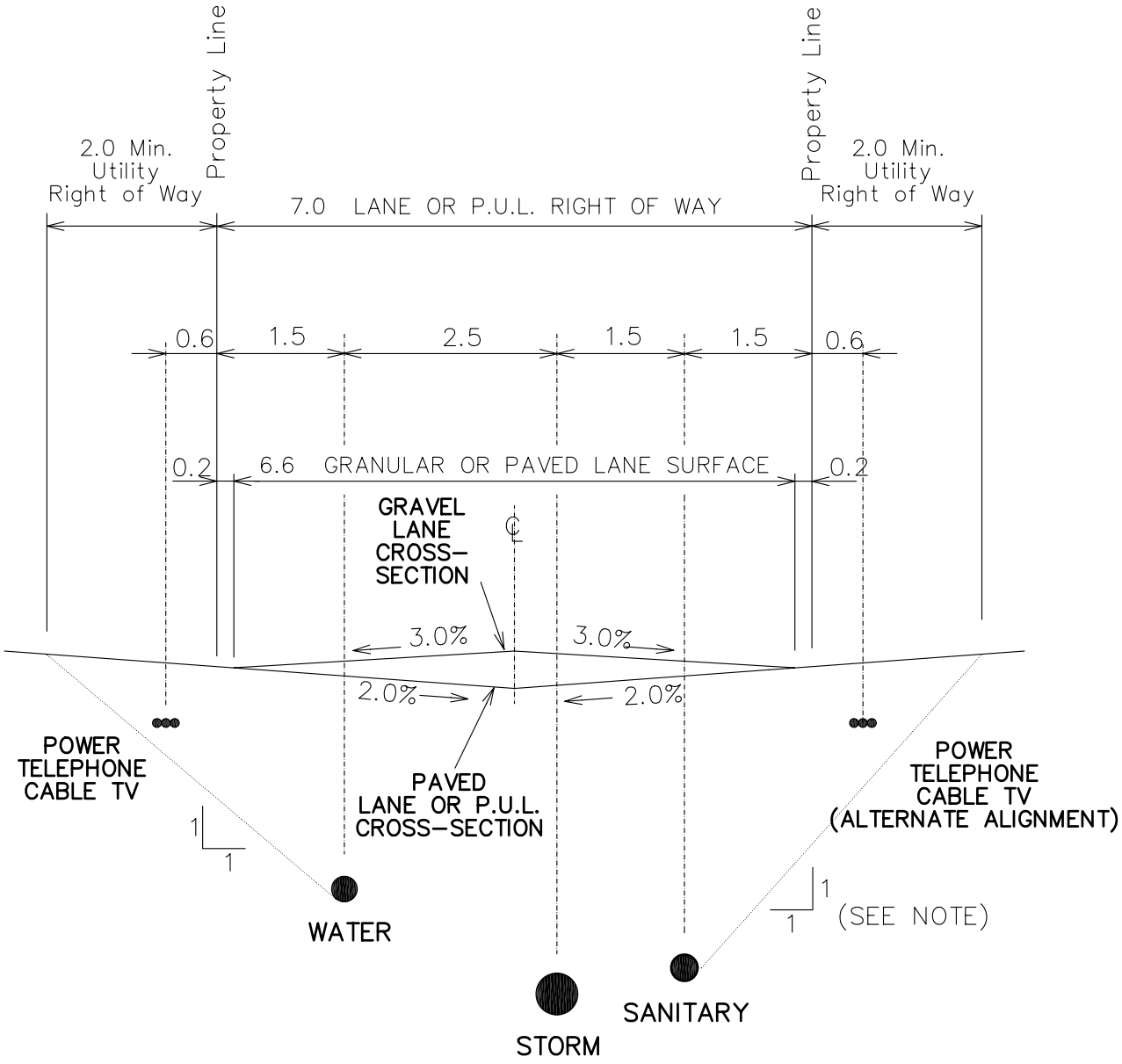
DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
DATE: JUNE/05	TYPICAL FRONT SERVICING ALIGNMENTS	
SCALE: N.T.S.		DRAWING NO. 4.07



NO.	DATE	REVISION	APP.

RED DEER COUNTY

DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
DATE: JUNE/05	LANE	DRAWING NO. 4.09a
SCALE: N.T.S.		



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 SPECIFICATION DRAWING 1.01)
- IF ANY REAR SERVICING PROPOSED – ALL LANES IN DEVELOPEMENT ARE TO BE 7.0m IN WIDTH.

NO.	DATE	REVISION	APP.

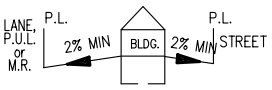
RED DEER COUNTY

DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Service Connections	APPROVED BY:
DATE: JUNE/05	LANE / P.U.L. SERVICING ALIGNMENTS	DRAWING NO. 4.09b
SCALE: N.T.S.		

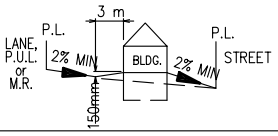
BUILDING GRADE CERTIFICATE

Red Deer County
Issued by: No. 2002-000

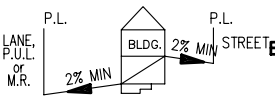
1. WHEN EXCAVATING IN A RIGHT OF WAY (EASEMENT), CHECK FOR UTILITIES.
2. STANDING AT THE WATER SHUTOFF AND FACING THE BUILDING, THE SANITARY SERVICE (PAINTED RED) IS ON THE LEFT SIDE OF THE WATER SERVICE: STORM SERVICE (PAINTED GREEN) IS ON THE RIGHT SIDE OF THE WATER SERVICE.
3. ALL DIMENSIONS ARE IN METRES AND DECIMALS THEROF. THE ELEVATIONS ARE IN METRES ABOVE GOEDETIC MEAN SEA LEVEL.
4. ELEVATIONS NOTED ON THE CERTIFICATE ARE WITHIN 100mm OF ACTUAL.
5. THE BUILDER MUST CONSTRUCT WITHIN 100mm OF THE DESIGN LANDSCAPE ELEVATION & ILLUSTRATED DRAINAGE PATTERNS UNLESS OTHERWISE APPROVED BY THE DEVELOPMENT OFFICER.
6. IF THE INFORMATION ON THIS CERTIFICATE HAS BEEN PREPARED BY A PRIVATE DEVELOPER OR THEIR AGENT, RED DEER COUNTY ACCEPTS NO RESPONSIBILITY FOR ITS ACCURACY.



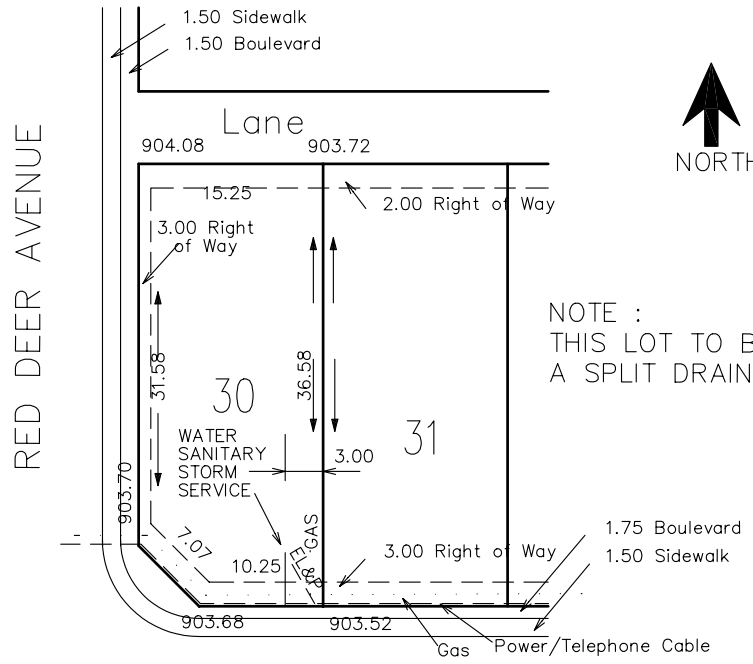
SPLIT DRAINAGE



BACK TO FRONT DRAINAGE



REARYARD BASEMENT WALKOUT SPLIT DRAINAGE



NOTE :
THIS LOT TO BE GRADED USING A SPLIT DRAINAGE PATTERN.

TOP OF FOOTING:
MAX. DEPTH BELOW AVERAGE SIDEWALK = 1.92
LOWEST ELEVATION = 901.68

AS-BUILT SEWER INVERT ELEVATIONS:
SANITARY AT RIGHT OF WAY LINE = 900.77
STORM AT RIGHT OF WAY LINE = 900.78

DESIGN LANDSCAPE ELEVATIONS
ELEV. AT FRONT OF HOUSE = 903.95
ELEV. AT REAR OF HOUSE = 903.95

CIVIC ADDRESS: 75 County Street
LOT: 30 BLOCK: 11 PLAN No.: 972 9999
DEVELOPER: ABC Developments Ltd. SCALE: 1:500
DRAWN BY: XYZ Consulting Ltd. DATE: June 28, 2000
APPROVED BY: DATE:
RECEIVED BY: DATE:

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Service Connections

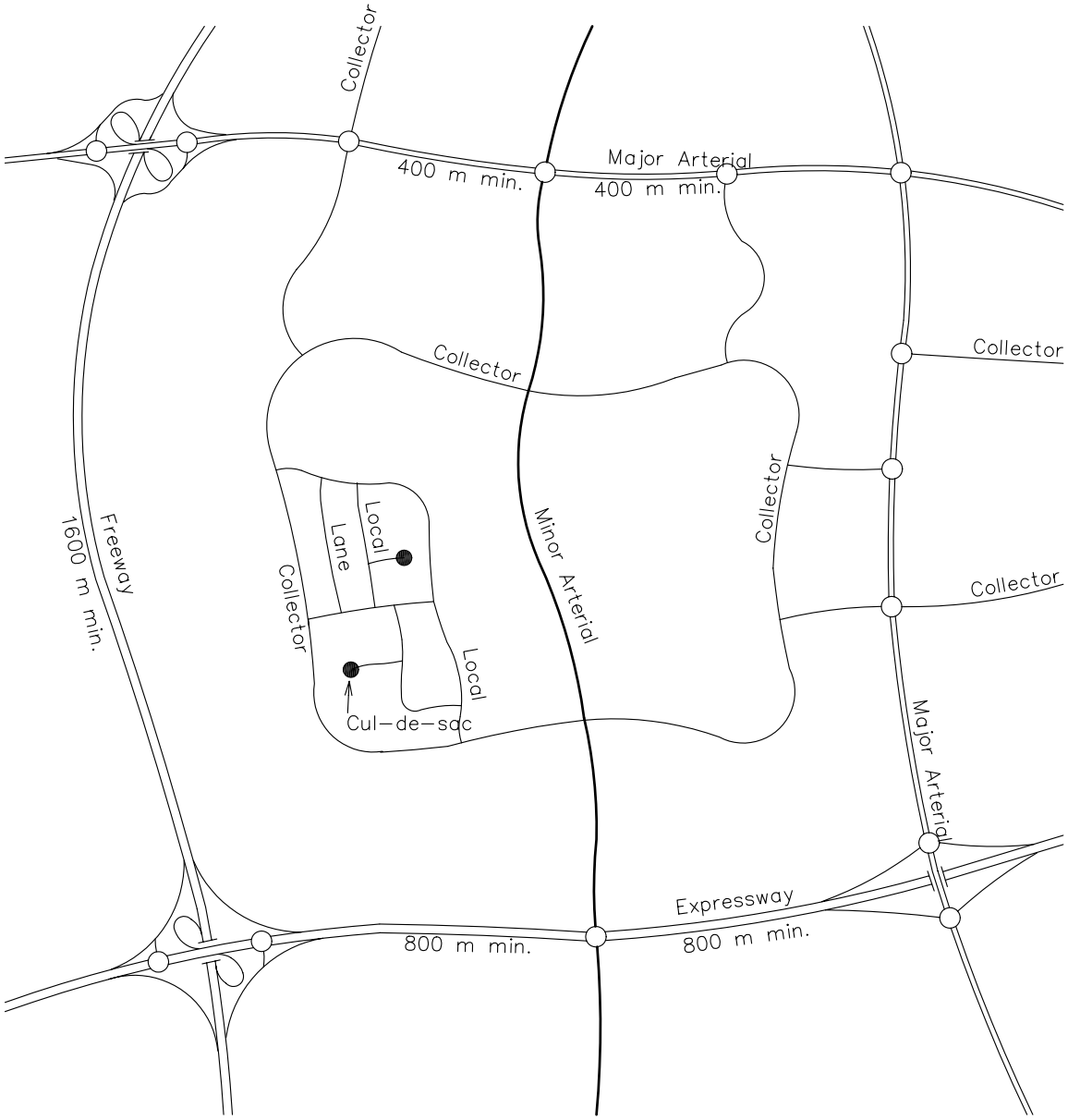
APPROVED BY:

DATE: JUNE/05

NEW RESIDENTIAL
BUILDING GRADE CERTIFICATE

SCALE: N.T.S.

DRAWING NO. 4.11



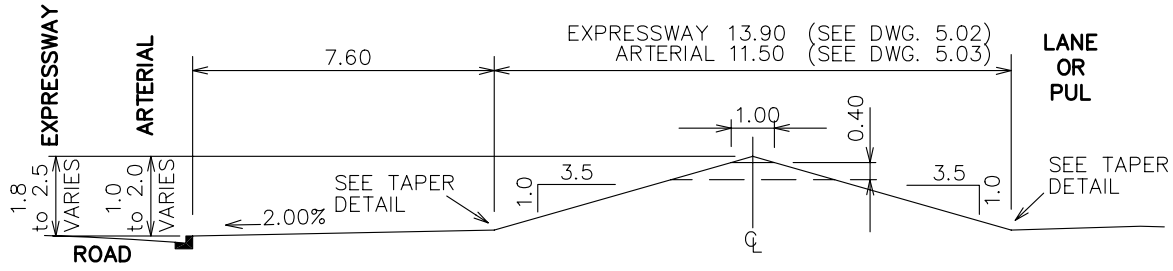
LEGEND

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

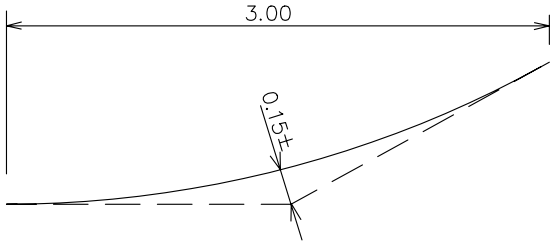
NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
DATE: JUNE/05	RELATIONSHIP OF STREET CLASSIFICATIONS	
SCALE: N.T.S.		DRAWING NO. 5.01



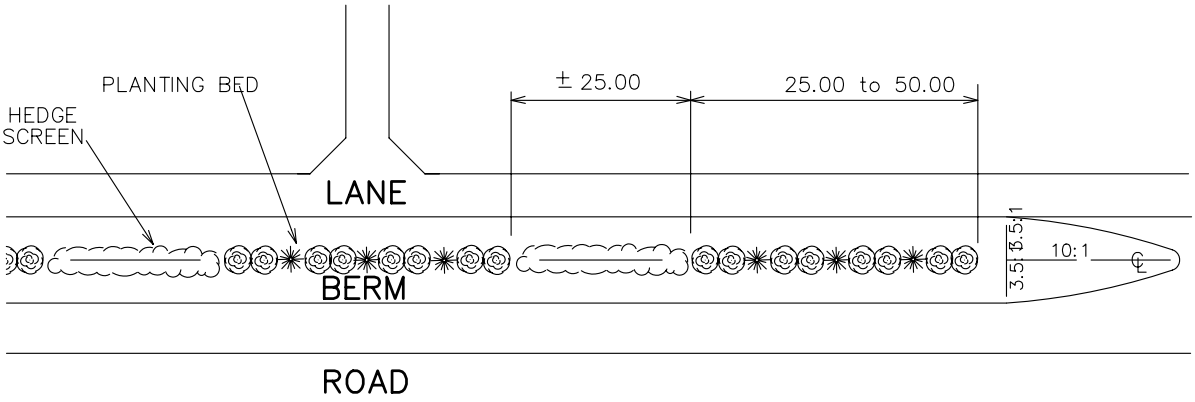
CROSS SECTION



NOTE :
PROVIDE A TAPER TO THE BERM ADJACENT TO THE BOULEVARD & PUBLIC UTILITY LOT/M.R. FOR MOWER TRANSITION.

A TRANSITION IS NOT REQUIRED IF A LANE IS CONSTRUCTED ADJACENT TO THE BERM.

BERM TAPER DETAIL

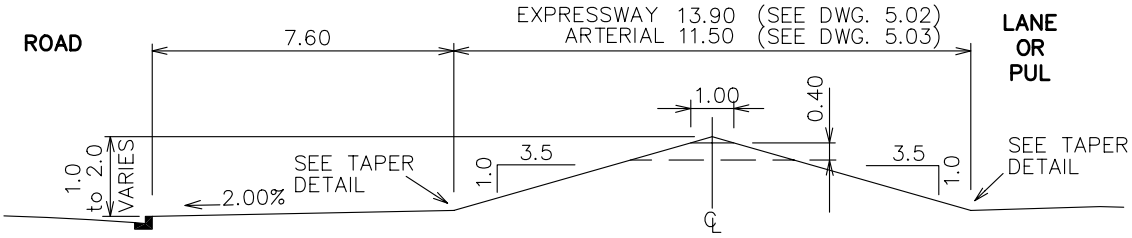


BERM PLAN VIEW

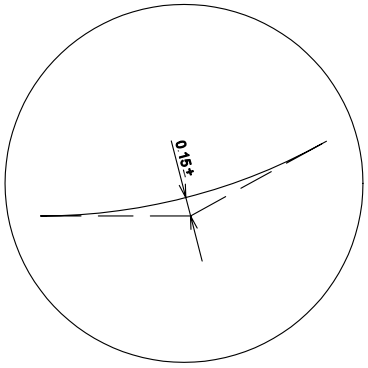
NOTE :
SEE DWG. 7.06 FOR BERM DETAIL
LOCATED ADJACENT TO COMMERCIAL SITES

BERM ELEVATED VIEW

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	TYPICAL BERM CROSS SECTION	
			SCALE: N.T.S.		DRAWING NO. 5.04a

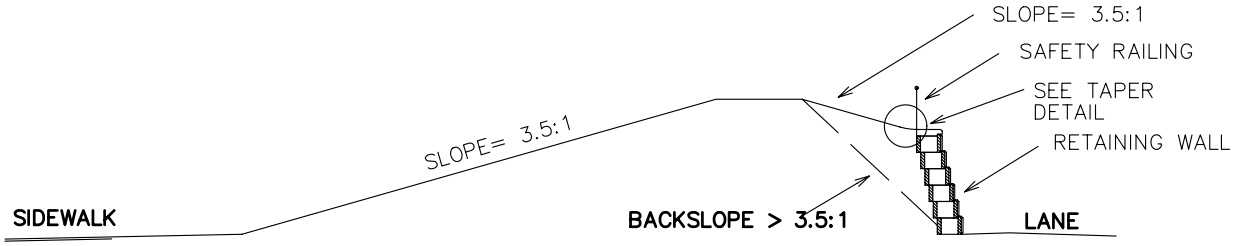


NORMAL BERM CROSS SECTION

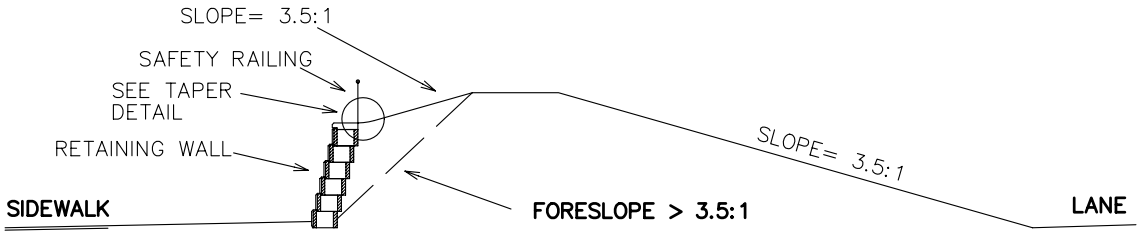


NOTE :
PROVIDE A TAPER TO THE BERM ADJACENT TO THE BOULEVARD & PUBLIC UTILITY LOT/M.R. WHERE APPLICABLE

BERM TAPER DETAIL

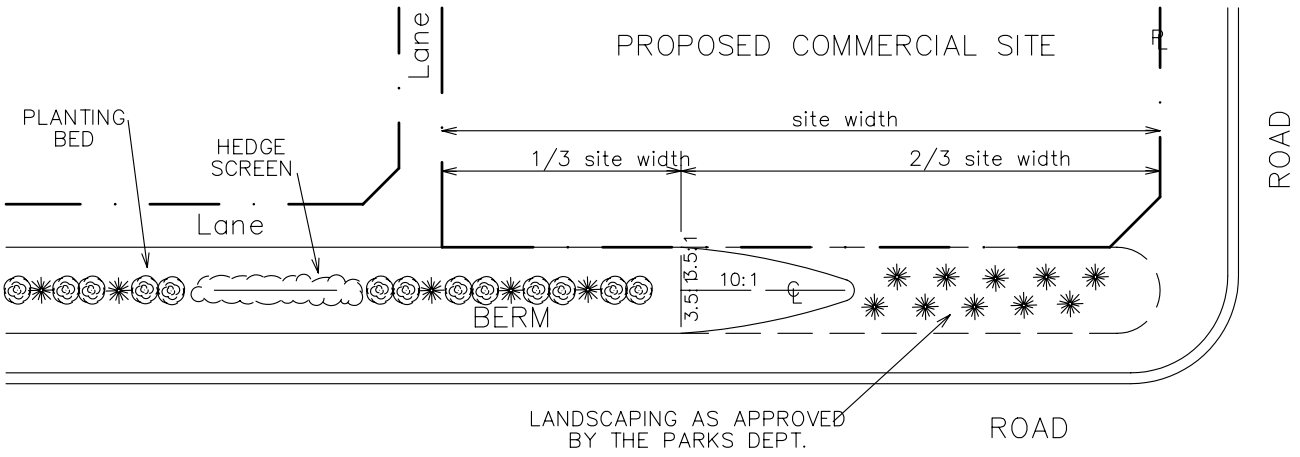


BACKSLOPE CROSS SECTION

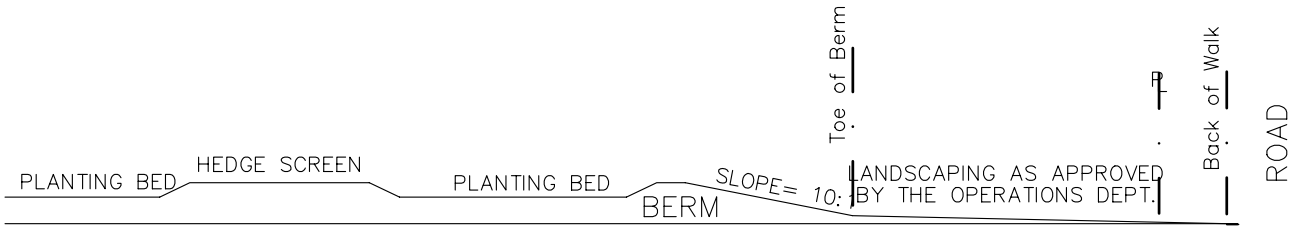


FORESLOPE CROSS SECTION

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	BERM SIDE SLOPE/RETAINING WALL REQUIREMENTS	DRAWING NO. 5.04b
			SCALE: N.T.S.		

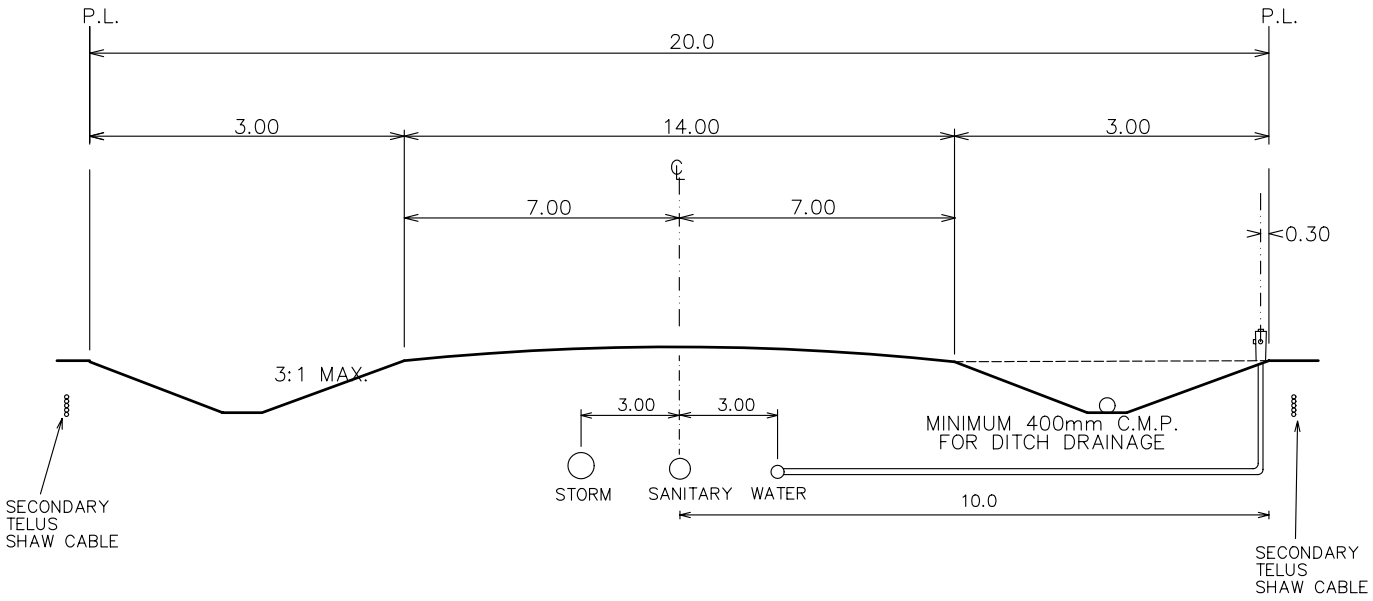


BERM PLAN VIEW



BERM ELEVATED VIEW

NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	BERM HEIGHT REDUCTION NEXT TO A COMMERCIAL SITE	DRAWING NO. 5.04c
			SCALE: N.T.S.		



NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

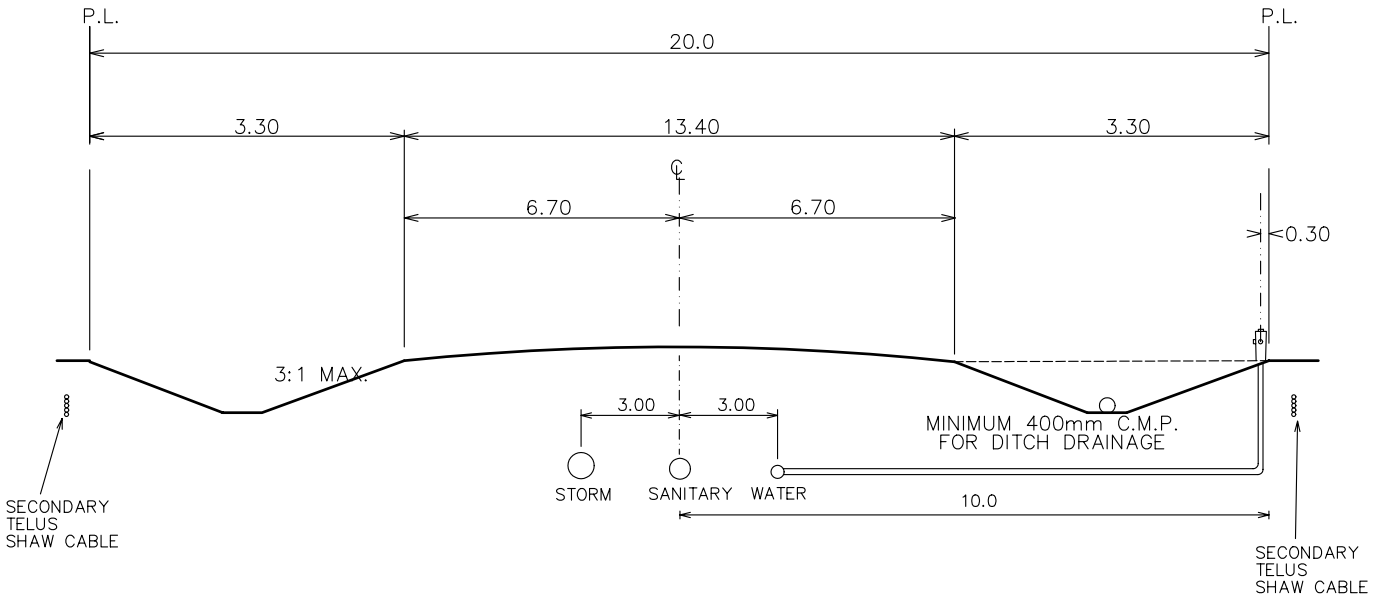
APPROVED BY:

DATE: JUNE/05

RURAL
LOCAL ROADS
RESIDENTIAL CUL-DE-SAC

SCALE: N.T.S.

