

Rocky View County **Servicing Standards**

April 2025 – Version 1



ROCKY VIEW COUNTY

SERVICING STANDARDS PREFACE



PREFACE

Intent

Rocky View County's Servicing Standards, as amended, set the minimum design guidelines for all construction and development projects within Rocky View County. The intent of the Servicing Standards is to assist developers and their consultants, contractors, and County administration in designing, reviewing, and constructing infrastructure in the County. The Servicing Standards also identify the existing regional industry-recognized standards, specifications, and guidelines and identifies County-specific procedures and practices required to be implemented in addition to those industry-recognized specifications. If conflicts exist between the industry-recognized standards and the County's County-specific procedures and practices, the highest standard or requirement shall prevail.

Disclaimer

The Servicing Standards are to be read as a whole, in conjunction with County Policies, and no individual part or section shall be read individually. The County shall not be held liable for any missed information inadvertently missed by the incomplete reading or assumptions made of these Servicing Standards.

Use of the Servicing Standards shall not absolve any party from the obligation to exercise his/her professional judgment and follow sound engineering and construction practices. The provisions of this document shall be in addition to and not in substitution for any Federal, Provincial, or Municipal legislation, regulation, or requirement relating to construction standards.

New technology or practices may result in a request to vary the development standards. Any party requesting to vary the Servicing Standards must submit a written request together with a detailed written report under the seal of the Engineering Consultant, which clearly demonstrates that the requested variance will not compromise the operation, anticipated service life, and performance or aesthetics of the subject infrastructure. The variance request will be circulated to impacted parties and stakeholders, who will be consulted to ensure their concerns about the proposed variance are considered. The decision to vary the Servicing Standards will be at the County's discretion. Requests can be sent to engineering@rockyview.ca.

Definitions

Except where the context otherwise requires, the following expressions or words, when used in these Servicing Standards, shall carry the following meanings:

- Alberta Environment and Protected Areas means the Provincial Ministry responsible for creating regulations, design guidelines, and specifications to protect Alberta's environment and preserve the quality of our water, air, natural lands, and wildlife.
- Alberta Transportation and Economic Corridors means the Provincial Ministry responsible for creating regulations, design guidelines, and specifications to provide a safe and efficient transportation system that supports Alberta's economic, social, and environmental vitality.
- **APEGA** means the Association of Professional Engineers and Geoscientists of Alberta.

- **ASET** The Association of Science and Engineering Technology Professionals of Alberta.
- **As-Built Drawings** shall mean drawings prepared by the Engineering Consultant under sign/seal that accurately depict the final constructed configuration of Improvements and shall show any construction deviations from the engineering drawings approved by the County.
- **CCC** shall mean Construction Completion Certificate.
- **County** shall mean Rocky View County in the Province of Alberta.
- **Developer** shall mean the registered and equitable owner of the Development Land or another party authorized by the landowner to develop the lands.
- Developer's Consultant shall mean including but is not restricted to, the Professional Engineer, the Engineering Consultant, contractors, and/or subcontractors acting for or on behalf of the owner.
- **Development Lands** shall mean the area to be developed, including any off-site improvement areas, as determined by the County.
- **Development Agreement** shall be an Agreement under Part 17 of the Municipal Government Act required by the County as a condition of development or subdivision approval specifying the Developer's legal, administrative, and technical obligations concerning the Development.
- Engineering Consultant shall mean a person licensed to practice engineering/ geoscience in good standing with The Association of Professional Engineers and Geoscientists of Alberta or a person with an applicable scope of practice licensed to practice engineering/geoscience in good standing with the Association of Science & Engineering Technology Professionals of Alberta.
- Engineering Drawings shall mean those engineering plans, profiles, and details prepared by the Engineering Consultant under sign/seal showing the proposed Improvements within the Development Lands, all of which shall conform to the minimum requirements outlined in these Servicing Standards.
- **FAC** shall mean Final Acceptance Certificate.
- Geotechnical Developable Area is defined as the area in which the geotechnical conditions of the land can physically accommodate the proposed development. Further, it is the minimum area required to ensure that there is adequate space for a building site, water well, two septic fields, required setback distances as recommended by the Geotechnical Engineer and any setback distances as required for land use, pipeline(s) or other utility(ies).
- Geotechnical Engineering Consultant shall mean an Engineering Consultant recognized as a
 geotechnical engineering specialist with educational training, demonstrated expertise, and
 experience in geotechnical engineering. The term may also include geoscience professionals as
 applicable as per Provincial Legislation.
- **Improvements** shall mean all on-site and off-site services, facilities, and infrastructure required to be constructed as a condition of a development permit or subdivision approval.
- In Writing/Written shall mean signed memos on company or corporate letterhead, signed letters on company or corporate letterhead, or emails from company or corporate email addresses.