DRAWING NO. 5.05A



NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

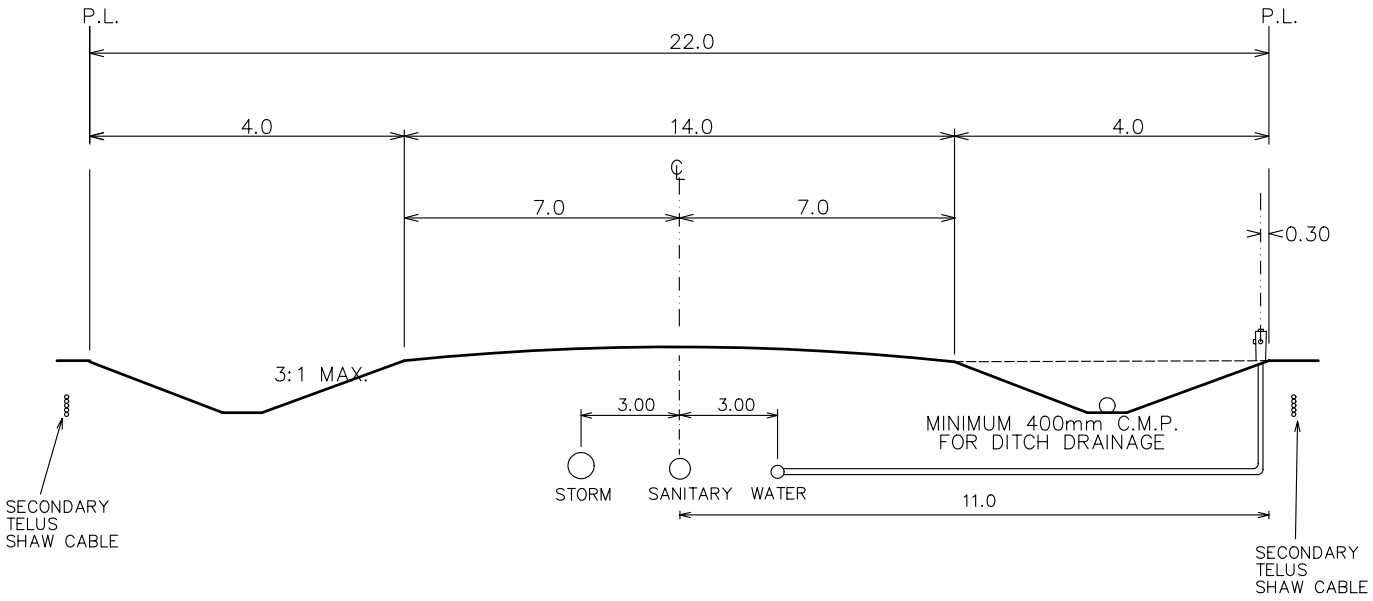
APPROVED BY:

DATE: JUNE/05

RURAL
LOCAL ROADS
RESIDENTIAL

SCALE: N.T.S.

DRAWING NO. 5.05B



NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

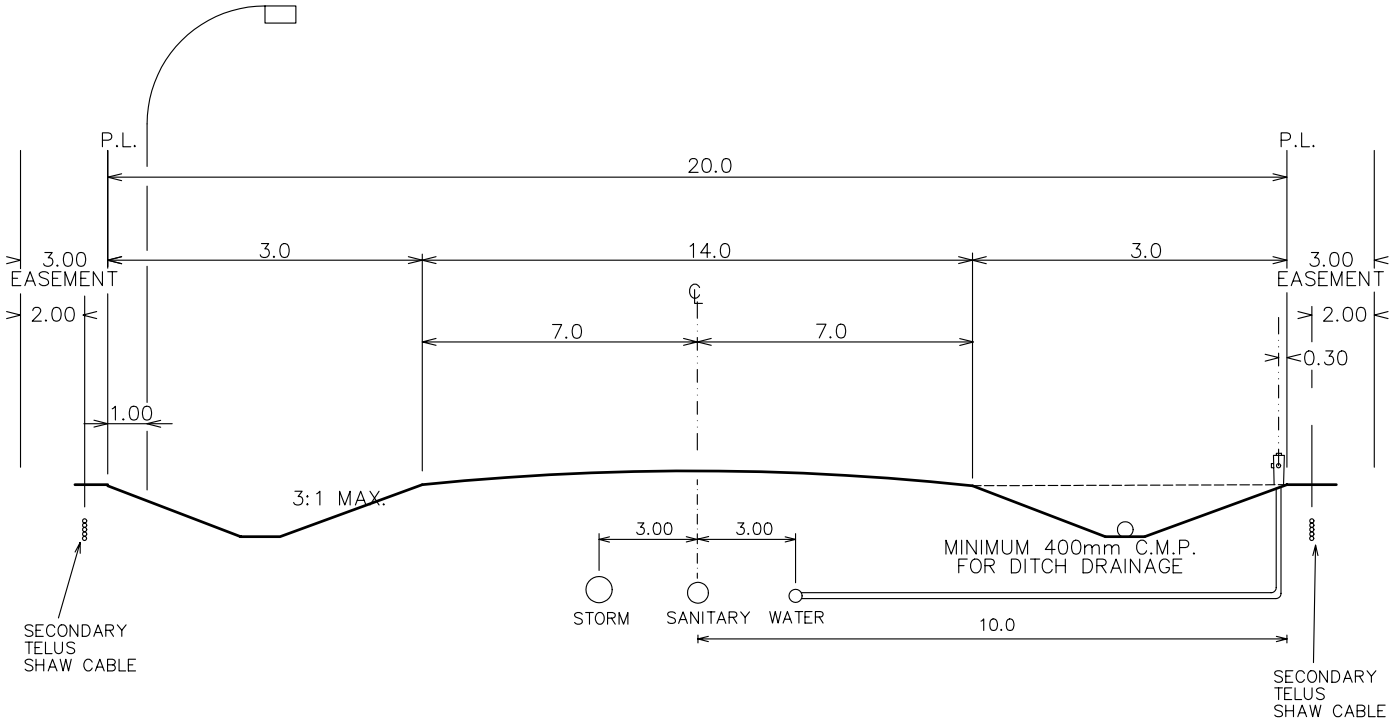
APPROVED BY:

DATE: JUNE/05

RURAL
LOCAL ROADS
COMMERCIAL/INDUSTRIAL

SCALE: N.T.S.

DRAWING NO. 5.05C



NO.	DATE	REVISION

RED DEER COUNTY

DESIGN GUIDELINE DRAWINGS
Roadway Design

RURAL
COLLECTOR ROADS
MINOR RESIDENTIAL

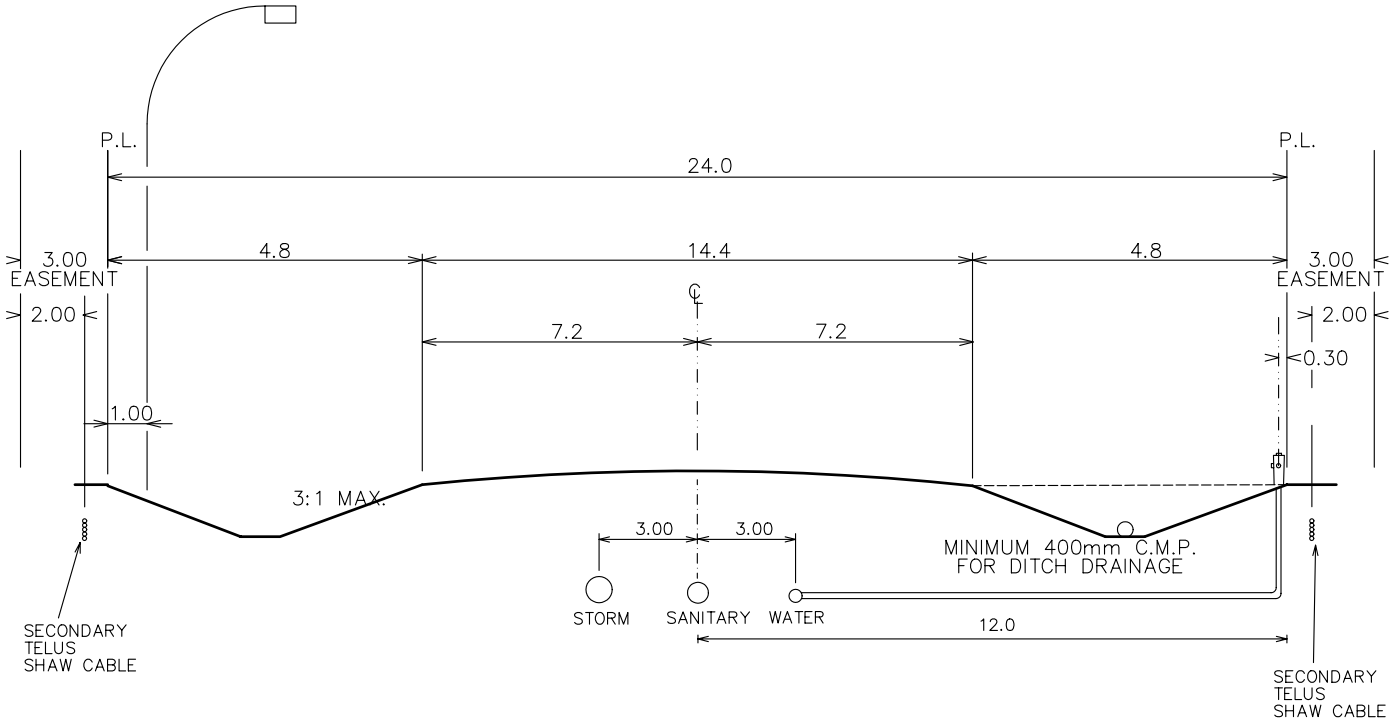
DRAWN BY: N.M.

DATE: JUNE/05

SCALE: N.T.S.

APPROVED BY:

DRAWING NO. 5.06A



NO.	DATE	REVISION

RED DEER COUNTY

DESIGN GUIDELINE DRAWINGS
Roadway Design

RURAL
COLLECTOR ROADS
MAJOR RESIDENTIAL

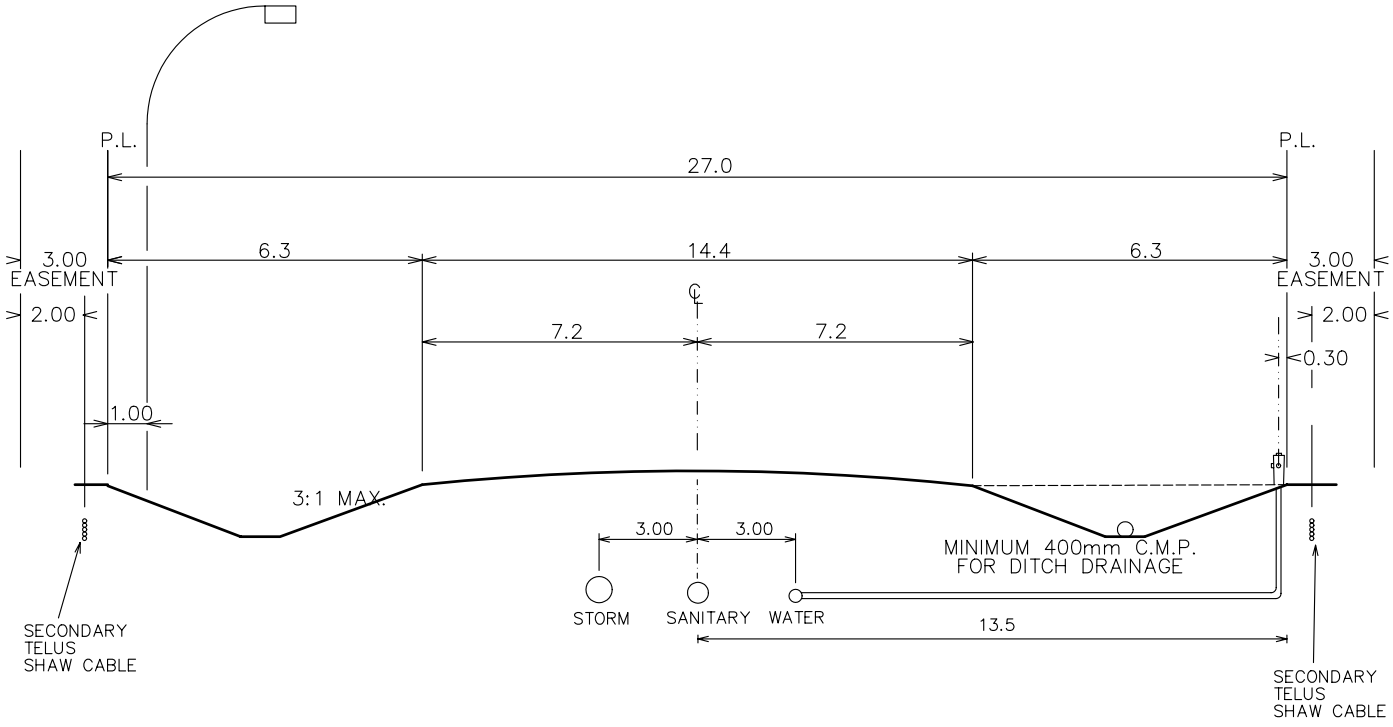
DRAWN BY: N.M.

DATE: JUNE/05

SCALE: N.T.S.

APPROVED BY:

DRAWING NO. 5.06B



NO.	DATE	REVISION

RED DEER COUNTY

DESIGN GUIDELINE DRAWINGS
Roadway Design

RURAL
COLLECTOR ROADS
COMMERCIAL/INDUSTRIAL

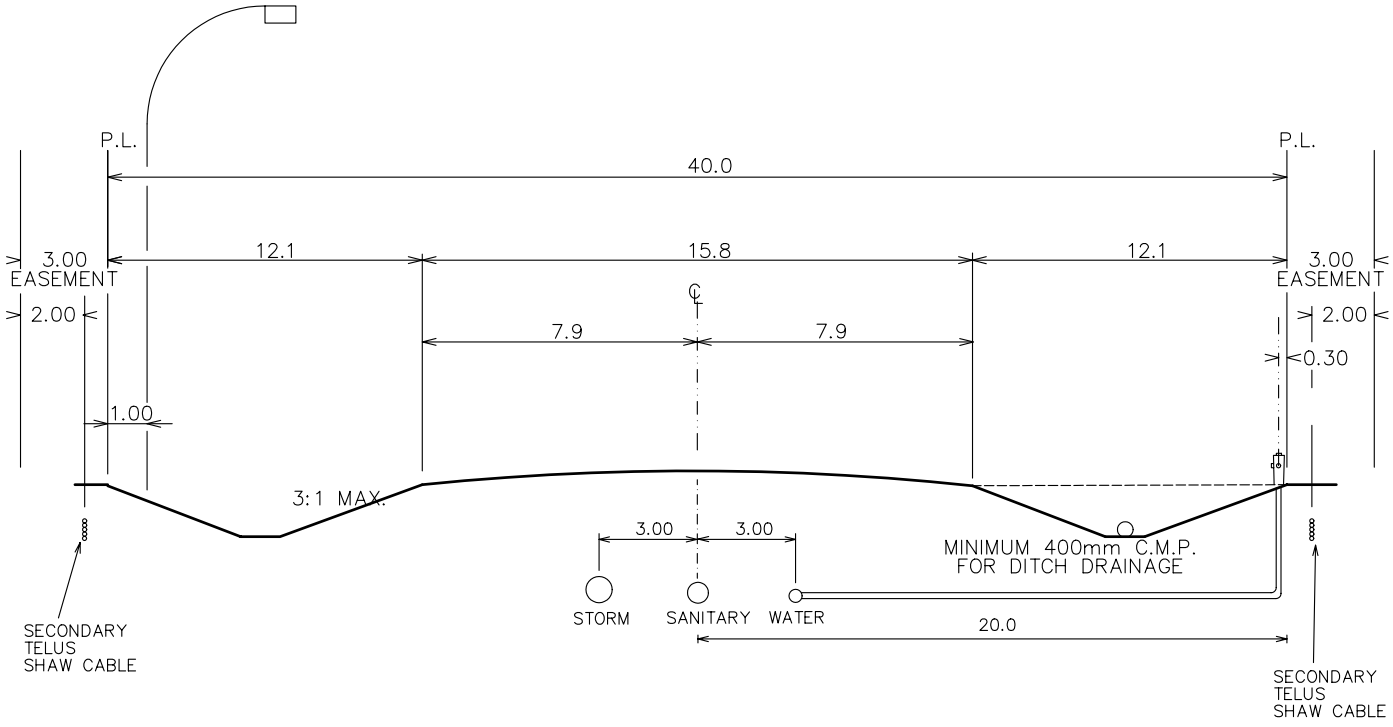
DRAWN BY: N.M.

DATE: JUNE/05

SCALE: N.T.S.

APPROVED BY:

DRAWING NO. 5.06C



NO.	DATE	REVISION

RED DEER COUNTY

DESIGN GUIDELINE DRAWINGS
Roadway Design

RURAL
ARTERIAL ROADS
UNDIVIDED ARTERIAL

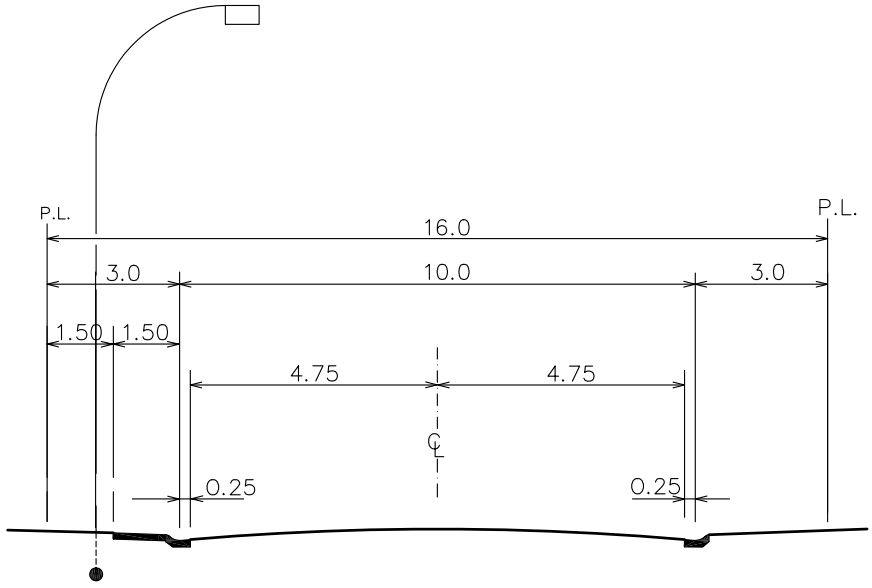
DRAWN BY: N.M.

DATE: JUNE/05

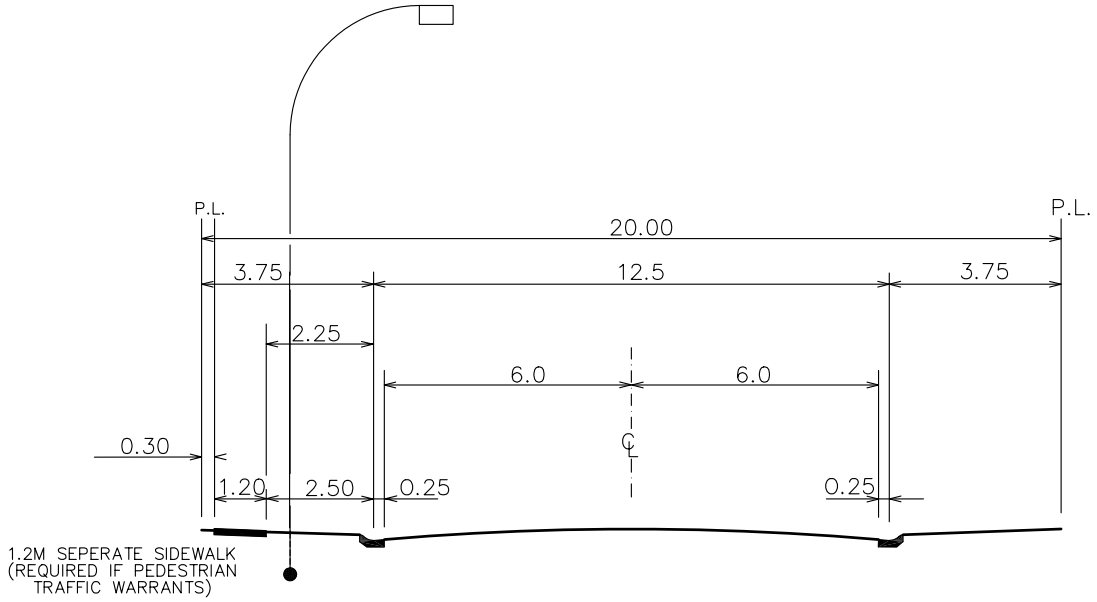
SCALE: N.T.S.

APPROVED BY:

DRAWING NO. 5.07



NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	URBAN LOCAL ROADS RESIDENTIAL	
			SCALE: N.T.S.		DRAWING NO. 5.08A



NO.	DATE	REVISION
1	Mar 22, 2004	Revised

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

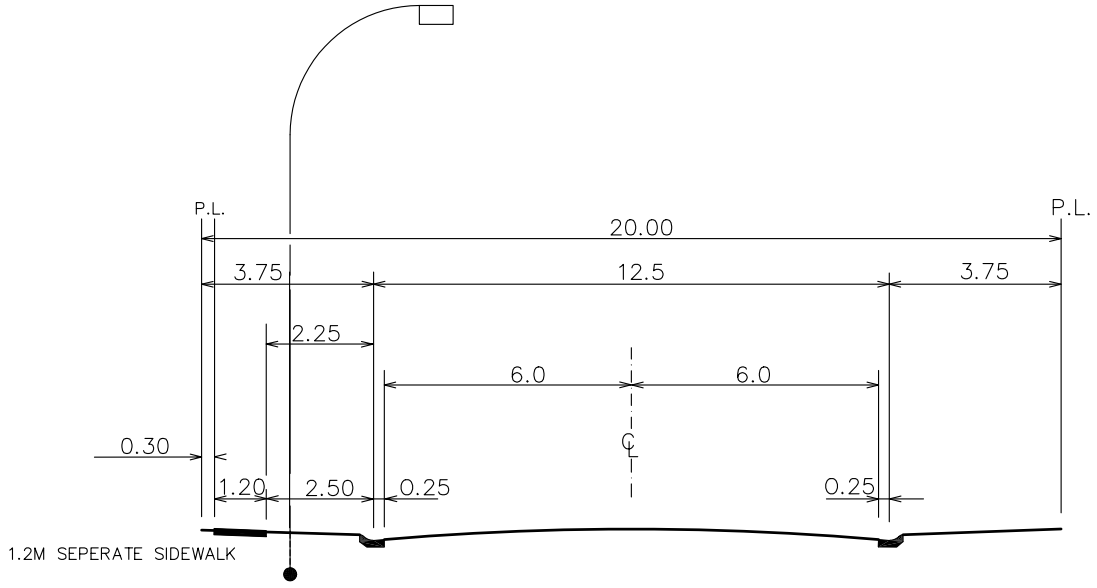
APPROVED BY:

DATE: DEC./04

URBAN
LOCAL ROADS
COMMERCIAL/INDUSTRIAL

SCALE: N.T.S.

DRAWING NO. 5.08B



NO.	DATE	REVISION
1	Mar 22, 2004	Revised

RED DEER COUNTY

DESIGN GUIDELINE DRAWINGS
Roadway Design

URBAN
COLLECTOR ROADS
RESIDENTIAL

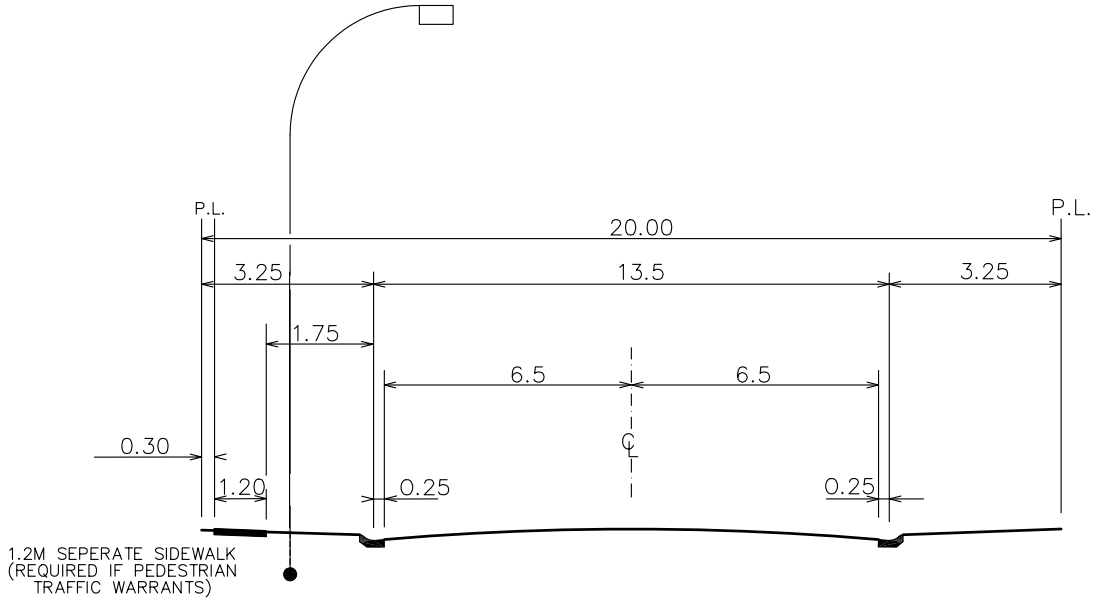
DRAWN BY: N.M.

DATE: DEC./04

SCALE: N.T.S.

APPROVED BY:

DRAWING NO. 5.09A



NO.	DATE	REVISION
1	Mar 22, 2004	Revised

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

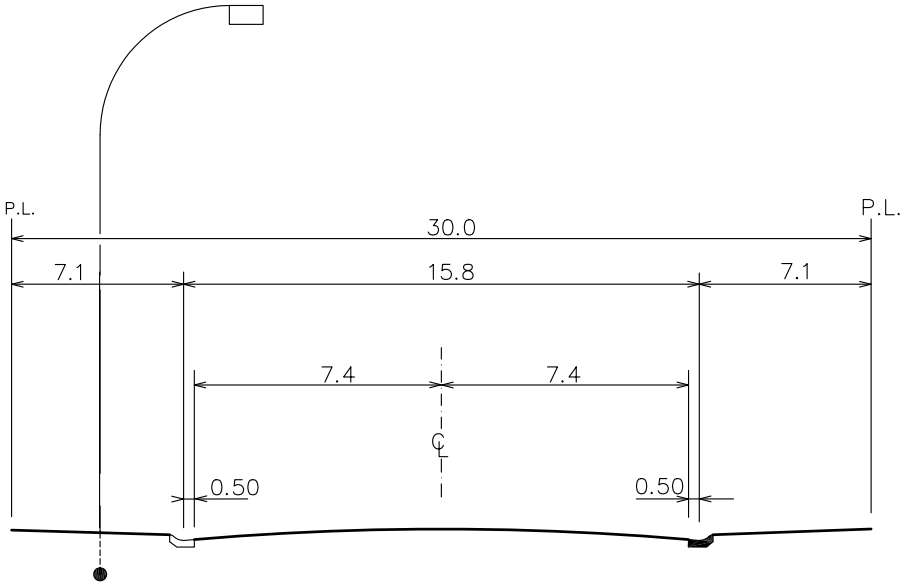
APPROVED BY:

DATE: DEC./04

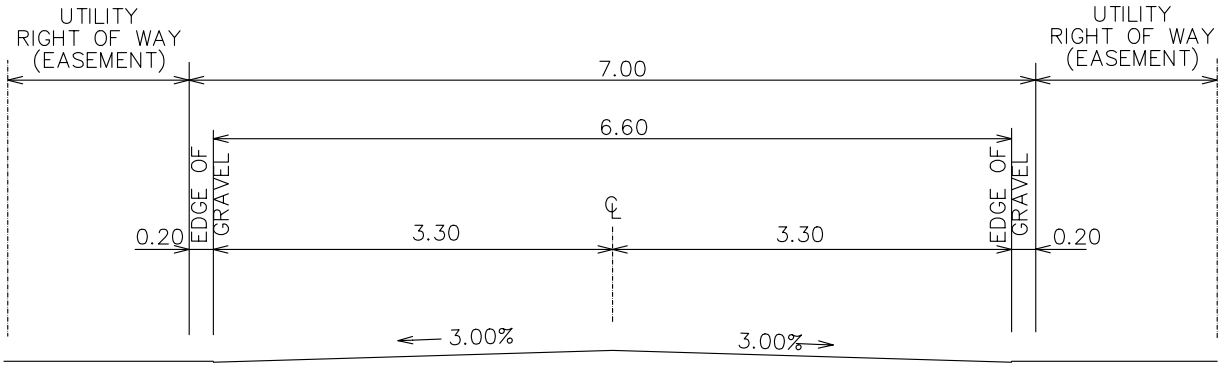
URBAN
COLLECTOR ROADS
COMMERCIAL/INDUSTRIAL

SCALE: N.T.S.

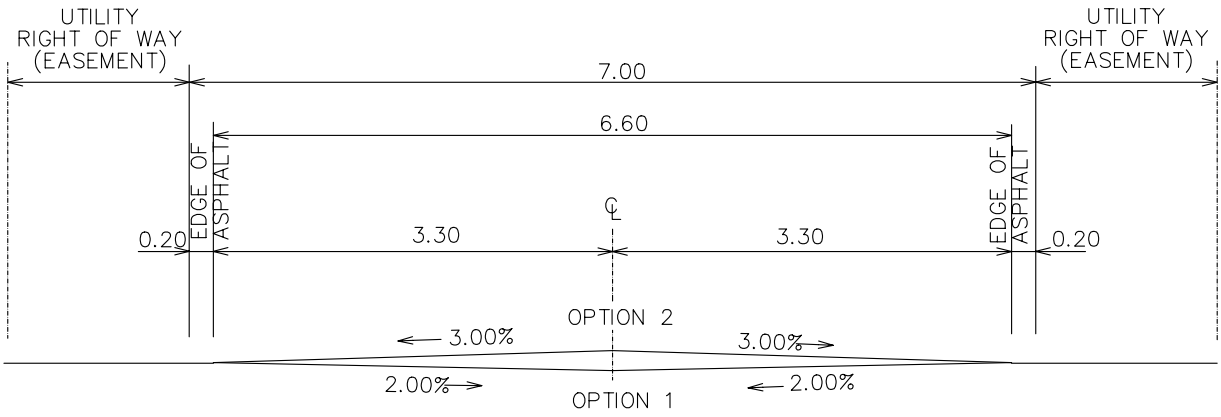
DRAWING NO. 5.09B



			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: DEC./04	URBAN ARTERIAL ROADS ARTERIAL	
			SCALE: N.T.S.		DRAWING NO. 5.10
1	Mar 22, 2004	Revised			
NO.	DATE	REVISION			



GRAVEL LANE

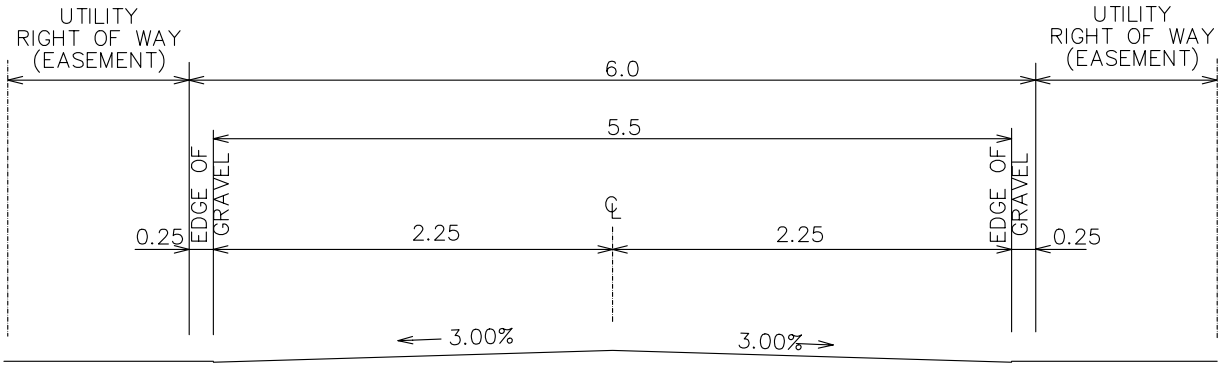


PAVED LANE

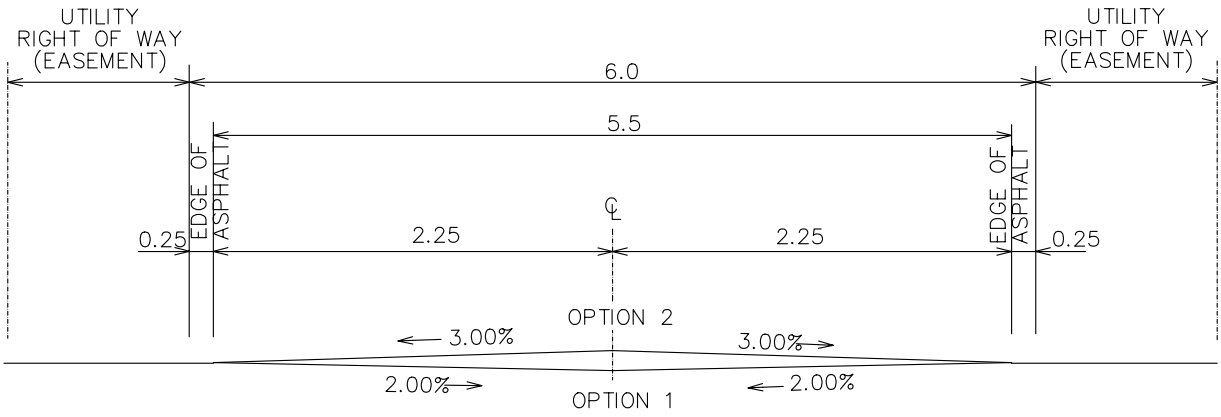
NOTE :

- MINIMUM 2.00m WIDE EASEMENT REQUIRED ON BOTH SIDES OF LANE FOR REAR SERVICING.
- LANE TO BE PAVED ADJACENT TO MULTI-FAMILY AND COMMERCIAL DEVELOPMENTS WHERE LANE ACCESS IS PROVIDED.
- LANE R/W WIDTH MAY VARY IN ESTABLISHED SUBDIVISION, CROSS-SECTION DIMENSIONS TO BE ADJUSTED ACCORDINGLY.

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	GRAVEL AND PAVED LANES REAR SERVICING	DRAWING NO. 5.14a
			SCALE: N.T.S.		



GRAVEL LANE

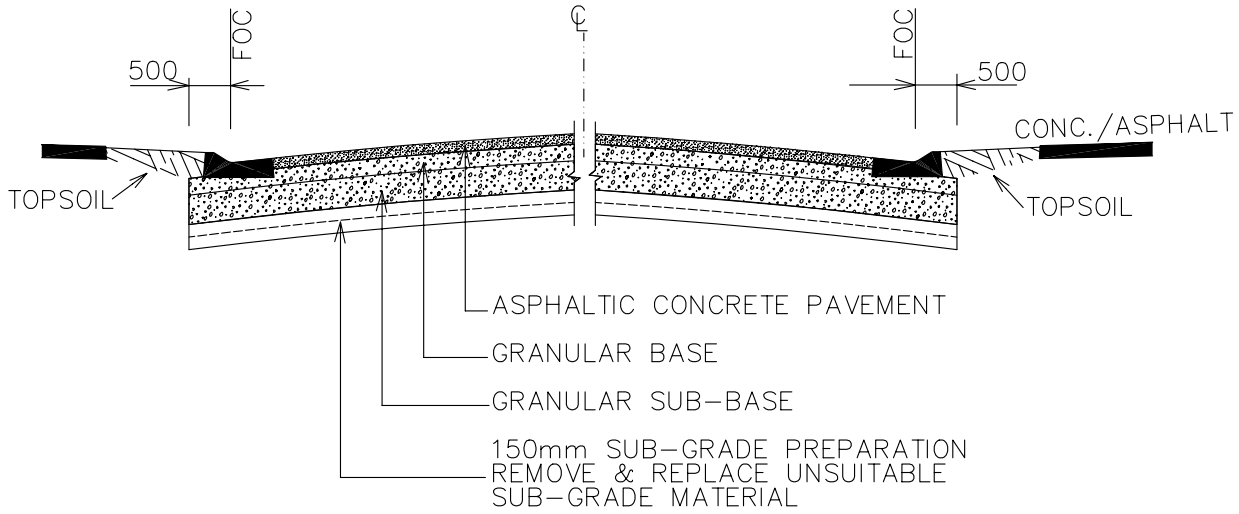


PAVED LANE

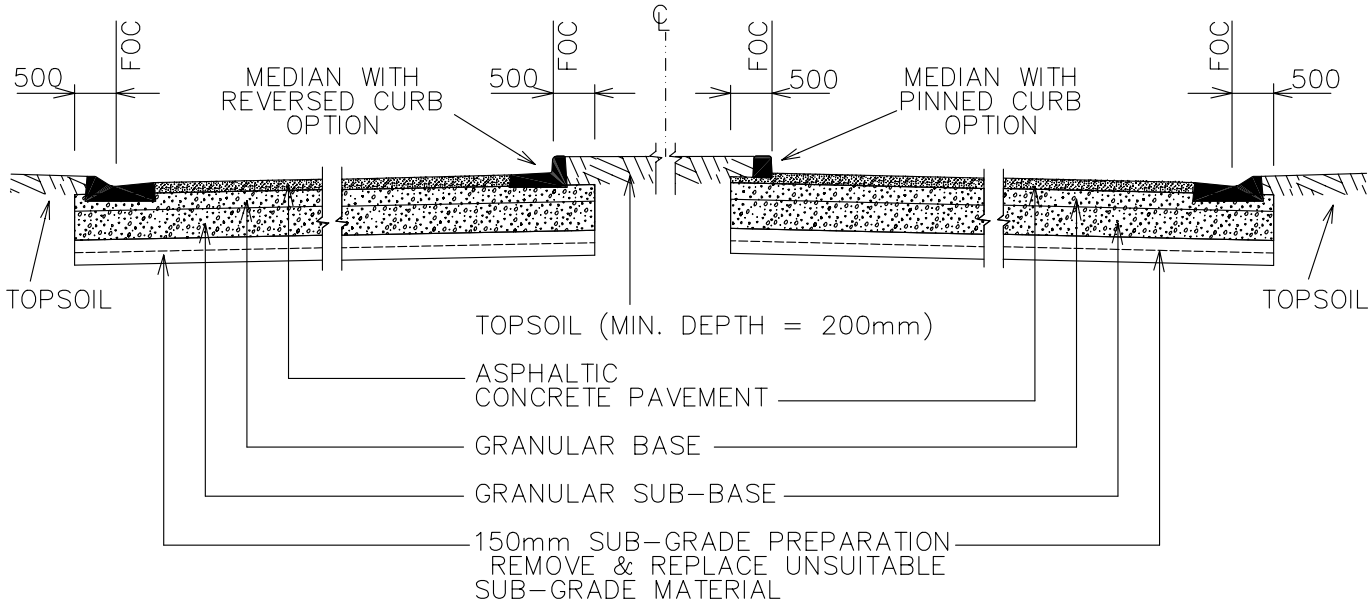
NOTE :

- LANE TO BE PAVED ADJACENT TO MULTI–FAMILY AND COMMERCIAL DEVELOPMENTS WHERE LANE ACCESS IS PROVIDED.
- LANE R/W WIDTH MAY VARY IN ESTABLISHED SUBDIVISION, CROSS–SECTION DIMENSIONS TO BE ADJUSTED ACCORDINGLY.

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	GRAVEL AND PAVED LANES FRONT SERVICING	DRAWING NO. 5.14b
			SCALE: N.T.S.		



UNDIVIDED ARTERIAL ROADWAY



DIVIDED ARTERIAL ROADWAY

MINIMUM DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB–BASE (mm)	TOTAL DEPTH (mm)
ARTERIAL & EXPRESSWAY	125	200	350	675

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

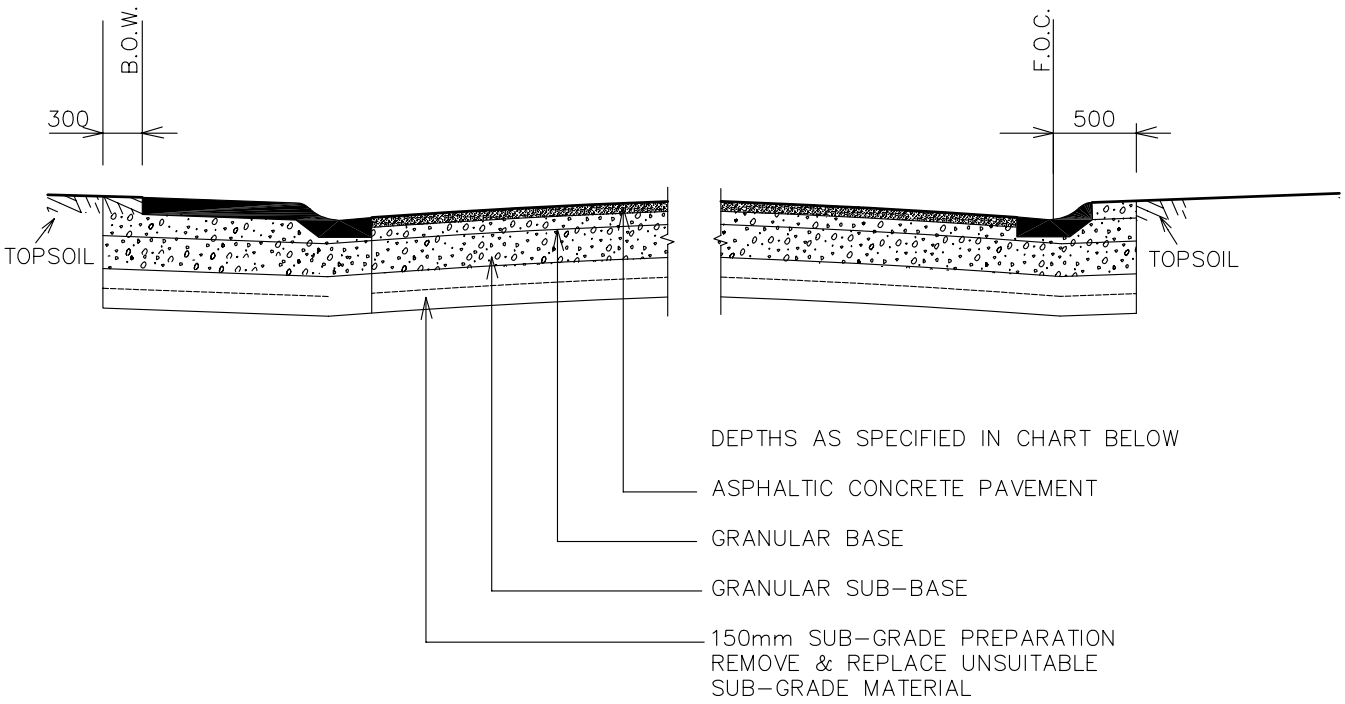
APPROVED BY:

DATE: JUNE/05

ARTERIAL ROADWAY
PAVEMENT STRUCTURE
CROSS–SECTION

SCALE: N.T.S.

DRAWING NO. 5.15



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

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

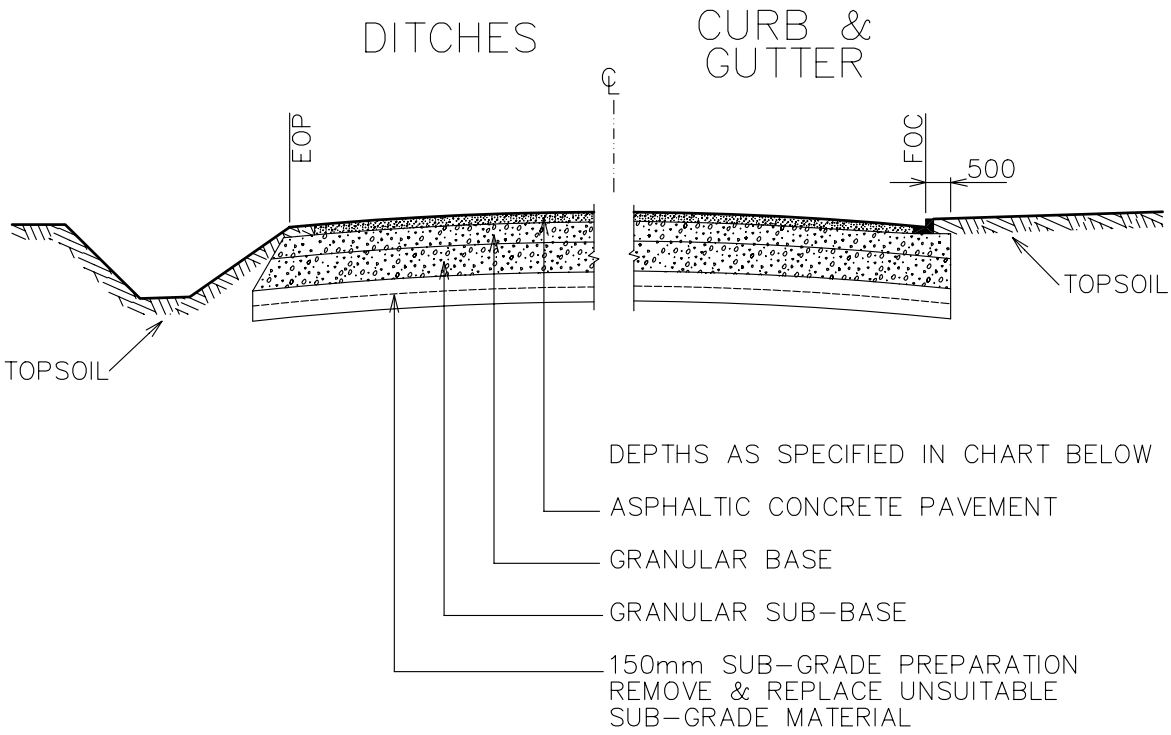
APPROVED BY:

DATE: JUNE/05

RESIDENTIAL ROADWAY
PAVEMENT STRUCTURE
CROSS – SECTION

SCALE: N.T.S.

DRAWING NO. 5.16



INDUSTRIAL LOCAL / COLLECTOR ROADWAY

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

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

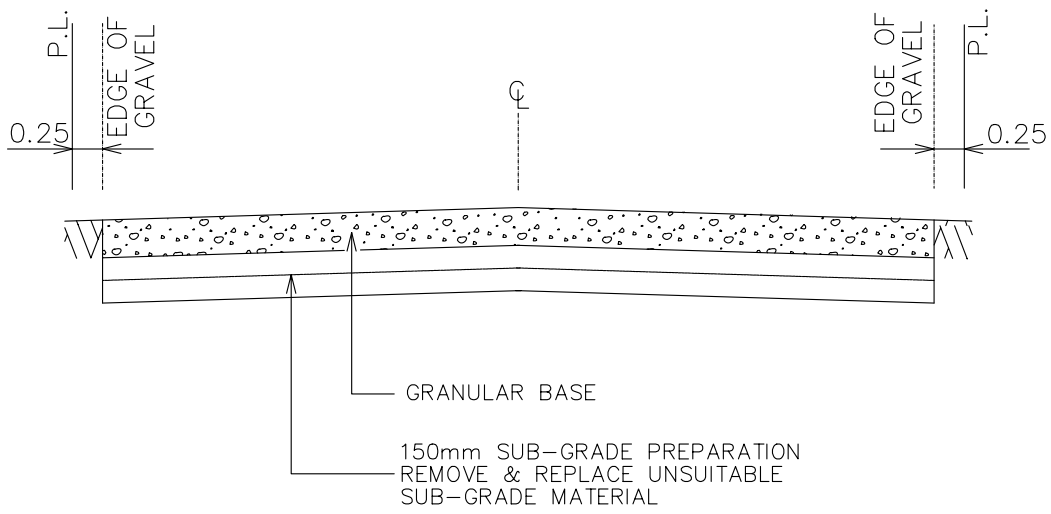
APPROVED BY:

DATE: JUNE/05

INDUSTRIAL ROADWAY
PAVEMENT STRUCTURE
CROSS – SECTION

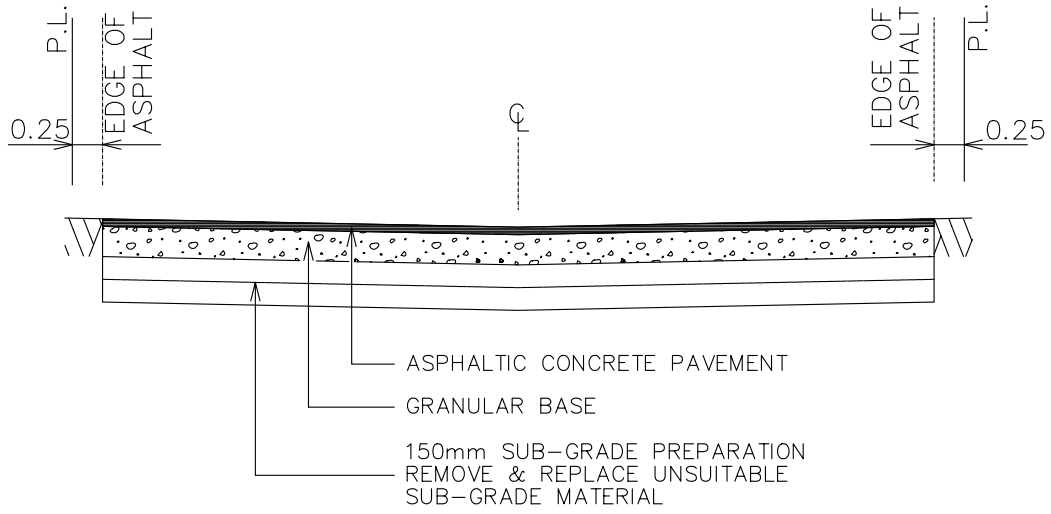
SCALE: N.T.S.

DRAWING NO. 5.17



NOTE : DEPTHS ARE AS SPECIFIED IN CHART BELOW

GRAVEL LANE



NOTE : DEPTHS ARE AS SPECIFIED IN CHART BELOW

PAVED LANE

DESIGN PAVEMENT STRUCTURE				
ROAD CLASSIFICATION	ASPHALTIC CONCRETE PAVEMENT (mm)	GRANULAR BASE (mm)	GRANULAR SUB–BASE (mm)	TOTAL DEPTH (mm)
RESIDENTIAL GRAVEL LANES	--	100	200	300
RESIDENTIAL PAVED LANES	75	100	200	300

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

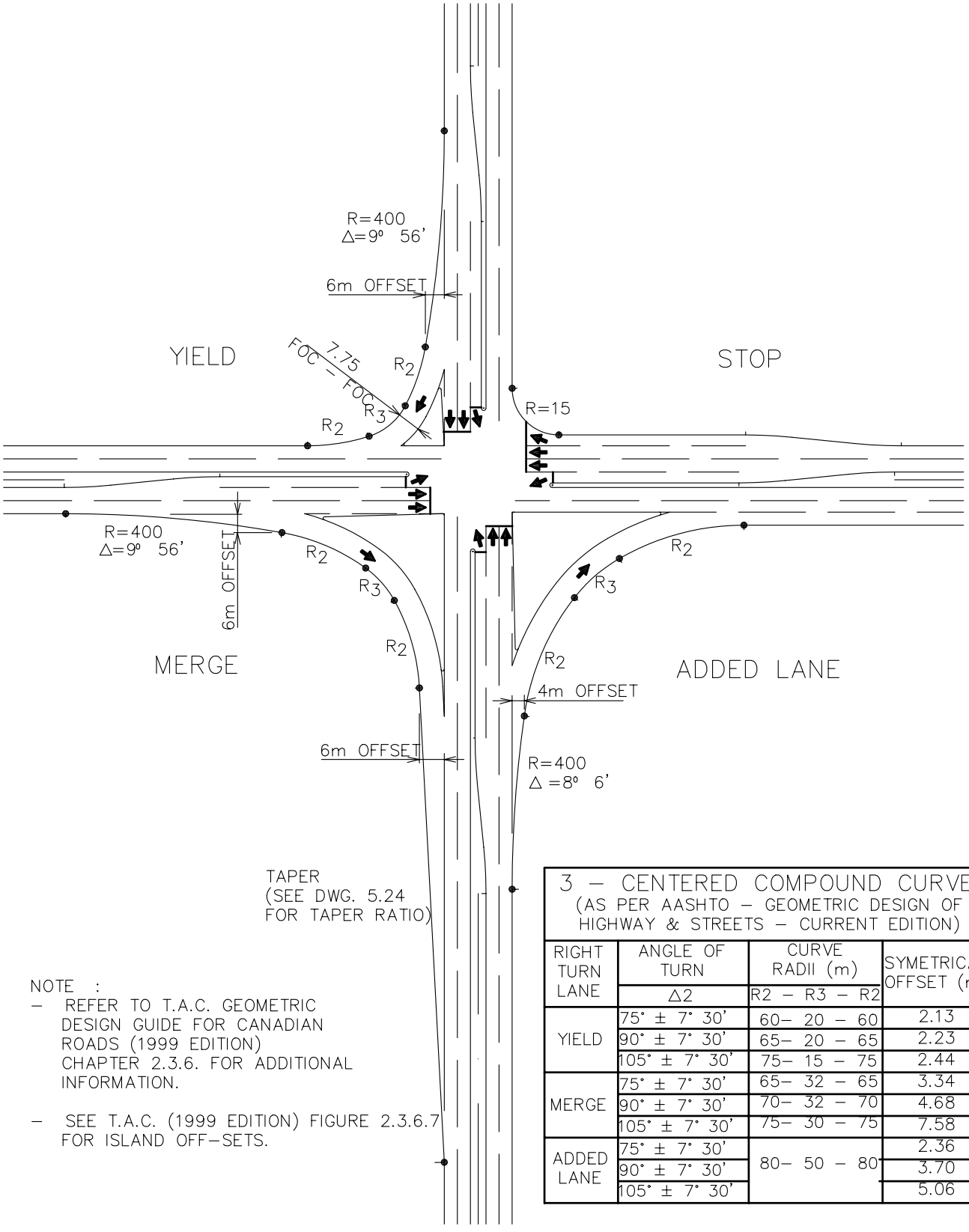
APPROVED BY:

DATE: JUNE/05

GRAVEL / PAVED LANE
PAVEMENT STRUCTURE
CROSS – SECTION

SCALE: N.T.S.

DRAWING NO. 5.18



NOTE :
- REFER TO T.A.C. GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS (1999 EDITION) CHAPTER 2.3.6. FOR ADDITIONAL INFORMATION.
- SEE T.A.C. (1999 EDITION) FIGURE 2.3.6.7 FOR ISLAND OFF–SETS.