- **Maintenance Period** means, unless otherwise specifically noted within this document or a Development Agreement, a period of two (2) years for all Improvements from the date that the County signs a CCC. During this time, the Developer is responsible for maintaining and repairing/replacing all deficiencies or defects.
- Notice of Decision shall have the same meaning as in the County's Land Use Bylaw.
- **NFPA** means the National Fire Protection Association.
- **Special Clauses** are provisions within a Development Agreement that will take precedence over Articles of Agreement and General Conditions in the Development Agreement.
- **Record Drawings** are defined per APEGA definitions.
- **Rurban Development:** Subdivisions within Rocky View County containing residential lots with piped water and/or sewer services may be referred to as Rurban.
- **Transmittal of Decision** shall mean a letter from the County addressed to the Developer regarding the Subdivision Authority's decision on a subdivision application.
- Water Body shall have the same meaning as in the Water Act

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SECTION 100

Development Procedures



100 DEVELOPMENT PROCEDURES

Before comprehensive development can occur, major County Studies may have to be completed. These studies may include but are not limited to Master Drainage Plans, Master Servicing Strategies, Transportation Functional Studies, Sub-Catchment Master Drainage Plans and other relevant studies.

In some cases, the County budgets or plans may restrict the initiation and/ or completion of these studies. In those circumstances, a Developer may wish to sponsor the initiation and completion of the required studies by front-ending the entire costs. This would result in County Studies being completed at the Developer's expense. Where the Developer(s) front-end studies cover a larger area than the lands owned by the Developer(s), the County may enter into a Cost Recovery Agreement with the Developer(s) for the benefitting lands outside of their ownership.

101 INSURANCE

Individuals certifying any report/study/plan submitted to the County in support of a Development are required to have Professional Liability/Errors and Omissions insurance shall not be less than \$2,000,000 inclusive per occurrence and shall be determined on a specific project basis.

102 ENGINEERING CONSULTANT OF RECORD

The Developer shall retain an Engineering Consultant(s) record, for the entire duration of the Development Agreement, to ensure continuity of the project's design, construction, quality control, and contract administration. The Engineering Consultant(s) will usually design, supervise, inspect, monitor, and certify all work carried out. The Engineering Consultant(s) is deemed an agent of the Developer for the purposes of the Development Agreement. The Engineering Consultant(s) shall ensure that all materials specified, and all the work performed conform to these Servicing Standards. The Developer shall provide adequate authority to the Engineering Consultant(s) such that in the absence of the Developer, the Engineering Consultant(s) can deal expediently and autonomously with emergencies. The Developer may utilize different Engineering Consultant(s) to act as the Engineering Consultant of record for different components of the Development.

The Engineering Consultant(s) must, at minimum, provide the sufficient supervision and monitoring required to certify the "As-built" drawings, CCC, and FAC forms.

103 CROSSING, PROXIMITY, GROUND DISTURBANCE AND/OR ENCROACHMENT

It is the Developer's responsibility to obtain all necessary Agreements, Approvals, and/or Permits from any applicable Utility company prior to construction. Separate agreements related to crossing, proximity, ground Disturbance and/or encroachment may be required if the Developer's proposed work or off-site upgrade requirements include crossings of and/or construction activity adjacent to the following:

Oil and gas pipelines

Well sites

Overhead or underground telecommunication lines

Overhead or underground power lines

Railways

Other rights-of-ways

104 POWER, GAS, TELECOMMUNICATIONS

The Developer is responsible for coordinating the power, gas, and telecommunications locations, including obtaining alignment and utility right-of-way approvals. The location of the shallow utilities must be confirmed to ensure that all the required utility rights-of-way are shown on the Utility Right-of-Way Plan before it is submitted to Land Titles for registration. The Legal Plan, the Utility Right-of-Way Plan, and the Utility Right-of-Way Agreements are released for registration when the Developer and the County have signed the Development Agreement.