3 – CENTERED COMPOUND CURVE
(AS PER AASHTO – GEOMETRIC DESIGN OF HIGHWAY & STREETS – CURRENT EDITION)

RIGHT TURN LANE	ANGLE OF TURN Δ2	CURVE RADII (m) R2 – R3 – R2	SYMETRICAL OFFSET (m)
YIELD	75° ± 7° 30'	60– 20 – 60	2.13
	90° ± 7° 30'	65– 20 – 65	2.23
	105° ± 7° 30'	75– 15 – 75	2.44
MERGE	75° ± 7° 30'	65– 32 – 65	3.34
	90° ± 7° 30'	70– 32 – 70	4.68
	105° ± 7° 30'	75– 30 – 75	7.58
ADDED LANE	75° ± 7° 30'	80– 50 – 80	2.36
	90° ± 7° 30'		3.70
	105° ± 7° 30'		5.06

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

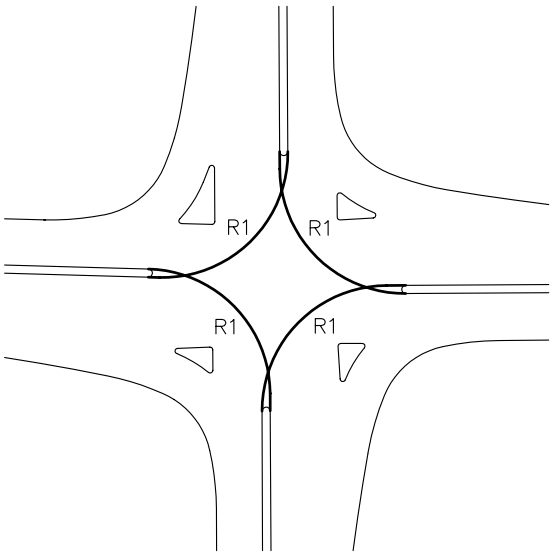
APPROVED BY:

DATE: JUNE/05

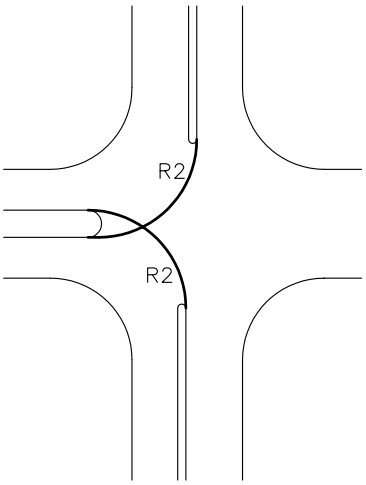
ARTERIAL ROADWAY
RIGHT TURN DESIGNS

SCALE: N.T.S.

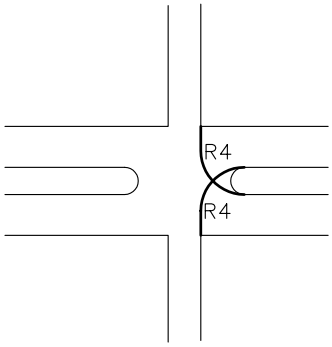
DRAWING NO. 5.19



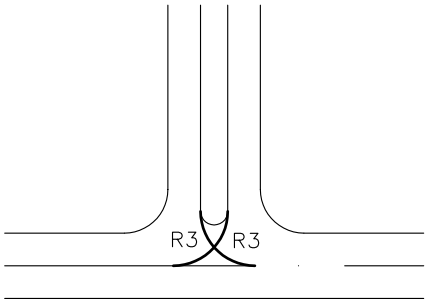
ARTERIAL TO ARTERIAL



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

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

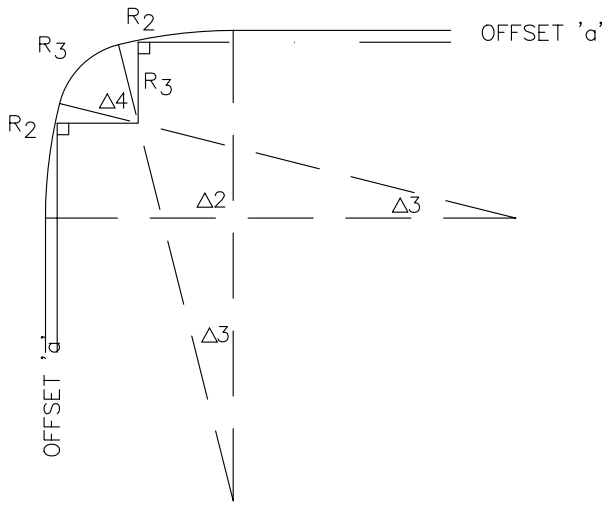
APPROVED BY:

DATE: JUNE/05

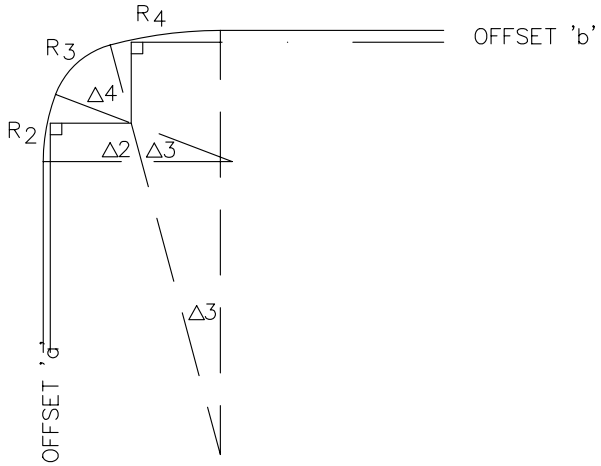
INTERSECTION CENTRE LINE
CONTROL RADII

SCALE: N.T.S.

DRAWING NO. 5.20



3 – CENTRED SYMETRICAL COMPOUND CURVE



3 – CENTRED ASYMETRICAL COMPOUND CURVE

NOTE :
Δ3 AND Δ4 TO BE CALCULATED USING
R_2 , R_3 AND OFFSET DISTANCE

MINIMUM DESIGN FOR TURNS AT INTERSECTIONS

Reference : A Policy on Geometric Design of Highways and Streets (AASHTO 1994 Metric Edition)

Design Vehicle (see Dwg 5.22)	Angle of Turn (degrees)	3 – Centered Symetrical Compound Curve				3 – Centered Asymetrical Compound Curve				
		Minimum Curve Radii (meters)			Symetric Off–set (meters)	Minimum Curve Radii (meters)			Asymetric Off–set (meters)	
		R_2	R_3	R_2	a	R_2	R_3	R_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

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

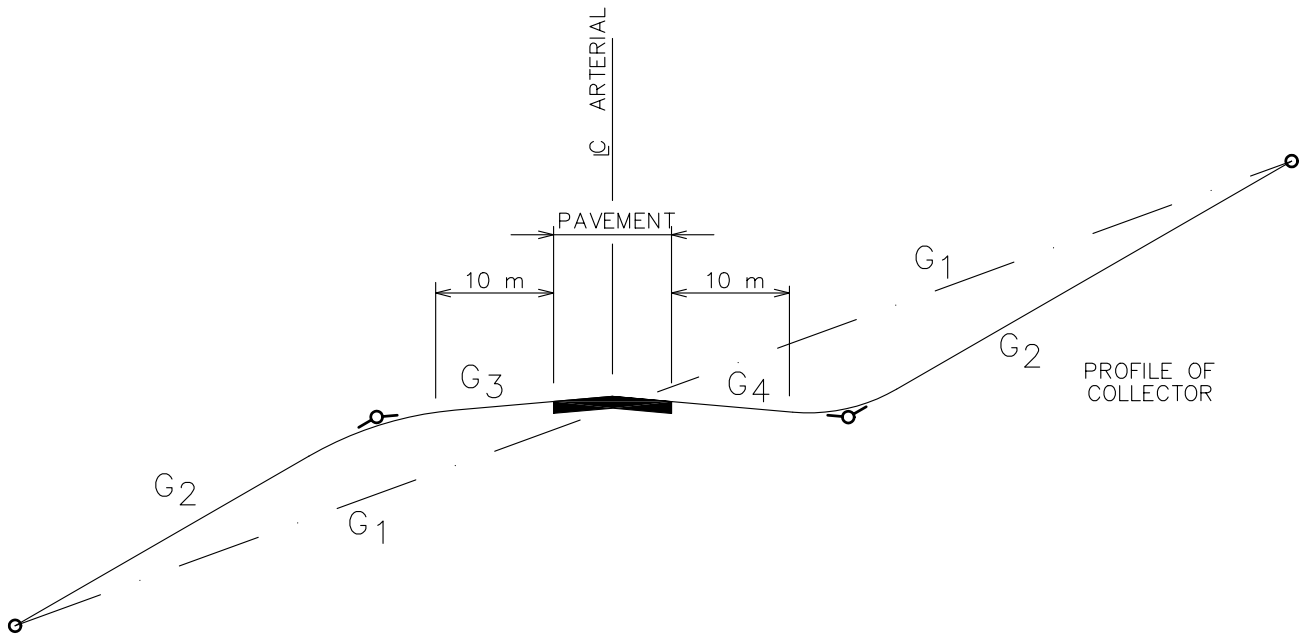
APPROVED BY:

DATE: JUNE/05

W.B. VEHICLE COMPOUND CURVE TURN DESIGN

SCALE: N.T.S.

DRAWING NO. 5.22



NOTE :

G_1	ORIGINAL GRADE OF MINOR ROAD
G_2	GRADE INTRODUCED TO ADJUST GRADE AT INTERSECTION
G_3 & G_4	GRADE ON COLLECTOR CONFORMS TO CROSS SLOPE ON ARTERIAL ROADWAY (EG. 0.5% TO 5.0%, NORMAL CROWN TO SUPERELEVATION).

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

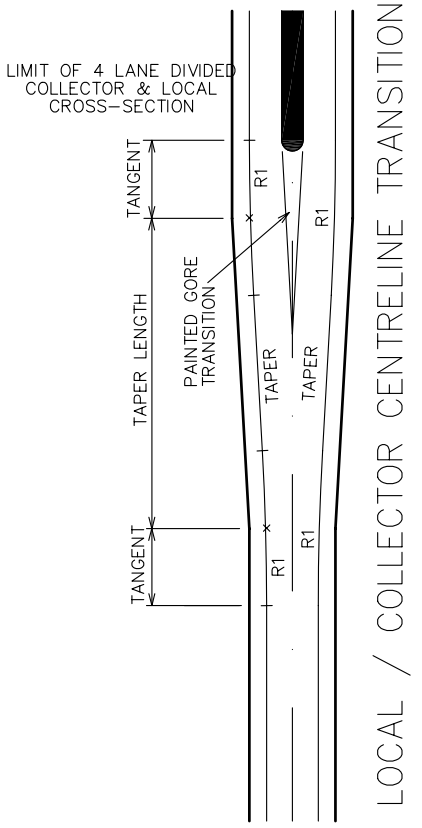
APPROVED BY:

DATE: JUNE/05

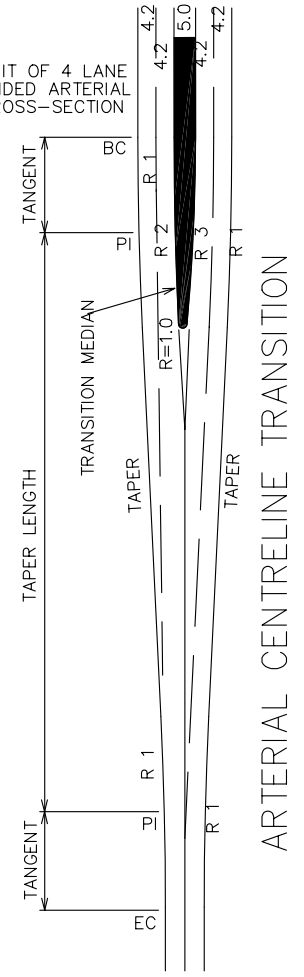
INTERSECTION GRADE ADJUSTMENT

SCALE: N.T.S.

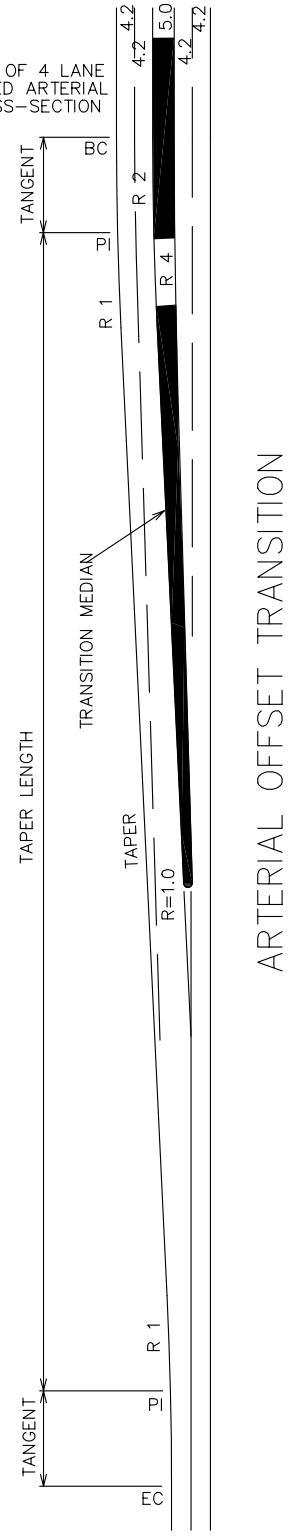
DRAWING NO. 5.23



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 TRANSITIONSARE BASED ON 70 fm/hr DESIGN SPEED.

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

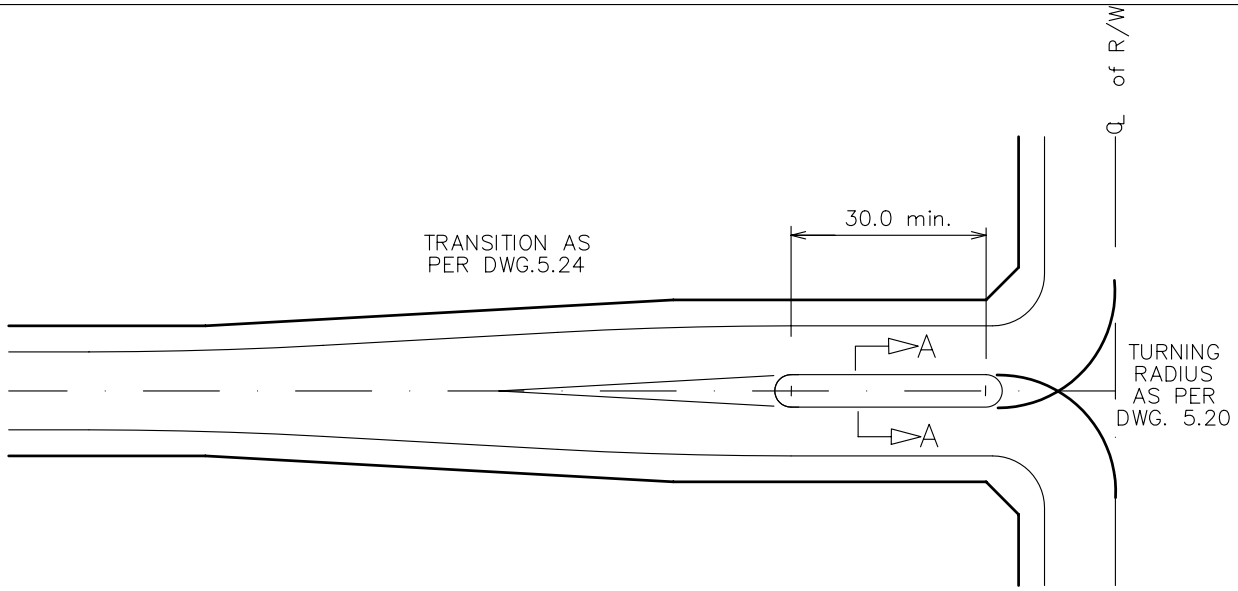
APPROVED BY:

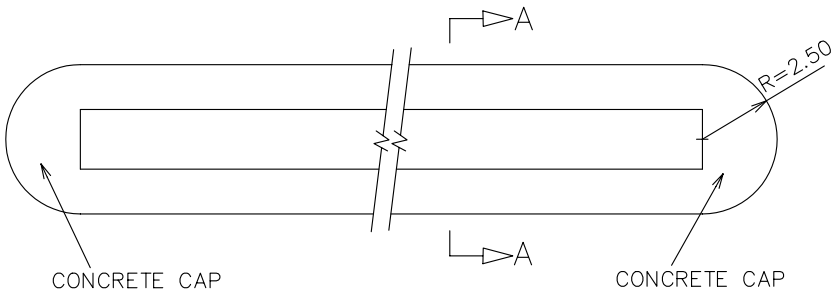
DATE: JUNE/05

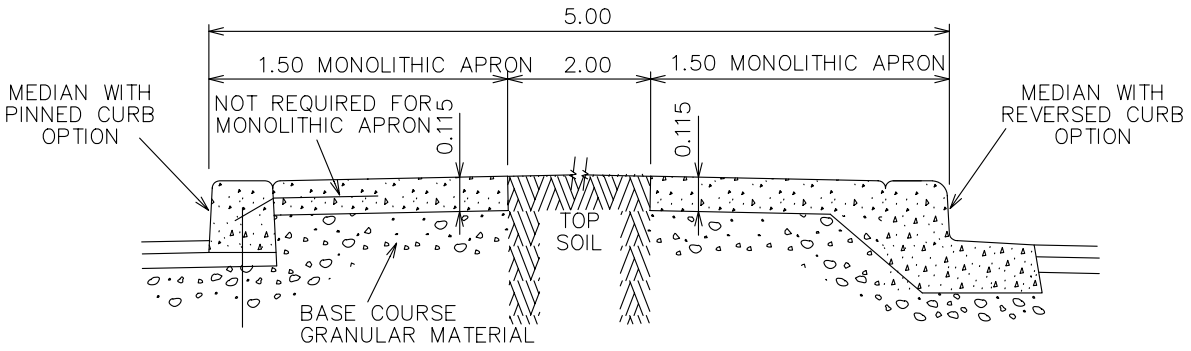
DIVIDED TO UNDIVIDED
ROADWAY TRANSITION

SCALE: N.T.S.

DRAWING NO. 5.24







NOTE :
PATTERNED CONCRETE OR PAVING STONES FOR APRON ARE PERMITTED

SECTION 'A – A'
(AS PER CONTRACT SPECIFICATION DWG 6.19)

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

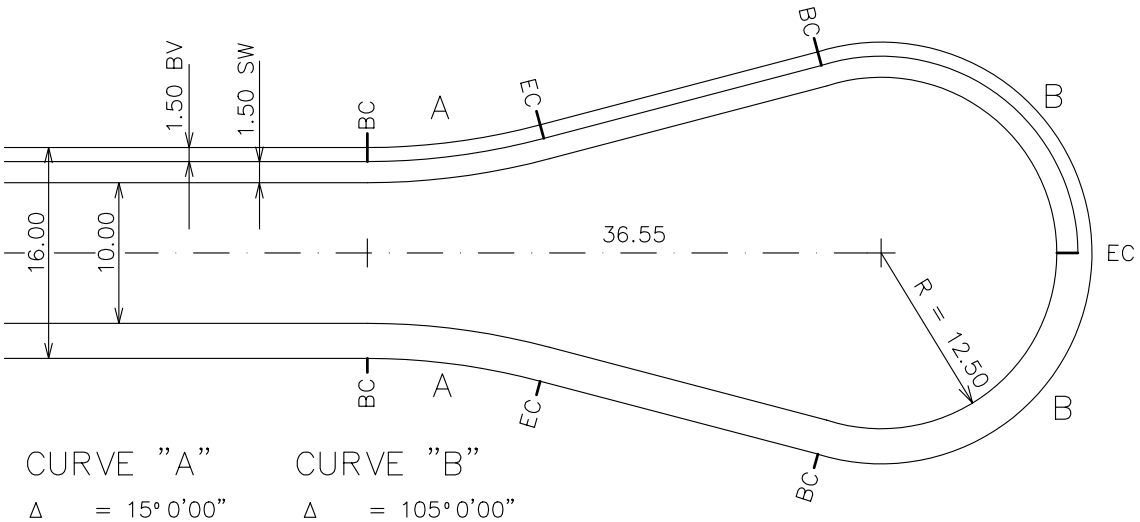
APPROVED BY:

DATE: JUNE/05

COLLECTOR AND LOCAL
ROADWAY CENTRE ISLAND

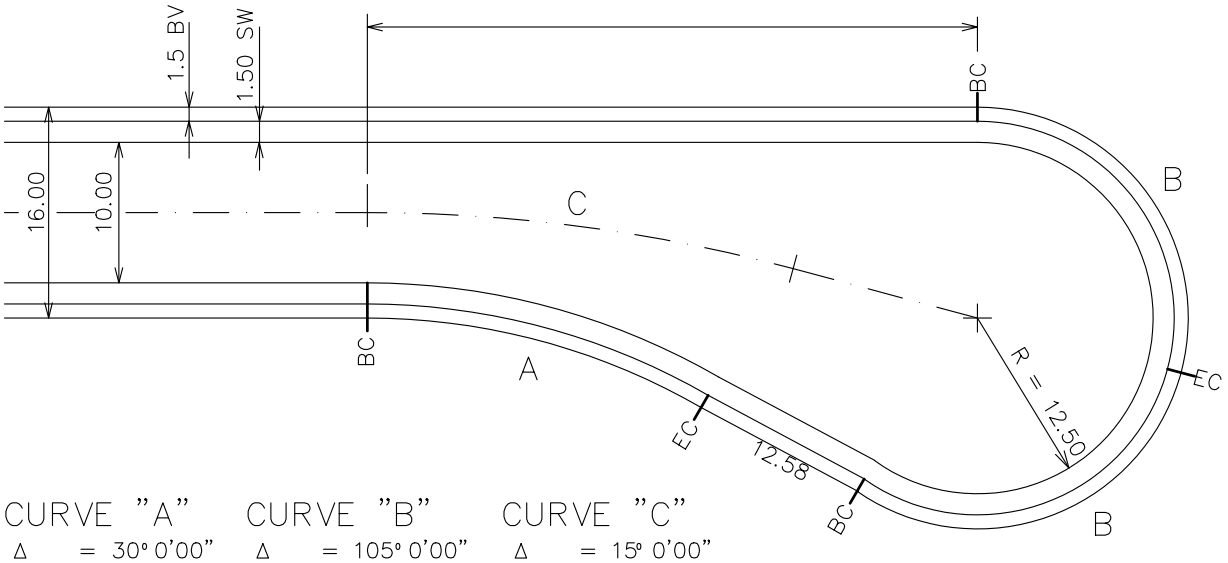
SCALE: N.T.S.

DRAWING NO. 5.25



CURVE "A"
Δ = 15° 0'00"
R = 50.00
(at property line)

CURVE "B"
Δ = 105° 0'00"
R = 15.50
(at property line)



CURVE "A"
Δ = 30° 0'00"
R = 50.00
(at property line)

CURVE "B"
Δ = 105° 0'00"
R = 15.5
(at property line)

CURVE "C"
Δ = 15° 0'00"

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.

DESIGN GUIDELINE DRAWINGS
Roadway Design

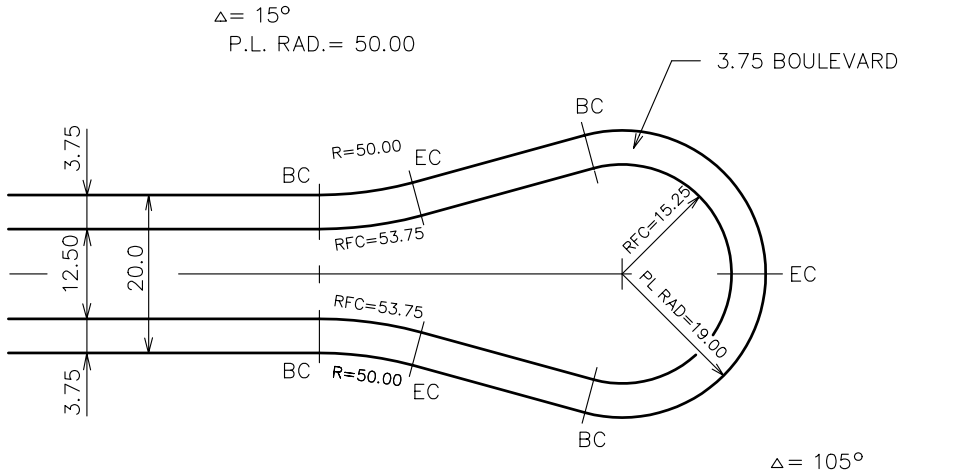
APPROVED BY:

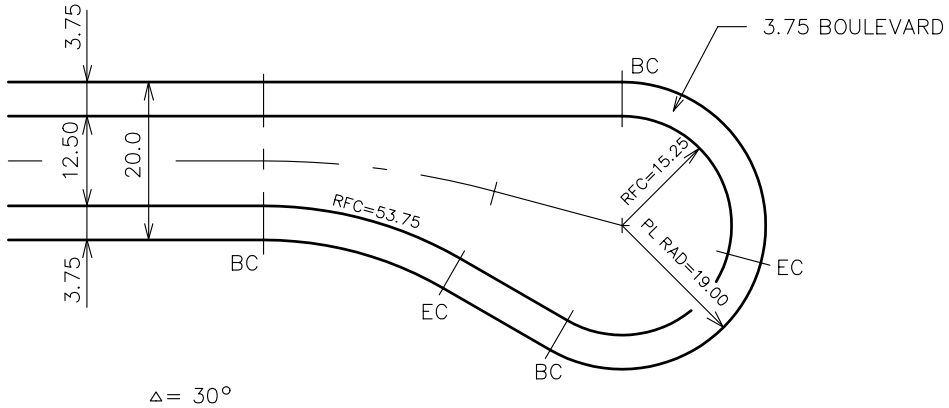
DATE: JUNE/05

16/10 URBAN LOCAL
RESIDENTIAL CUL-DE-SAC

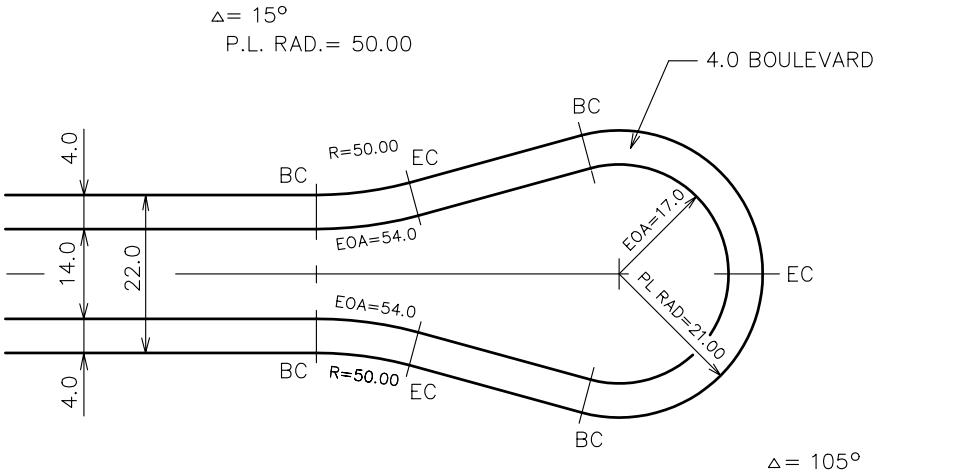
SCALE: N.T.S.

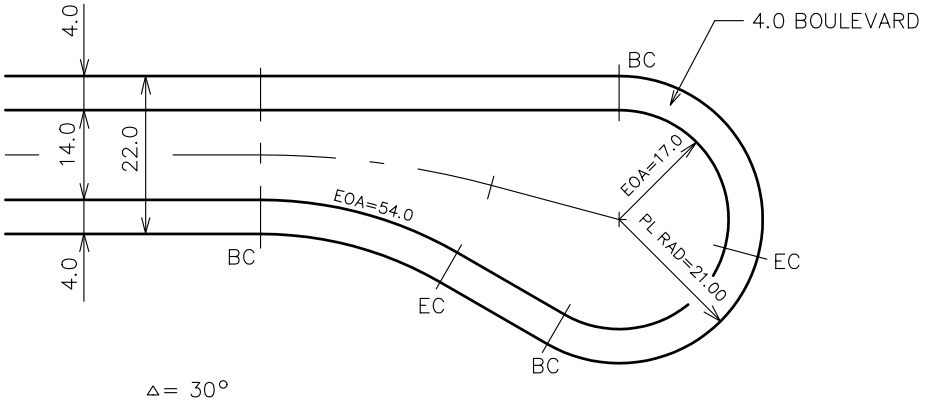
DRAWING NO. 5.27



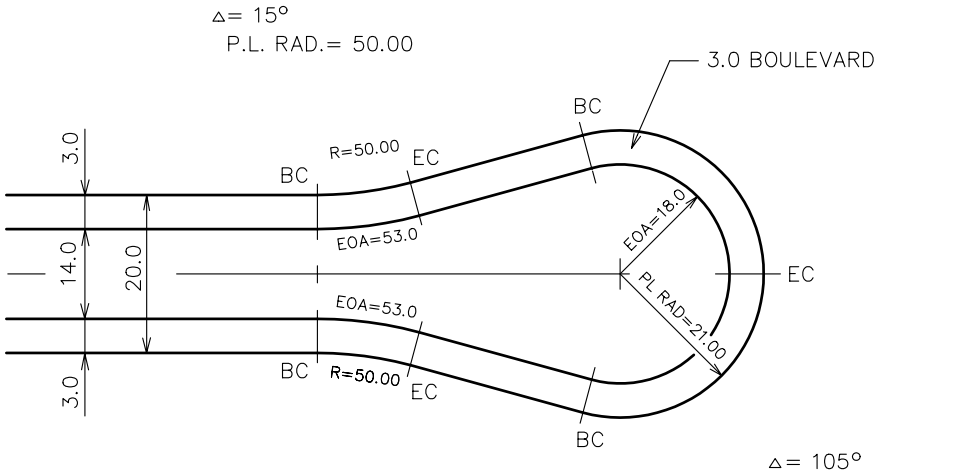


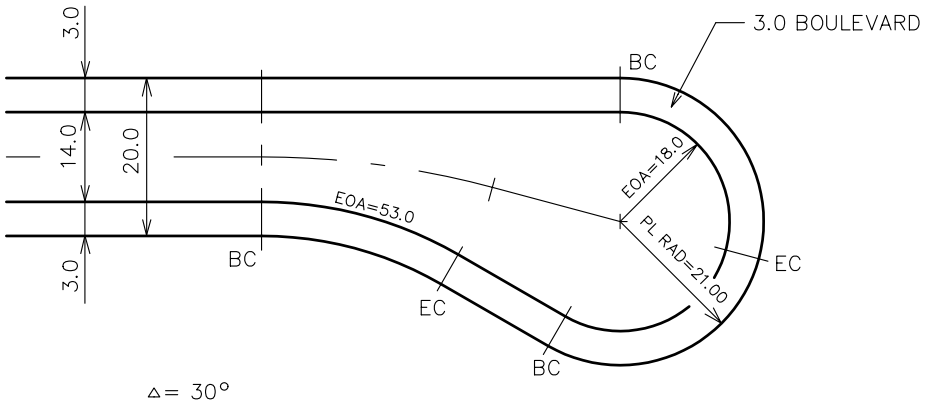
NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	20/12.5 URBAN LOCAL COMMERCIAL/INDUSTRIAL CUL-DE-SACS	DRAWING NO. 5.29
			SCALE: N.T.S.		





NO.	DATE	REVISION			
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	22/14 LOCAL RURAL COMMERCIAL/INDUSTRIAL CUL-DE-SACS	
			SCALE: N.T.S.		DRAWING NO. 5.30

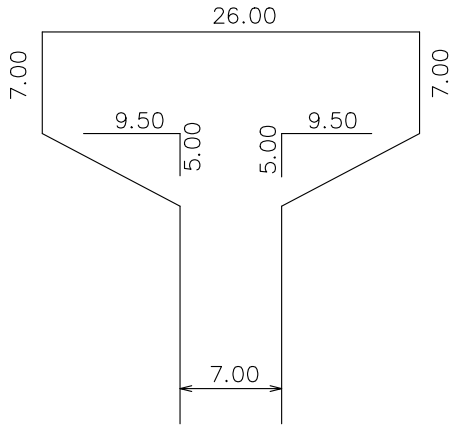




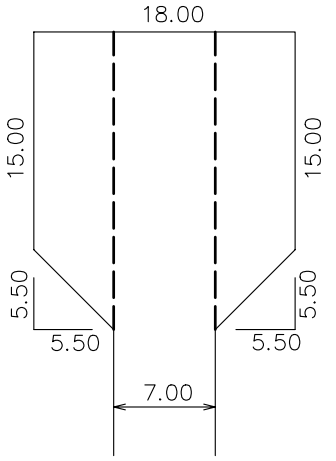
NO.	DATE	REVISION

RED DEER COUNTY

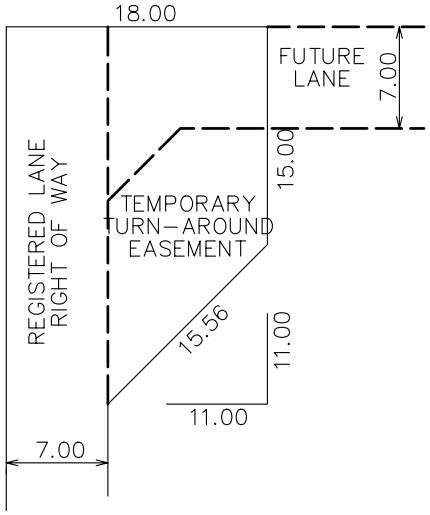
DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
DATE: JUNE/05	20/14 LOCAL RURAL RESIDENTIAL CUL-DE-SACS	
SCALE: N.T.S.		DRAWING NO. 5.31



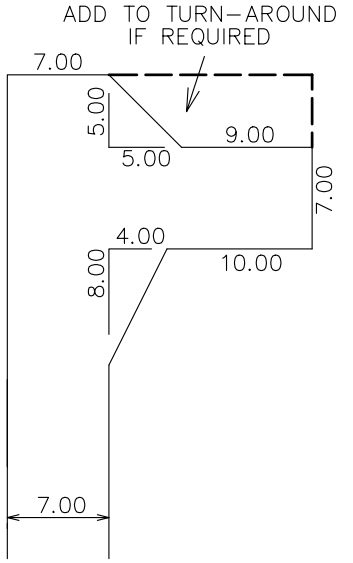
" T " TYPE



STANDARD TYPE

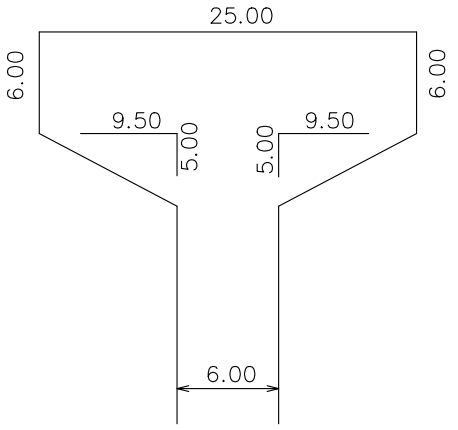


OFFSET TYPE

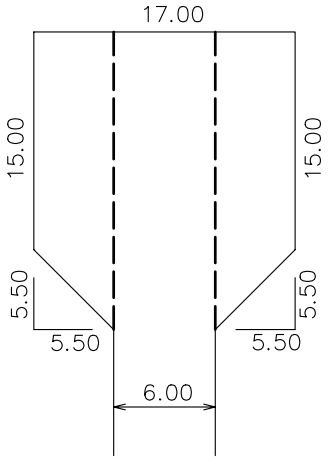


BRANCH TYPE

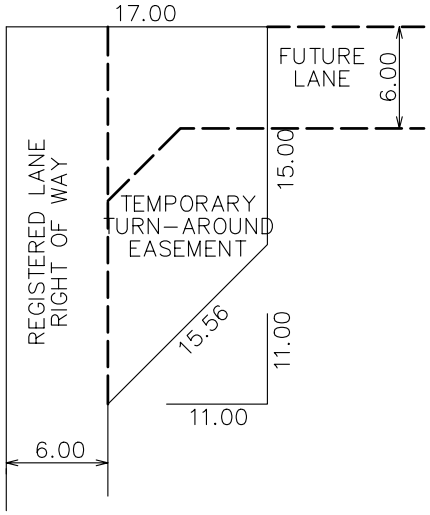
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	LANE TURN – AROUNDS REAR SERVICING	DRAWING NO. 5.34a
			SCALE: N.T.S.		
NO.	DATE	REVISION			



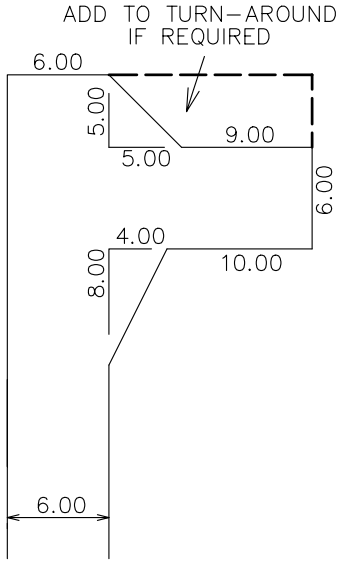
" T " TYPE



STANDARD TYPE

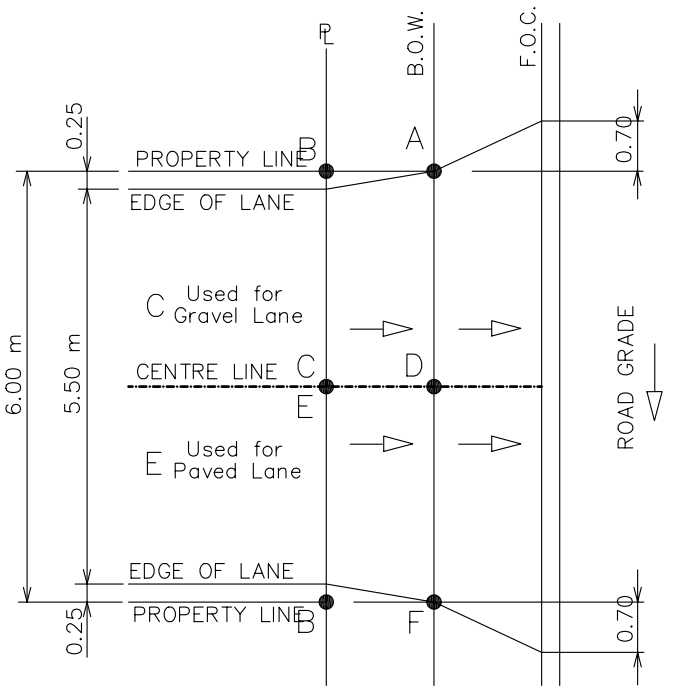


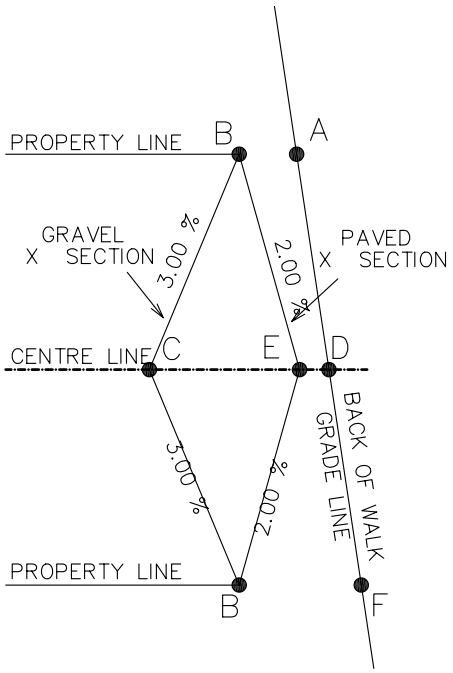
OFFSET TYPE

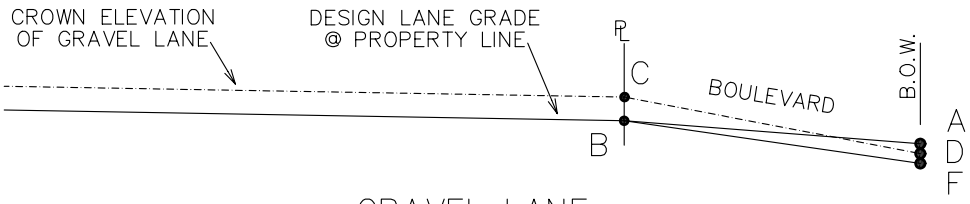


BRANCH TYPE

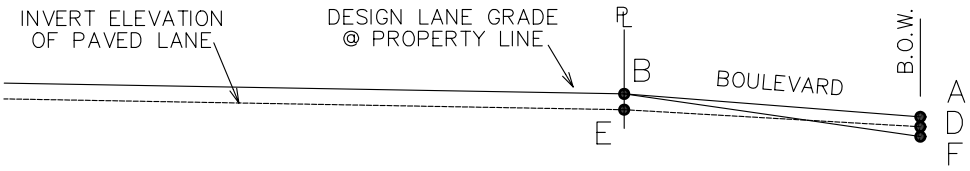
			RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	LANE TURN – AROUNDS FRONT SERVICING	DRAWING NO. 5.34b
			SCALE: N.T.S.		
NO.	DATE	REVISION			







GRAVEL LANE



PAVED LANE

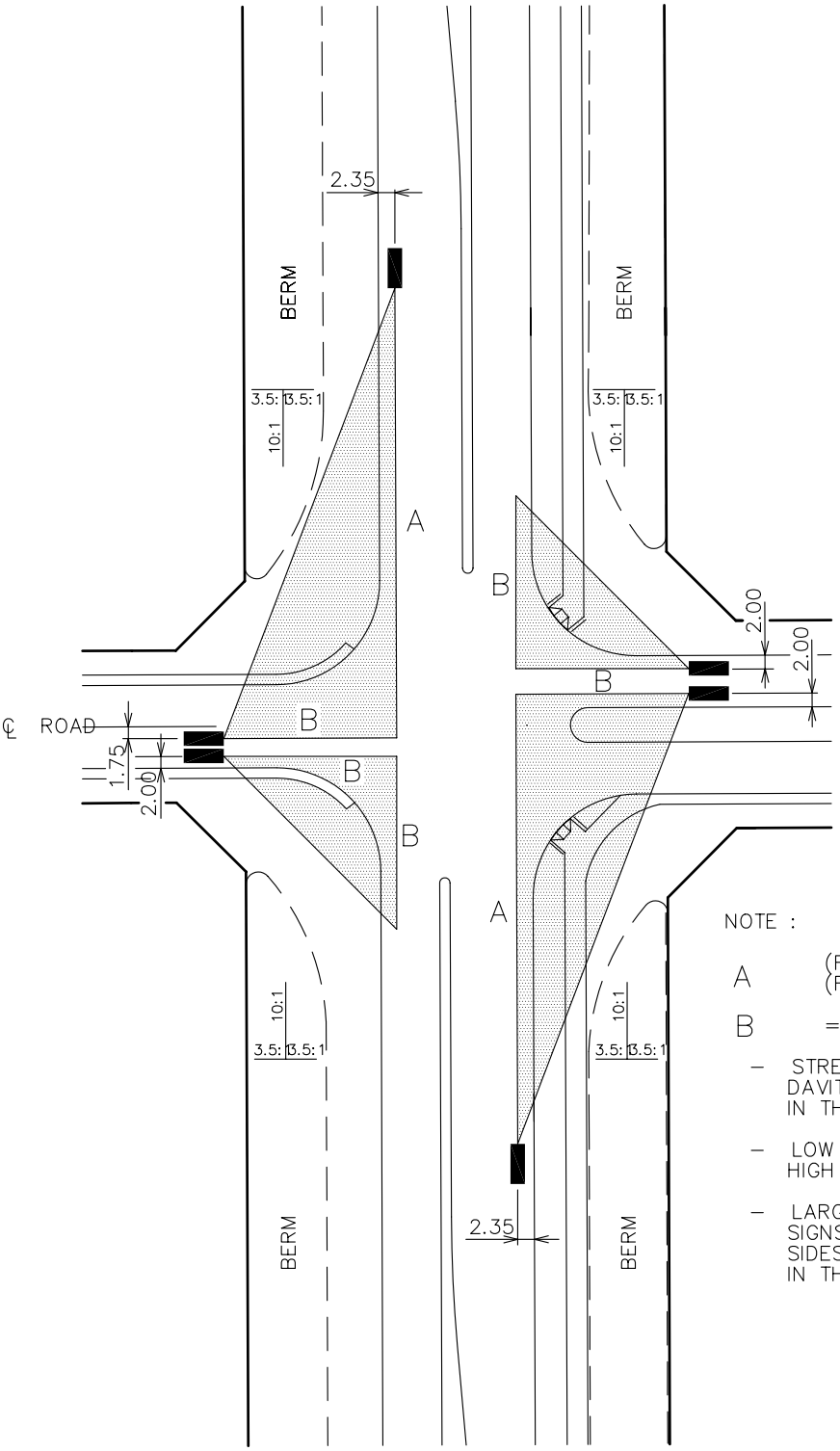
NOTE :

IF LANE ELEVATION (E) IS LOWER THAN BACK OF WALK ELEVATION (D), A DEPRESSED CROSSING AS PER CONTRACT SPECIFICATION DWG. 6.11 MAY BE REQUIRED FOR DRAINAGE.

NO.	DATE	REVISION

RED DEER COUNTY

DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
DATE: JUNE/05	LANE GRADE CALCULATIONS	DRAWING NO. 5.35
SCALE: N.T.S.		



NOTE :

A (FOR 70 KM/HR) = 60 METERS
(FOR 80 KM/HR) = 65 METERS

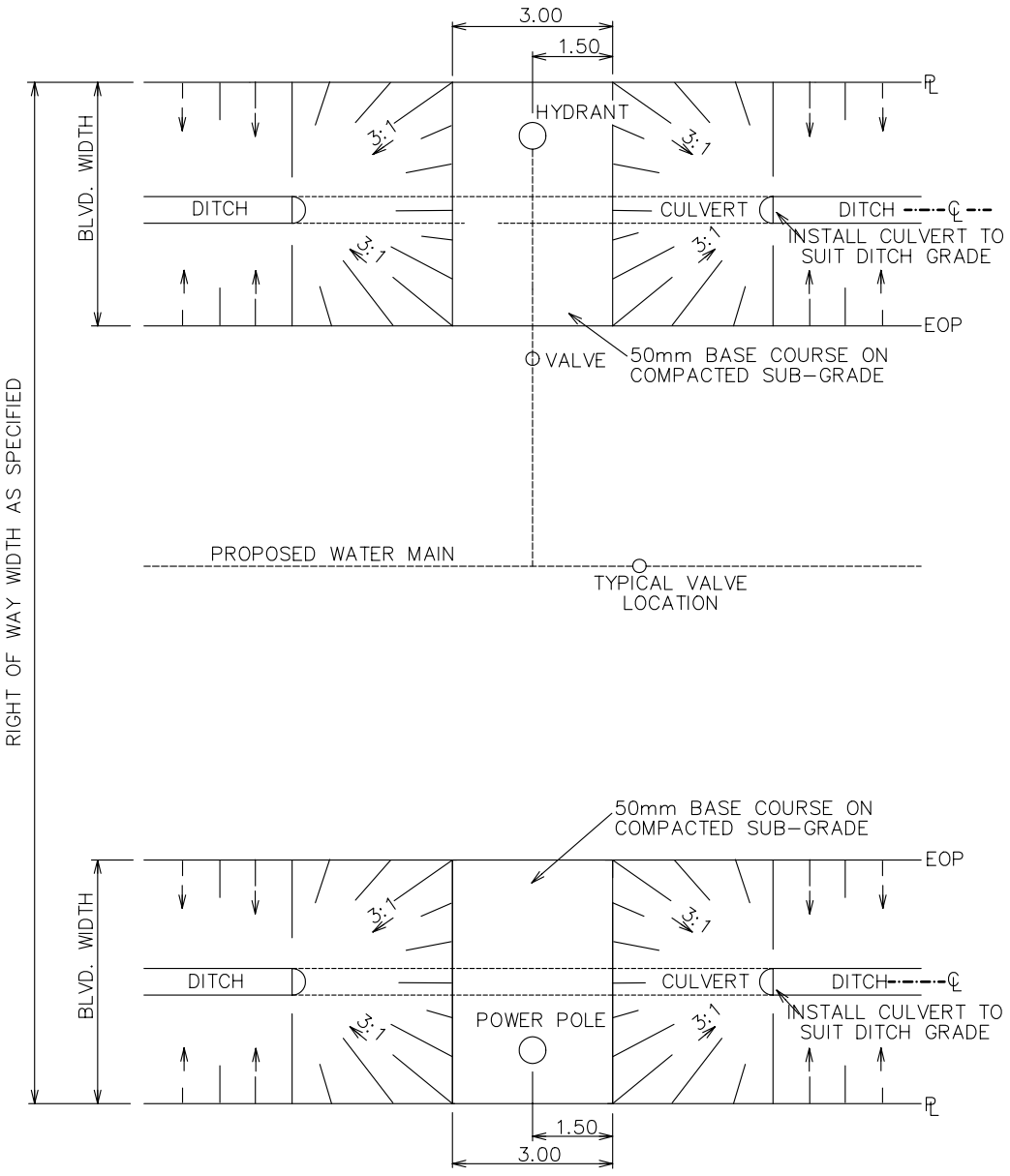
B = 25 METERS

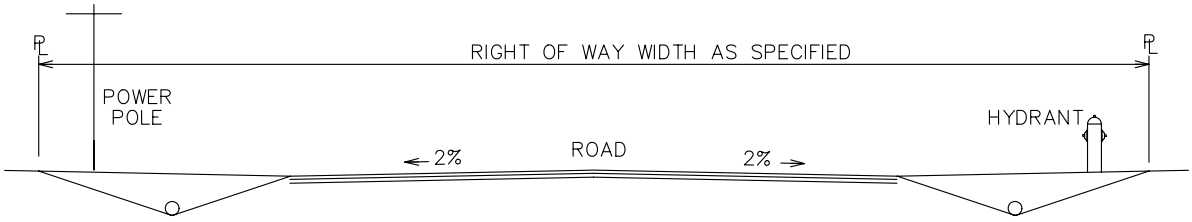
- STREETLIGHT POLES, POWER POLES, TRAFFIC DAVITS & TRAFFIC SIGNS WILL BE PERMITTED IN THE VISIBLITY TRIANGLE.
- LOW GROWING SHRUBS LESS THAN 1.00 METER HIGH WILL BE PERMITTED
- LARGE TREES (DECIDUOUS & CONIFEROUS), SIGNS, TRAFFIC CONTROL CABINETS, BERM SIDESLOPES, ETC. WILL NOT BE PERMITTED IN THE VISIBILITY TRIANGLE.

NO.	DATE	REVISION

RED DEER COUNTY

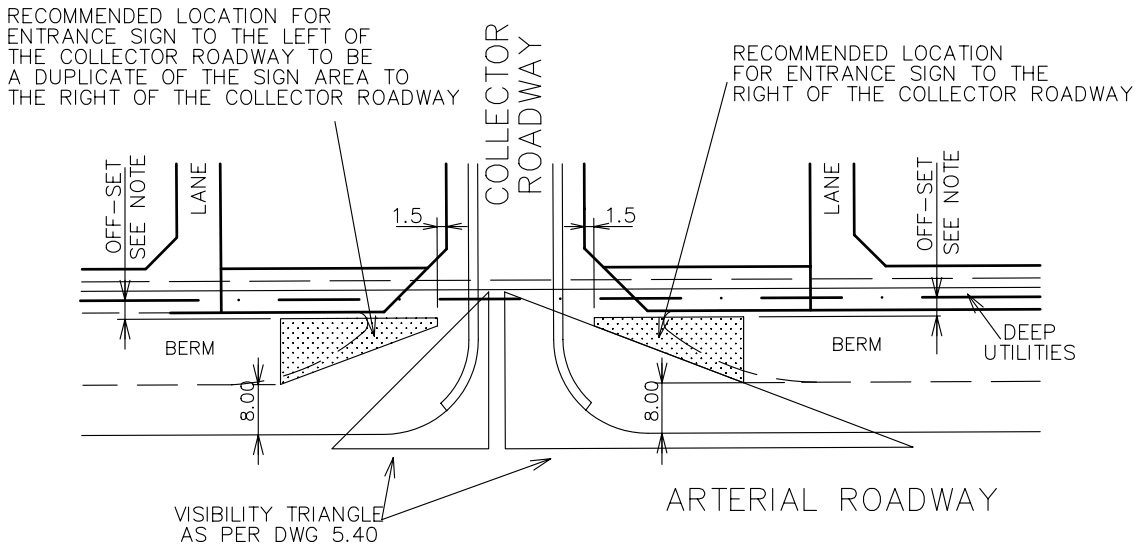
DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
DATE: JUNE/05	ARTERIAL ROADWAY VISIBILITY TRIANGLE	
SCALE: N.T.S.		DRAWING NO. 5.40



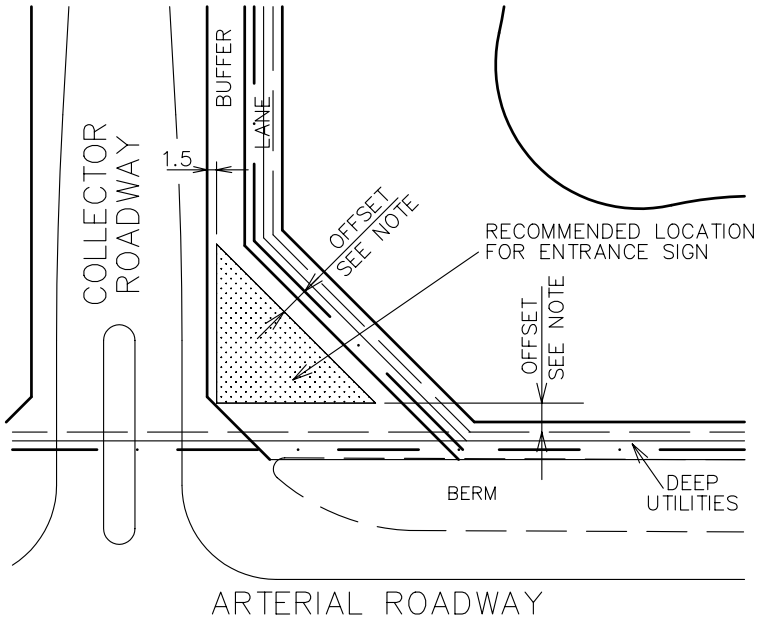


CROSS – SECTION

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Roadway Design	APPROVED BY:
			DATE: JUNE/05	RURAL CROSS SECTION HYDRANT AND POWER POLE ACCESS	
			SCALE: N.T.S.		DRAWING NO. 5.41



OPTION 1



OPTION 2

NOTE :

– OFFSET NOT TO BE LESS THAN 1:1 SEPARATION FROM THE INVERT OF THE NEAREST UTILITY MAIN TO GROUND ELEVATION, OR A MINIMUM OF 3.0m FROM NEAREST DEEP UTILITY.

NO.	DATE	REVISION	RED DEER COUNTY		
			DRAWN BY: N.M.	DESIGN GUIDELINE DRAWINGS Signage and Pavement Markings	APPROVED BY:
			DATE: JUNE/05	SUBDIVISION ENTRANCE SIGN LOCATIONS	DRAWING NO. 6.04
			SCALE: N.T.S.		

Appendix

Red Deer County

SUBDIVISION DEVELOPMENT AGREEMENT

TABLE OF CONTENTS

SUBDIVISION DEVELOPMENT AGREEMENT

This Agreement entered into between:

RED DEER COUNTY
A Municipal Corporation in the Province of Alberta
(herein referred to as "the County")

-and-

An Alberta Corporation
(herein referred to as "the Developer")

WHEREAS the Developer is the registered owner of lands in the Province of Alberta described in Schedule "A" (hereinafter referred to as the “Lands");

AND WHEREAS the Developer wishes to subdivide that portion of the Lands outlined on the plan attached hereto and marked Schedule “B”, (hereinafter referred to as the “Subdivision Lands");

AND WHEREAS the Developer has received 2nd reading to a request to rezone the Subdivision Lands in accordance with the County Land Use Bylaw in support of a proposed subdivision;

AND WHEREAS the County requires this Agreement be signed and certain assurances provided prior to 3rd reading of the Bylaw changing the land use district or issuing a conditional approval for subdivision of the Subdivision Lands or issuing of a development permit for the Subdivision Lands or endorsing a Plan of Subdivision;

AND WHEREAS at such time as the Developer receives conditional subdivision approval pursuant to a decision of the County, a copy of the approval shall be attached hereto marked as Schedule "C" and shall form part of this Agreement;

AND WHEREAS this Agreement shall not take effect until such time as the Subdivision Lands are properly designated and the subject of a conditional subdivision approval for the intended use in accordance with the County Land Use Bylaw;

NOW THEREFORE in consideration of the terms and covenants herein contained and other good and valuable consideration hereinafter set forth the parties mutually covenant and agree the one with the other as follows:

1. Definitions

In this Agreement:

1.1 **"Act"** shall mean *the Municipal Government Act*, R.S.A. 2000, c. M-26 and amendments and regulations thereto;

1.2 **"Building"** shall mean any structure, used or intended for supporting or sheltering any use or occupancy;

1.3 **"Commence Construction"** shall mean the initiation of clearing, grading, leveling, excavating or trenching of land for construction, installation or restoration of Improvements or the Development;

1.4 **"Construction Approval"** shall mean a document issued by the Development Officer authorizing the commencement of construction, placement or erection of an Improvement;

1.5 **"Construction Completion Certificate"** shall mean a Certificate in either of the forms attached hereto and marked as Schedule "D" signed by the Director of Operations;

1.6 **"Consulting Engineer"** shall mean a licensed member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta, retained by and at the expense of the Developer, to provide professional assurance of compliance with this agreement for the benefit of the County, and who has designed the Improvements and/or is supervising the installation of the Improvements as required by this Agreement ;

1.7 **"Developable Area"** means the minimum area required to ensure that there is adequate space for a building site, water well, sewage system, required setback distances as set out in the Land Use Bylaw and any setback distance recommended in any geotechnical investigation the County may require for the Subdivision Lands. The developable area shall be a contiguous area that is not less than 0.4 hectares in size, unless a smaller size has been approved.