The Developer shall forward copies of the roadway, deep utility plans, and Engineering Drawings to the shallow utility companies.

105 DEVELOPMENT AGREEMENT

The Transmittal of Decision or Notice of Decision outlines the conditions that must be met as conditions of approval. In some cases, the Decisions will dictate that the Developer shall enter into a Development Agreement. The Development Agreement is an essential legal document that details the Developer's obligations in completing the conditions of approval.

The construction of Improvements within a subdivision is subject to the terms and conditions of a Development Agreement. Without a Development Agreement, no deep underground infrastructure or road work can be constructed. The Development Agreement is integral to the subdivision servicing and registration process. Without a signed Development Agreement, the subdivision may not be registered, nor may construction of the development proceed beyond the stripping and grading outlined under the authority of an applicable Development Permit.

Once the applicant has secured an engineering consultant (s), the County should be contacted regarding the processing of the Development Agreement. It is recommended that the Developer or his representative review the General Conditions of the Development Agreement prior to meeting with the County. The Development Agreement template is available upon request from the County at engineering@rockyview.ca.

105.1 Development Agreement Submission Requirements

All submissions to the County shall be made electronically via email or FTP (or equivalent). Following Subdivision/Development Permit approval, the Developer should allow up to six (6) weeks, depending on the quality of the drawing submission, to complete the engineering review after submitting ALL the required information, where applicable. The time required to process a Development Agreement varies, depending on the number of approvals needed, the complexity of the Development, the timely submission of documentation, and other factors. The County will prepare the Development Agreement once all the required documents, studies, reports, and

construction drawings as outlined in the Transmittal of Decision/ Notice of Decision have been received and reviewed to the satisfaction of the County.

- 1. Drawing set submissions that adhere to the requirements as outlined in Section 200.0
- 2. Tentative Legal Plans of Survey
- 3. Tentative Utility Right-of-Way Plans
- 4. Geotechnical Report, if applicable, as per Section 300.0
- 5. Traffic Impact Assessments, if applicable, as per Section 400.0
- 6. Confirmation of wastewater disposal solution as per Section 500.0
- 7. Confirmation of water supply as per Section 600.0
- 8. Stormwater & Drainage studies, if applicable, as per Section 700.0
- 9. Environmental and Historical Studies, if applicable, as per Section 900
- 10. Construction Management Plans, if applicable, as per Section 800
- 11. Erosion & Sedimentation Control report and/or plan, if applicable, as per Section 800
- 12. Other pertinent items as deemed necessary by the County
- 13. Cost estimate prepared by the Developer's Engineering Consultant in accordance with Council Policy C-407
- 14. Confirmation from Alberta Environment and Protected Areas of appropriate licenses, approvals, and permits as required for the construction and/or operation of the water utility, wastewater utility, stormwater utility, or other Improvements as required
- 15. Confirmation from all other applicable Federal and Provincial regulatory bodies of appropriate licenses, approvals, and permits as required
- 16. Written confirmation from the Shallow Utility Companies acknowledging the proposed alignments, utility right-of-way plan(s), and associated Agreements
- 17. Landscaping Plans
- 18. Written confirmation from Canada Post regarding their acceptance of proposed community mailbox locations within the Development or indication none are required
- 19. Proof of liability insurance coverage in the amount of five million dollars (\$5,000,000) with the County named as an additional insured
- 20. All necessary Security Requirements as per Council Policy C-407
- 21. Written confirmation from the applicable water service provider that sufficient potable water capacity will be provided to the Development (if the water source is from a non-County system)
- 22. Written confirmation from the applicable water service provider that the fire hydrants and fire suppression systems will have sufficient flows (as applicable) required to service the development (if the water source is from a non-County system)

- 23. Written confirmation from the applicable wastewater service provider that sufficient wastewater capacity exists to service the Development (if the wastewater servicing is from a non-County system)
- 24. At its sole discretion, the County may require additional information, reports/ reviews from a third party, or an independent engineering analysis before finalizing the development review process. As outlined in the County's Master Rates Bylaw, the Developer will be responsible for any associated costs, which must be paid in accordance with the Bylaw

Should the County not approve the Developer's plans, drawings or proposals, comments will be sent to the Engineering Consultant for the Engineering Consultant to revise to the satisfaction of the County. Once the revisions have been submitted to the County, the Developer shall allow up to four (4) additional weeks for review.