1.8 **"Development"** shall mean an excavation or stockpile and the creation of either of them; or a building or an addition to, or replacement or repair of a building and the construction or placing in, on, over or under land or any of them; or a change of use of land or Building or an act done in relation to land or a Building that results in, or is likely to result in a change in the use of the land or Building; or a change in the intensity of use of land or Building or an act done in relation to land or a Building that results in or is likely to result in a change in the intensity of use of the land or a Building, and includes signs and advertising structures;

1.9 **"Development Officer"** shall mean any person appointed as a development officer pursuant to the County's Land Use Bylaw;

1.10 **"Development Permit"** shall mean a document issued by the Development Officer authorizing a development pursuant to the County's Land Use By-Law;

1.11 **"Director of Operations"** shall mean a person appointed as the Director of Operations by the County;

1.111.12 **Final Acceptance Certificate"** shall mean a final Certificate in either of the forms attached hereto and marked as Schedule "E", signed by the Director of Operations;

1.121.13 **Improvements"** shall mean and include all improvements to be constructed and developed within, upon or under the Subdivision Lands and outside the Subdivision Lands, as set forth in the Plans and shall include stripping and grading of lands, construction of roads and lanes, installation of water, storm sewer and sanitary sewer, natural gas, electric power, street lights and other utilities;

1.131.14 **Inspection Authority"** shall mean the agency responsible for the enforcement of standards and regulations established by any relevant authority and those matters to be dealt with shall include:

1.13.11.14.1 W
ater, including ground water evaluation, percolation testing and potability testing to comply with Alberta Environment standards or guidelines, as the case may be, and approved by Alberta Environment and/or the County;

1.13.21.14.2 P

ercolation and sewage disposal, storm water management and site drainage, to comply with Alberta Environment standards or guidelines, as the case may be and approved by Alberta Environment and/or the County;

1.13.31.14.3 P lumbing systems to be designed and constructed to the requirements of the *Safety Codes Act*;

1.13.41.14.4 R oads to be designed and constructed to the specifications of the County and/or Alberta Transportation, where necessary, and approved by Alberta Transportation and/or the Director of Operations;

1.13.51.14.5 B uilding elevations, landscaping, site grading and levelling of the site; to be approved by the Development Officer;

1.141.15 **"Maintenance Period"** as applied to Improvements shall mean a period of two (2) years commencing the date specified by the Director of Operations on the Construction Completion Certificate as the date for the commencement of the maintenance period;

1.15 **"Director of Operations"** shall mean a person appointed as the Director of Operations by the County;

1.16 **"Plans"** shall mean the plans, detailed design drawings and specifications, materials lists and performance criteria for the Improvements approved by the County, covering the design, construction, and installation of the Improvements, shall address geotechnical and environmental issues in construction of the Improvements and include:

1.16.1 The tentative plan of subdivision submitted to and approved by the Subdivision Approving Authority, including any requirement by the Developer for staging of the development, as approved by the County;

1.16.2 The engineered storm water management plan and site grading plan which shall contain any other requirements specified by the County including geotechnical limitations (if any) of the Subdivision Lands or any specific lot;

1.16.3 The plans outlining the placement of the various utilities to be placed within, upon or under the Lands, including but not limited to sewer, water, power and gas, with the approval of the County and the required utility companies endorsed thereon;

1.16.4 The plan outlining the developable area available on each proposed lot. The lands deemed as developable shall generally include, without limiting other requirements, areas that lay a minimum of 2 metres above the ground water table, unless the Developer can satisfactorily fill the lands and achieve the necessary water table clearance. Any such work will require prior approval of the County.

1.16.5 The plans outlining the engineered design of interior roads and exterior roads servicing the Subdivision Lands, to be constructed and/or improved by the Developer as well as the location of all accesses and approaches to and from the Subdivision Lands and each of the lots situated therein as approved by the County. Access to all subdivision lots shall be from the internal subdivision road. No direct access will be permitted to any subdivision lot from any external County or Provincial road unless specifically consented to in writing by the County. All roads, accesses and approaches shall be constructed to the specifications and standards of the County and/or Alberta Transportation;

1.16.6 The plans prepared by a landscape design professional outlining any landscaping required on any public or private lands within or outside the Subdivision Lands, including provisions for the restoration, hydro seeding and landscaping of any disturbed area within the Subdivision Lands to prevent erosion, as approved by the County.

1.16.7 Other documents required by the County including but not limited to:

1.16.7.1 A detailed geotechnical investigation prepared by a consulting engineer addressing slope stability, such investigation to be carried

out to the guidelines and specifications of Alberta Environment Protection;

1.16.7.2 A detailed flood plain investigation prepared by a consulting engineer and providing evidence that the development is outside the 1:100 year flood plain;

1.16.7.3 A noise and other traffic-related impact study to determine what impact, if any, vehicular and/or railway traffic and noise generating land uses within the area would have on residents of the Subdivision Lands such study to recommend what means and methods might be necessary to mitigate any potential problems;

1.16.7.4 Other plans and documents as specified in Schedule "F" hereto, including but not limited to landscaping plans, utility rights of way, servicing plans, easements, etc.

1.17 **"Utilities"** shall include sanitary sewer, water, storm drainage, power, gas, telephone and street lights.

1.18 **In this Agreement, where the words "and/or" appear, they shall mean either or both, the determination of which shall be at the sole discretion of the County.**

2. Requirements Prior to Conditional Subdivision Approval

The Developer at its sole cost and expense shall cause one or more plans of subdivision for the Subdivision Lands to be prepared and approved by the subdivision authority of the County. No Development or work related to the construction and installation of Improvements shall be undertaken by the Developer unless and until:

2.1 conditional subdivision approval has been obtained, and
2.2 a Development Permit has been issued by the County, and
2.3 Construction Approval has been issued by the Development Officer, and
2.4 this Agreement has been signed by all parties, or
2.5 as may otherwise be approved in writing by the County.

3. Requirements Prior to Issuance of Development Permit

Upon the execution of this Agreement and prior to applying for or having issued to it a Development Permit and in addition to all other fees to be paid and requirements to be met, as hereinafter provided the Developer shall deliver to the County:

Insurance

3.1 A policy, acceptable to the County, of comprehensive general liability insurance and property damage insurance applicable to all activities of the Developer in connection with this Agreement, including but not limited to, coverage for use of owned or non-owned vehicles, completed operations and blanket contractual liability. This protection shall include, but not be limited to, the Developer's contingent liability with respect to the activities of anyone, including contractors or subcontractors, or anything done or omitted to be done, pursuant to this Agreement. The Developer shall have the County added to such insurance coverage as an additional insured, but not as a named insured, for all liabilities arising from anything done or omitted to be done by the Developer in connection with this Agreement. The minimum amount of coverage shall be $2 million per occurrence for bodily injury, death, and damage to property, including loss of use thereof. The Developer shall not cancel nor change the insurance coverage without first giving the County 30 days prior written notice and shall ensure that the insurance coverage required shall remain in full force and effect until the Developer has complied with all obligations pursuant to this Agreement .

Plans

3.2 Three (3) copies of the Plans for review and approval by the County.

Estimates

3.3 Detailed construction schedules, including start and completion dates and cost estimates prepared by the Consulting Engineer for each of the Improvements to be constructed.

Securities

3.4 An Irrevocable Letter of Credit in a form acceptable to the County and in favour of the County in an amount equal to 100% of the total construction costs for constructing and installing the Improvements, based upon estimated construction costs provided by the Consulting Engineer and approved by the County. The Irrevocable Letter of Credit shall act as security for the performance of the covenants and obligations of the Developer as set forth in this Agreement, and shall not expire or be withdrawn before the issuance of a Final Acceptance Certificate, or upon the expiration of any maintenance or other period which may be set by the County, or upon the expiration of the time specified in any undertaking granted by the Developer pursuant to the provisions of this Agreement. The irrevocable Letter of Credit provided as security by the Developer shall contain a covenant by the issuer that if the issuer has not received a release from the County sixty (60) days prior to the expiry date of the Letter of Credit, then the Letter of Credit shall automatically be renewed.

Fees

3.5 The sum of Four Thousand Dollars ($4,000.00), representing payment towards the County's incurred and projected engineering and legal costs. The Parties hereto agree that any engineering or legal costs to the County over the amount of Four Thousand Dollars ($4,000.00) shall be charged to and payable by the Developer.

3.6 The sum of Two Thousand Dollars ($2,000.00) for each of the subdivided lots within the Subdivision Lands, excluding reserves, (such total amount as indicated in Schedule “C”) as a contribution towards the additional costs to be incurred by the County to provide and maintain service to the Subdivision Lands.

Consents

3.7 The required consents, in writing, from Alberta Environment, Alberta Transportation and any other agencies and authorities for the items referred to inrequired by this Agreement, including written confirmation from Canada Post respecting the postal service arrangements for the Subdivision Lands. The provision of any mail receptacle equipment shall be approved by Canada Post and the County.

Registration

3.8 Proof of registration upon the title to all the Lands and copies of those Easements or Utility Rights of Way acceptable and satisfactory to the County, respecting the construction, installation, operation, repair, maintenance and replacement of all Utilities and appurtenances required to serve the Development, the form and content of such Easements or Utility Rights of Way to have been approved in writing by the County prior to registration.

Municipal Reserves

3.9 Either tThe sum set out in Schedule “C” representing ten (10%) per cent of the appraised fair market value of the Subdivision Lands, as stipulated in the Act, in lieu of dedicatingor the dedication of ten (10%) per cent of the Subdivision Lands for Municipal Reserves or a combination of the two as set out in Schedule “C”.

Transportation and Off-Site Levies

3.10 The sum required as the Developer's share of Improvements to the existing road system which will be necessary to accommodate the increased traffic resulting from the development of the Subdivision Lands. In this regard, the Developer shall be responsible for those costs of those improvements set out in Schedule "C".

The amount to be paid by the Developer as its share of the costs of improvements shall be based on the total gross area, as stipulated by the County and indicated in Schedule "C".

4. Plans to be Approved Prior to Construction Approval

All Plans and construction timetables require approval by the Development Officer, at the sole cost and expense of the Developer, before Construction Approval will be issued and delivered. No Development or work related to the construction and installation of Improvements shall be undertaken by the Developer unless and until Construction Approval has been obtained or as may otherwise be approved in writing by the County.

Notwithstanding the approval of the County, the developer has the sole responsibility for and remains responsible for the design, construction and maintenance of the Improvements in accord with the provisions of this Agreement, and for the purposes of the *Occupations Health & Safety Act*, RSA 2000 c. O-2, is the prime contractor for the Subdivision Lands and those lands outside the Subdivision Lands affected by this Agreement.

5. Timing to Issue Construction Approval

When the Development Officer has approved the Plans and all of the consents from the appropriate inspection authorities for the items referred to in this Agreement have been obtained, Construction Approval may be issued. If the Development Officer does not approve the Plans within thirty (30) days from the date of submission the Developer may then appeal within fifteen (15) days to the Council of the County, whose decision shall be final and binding. Once approved, the Plans shall not be altered or amended without the written consent of the County.

6. Rights of Way Required

The Plans, as approved by the County, shall designate rights-of-way adequate to the needs of the Developer, the County, and utility companies, for the construction and supply of all Improvements and services to the Lands, including Utilities, and shall be of a width and in such locations as required by the County, acting reasonably.

7. Plan Revisions

It is understood and agreed that the County's approval of the Plans for the Improvements shall be in principle only, and in the case of unforeseen conditions which may adversely affect the Development, the Plans or detailed design specifications for any of the Improvements shall be subject to review and revision, from time to time, by the County, acting reasonably, in accordance with the Specifications attached hereto as Schedule "I" and in accordance with accepted engineering and construction practices.

8. Compliance with Time Limits

The Developer shall comply with all time limits and complete all phases of the Developer's work within the dates specified in the approved construction timetable in Schedule "G" attached hereto.

9. Notice Required to Commence Construction

The Developer shall give the Development Officer forty-eight (48) hours prior written notice of intention to commence construction of each phase or type of Improvement authorized by this Agreement and by the Construction Approval.

9.1 Except as otherwise specified in the construction timetable approved under this Agreement, the Developer shall, on or before 90 days from the date of this Agreement, commence construction and installation of the Improvements at the Developer's own cost and expense and in a good and workmanlike manner, in strict conformance with the Plans and proper and accepted engineering and construction practices, including the County's specifications and standards, in accordance with the requirements of this Agreement, and in accordance with the requirements of law applicable to the work;

9.2 If the Developer fails to commence and complete construction as required, the County shall be entitled to terminate this Agreement and revoke any Construction Approval for all purposes by giving notice of termination in writing to the Developer.

10. Completion Date

10.1 Subject to the provisions of this Agreement, the Improvements shall be constructed and completed in accordance with the terms of this Agreement within one (1) year from the date the Construction Approval has been issued by the County or such other date as may be agreed to in writing by the County, and in accordance with the specifications set forth in Schedule "B" attached hereto and forming part of this Agreement.

10.2 The Developer shall cause all work to be conducted diligently, with reasonable dispatch, in a workmanlike manner, according to the requirements and specifications of this Agreement and of the County and so as to not cause more inconvenience to other residents of the County than is necessary in the circumstances.

10.3 The Developer, its agents and contractors shall do as little damage as possible in the construction of the Improvements and shall cause as little obstruction as possible to the movement of traffic and other works within the County during the progress of the work under this Agreement , and at all times shall restore the streets, highways, avenues, lanes, public areas, and privately owned lands and improvements to a state of repair as nearly as possible equal to their state of repair existing at the commencement of construction, and shall be responsible for any maintenance to the Improvements during the construction of the Improvements and until a Construction Completion Certificate is issued for the Improvements.

11. Utilities and Connection Charges

The Developer agrees to be solely responsible for any and all costs associated with the connection of any of the Improvements to existing services or utilities, including without limiting the generality of the foregoing, sanitary and storm sewer lines, roads, water lines, natural gas or electric transmission or distribution lines, where so required.

12. Security

In any one or more of the following events:

12.1 the Director of Operations does not issue a Final Acceptance Certificate upon the expiration of the maintenance period; or

12.2 the Developer has failed to complete its undertakings pursuant to the provisions of Article 39 herein; or

12.3 the Developer has breached this Agreement; or
12.4 the Developer has breached any term or condition of the Construction Approval;

then and in that event:

12.5 the County may demand and receive payment of the full amount or such portions of the fund provided as security under the Irrevocable Letter of Credit the County deems necessary to rectify and remedy the breach; and/or
12.6 the County may revoke or suspend the Construction Approval.

13. Use of Letter of Credit

In addition to any other remedy the County may have available to it, the County may realize upon the Letter of Credit:

13.1 to the extent that the Developer is in default of the terms and conditions and covenants herein contained for the purposes of completing the construction and installation of all Improvements not then complete;
13.2 for the purposes of repairing, replacing or maintaining such Improvements as are herein required to be repaired, replaced or maintained by the Developer;
13.3 for payment of any money owing to the County; and
13.4 for payment of damages and extra costs incurred by the County.

14. Variance of Letter of Credit

Following issuance of a Construction Compliance Completion Certificate, the Letter of Credit may, at the discretion of the Development Officer, be reduced or varied, based upon the proportion of the installation of the Improvements which are required to be completed by the Developer; PROVIDED THAT:

14.1 the Letter of Credit shall be maintained in an amount sufficient and deemed necessary by the Director of Operations to ensure the proper installation of the remaining Improvements and any repair or replacement of or to the Improvements during the maintenance period, should the Developer fail to repair or replace the Improvements as may be required by the County; and
14.2 any reduction or variation of or to the Letter of Credit is approved in writing by the issuer of such security.

15. Restrictive Covenant

If required by the County, the Developer covenants and agrees to grant to the County a Restrictive Covenant, in the form and content set forth in Schedule "H" attached hereto, and to register the same simultaneously with the registration of the Plan of Subdivision upon the titles to the lots within the Subdivision Lands, free and clear of any previous encumbrances except those Easements or Rights of Way approved by the County.

16. Application for Construction Completion Certificate

When the Developer claims that all Improvements have been constructed and installed in accordance with the terms of this Agreement, free and clear of all Builder's Liens and encumbrances not permitted or accepted by the County, the Developer shall submit to the Development Officer three (3) copies of the Construction Completion Certificate duly signed by an appropriate Officer of the Developer and signed and sealed by the Consulting Engineer indicating that the Improvements have been constructed and completed in accordance with the terms of this Agreement and that all approvals from the required Inspection Authorities have been obtained.

The failure to provide such Construction Completion Certificate shall result in the withholding of a Final Acceptance Certificate. The Developer agrees, that until it completes its obligations and covenants as set forth herein, and until the Development Officer and Director of Operations, acting reasonably, determine that the terms of this Agreement and the Development Permit have been complied with, a Construction Completion Certificate will not be approved or issued.

17. Construction Completion Inspection

Within thirty (30) days from the date of receipt of the Construction Completion Certificate, (weather conditions permitting) the Director of Operations, or his agent, and Development Officer shall undertake an inspection of the Improvements. If the inspection shows to the satisfaction of the Director of Operations and Development Officer that all of the Improvements are completed and all requirements of this Development Agreement have been met the Director of Operations and the Development Officer shall sign the Construction Completion Certificate and shall indicate thereon the date when the Maintenance Period shall commence.

18. Deficiencies Apparent at Inspection

If defects or deficiencies are apparent to the Director of Operations or the Development Officer with respect to any of the Improvements or requirements of this Development Agreement, the Construction Completion Certificate may at the option of the Director of Operations or the Development Officer be returned to the Developer unsigned with a report of the defects and deficiencies listed and the Developer shall correct the defects and deficiencies within the time period specified by the Director of Operations or Development Officer and subsequently resubmit the Construction Completion Certificate, signed by the Developer and signed and sealed by the Engineer. Alternatively, the Director of Operations and the Development Officer may sign the Construction Completion Certificate subject to the correction or rectification of the listed defects and deficiencies by the Developer within the time period specified After the initial inspection, any additional inspections required by the County shall be at the sole cost and expense of the Developer, being Two Hundred Fifty Dollars ($250.00) for each additional inspection.

19. Developer Responsible for Repairs

Upon the issuance of a Construction Completion Certificate, the Developer shall be responsible for any and all repairs, replacements and maintenance to any Improvements which may become necessary from any cause whatsoever (except ordinary wear and tear and negligence by County employees, agents or sub-contractors engaged by the County directly in the use or operation thereof) up to the time of issuance by the Director of Operations and the Development Officer of a Final Acceptance Certificate, at which time the Developer's obligations and responsibilities for the ongoing maintenance and repair in relation to the Improvements shall cease.

20. Deficiencies that Appear After Inspection

If, prior to the issuance of a Final Acceptance Certificate, any defects become apparent in any of the Improvements installed or constructed pursuant to this Agreement or the terms of a Development Permit and the Director of Operations or the Development Officer specifies repairs or replacements to be done, the Developer shall within a reasonable time after notice cause such repairs or replacements to be done and if the Developer defaults, or any emergency exists, the County may do the repairs or replacements and recover the costs from the Developer including designating the costs due by the Developer to the County as outstanding taxes and levying and assessing those taxes against the Subdivision Lands.

21. Maintenance Obligations of the Developer

The Developer agrees and it is fully understood that before the issuance of a Final Acceptance Certificate, the County shall not be obliged or required to provide any part of the Subdivision Lands with any municipal services, including but not restricted to, road maintenance, which may become the County's duty to provide or perform after the issuance of a Final Acceptance Certificate except for services of fire and police protection, and until the issuance of a Final Acceptance Certificate all other services in respect to the Subdivision Lands shall be provided by the Developer at the Developer's sole cost and expense.

During the construction of the Improvements and during the Maintenance Period, any Improvement which by virtue of this Agreement is constructed or is subject to the direction, management, and control of the Developer or other work made or done therein or thereon by the Developer or by a person with the permission of the Developer shall be kept in a reasonable state of repair by the Developer and in default of the Developer keeping the same in repair, the Developer shall be liable for all damages sustained by the County and by any person or corporation by reason of such default and the Developer shall indemnity and save harmless the County against any claim for damages, expenses or costs arising therefrom and for which the County is held liable

22. Maintenance Agreement

Notwithstanding Article 21, the Director of Operations may, at the Developer's request, enter into an agreement with the Developer authorizing the County to provide routine maintenance services to the Subdivision Lands subsequent to the issuance of a Construction Completion Certificate, but prior to the issuance of a Final Acceptance Certificate. In all instances where an agreement has been made for the County to provide routine maintenance of the Subdivision Lands, the Developer will be required to pay all costs of such maintenance and administration costs. The Developer shall maintain all Improvements covered under this Development Agreement following construction until the Final Acceptance Certificate for that Improvement has been issued by the Director of Operations and the Development Officer. Maintenance, repairs, replacements, and adjustments for which the Developer shall be responsible include, but is not limited to the following:

22.1 Failure of or damage to any of the Improvements resulting from defective materials or improper installation;
22.2 water mains, hydrants, valves, and service lines;
22.3 sewer mains, sewer services, manholes, catch basins, catch basin leads, and frames and covers;
22.4 road and lane surfaces and access roads;
22.5 drainage course, swales, or ditches and repair of culverts.

If, during the Maintenance Period, any defects become apparent in any of the Improvements installed or constructed under this Agreement, and the Director of Operations or the Development Officer requires repairs or replacements to be done, the Developer shall, within a reasonable time after notice, cause such repairs and replacements to be done.

23. Control of Nuisance and Noise

The Developer shall take effective means to control dust, dirt, noise, or any other annoyance originating within the Development because of construction procedures, including building contractor activities, until the Final Acceptance Certificate for paved roads and gravel lanes has been issued. The Developer shall take effective remedial measures within 48 hours of notification from the Director of Operations or the Development Officer in regard to complaints of dust, dirt, noise, or other annoyance.

24. Failure to Control Nuisance and Noise

If the Developer fails to maintain any Improvement, or remedy any annoyance, nuisance or noise, or repair any deficiency or defect when given notice by the Director of Operations or the Development Officer within the time specified in the notice, the County, by its own forces or by the services of an independent contractor, may effect such maintenance or repairs at the expense of the Developer, and the Developer shall make payment of all such costs to the County on demand.

25. Extension of Maintenance Period

The Developer covenants and agrees that if the Director of Operations or the Development Officer, acting reasonably, is of the opinion that any repair or replacement of or to the Improvements, required during the maintenance period is of a major nature, the Director of Operations or the Development Officer may stipulate by written notice to the Developer of a further full maintenance period for the particular Improvement, or portion thereof, and such further maintenance period shall commence upon the Director of Operations and the Development Officer accepting the repair or replacement work as being completed.

26. Plan Registration

After the Developer has complied with the requirements of paragraph 2, 3, 4 & 6 of this Agreement and prior to the issuance of a Construction Completion Certificate, the Developer at its sole cost and expense shall cause a Plan of Subdivision for the Subdivision Lands to be prepared and approved by all necessary approving authorities and in accordance with the law in that respect.

Prior to endorsement of any plan of subdivision by the County, the Developer shall provide written confirmation from the appropriate utility companies that all necessary arrangements have been made for services to the Subdivision Lands for the supply and installation of underground power, natural gas, telephone and other utility services.

27. Grant of Easements

Concurrent with registration of a Plan of Subdivision, and prior to the sale of any lots within the Subdivision Lands covered by the Plan of Subdivision, the Developer shall grant to the County easements or grants of rights-of-way as required by, and in the form and content approved in writing by, the County and shall register or cause to be registered such easements or grants of rights-of-way contemporaneously with the registration of the Plan of Subdivision.

28. Content of Easement

All easements or grants of rights-of-way required by the County shall be submitted to the Development Officer for approval prior to registration and shall provide that the County shall have the right:

28.1 To assign all or any part of the rights thereby granted to operators of utilities; and
28.2 To grant permits or licenses to install, repair and replace gas, power, telephone lines and other utilities or services which may be advantageous and all drainage systems.

29. Proof of Registration

The Developer shall within one (1) month of registration of the Plan of Subdivision, and prior to the sale of any lots within the Subdivision Lands, provide to the County proof of the registration of all easements, rights-of-way and restrictive covenants required by the County.

30. Priority of Easements

The Developer agrees that this Agreement, and any easements, rights-of-way and restrictive covenants to be registered by the Developer upon the titles to the lots within the Subdivision Lands, pursuant to the terms of this Agreement shall have priority over other registrations against title to the Lands (excepting other easements) and that the Developer shall obtain and register postponements of all liens, charges and encumbrances in favour of the caveat respecting this Agreement and all easements, rights of way and restrictive covenants.

31. Plan to be Registered within One Year

In the event that the Developer has not registered the Plan of Subdivision in a Land Titles Office within twelve (12) months of the date of obtaining subdivision approval (conditional or otherwise), and which twelve-month period shall commence from the date subdivision approval is granted by the County or the date an appeal is adjudicated upon and a decision granted by the Subdivision and Development Appeal Board or the Court of Appeal of Alberta, as the case may be, or the appeal is discontinued, whichever event shall first occur, then the County shall be entitled to terminate this Agreement for all purposes by giving notice of termination in writing to the Developer.

32. Requirement to Cancel Registration of Plan

In the event that the said Plan of Subdivision has been registered by the Developer and the Developer fails to proceed with the construction and installation of the Improvements within the time limits herein specified the Developer shall, upon receiving written direction from the County to do so, immediately proceed to take all steps necessary to cancel the registration of said Plan of Subdivision, and further, the Developer, in all events, shall have obtained the cancellation of the registration of the Plan of Subdivision within three (3) months of the County providing written notice to the Developer as herein provided.

33. Development Permits for Lots Created By Subdivision

Any development permit issued for a lot created in the Subdivision Lands may be subject to a condition requiring a development agreement to be entered pursuant to s. 650 of the Municipal Government Act to require installation of utilities and roads necessary to serve the development on the said lot or such other conditions as are required to ensure such road and utilities are completed prior to construction of the development provided for in such development permit.

34. Application for Final Acceptance Certificate

Thirty (30) days prior to the expiration of the Maintenance Period specified in the Construction Completion Certificate the Developer shall, following a complete inspection of all of the Improvements, provide to the Development Officer three (3) copies of the Final Acceptance Certificate signed by the Developer and signed and sealed by the Consulting Engineer requesting an inspection of the Improvements.

35. Final Acceptance Certificate Inspection

Upon receipt of the Final Acceptance Certificate, the Director of Operations or his agent and the Development Officer shall make an inspection within thirty (30) days of the receipt thereof (provided always that weather conditions permit a proper inspection) and if the inspection shows to the satisfaction of the Director of Operations and the Development Officer that the Improvements are acceptable, the Director of Operations and the Development Officer shall sign and issue the Final Acceptance Certificate.

36. Deficiencies Apparent at Final Inspection

If defects or deficiencies are apparent in any of the Improvements the Final Acceptance Certificate will be returned to the Developer unsigned with a report of the defects and deficiencies listed and specifying the time within the deficiencies and defects shall be rectified by the Developer. Any additional inspections required by the County shall be at the sole cost and expense of the Developer, being Two Hundred Fifty Dollars ($250.00) for each additional inspection.

37. Withholding Final Acceptance Certificate

The Developer agrees, that until it completes its obligations and covenants as set forth herein, and until the Development Officer and Director of Operations, acting reasonably, determine that the terms of this Agreement and the Development Permit have been complied with, a Final Acceptance Certificate will not be approved or issued.