105.2 Development Agreement Endorsement

When the Developer has completed all the requirements for the Development Agreement, The County will draft the Development Agreement for the Developer to review. Attention should be paid to any Special Clauses inserted at the end of the Agreement. Once accepted and signed by the Developer, including the deposit of appropriate securities and payment of all applicable levies, the Agreement will be forwarded for signatures by Municipal Authorities.

In accordance with Part 17 of the Municipal Government Act, the County is entitled to register and maintain caveats evidencing its interest under the Development Agreement on the Certificate of Title to every lot within the Development Area until all obligations under the Development Agreement have been fulfilled.

106 AGREEMENT FOR OFF-SITE CONSTRUCTION

In cases where the Transmittal of Decision or Notice of Decision requires construction or upgrades of existing municipal infrastructure, special consideration will be required to accommodate the needs of existing users and the general public. In some cases, the County may require the Developer to enter into a separate agreement for off-site improvements.

In some circumstances, the Development Agreement will dictate the responsible party for the maintenance period of infrastructure Improvements.

107 ROAD RIGHT-OF-WAY CONSTRUCTION AGREEMENTS

An individual landowner, company, or other party may request permission from the County to construct or upgrade a roadway within a road right-of-way. A letter of application with the appropriate application fee must be submitted to the County for processing and is subject to approval from the Executive Director. Applicants must provide clear and accurate proposal details, including a site plan for the project location. The County retains discretion to approve or deny an application.

The applicant should contact the County at engineering@rockyview.ca to process the agreement. The submission requirements accompanying the application are the same as those outlined in the Development Agreements. The security requirements will be in accordance with County Policy C-407.

108 DEVELOPMENT PERMITS

The County will review the application to determine if there are any related development requirements, such as engineering studies, on-site or off-site infrastructure upgrades, payment of levies, fees, or any other requirements. The Developer will be required to provide these requirements as conditions of the Development Permit.

If the County requires off-site Improvements, the Developer will be required to enter into a Special Improvements Development Agreement, Development Agreement or Road Right-of-Way Construction Agreement. The Developer will be required to pay any Third-Party fees in accordance with the Master Rates Bylaw for reviews/inspections conducted by Third-Party Engineering Firms on behalf of the County.

If the County requires any on-site Improvements, the Improvements will be included as conditions of the Development Permit or Subdivision. For any necessary improvements to support the development on-site, the Developer will be required to employ an Engineering Consultant to supervise the construction of the Improvements and provide "As-built" drawings upon completion of the work. The Developer must both complete the required Improvements and provide "As-built" drawings prior to occupancy of the site.

109 CONSTRUCTION COMPLETION CERTIFICATE (CCC)

109.1 CCC Procedure

When the Developer has completed all the improvements for each category identified in the Development Agreement or the Road Right-of-Way Construction Agreement, the Developer's Engineering Consulting firm shall perform a complete inspection of all the improvements for each category listed below accompanied by the Developer's contractor(s), whereupon the Developer shall correct all defects and deficiencies. Upon correcting defects and deficiencies, the Developer may submit a complete CCC application package to the County.

For each CCC Category listed below, separate CCC application forms are expected to be submitted for each related improvement. The CCC application package for each category shall be in the form of one well-organized electronic file submitted via email or FTP (or equivalent) to the County. Categories and the corresponding Improvements for CCC application packages are listed in Table 100-A.

The application package for each improvement shall include the following:

1. Construction Completion Certificate forms, duly signed and sealed by the appropriate Engineering Consultant, with 11" x 17" plans attached, highlighting the improvement constructed in red.