38. Repair and Reapplication

If any part of the Improvements being installed within, upon or under the Subdivision Lands do not comply with the Plans, or if such Improvements should not be operational, the Developer shall rectify the deficiencies and re-apply to the appropriate Inspection Authority for the required approval.

39. Minor Defects

Notwithstanding Article 38, where minor deficiencies exist in the Improvements which in the opinion of the Director of Operations and the Development Officer, acting reasonably, do not alter or detract materially from the Plans or specifications and which by reason of adverse conditions cannot be rectified immediately, a Final Acceptance Certificate may be granted, at the sole discretion of the Director of Operations and the Development Officer provided that the Developer:

39.1 accepts and agrees in writing to the list of deficiencies specified by the Director of Operations and the Development Officer; and

39.2 submits an undertaking in writing to rectify all such defects or deficiencies within six (6) months or such period of time as may be required by the Director of Operations and the Development Officer; and

39.3 The Developer posts Security, in the amount of a minimum of 2.5 times the Consulting Engineer's estimated cost of rectifying the deficiencies.

40. Matters Following Issue of Final Acceptance Certificate:

Upon the issuance of a Final Acceptance Certificate and upon the expiration of the time specified in any undertaking granted by the Developer pursuant to the provisions of this Agreement:

40.1 The Irrevocable Letter of Credit less any portion that has been forfeited and less any portion required to ensure that the deficiencies listed under Article 38 are remedied or completed, shall be returned to the Developer or notice shall be given to the Grantor of the Letter of Credit that such security is no longer required;

40.2 The County shall provide to the Developer a registrable discharge of the Caveat registered by the County on Lands, to be registered at the cost of the Developer; and

40.4 The Improvements shall become the property of and belong absolutely to the County without any cost or expense to the County.

41. Access to Records

The County shall have free and immediate access to all records of, or available to, the Developer and the Developer's Consultants relating to the performance of the work required by this Agreement, including but without limiting the generality of the foregoing, all design, inspection, material testing and "as constructed" records.

42. Inspections and Supervision

The County may at all times during the performance of the work, the Maintenance Period and any extension of time as may be required by Article 39:

42.1 Exercise such inspection of the performance of the work required by this Agreement as the County or its agents may deem necessary and advisable to ensure to the County the full and complete compliance with the terms of this Agreement and any Development Permit which may have been issued; and

42.2 Request and obtain, at the Developer's sole cost and expense, such written opinions and assurances from the Consulting Engineer as the County, in its sole discretion, deems necessary and appropriate.

42.3 Reject any unsatisfactory design, material or work;

42.4 Order that unsatisfactory work be re-executed or replaced at the Developer's cost;

42.5 Order the Developer to bring on the job and use additional labour, machinery, and equipment, at the Developer's cost, as the County shall deem necessary to ensure proper performance of the work;

42.6 Order the performance of the work be stopped until the County's Orders can be obeyed; and the Developer shall comply with the said Orders and requirements of the County.

43. Entry to Land and Testing

The Director of Operations, his agent and the Development Officer may enter upon the Lands or any right of way within the Subdivision Lands for the purpose of inspection and conducting any testing which any of them may deem necessary. Where any testing is required, the County shall give notice of such required testing to the Developer and the Developer will complete such testing within the period specified by the County. If the Developer fails to complete such testing as required or fails to provide the results thereof to the County within the time specified, then the County may conduct the testing and the Developer shall make payment in full to the County of all costs incurred in such testing.

44. As Built Drawings

Prior to issuance of a Final Acceptance Certificate, the Developer shall transcribe on a set of construction drawings the as-built information as they are actually measured in place after construction and deliver the same to the County. This information is to be submitted to the County using standard engineering symbols and format to the satisfaction of the Director of Operations and the Development Officer.

45. Comply with Approval

The Developer covenants and agrees that it shall comply fully with this Agreement and all conditions of any subdivision approval which may be imposed by the subdivision approving authority.

46. Subdivision Development Agreement Caveat

The Developer agrees the County may register a Caveat against the title to the Lands in respect of this Agreement. The Caveat shall remain registered until the issuance of Final Acceptance Certificate for each lot in the Subdivided Lands by the Director of Operations and the Development Officer and the County shall not be obliged to relinquish, postpone or discharge its Caveat in respect to the Lands, until issuance of such Final Acceptance Certificate(s).

47. Time of Essence

The County and the Developer each agree to do promptly all things necessary to carry out the true intent and meaning of this Agreement. Time shall be of the essence of this Agreement.

48. Improvements to be Operational Prior to Construction of Buildings

The Developer covenants and agrees that it shall plan and stage the work on the Lands so as to guarantee and ensure to the County that all Improvements will be installed and rendered operative in the Lands before any Buildings or facilities are constructed in the Lands, except as otherwise permitted in writing by the County.

49. Interest

The Developer covenants and agrees to pay to the County interest at the rate of Four (4) per cent above Community Credit Union Ltd.'s Prime Lending Rate, calculated monthly, such interest rate to be initially set on the first of the month following the date of the invoice sent to Developer from the County on any money due and owing by the Developer to the County pursuant to the terms of this Agreement, such interest to be payable from the first of the month following the date of the invoice sent to Developer from the County, until paid. "Prime Lending Rate" means the rate of interest established and announced by Community Credit Union Ltd. as being its prime rate for commercial demand loans made in Red Deer, Alberta and expressed as a percentage per annum, (the prime lending rate to be determined in the event of a dispute by letter from a manager or assistant manager of the main branch of Community Credit Union Ltd., in Red Deer, Alberta).

50. Appointment of Attorney

Notwithstanding anything to the contrary contained in this Agreement, the Developer irrevocably appoints the County as its Attorney in fact and in law for the purposes of making, in the County's sole discretion or opinion, all necessary or desirable applications, executing all necessary or advisable documents, and taking all further steps or actions required in order to obtain the cancellation of the registration of the said Plan of Subdivision in accordance with this Agreement.

51. Exercise of Power of Attorney

The Power of Attorney conferred upon the County by the Developer in this Agreement may be exercised by the County in the event that the Developer has not applied for the cancellation of the registration of the Plan of Subdivision within one (1) month of the County providing written notice to the Developer pursuant to this Agreement, or may be exercised in the event that the Developer has not obtained the cancellation of the registration of the Plan of Subdivision within three (3) months of the County providing written notice to the Developer pursuant to this Agreement.

52. Extension of Time Limits

Notwithstanding Article 47, the County in its sole discretion may extend the time limits specified in this Agreement but the County and the Developer agree that no act or omission on the part of the County, intentional or unintentional, shall constitute a waiver of the County's right to exercise the Power of Attorney conferred upon the County by the Developer pursuant to this Agreement.

53. Severable

The Developer and the County agree that all covenants, easements and restrictions contained in this Agreement shall be severable, and that should any covenant, easement or restriction in this Agreement be declared invalid or unenforceable, the remaining covenants, easements and restrictions shall not terminate.

54. Preamble and Schedules Confirmed

The parties hereby confirm and ratify the matters contained and referred to in the Preamble and the various Schedules to this Agreement and agree that the same are expressly incorporated into and form part of this Agreement.

55. Right of County to Perform Covenants

All covenants and agreements to be performed by the Developer under any of the terms of this Agreement will be performed by the Developer, at the Developer's sole cost and expense. If the Developer fails to perform any act on its part to be performed under this Agreement, and such failure continues for ten (10) days (or such other period that may be specified herein) after notice thereof has been given by the County to the Developer, the County may (but will not be obligated so to do) perform such act without waiving or releasing the Developer from any of its obligations relative thereof. All sums paid or costs incurred by the County in so performing such acts, together with interest thereon at the rate set out in Article 49 will be payable by the Developer to the County on demand.

56. Remedies Cumulative

No reference to nor exercise of any specific right or remedy by the County will prejudice or preclude the County from exercising or invoking any other remedy in respect thereof, whether allowed at law or expressly provided for in this Agreement. No such remedy will be exclusive or dependent upon any other such remedy, but the County may from time to time exercise any one or more of such remedies independently or in combination.

57. Payments to County

No payment by the Developer, or receipt by the County, of a lesser amount than the amount due under this Agreement will be deemed to be other than on account of the earliest amount due the County by the Developer, nor will any endorsement or statement on any cheque or any letter accompanying any cheque, or payment, be deemed an accord and satisfaction, and the County may accept such cheque or payment without prejudice to the County's right to recover the balance of such amount or pursue any other remedy available to the County.

58. Headings

The headings in this matter have been inserted for reference and as a matter of convenience only and in no way define, limit or enlarge the scope or meaning of this Agreement or any provision hereof.

59. No Waiver

No consent or waiver, express or implied, by either party to or of any breach or default by the other party in performance by the other party of its obligations hereunder shall be deemed or construed to be a consent or waiver to or of any other breach or default in the performance of

obligations hereunder by such party hereunder. Failure on the part of either party to complain of any act or failure to act of the other party or declare the other party in default, in respect of how long such failure continues, shall not constitute a waiver by such party of its rights hereunder.

60. Indemnity

The Developer shall indemnify and save harmless the County, its officers, employees, and agents from, of, and against:

any and all losses, costs, damages, actions, causes of action, suits, claims, costs, including solicitor and client costs, expenses, and demands arising out of or attributable to anything done or omitted to be done by the Developer in pursuance or purported pursuance of this Agreement; and

all claims, proceedings, demands, damages, actions, judgments of every nature or kind; including, without limiting the generality of the foregoing, all damages for personal injury or death arising out of or attributable to all actions or conduct of the Developer, its employees, agents, and contractors upon the Lands; including, but not limited to any work or act committed or omitted by the Developer in the performance of this Agreement.

61. Notices

Whenever under the provisions of this Agreement any notice, demand or request is required to be given by either party to the other, such notice, demand or request may be given by delivery by and to, or by registered mail sent to, the respective addresses of the parties set out on the signature page of this Agreement.

62. Force Majeure

In each instance where the Developer is delayed in completing the Improvements, or the remediation of defects and deficiencies as a result of:

62.1 An act or omission of the County or by anyone directly employed or engaged by the County, contrary to the provisions of this Agreement;
62.2 A stop-work Order issued by a Court or other public authority and providing such Order was not issued as a result of an act or fault of the Developer or anyone employed or engaged by it directly or indirectly;
62.3 Labour disputes, strikes, Lockouts, foul weather, unavoidable casualties, and without limiting any of the foregoing, by a cause beyond the Developer's control;

then the relative time period shall be extended for a reasonable time taking into consideration the reason for the delay.

63. Legal Fees

The Developer shall be responsible for and shall pay to the County all legal costs, fees, expenses and disbursements incurred by the County in the negotiation, preparation and execution of the within Agreement, and for all further legal costs, fees, expenses and disbursements incurred in advising regarding the preparation or performance of the within Agreement, and in monitoring, reviewing, enforcing and otherwise dealing with the Agreement or the Development or in any manner collateral thereto on a solicitor and own client basis.

The charges by the County's Solicitors shall be subject to taxation by the Developer on a Solicitor and own client basis as provided for in the Alberta Rules of Court.

64. Provincial Legislation

The Developer shall comply with all requirements of the *Worker's Compensation Act*, RSA 2000, Cc. W-15, together with any other legislation or law applicable to the Developer's activities.

65. Non-Assignability

This Agreement shall not be assigned by the Developer without the prior written approval of the County, which the County acting reasonably, shall be at liberty to withhold.

66. Enurement

This Agreement shall enure to the benefit of and be binding upon each of the Parties and their respective successors and, where permitted, its assigns.

RED DEER COUNTY

Per:_____
(Seal)

Address: 38106 Rge. Rd. 275, Red Deer County, Alberta T4S 2L9

An Alberta Corporation

Per:_____

(Seal)

Per:_____

Address:

INDEX TO SCHEDULES

SCHEDULE "A" Certificate of Title

Schedule "B"
Subdivision Plan
(detailed drawing)

SCHEDULE"C"
Conditional Subdivision Approval (to be attached when granted)

SCHEDULE "D" - Part I
CONSTRUCTION COMPLETION CERTIFICATE - (IMPROVEMENTS NOT APPROVED)

Pursuant to the provisions of a Subdivision Development Agreement (the "Agreement") dated the ____ day of _____, _____, and entered into between Red Deer County and _____ as the Developer, the undersigned hereby confirms that the following improvements have not been completed to the satisfaction of the Director of Operations and Development Officer namely:

1.

2.

3.

DATED at the City of Red Deer, in the Province of Alberta, this ___ day of _____, _____.

RED DEER COUNTY

Per: _____
Director of Operations

Per: _____
Development Officer

ACKNOWLEDGED this _____ day of _____, _____.

DEVELOPER

Per: _____

- and

_____
Consulting Engineer

SCHEDULE"D" – Part 2
CONSTRUCTION COMPLETION CERTIFICATE (IMPROVEMENTS APPROVED)

Pursuant to the provisions of a Subdivision Development Agreement ("the Agreement") dated the _____ day of _____, _____, and entered into between Red Deer County and - _____ as the Developer, the undersigned hereby confirms, subject to the correction or completion of the defects or deficiencies listed hereafter, that the following Improvements have been completed to the satisfaction of the Director of Operations and Development Officer and the Maintenance Period of two (2) years will commence on the ____ day of _____, _____, and terminate on the ____ day of _____, _____ namely:

SIGNS:

Traffic Control Signs _____
Street Signs _____

LANDSCAPING:

Backsloping _____
Seeding _____
Brush Removal _____
Internal On SiteLandscaping _____
Off Site Landscaping _____

ROADS:

Internal Road _____
External Road _____
Subgrade _____
Gravel _____
Approaches _____
Asphalt _____

UTILITIES:

Water _____
Sewer _____
Power _____
Gas _____
Level and Landscape _____

STORM WATER MANAGEMENT _____
On Site Storm Water Management _____
Off-Site Storm Water Management _____

OTHER:

_____
_____
_____
_____
_____

Subject to the correction or completion of the following defects or deficiencies on or before the _____ day of _____, _____, namely:

_____

_____
_____

DATED at the City of Red Deer, in the Province of Alberta, this ____ day of _____, _____.

_____
Director of Operations
Red Deer County

_____
Development Officer

ACKNOWLEDGED this ____ day of _____, _____.

COMPANY NAME

Per: _____

_____
Engineer

SCHEDULE"E"
FINAL ACCEPTANCE CERTIFICATE

RE: Subdivision File No.: _____
Legal: Lot _____Block _____Plan _____ Quarter Section _____
Subdivision Name:

Pursuant to the provisions of the Subdivision Development Agreement (the Agreement) dated the ____ day of _____, and entered into between the County, and _____, as the Developer, the undersigned hereby confirms that, subject to the minor deficiencies listed in Attachment "A" attached hereto, the Maintenance Period specified in the Construction Completion Certificate dated the ____ day of _____, _____, has expired and all Improvements to be constructed or installed by the Developer pursuant to the terms of the Agreement have been completed to the satisfaction of the undersigned.

DATED at the City of Red Deer, in the Province of Alberta this ____ day of _____, _____.

_____
Director of Operations
Red Deer County

_____

Development Officer

ATTACHMENT "A" to **Final Acceptance Certificate**

Pursuant to a Subdivision Development Agreement entered into between the County and _____ as the Developer the following is a list of minor deficiencies which shall be completed within a period of six (6) months from the date of the issuance of this certificate, namely:

DATED at the City of Red Deer, in the Province of Alberta, this ____ day of _____, _____.

_____
Director of Operations
Red Deer County

_____
Development Officer

THE UNDERSIGNED hereby undertakes and agrees to rectify the defects and deficiencies listed above, within the time period specified above.

DATED at the City of Red Deer, in the Province of Alberta, this ____ day of _____, _____.

COMPANY NAME

Per: _____

SCHEDULE "E"
FINAL ACCEPTANCE CERTIFICATE

RE: Subdivision File No.: _____
Legal: Lot _____Block _____Plan _____ Quarter Section _____
Subdivision Name: _____

Pursuant to the provisions of the Subdivision Development Agreement (the Agreement) dated the _____ day of _____, _____, and entered into between the County, and _____ as the Developer, the undersigned hereby confirms that the Maintenance Period specified in the Construction Completion Certificate dated the _____ day of _____, _____, has expired and all Improvements to be constructed or installed by the Developer pursuant to the terms of the Agreement have not been completed to the satisfaction of the undersigned. Following is a list of the defects and deficiencies which an inspection of the Improvements has revealed, namely:

Pursuant to the terms of the Agreement a Final Acceptance Certificate will not be issued until the defects and deficiencies listed aforesaid have been completed to the satisfaction of the Director of Operations and Development Officer which shall not be later than the ___ day of _____, _____, failing which the Letter of Credit or such portion thereof as County Council at its sole discretion deems necessary, will be forfeited pursuant to the terms of the Agreement to complete the obligations of the Developer.

DATED at the City of Red Deer, in the Province of Alberta, this ___ day of _____, _____.

_____
Director of Operations
Red Deer County

_____
Development Officer

ACKNOWLEDGED this _____ day of _____, _____.

COMPANY NAME

Per: _____

_____
Engineer

SCHEDULE "F"
OTHER PLANS & DOCUMENTS REQUIRED

UTILITY RIGHT OF WAY

THIS AGREEMENT made this _____ day of _____, 1999.

BETWEEN:

COMPANY NAME
(hereinafter called “the Grantor”)- and -

Red Deer County
a municipal corporation in the Province of Alberta,
(hereinafter called “the Grantee”)
WHEREAS the Grantor is the registered owner of an estate in fee simply of the following lands in the Province of Alberta, namely:

> Plan _____, Block ___, Lot ___,
> Excepting Thereout All Mines and Minerals
> containing _____ Hectares (_____ acres) more or less
> (hereinafter called “the Grantor’s Lands”);

and

> All that portion of the _____ Quarter of Section _____, Township ____, Range ____, West of the __th Meridian Described as follows:

WHEREAS the Grantor has agreed to grant a utility right of way or rights of way to the Grantee in accordance with the provisions herein contained.

NOW THEREFORE THIS AGREEMENT WITNESSETH that the parties hereto agree as follows:

1. In consideration of this Agreement and of the payment of the sum of $10.00 by the Grantee to the Grantor, the receipt of which sum is hereby acknowledged by the Grantor, the Grantor hereby grants, transfers and conveys unto the Grantee, its successors and assigns, and its servants, agents and contractors, the free and uninterrupted right, license, liberty, privilege, and right of way to enter upon and use that portion of the Grantor’s lands, namely:

Description
Excepting Thereout All Mines and minerals

for the construction, laying down, maintenance, operation, repair and if necessary, removal and reconstruction of ALL UTILITIES AND THEIR APPURTENANCES, through, under, along and across the Said Right of Way, and the Grantor further grants, transfers and conveys unto the Grantee, its successors and assigns, a free and uninterrupted right of way for ingress, egress and regress to the Right of Way for all purposes incidental to the grant.

2. The Grantor covenants and agrees that it will not place, erect, build, or cause, permit, or allow to the placed, erected, or built upon the Right of Way any building or structure whatsoever (excepting a

driveway, nor shall it plant or cause, permit or allow to be planted any tree which will in any way prevent or hinder the exercise of the rights herein granted to the Grantee.

3. The Grantee covenants and agrees that the Grantee, its servants, agents or workmen shall restore the Right of Way whenever so entered upon and used, to the same condition, as nearly as practicable, as the same was in before the entry and use thereof for the purposes aforesaid, and shall save harmless and keep indemnified the Grantor from and against all claims or demands made against it by any other person for any injury or damage resulting from or in any way arising out of the exercise of the Grantee by the rights herein granted.

4. The Grantor and Grantee agree that at all times, all utilities and appurtenances remain the property of the Grantee notwithstanding that the same may be annexed or affixed to the freehold and shall at any time and from time to time be removable in whole or in part by the Grantee, its successors and assigns.

5. This Agreement may be assigned in whole or in part as to all or any portion of the rights, licenses, liberties, privileges and rights of way hereby granted.

6. The right of way and this Agreement shall be of the same force and effect, to all intents and purposes, as a covenant running with the Grantor's lands, and these presents, including all the covenants and conditions herein contained, shall extend to, be binding upon, and enure to the benefit of the executors, administrators, successors and assigns of the Grantor and Grantee respectively.

IN WITNESS WHEREOF THE Grantor and Grantee have executed this Agreement this ____ day of _____, 20____

COMPANY NAME

Per: _____

Red Deer County

Per: _____

Per: _____

Easement for emergency access

CAVEAT

TO the Registrar of the North Alberta Land Registration District

TAKE NOTICE that Red Deer County, in the Province of Alberta, claims an Easement under an ACCESS RIGHT OF WAY AGREEMENT in writing dated the ___ day of _____, 20___ between the registered owner and this Caveator, a copy of which is hereunto annexed, pertaining to the below mentioned lands ("servient tenement"):

Plan 00 _____,
Block __,
Lot __,
Excepting thereout all Mines and Minerals

in favour of the following lands ("dominant tenement"):

Road Plan _____

as more particularly described in certificate of title number _____ standing in the register in the name of the County and forbid the registration of any person as transferee or owner of, or of any instrument affecting the said estate or interest, unless the instrument or certificate of title, as the case may be, is expressed to be subject to the said claim.

I APPOINT Red Deer County municipal office, 38106 Rge. Rd. 275, Red Deer County, Alberta T4S 2L9 as the place at which notice of proceedings relating hereto may be served:

DATED this ___ day of _____, 20___.

RED DEER COUNTY

Per:_____

Per:_____

AFFIDAVIT IN SUPPORT OF CAVEAT
(A.R. 480/81; 195/85 Form 27 s. 131)

I, _____ of Red Deer, in the Province of Alberta, MAKE OATH AND SAY:

1. I am agent for the caveator.

2. I believe that the caveator has a good and valid claim upon the said land, and I say that this Caveat is not being filed for the purpose of delaying or embarrassing any person interested in or proposing to deal therewith.

SWORN before me at Red Deer,)
in the Province of Alberta, this)
_____ day of _____, A.D. _____, 20___.) _____
)

_____
A Commissioner for Oaths in and
for the Province of Alberta.

EASEMENT AND EMERGENCY ROAD RIGHT OF WAY AGREEMENT

THIS AGREEMENT made this____ day of _____, _____, 20___.

BETWEEN:

RED DEER COUNTY
A Municipal Corporation in the Province of Alberta
(hereinafter referred to as the “Grantee")-and-

COMPANY NAME
An Alberta Limited Corporation
(hereinafter referred to as the “Grantor")
WHEREAS the Grantor is the registered owner of the following lands:

Plan _____, Block ___, Lot ___,
Excepting Thereout All Mines and Minerals
(herein called the "servient lands");

AND WHEREAS the Grantee is the registered owner of the following lands lying adjacent to the servient lands:

Road Plan _____
(herein called the "dominant lands");

AND WHEREAS the Grantor desires to grant unto the Grantee an easement or right of way over a portion of the Grantor’s lands for the purposes of emergency access in accordance with the provisions herein contained;

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the premises and the mutual covenants and agreements herein contained and in consideration of the sum of One Dollar ($1.00) now paid by the Grantee to the Grantor, receipt whereof is hereby acknowledged, the parties agree as follows:

1. The preamble and premises to this agreement shall form part hereof.

2. The Grantor, as the owner of the servient lands, hereby irrevocably grants to the Grantee, as owner of the dominant lands, an easement and right of way for the purpose of providing emergency access and passage for persons or vehicles to and from the dominant lands across that portion of the servient lands described or identified as _____ on Schedule “A” attached hereto which, without limiting the generality of the foregoing, includes the right to construct, keep in place, maintain, repair or replace if necessary, a roadway over and across the easement and right of way for the purpose of emergency access, provided however that in the event the Grantee constructs a roadway that the same shall be constructed with a gate controlling and limiting the access from the dominant lands to emergency use only.

3. Upon the execution of this agreement, and at all times hereafter, the Grantee or any person, firm or corporation acting on behalf of the Grantee or at the Grantee's request may enter upon and occupy the easement and right of way with its employees, agents, lessees, licensees, and invitees and with vehicles, machinery and equipment for the purpose aforesaid.

4. Each of the Grantor and the Grantee, and their employees, agents, lessees, licensees, and invitees, shall have unrestricted access to use the roadway located on the easement and right of way.

5. Unless the Grantor obtains prior written consent from the Grantee, the Grantor shall not:

(a) erect or place any buildings or structures,
(b) plant any new trees or bushes, or
(c) erect any new fences or gates

upon the easement and right of way which interfere or restrict the rights granted pursuant to this agreement.

6. The Grantee covenants and agrees with the Grantor that it shall indemnify and save harmless the Grantor of and from all liabilities, actions, claims and demands which may be lawfully brought or made against the Grantor by reason of anything done by the Grantee, its employees, agents, lessees, licensees, or invitees contrary to the terms of this agreement.

7. The parties agree that:

(a) This agreement shall enure to the benefit of and be binding upon the parties hereto, their heirs, executors, administrators, successors in title and assigns;
(b) Wherever the singular or the masculine pronouns are used throughout this agreement, the same shall be construed as meaning the plural, feminine or the neuter, where the context or the parties so require; and
(c) This agreement and the covenants herein contained are and shall be deemed to be covenants running with the land and for the benefit of the dominant lands and shall inter alia be capable of registration as an easement pursuant to the *Land Titles Act* of the Province of Alberta.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first above written.

RED DEER COUNTY

Per:_____

Per:_____

COMPANY NAME

Per:_____

Red Deer County

SCHEDULE "H"
RESTRICTIVE COVENANT

Red Deer County

SCHEDULE "I"
User Guide & Engineering Specifications

1. Article 2.1: The Developer shall deliver a general comprehensive liability insurance in an amount of not less than Two Million Dollars ($2,000,000.00) for bodily injury, death and property damage and naming the County as an insured party.

2. Articles 2.2: The Developer shall deliver three (3) copies of the Plans for review, including an engineered cost estimate of each of the Improvements.

3. Article 2.3 The Development proponent shall deliver an Irrevocable Letter of Credit in an amount equal to and representing 100% of the total estimated construction costs which shall not expire or be withdrawn before the issuance of a Final Acceptance Certificate.

4. Article 2.4: The Developer shall pay the amount of Four Thousand Five Hundred Dollars ($4,000.00), representing payment towards the County's projected engineering and legal costs.

5. Article 2.5: The Developer shall pay the amount of Two Thousand Dollars ($2,000.00) for each of the subdivided lots within the Subdivision Lands, excluding reserves.

6. Article 2.6: The Developer shall deliver the required consents and approvals from Alberta Environment, Alberta Transportation and any other agencies or authorities required in this Agreement prior to the issuance of a Construction Completion Certificate.

7. Article 2.7 The Developer shall obtain, register and provide evidence of registration, all easements and/or Utility Rights of Way, and/or Restrictive Covenants required in this Agreement prior to the issuance of a Construction Completion Certificate.

8. Article 2.8 The Developer shall pay all off-site levies outstanding, being _____Thousand Dollars ($ 0.00)

9. Article 2.9: The Developer shall pay the amount of _____Thousand Dollars ($0.00), representing 10% of the appraised fair market value of the Subdivision Lands, as stipulated in the Act, in lieu of dedicating ten (10%) per cent of the Subdivision Lands for Municipal Reserves.
10. Article 3.10: Improvements to the existing road system necessary to accommodate the increased traffic resulting from the development of the Subdivision Lands are described as follows:_____..
The amount to be paid by the Developer as its share of the costs of improvements shall be: $_____.
11. Article 2.10: The Developer shall file all detailed design drawings and specifications prepared by the consulting engineer;

12. Article 2.11: The Developer shall file a landscaping plan

13. Article 3: The Developer shall obtain a Development Permit prior to start of construction.

14. Article 9: The Improvements shall be constructed and completed within one (1) year from the date the Development permit has been issued.

15. Article 18: The Developer shall submit one (1) copy of the Construction Completion Certificate duly signed by the appropriate Officer and signed and sealed by the Consulting Engineer.

16. Article 24: The Developer shall register the Plan of Subdivision within twelve (12) months of the date of obtaining final approval of the subdivision.

17. Article 27: The Developer shall not transfer any lot within the Subdivision Lands prior to the issuance of a Construction Completion Certificate.

18. Article 31: The Developer shall maintain all Improvements until the Final Acceptance Certificate for that Improvement has been issued.

19. Article 35: The Developer shall request an inspection for a Final Acceptance Certificate thirty (30) days prior to the expiry of the Maintenance Period.

21 Article 46: The Developer shall deliver as-constructed drawings prior the issuance of a Final Acceptance Certificate.

GENERAL

Road classification and designation shall be in accordance with the classification system outlined in the latest version of the Transportation Association of Canada (TAC) Manual — Geometric Design Guide for Canadian Roads or as stated herein.