- Engineering drawings indicate the completed improvements and are marked "As-Built Drawing," with the Engineering Consultant's stamp and signature dated to reflect the CCC application date.
- 3. Current cost calculation, certified by the Engineering Consultant, outlining the actual costs of construction for the Development and outlining the costs of construction to complete Improvements outlined within the Development Agreement.
- 4. Erosion and Sediment Control Logs/Inspection Reports (as applicable).
- 5. Geotechnical materials and compaction testing report addressing materials, compaction testing, and placed deep fills certified by a Geotechnical Engineering Consultant confirming that all materials and all fill, stripping, grading, surface Improvements, and underground utility construction were made in accordance with these Servicing Standards and in accordance with the geotechnical project specifications as specified by the Geotechnical Engineering Consultant in the Deep Fills report and Geotechnical Investigation/Evaluation Report.
- 6. Testing Material / Requirements as listed in Table 100-A.
- 7. Submitted with Surface Improvements CCC application, provide written proof from the electrical, gas, and telecommunication utility providers and/or the Engineering Consultant that the respective utilities have been installed in accordance with all applicable specifications to the satisfaction of the respective utility provider and that responsibility for such utility has been assumed by the utility provider.
- 8. Written proof of the Developer's current liability insurance with the County named as additional insured. Liability insurance is to remain in place for the entire duration of the maintenance period until FAC has been granted.
- 9. A list identifying the contractors that the Developer has retained to carry out operations and maintenance activities until FAC has been obtained for the infrastructure constructed as per the Development Agreement. The list, at a minimum, shall include the following:
 - Contractor name and area of responsibility
 - o Contractor business phone number and contact information
 - Contractor's after-hours phone number
 - Contractor's emergency phone number

TABLE 100-A CCC IMPROVEMENT TESTING MATERIAL/REQUIREMENTS CATEGORY For all privately owned water/ wastewater utilities, the below requirements do not apply; instead, provide a CCC form signed and accepted by the service provider or other suitable written confirmation from the utility provider as proof the utility has accepted the construction of the infrastructure as complete.

UNDERGROUND IMPROVEMENTS		
Water Mains/Services/Hydrants	Grade Sheets (unless installed by drilling method) Pressure Test Results Water quality Tests Compaction Tests Bedding Material Drop Test and Grain Size Analysis Tests from Geotechnical Engineering Consultant Hydrant Pressure and Flow Testing	
Other Fire Suppression Infrastructure	Pressure & Flow Testing in accordance with applicable NFPA documents	
Stormwater Mains/ Services	Video Inspection completed within the last 90 days. Video Inspection Log. Infiltration/Exfiltration Testing (only required if infiltration or exfiltration is occurring). Compaction Test Results. Bedding Material Drop Test and Grain Size Analysis Tests from Geotechnical Engineering Consultant.	

Sanitary Sewers/ Services	 Video Inspection completed within the last 90 days. Video Inspection Log. Infiltration/Exfiltration Testing (only required if infiltration or exfiltration is occurring). Compaction Test Results. Bedding Material Drop Test and Grain Size Analysis Tests from Geotechnical Engineering Consultant. 	
Sewer Force mains	Grade Sheets (unless installed by drilling method) Pressure Test Results. Compaction Tests. Bedding Material Drop Test and Grain Size Analysis Tests from Geotechnical Engineering Consultant for segments installed by open cut method.	
ONSITE/OFFSITE SURFACE IMPROVEMENTS		

Sidewalks, Curbs, Gutters, Drainage Swales (Concrete), and Catch Basins	Concrete Test Results. Compaction Test Results. Will require survey and confirmation of grade achievement on as-built drawings
Paved Road and Lanes	Asphalt Test Results. Granular Materials Test Results. Compaction Test Results. Confirmation of Proof Rolling (Subgrade). Compaction Test Results.
Paved Pathways	Asphalt Test Results. Compaction Test Results.
Gravel Pathways	Compaction Test Results.
Gravel Road and Lanes	Compaction Test Results. Confirmation of Proof Rolling (Subgrade)
Overland Drainage Facilities (Swales – grass/concrete and ditches)	Will require survey and confirmation of grade achievement on as-built drawings.

Stormwater Management Facilities (i.e., Ponds, Outfalls)	As-built pond survey confirming design storage volume is provided. Operation & Maintenance Plan. Registration and copies of any existing/new code of practice. Pond and/or Outfall registrations and approvals transferred to the County (if applicable). Verification from Engineering Consultant that all Pond Control and alarm systems are operating and communicating per design (if applicable). Liner testing confirming liner specifications has been achieved.	
Streetlighting	All streetlighting to be energized at CCC inspection	
NATURAL GAS, TELECOMMUNICATIONS & ELECTRICITY (NO CCC FORM REQUIRED)		