Designation of a development as “rural” or “urban” and individual street/roadway classification are to be based on functional use established by the Engineering Services Department.

The guidelines provided herein represent the minimum requirement under general conditions. The Developer and the Developer’s Consultant are responsible to ensure that the roadway infrastructure is designed and constructed to achieve design life expectations consistent with good design and construction practice. The Developer, through their Consultant, is responsible to confirm whether minimum standards are appropriate for the specific proposed development. This document is intended as a guideline and makes use of reference documents for design standards and/or construction specifications not outlined herein. The current edition of the TAC Manual “Geometric Design Guide for Canadian Roads” is generally utilized for design issues while the current edition of Alberta Transportations “Standard Specifications for Highway Construction” is generally to be utilized for construction specifications and/or issues. The most recent Alberta Environmental (AEP) guidelines shall apply as well.

DESIGN

1. Traffic Analysis/Traffic Assessments:

The Developer is responsible for a traffic assessment when required by the County.

This traffic assessment should include but is not limited to the following:

1. Volume of daily traffic generated by the development at full development. If the planned development is staged, then the assessment will also include daily traffic volumes at the end of each consecutive development stage.
2. Layout of the internal road system of the proposed development with the accesses clearly marked.
3. Location of the proposed access points.
4. Sight distance assessments at the proposed access points.

5. Full review of the proposed access points using A.T. design guidelines, establishing whether or not intersectional improvements are required.
6. Traffic signal warrant and pedestrian accommodation at major intersections for urban developments.

This traffic assessment will be used by the Developer's Engineer, in addition to the County's design guidelines, to establish a safe, viable access(es) and road system within the County right-of-ways. Depending on the location and nature of the development, assessment of the impact on existing roadways and intersections may be required.

2. Street Classification:

Roadways within the County are generally divided under three possible classification types; Rural Subdivisions, Rural External Roads, or Urban Roads.

The following tables indicate the required road cross-sections for each street classification. The County is the final arbiter of whether a development is rural or urban, the street classification and the requirement for on-street parking.

Table B1.1
Roadway Dimensions by Classification (Rural)

Road Classification Rural Subdivisions	Operating Speed (km/h)	Right-of-Way Width (m)	Lane Width (m)	Shoulder (m)
Local Roads				
Residential Cul-de-sac	50	20.0	3.5	1.0
Residential	50	20.0	3.2	0.5
Commercial/Industrial	50	22.0	3.5	1.0
Collector Roads				
Minor Residential (1000— 2500 vpd)	50	20.0	3.5	1.5
MajorResidential (>2500 vpd)	50	24.0	3.7	2.0
Commercial/Industrial	50	27.0	3.7	2.5
Arterial Roads				
Undivided Arterial	60	40.0	3.7	3.0

Rural External Roads	Operating Speed (km/h)	Right-of-Way Width (m)	Surface Width (m)	Fig. #
	100/80	30/20	8.0	5
	80	30/20	7.5	6
	80	30/20	7.5	7
	60	20	6.0	8

Note: desirable / minimum

Table B1.2
Roadway Dimensions by Classification (Urban)

Street Classification **Urban Roads**	Operating Speed (kph)	Right-of-Way Width (m)	Pavement Width (m)
Local Roads			
Residential	50	16.0	10.0
Commercial/Industrial	50	20.0	12.5
Collector Roads			

Residential Commercial/Industrial	60 60	20.0 20.0	12.5 13.5
Arterial Roads Arterial	70	30.0	15.8

Urban roads are to be assumed to have curb and gutter. Parking lanes are required. The requirement for sidewalks or other design considerations will be reviewed on a development specific basis.

3. Pavement Design Standards

The minimum pavement structure permitted for each road classification shall be:

Table B2.1
Minimum Pavement Structures – Rural Roadways

Road Classification **Rural Subdivisions**	Asphaltic Concrete Pavement (mm)	Granular Base Course (mm)	Granular Subbase (mm)	Total Depth (mm)
Local Roads				
Residential Cul-de-sac	75	200	n/a	275
Residential	75	200	n/a	275
Commercial/Industrial	100	200	n/a	300
Collector Roads				
Minor Residential (1000 – 2500 vpd)	100	230	n/a	330
Major Residential (>2,500 vpd)	120	250	n/a	370
Commercial/Industrial	100	300	n/a	400
Arterial Roads				
Undivided Arterial	100	300	n/a	400

Road Classification **Rural External Roads**	Asphaltic Concrete Pavement (mm)	Granular Base Course (mm)	Granular Subbase (mm)	Total Depth (mm)
Paved Roads	100	250	n/a	350
Chip Seal Roads	Double Chip Seal	250	n/a	250
Gravel Roads	n/a	n/a	n/a	n/a
Limited Access Roads	n/a	n/a	n/a	n/a

Notes:
- Paving of subdivisions with ACP requirements greater than 75 mm shall be placed in two equal lifts with the second lift being placed one year after the first lift to allow for development to proceed final lift. In smaller subdivisions placing both lifts in the same year may be allowed by the County.
- In exceptional circumstances certain rural subdivision roads may be allowed to remain with a finished gravel surface subject to County approval.
- Granular subbase can be utilized on an as-need basis.
- Gravel roads shall be graveled in two lifts with the first lift being applied at a rate of 200 m^3 /km and a second lift at a rate of 150 m^3/km. All entrances shall be graveled at a rate of no less than 8 m^3/ entrance and shall extend from the shoulder to the property line.
- Limited Access Roads shall be graveled in one lift at a rate of 250 m^3/km.
- Surface gravel shall be according to the Alberta Transportation Specifications for Designation 4 Class 20 for both lifts. In instances of silt subgrade, Designation 4 Class 25 material can be substituted for the first lift however, in all cases the final lift shall be Designation 4 Class 25 material.

Table B2.2
Urban Roadways

Road Classification Urban Roadways	Asphaltic Concrete Pavement (mm)	Granular Base Course (mm)	Granular Subbase (mm)	Total Depth (mm)
Arterial	125	200	350	675
Industrial Collector	100	200	300	600
Residential Collector	100	150	300	550
Industrial Local	90	150	300	540
Residential Local	75	100	250	425

This design assumes that all 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. Where soils of a lower stability are used, an increase in pavement structure will be required. Any modification to the pavement standards must be substantiated by a geotechnical report and approved by the Engineer. The Developer's Engineer shall also take into account traffic volumes and axle loading.

Asphalt Type:

The Developers Consultant shall determine the type of Asphalt Concrete Pavement from the types available and as outlined in the latest edition of Alberta Transportations Standard Specifications for Highway Construction.

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. Final pavement crown shall be 2.0%.

4. Ditch Design:

Ditches shall be designed to effectively convey site drainage from the area consistent with the approved stormwater management plan where available. Roadway ditch design shall be integrated with the requirements of Section C (Storm Sewerage System) of the County's Engineering Guidelines and Minimum Servicing Standards.

General ditch requirements for rural subdivisions are as follows:

- Roadway ditches – 4:1 sideslopes and 3:1 backslopes
- Drainage channels — 3:1 side and backslopes
- Minimum 1.0 m wide ditch bottom
- Maximum gradient 6%, minimum gradient 0.5%. In some instances, gradients above the maximum may be appropriate, subject to County approval.
- Ditch depth to be sufficient for drainage requirements and to accommodate approach culverts, generally 1.0 m with a minimum of 0.6 m.

General ditch requirements for Rural Exterior Roads are as shown on the Standard Cross Section drawings.

Urban roads will utilize curb and gutter.

Where roadway and ditch requirements result in a portion of the ditch or ditch backslope extending beyond the road right-of-way, the Developer shall be responsible to secure appropriate drainage

easements in the name of the County.

5. Vertical Alignment:

The maximum grade and vertical alignment for all roads shall be as per TAC Geometric Design Guide for Canadian Roads or as shown on the Standard Cross Section drawings.

6. Vertical Curves:

1. Vertical curves shall be calculated according to TAC Geometric Design Guide for Canadian Roads.
2. The minimum length of a vertical curve shall be 30 m on local roads, and greater than or equal to the design speed in km/h on collector and arterial roads.

7. Horizontal Alignment:

1. The minimum degree of curvature of the centerline of the carriage way is dependent on the road classification and its design speed.
2. All horizontal curves shall be designed to meet TAC Geometric Design Guide for Canadian Roads.

8. Design Minimum:

Several cases exist where the design guidelines indicate a desirable and a minimum design value. The desirable values shall be utilized for the majority of cases with the minimum values utilized only for the exceptional isolated instances and are subject to County approval.

9. Subgrade Compaction:

Roads are to be built by a qualified road construction company to the following specification:

Sub-Grade — 1 m of acceptable material (clay/sand) compacted to 95% of Standard Proctor density at optimum moisture content with no organic material i.e. black dirt. Further, the top 0.3 m shall be compacted to 100% of Standard Proctor density at optimum moisture content.

MATERIAL AND CONSTRUCTION SPECIFICATIONS:

All materials and construction thereof shall be in accordance with the latest edition of Alberta Transportations Standard Specifications for Highway construction including Granular Base Course, Asphalt Concrete Pavement, Double Seal Coats, Granular Subbase (Fill), and Surface Gravel. Any substitutes or modifications will require the prior approval of the County.

COMMUNITY MAILBOXES

The Developer shall be responsible for coordinating the placement of community mailboxes with Canada Post Corporation, as identified in the Engineering specifications and guidelines, to the County's satisfaction.

WASTE DISPOSAL BINS

The Developer shall be responsible for the placement of waste disposal bins and containers, to the County's satisfaction.

SURVEY CONTROL

Developers are responsible for full restoration of all survey control markers and legal pins removed or disturbed during construction.

APPROACHES

All rural residential subdivision lots and private properties, accessed by local and collector roadways, will require one approach constructed to the property from the accessing roadway according to the requirements and specifications.

Residential approaches shall have a width at property line of 6 m and minimum radii of 5 m while agricultural approaches shall have a width at property line of 8 m and minimum radii of 5 m.

Industrial approaches shall be constructed to the same requirements and specifications as private approaches with the exception that the width of the approach may be increased to accommodate the type of development. Industrial lot approaches shall be constructed to accommodate a turning radius of 15 meters and be a minimum of 15 meters in width.

Road approaches shall be located and designed to access the parcel's most desirable building location. These specifications are the minimum standards to be followed. For rural developments, approach locations along through roads shall meet or exceed minimum site distance requirements as outlined in TAC Geometric Design Guide for Canadian Roads for the appropriate design vehicle.

Where an approach for a commercial, industrial or residential lot within a multi lot subdivision accesses onto a paved road or highway, the approach shall be paved from the edge of the road surface to 5 meters into the lot; as per Section 50 of the Red Deer County Land Use Bylaw.

The final location and construction must be approved by the County's Development Officer.

The following are minimum culvert sizes and minimum specifications for approaches:

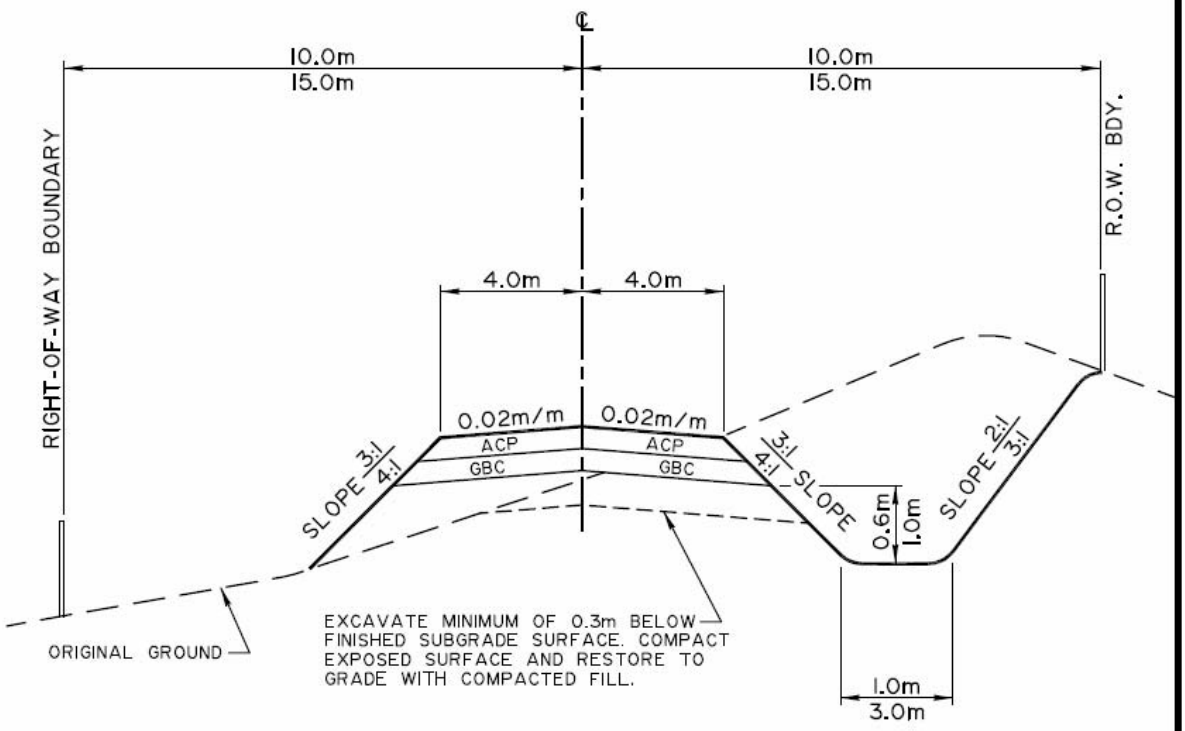
Residential Approach Culvert	400 mm diameter
Roadway Cross Culvert	500 mm diameter
Industrial Approach Culvert	600 mm diameter

Culverts shall be corrugated steel or concrete reinforced Class III. Depth of cover shall meet manufacturer's requirements, with a minimum of 300 mm. Rock rip-rap or sacked concrete rip-rap to be provided at the inlet and outlet of all approach and road culverts.

It is noted these sizes are minimums and the Developer shall also confirm that culvert sizing is adequate for the location and/or consistent with the stormwater management plan for the development.

LIMITED ACCESS ROAD FEE AND SECURITY

A $250 non-refundable inspection fee will be charged for limited access road applications. For limited access roads under 152 meters (500 feet), a $500 security is required, to be returned upon satisfactory completion of all the conditions of the approval. An additional one dollar per foot security will be charged for limited access roads over 152 meters (500 ft) in length. All other roads are to be constructed as per the governing development agreement.



SURFACE WIDTH (m)	R.O.W. REQUIRED (m)	NORMAL SIDE SLOPE	MAXIMUM SIDE SLOPE	NORMAL BACK SLOPE	MAXIMUM BACK SLOPE	MINIMUM CURVE RADIUS (m)	MAXIMUM SUPER ELEVATION (m/m)	MAXIMUM GRADIENT (%)
8.0	20.0 / 30.0	4:1	3:1	3:1	2:1	* 300	0.08	* 7.0

NOTES:

- IF ADDITIONAL RIGHT-OF-WAY IS REQUIRED, TRY TO OBTAIN BY BACKSLOPING AGREEMENT OTHERWISE PURCHASE.
- IN CERTAIN INSTANCES GRADIENTS ABOVE MAXIMUMS SHOWN MAY BE APPROPRIATE SUBJECT TO COUNTY APPROVAL
- DIMENSIONS $\frac{X}{Y}$ $\frac{\text{MINIMUM}}{\text{DESIRABLE}}$, MINIMUMS SHOULD BE USED ONLY IN EXCEPTIONAL SITUATIONS

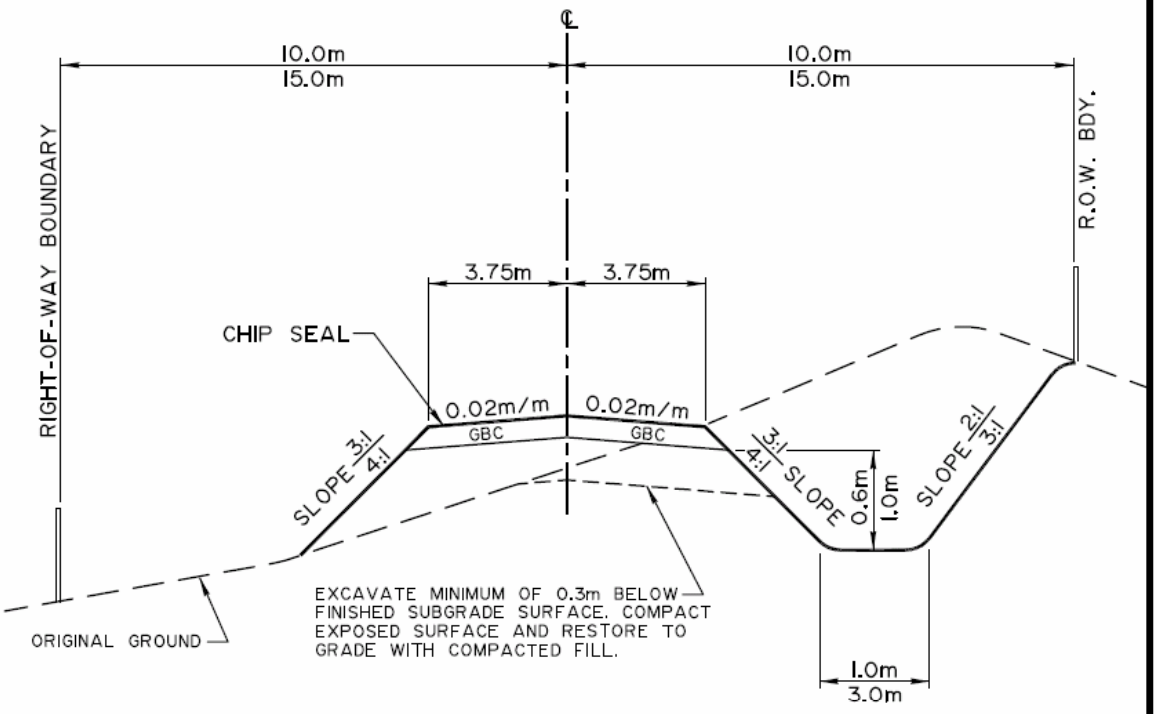
* MINIMUM CURVE RADIUS (m) FOR RLU-208-110 IS 600 WHILE MAXIMUM GRADIENT IS 6%

RLU-208-90 or RLU-208-110

Red Deer County

PROJECT NO.: 304300	DRAWN: MRM
DATE: 2002-08-22	CHECKED: BJO
EXH	SCALE: N.T.S.
	PAGE No.: - -

FIGURE 5
PAVED ROAD
STANDARD CROSS-SECTION



SURFACE WIDTH (m)	R.O.W. REQUIRED (m)	NORMAL SIDE SLOPE	MAXIMUM SIDE SLOPE	NORMAL BACK SLOPE	MAXIMUM BACK SLOPE	MINIMUM CURVE RADIUS (m)	MAXIMUM SUPER ELEVATION (m/m)	MAXIMUM GRADIENT (%)
7.5	20.0 / 30.0	4:1	3:1	3:1	2:1	300	0.08	7.0

NOTES:

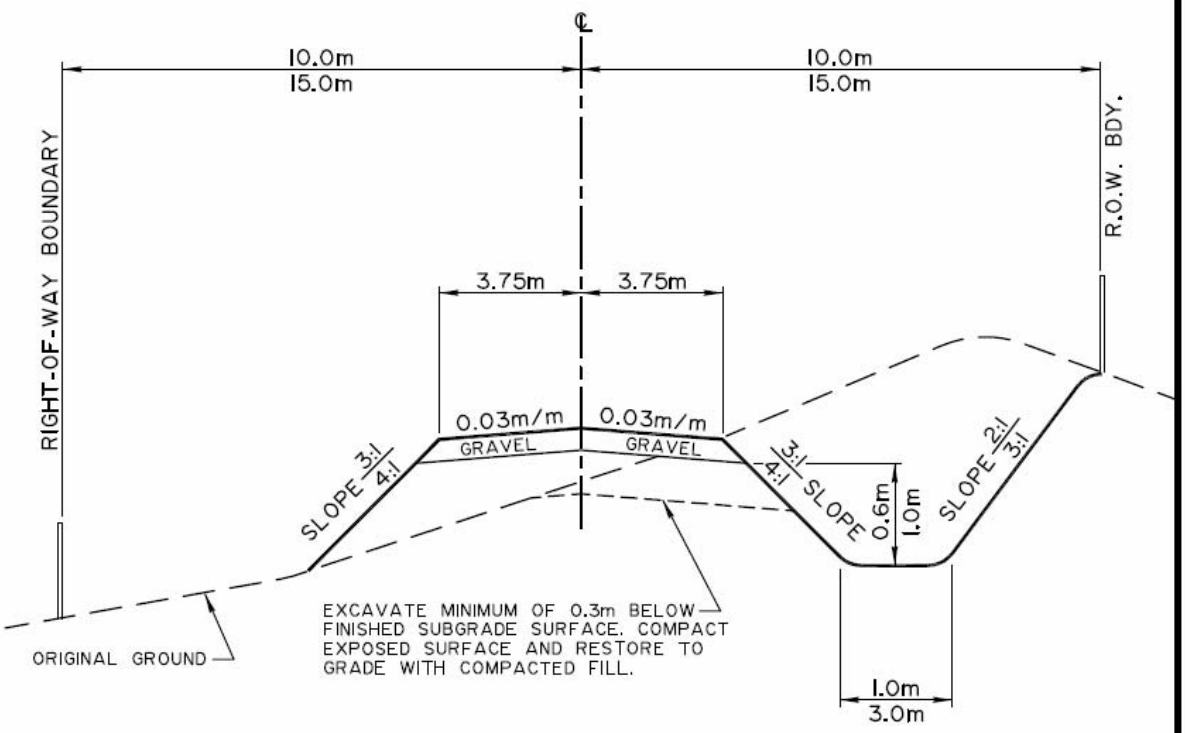
- IF ADDITIONAL RIGHT-OF-WAY IS REQUIRED, TRY TO OBTAIN BY BACKSLOPING AGREEMENT OTHERWISE PURCHASE.
- IN CERTAIN INSTANCES GRADIENTS ABOVE MAXIMUMS SHOWN MAY BE APPROPRIATE SUBJECT TO COUNTY APPROVAL
- DIMENSIONS X / Y MINIMUM / DESIRABLE, MINIMUMS SHOULD BE USED ONLY IN EXCEPTIONAL SITUATIONS

RLU-207.5-90

Red Deer County

PROJECT NO.:	DRAWN:
304300	MRM
DATE:	CHECKED:
2002-08-22	BJO
EXH	SCALE: N.T.S.
	PAGE No.: - -

FIGURE 6
CHIP SEAL ROAD
STANDARD CROSS-SECTION



SURFACE WIDTH (m)	R.O.W. REQUIRED (m)	NORMAL SIDE SLOPE	MAXIMUM SIDE SLOPE	NORMAL BACK SLOPE	MAXIMUM BACK SLOPE	MINIMUM CURVE RADIUS (m)	MAXIMUM SUPER ELEVATION (m/m)	MAXIMUM GRADIENT (%)
7.5	20.0 / 30.0	4:1	3:1	3:1	2:1	300	0.08	7.0

NOTES:

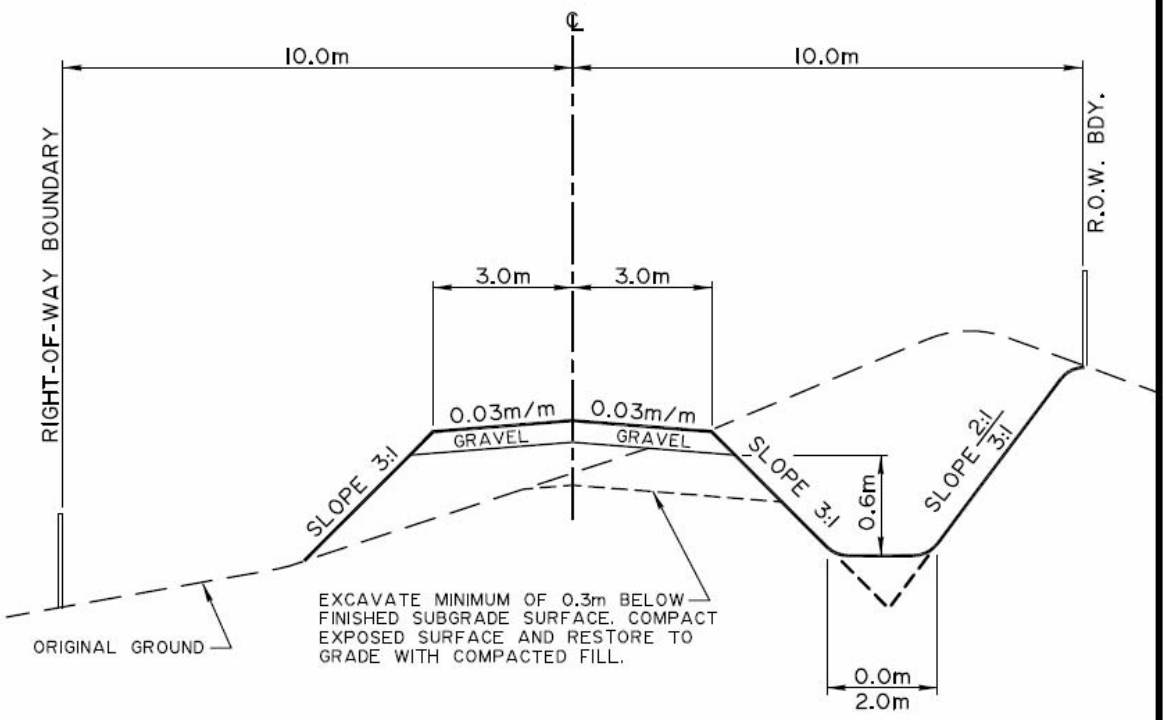
- IF ADDITIONAL RIGHT-OF-WAY IS REQUIRED, TRY TO OBTAIN BY BACKSLOPING AGREEMENT OTHERWISE PURCHASE.
- IN CERTAIN INSTANCES GRADIENTS ABOVE MAXIMUMS SHOWN MAY BE APPROPRIATE SUBJECT TO COUNTY APPROVAL
- DIMENSIONS X / Y MINIMUM / DESIRABLE, MINIMUMS SHOULD BE USED ONLY IN EXCEPTIONAL SITUATIONS

RLU-207.5G-90

Red Deer County

PROJECT NO.:	DRAWN:
304300	MRM
DATE:	CHECKED:
2002-08-22	BJO
EXH	SCALE: N.T.S.
	PAGE No.: -

FIGURE 7
GRAVEL ROAD
STANDARD CROSS-SECTION



SURFACE WIDTH (m)	R.O.W. REQUIRED (m)	NORMAL SIDE SLOPE	MAXIMUM SIDE SLOPE	NORMAL BACK SLOPE	MAXIMUM BACK SLOPE	MINIMUM CURVE RADIUS (m)	MAXIMUM SUPER ELEVATION (m/m)	MAXIMUM GRADIENT (%)
6.0	20.0	3:1	3:1	3:1	2:1	50	0.08	11.0

NOTES:

- IF ADDITIONAL RIGHT-OF-WAY IS REQUIRED, TRY TO OBTAIN BY BACKSLOPING AGREEMENT OTHERWISE PURCHASE.
- IN CERTAIN INSTANCES GRADIENTS ABOVE MAXIMUMS SHOWN MAY BE APPROPRIATE SUBJECT TO COUNTY APPROVAL
- DIMENSIONS $\frac{X}{Y}$ $\frac{\text{MINIMUM}}{\text{DESIRABLE}}$, MINIMUMS SHOULD BE USED ONLY IN EXCEPTIONAL SITUATIONS

RLU-206G-40

Red Deer County

PROJECT NO.:	DRAWN:
304300	MRM
DATE:	CHECKED:
2002-08-22	BJO
EXH	SCALE: N.T.S.
	PAGE No.: - -

FIGURE 8
LIMITED ACCESS ROAD STANDARD CROSS-SECTION

Dated: ___ day of_____, 200____

****

BETWEEN:
RED DEER COUNTY
A Municipal Corporation in the Province of Alberta
(hereinafter referred to as "the County")
OF THE FIRST PART

-and-

COMPANY NAME
(hereinafter referred to as "the Developer")

****

SUBDIVISION DEVELOPMENT AGREEMENT

****

Subdivision File No. _____

127152;November 14, 2005