Electrical Utilities	Written proof from the utility provider and/or the Engineering Consultant that electrical utilities have been installed to the satisfaction of the respective utility provider and that the utility provider has assumed responsibility for such utility.
Natural Gas and/or District Heat	Written proof from the utility provider and/or the Engineering Consultant that Natural Gas and/or District Heat utilities have been installed to the satisfaction of the respective utility provider and that responsibility for such utility has been assumed by the utility provider.
Telecommunication:	Written proof from the telecommunications provider and/or the Engineering Consultant that utilities have been installed to the satisfaction of the respective utility provider and that the utility provider has assumed responsibility for such utility.
ON-SITE LANDSCAPING IMPR	ROVEMENTS
Landscaping	As-Built Drawings, stamped and signed by a Landscape Architect. Landscaping CCC inspections will be performed from May 1- Sept. 30 (Weather permitting). All CCC requests received after Sept. 30 will be conducted as weather permits
Special Improvements	
Fire Pump Houses	Operation & Maintenance Plan. Commission reports and summaries. Hydrant Pressure & Flow Testing is in accordance with Section 500 and the applicable NFPA sections. In the case of a non-County system, a letter from the fire suppression water provider certifying the fire system has been constructed to meet all applicable NFPA sections and has sufficient capacity and delivery ability for fire suppression purposes, if applicable.
Fire-Water Storage Ponds/ Cisterns	 As-built pond survey confirming the design storage volume is provided Operation & Maintenance Plan. Permeability Testing of Liner if clay-based. Confirmation of the manufacturer's specifications for membrane liners has been achieved if they are synthetic-based. In the case of a non-County system, a letter from the fire suppression water provider certifying the fire system has been constructed to meet all applicable NFPA sections and has sufficient capacity and delivery ability for fire suppression purposes, if applicable.

Water Treatment Plants	Substantial or Construction Completion Certificates for the construction contract. Alberta Environment and Protected Areas Approval to Operate and water license transfer to the County (if applicable). Operation & Maintenance Plans and Manuals. Registrations and copies of existing / new Code of Practice. Commission reports and summaries. Water Quality Testing reports.
Wastewater Treatment Plants	Substantial or Construction Completion Certificates for the construction contract. Alberta Environment and Protected Areas Approval to Operate and outfall license/approval transfer to the County (if applicable). Operation & Maintenance Plan and Manuals. Registrations and copies of existing/new Code of Practice. Commission reports and summaries. Water Quality Testing reports.
Lift Stations and Booster Stations	Substantial or Construction Completion Certificates for the construction contract. Alberta Environment and Protected Areas Approval to Operate and license transfer to the County (if applicable). Operation & Maintenance Plans and Manuals. Registrations and copies of existing/new Code of Practice, Commission reports and summaries, if applicable. Water Quality Testing reports, if applicable.
Off-site Improvements (e.g., roads, water mains, sanitary mains, stormwater infrastructure, etc.)	Varies depending on the improvement. Requirements as per improvement categories listed above.

If all the relevant items listed above is not submitted to the satisfaction of the County, the Developer shall be notified in writing of the outstanding requirements, and the CCC may be rejected.

With the exception of landscaping (see Table 100-A for Landscaping requirements), after all of the items for each improvement category listed above are complete and submitted to the satisfaction of the County, the Engineering Consultant shall submit a written request to the County to schedule the applicable CCC inspection. In some cases, at the discretion of the County, the Engineering Consultant may make a written request for the inspection to the County prior to submitting the above paperwork,

provided that the Engineering Consultant has inspected the infrastructure and is satisfied there are no major deficiencies. The County shall attempt to inspect within 3 weeks of receiving the complete written request; however, pending weather and seasonal conditions, the County will do an inspection no later than within the time period as outlined in the Development Agreement. Snow cover in the development area will delay inspection timelines.

Either the Engineering Consultant or their representative must be present during the inspection and will be responsible for the following:

- Recording notes related to the inspection and providing a copy of the notes to the County following the inspection.
- Recording a list of deficiencies and or defaults noted during the inspection and providing a copy of the list to the Developer and the County following the inspection.

For underground sanitary and storm systems inspections, the Developer is responsible for ensuring that all manholes and catch basins are flushed/pumped clean prior to inspection. All inlets and outlets must be visible for inspection. The Developer shall make available necessary personnel with confined space certification for manhole and underground pipe inspections on pipes exceeding 900mm in diameter. Photography equipment shall be used for visual inspection purposes, with electronic photographs provided to the County post-inspection. Personnel shall be available to open manhole lids and operate valves when underground infrastructure inspections occur.

Prior to the Surface Improvement and/or Landscaping Improvements CCC inspection date, the Developer shall ensure that all rights-of-way, public utility lots, easements and municipal reserves areas are top soiled, seeded, left in a neat and tidy condition to the satisfaction of the County, in some cases, inspections can occur before seeding. Unless otherwise approved by the County, the entire width of the rights-of-way and easement areas shall be free of roots, stumps, rocks and other harmful materials. The surface shall be left in a dressed condition suitable for mowing operations. All projecting materials (including rocks, stumps, roots, and shrubs) that would interfere with mowing operations shall be removed, and the resulting cavities, if any, backfilled with suitable material, top-soiled and seeded.

Road rights-of-way shall be free from ruts and ridges and have firm, uniform ditches, side slopes and back slopes. Stormwater drainage infrastructure, such as culverts, swales, areas adjacent to ponds, and surface improvements should be clean, clear of sediment and/or blockages, and left in a neat and tidy condition to the satisfaction of the County.

In some cases, the County may issue the CCC despite minor deficiencies. Minor deficiencies for CCC, at the sole discretion of the County, may include but are not limited to loaming, seeding, and grass catch. They may also include minor defects in underground infrastructure that don't affect the safety or operation of the infrastructure (i.e., collar grouting at manholes).

If the CCC inspection shows that the Improvements have been completed to the County's satisfaction, and once the County has accepted the paperwork, the County shall sign and issue the CCC and indicate that the maintenance period shall only expire upon the approval of a FAC by the County. There will be one Security reduction for each improvement category listed above at CCC.

If deficiencies or defaults exist following the CCC inspection, the Developer shall be notified in writing of such deficiencies and shall have one (1) month (30 calendar days) to resolve the deficiencies. The County will carry out a second inspection to ensure the deficiencies are corrected. In some cases, at the discretion of the County, a second inspection may not be required if written confirmation and photographs are provided by the Engineering Consulting indicating the deficiencies have been corrected. Should the deficiencies not be corrected within the (1) month period, the CCC forms may be rejected; the Developer shall subsequently resubmit the CCC forms once corrections are completed.

CCC inspections/reviews for each improvement category may be charged fees in accordance with the County's Master Rates Bylaw. The Developer must pay these fees before the County signs the CCC forms and before any security reduction.

1010 INSPECTION - TOP LIFT ASPHALT

For developments with paved roads and/or lanes, Developers must apply for and receive a base-lift asphalt inspection prior to placing the top-lift asphalt. Requests for Base-Lift Asphalt Inspection must be sent to the County in writing. Upon receipt of the written request, the County will schedule the inspection within two weeks, weather and seasonal conditions permitting. Cold weather or snow cover in the development area will delay the inspection and/or placement of top lift timelines.

Either the Engineering Consultant or their representative must be present during the inspection and will be responsible for the following:

- Recording notes related to the inspection and providing a copy of the notes to the County following the inspection and
- Recording a list of deficiencies and or defaults noted during the inspection and providing a copy of the list to the Developer and the County following the inspection.

If following the Base-Lift Asphalt Inspection deficiencies or defaults exist, the Developer shall be notified in writing of such deficiencies, and the top lift of asphalt cannot be placed until the deficiencies are corrected. Following the correction and repair of the deficiencies, the Engineering Consultant shall again provide a written request to the County to schedule another Base-Lift Asphalt Inspection. In some cases, at the discretion of the County, a second inspection may not be required if written confirmation and photographs are provided by the Engineering Consulting indicating the deficiencies have been corrected.

Base-lift inspections/reviews may incur fees in accordance with the County's Master Rates Bylaw (Third Party Reviews). The Developer must pay these fees prior to authorization to place the top lift asphalt and any security reduction.

If neither the County nor the Engineering Consultant has identified deficiencies following the base-lift asphalt inspection, the Developer may proceed with placing the top-lift asphalt.

The Developer must provide the County twenty-four (24) hours of notice before placing any asphalt.

1011 TANGIBLE CAPITAL ASSET MANAGEMENT

Prior to the issuance of Final Acceptance Certificates, it is the responsibility of the Engineering Consultant to submit As-Constructed costs for any infrastructure. The costs will be based on City of Calgary Development Agreement rates or ATEC unit rates. The County will use this information for its Tangible Capital Asset (TCA) Management program. Standard TCA spreadsheet information forms will be provided by the County. A delay in submitting TCA information may result in withholding of the security until the information has been submitted and is satisfactory to the County.

1012 FINAL ACCEPTANCE CERTIFICATE (FAC)

1012.1 FAC Procedure

When the maintenance period has expired for the Improvements identified in the Development Agreement or the Road Right-of-Way Construction Agreement, the Developer's Engineering Consultant shall perform a complete inspection of all the Improvements for each category accompanied by the Developer's contractor(s), whereupon the Developer shall correct all defects and deficiencies. Upon correction of defects and deficiencies, the Developer may submit a complete FAC application package to the County.

Separate FAC application forms are expected to be submitted for each related improvement for each FAC category. The FAC application package for each category shall be one well-organized electronic file submitted via email or FTP (or equivalent) to the County. Categories and the corresponding Improvements for FAC application packages are listed in Table 100-C.

- 1. Final Acceptance Certificate form, duly signed and sealed by the Engineering Consultant, with 11" x 17" plans attached highlighting in red the improvement constructed.
- 2. Engineering drawings indicating the completed improvements and marked "As-Built for FAC," with the Engineering Consultant's stamp and signature dated to reflect the FAC application date.
- 3. If no changes have occurred to the Improvements since the issuance of As-Built drawings prepared at the CCC stage, updated As-Builts are not required, provided the Engineering Consultant provides a letter confirming that no changes have occurred to the Improvements since the drawings were originally issued and that the original drawings are, therefore, still valid.
- 4. Requirements as listed in Table 100-C.
- 5. PDF and CAD files of "As-Built" engineering design drawings. The PDF drawings must be signed/sealed.
- 6. List of deficiencies and/or defects indicating when they were repaired.
- 7. As-Constructed costs for any infrastructure as per the TCA requirements above. Please request the TCA tracking template from engineering@rockyview.ca

For any works that have occurred since the CCCs were issued, provide relevant updated Geotechnical materials and compaction testing report(s) addressing materials, compaction testing, and placed deep fills certified by a Geotechnical Engineering Consultant confirming that all materials and fills, stripping, grading, surface Improvements, and underground utility construction was made in accordance with these Servicing Standards and in accordance with the geotechnical project specifications as specified by the Geotechnical Engineering Consultant in the Deep Fills report and Geotechnical Investigation Report.

If all of the items listed above are not submitted to the satisfaction of the County, the Developer shall be notified in writing of the outstanding requirements, and the FAC form will be rejected and returned to the Developer.

TABLE 100-C	Final Acceptance Certificate (FAC) Testing Material/Requirements
FAC IMPROVEMENT CATEGORY ¹	TESTING MATERIAL/REQUIREMENTS
For all privately owned water/wastewater utilities, the below requirements do not apply. Instead, provide a FAC form signed and accepted by the service provider or other suitable written confirmation from the utility provider as proof that the utility has accepted the construction of the infrastructure as complete and has accepted all ownership, operation, and maintenance of the improvement.	
ON-SITE UNDERGROUND IMPROVEMENTS	
Water Mains/Services/Hydrants	Pressure Test Results for any sections repaired (if any) since the CCC was issued. Water quality tests for any sections repaired (if any) since the CCC was issued. Hydrant Pressure & Flow Testing
Fire Suppression Infrastructure	Pressure & Flow Testing in accordance with and applicable NFPA sections.
Stormwater Mains/ Services	Video Inspection and Mandrel Testing completed within the last 90 days. Video Inspection Log Infiltration/Exfiltration Testing (only required if infiltration or exfiltration occurs).
Stormwater Mains/ Services	Video Inspection and Mandrel Testing completed within the last 90 days. Video Inspection Log Infiltration/Exfiltration Testing (only required if infiltration or exfiltration occurs).

Sanitary Mains/ Services	Sewer Forcemains Pressure Test Results for any sections repaired (if any) since the CCC was issued. Geotechnical Materials testing has been conducted for any repaired sections (if any) since the CCC was issued if installed by the open-cut method.
	ON-SITE SURFACE IMPROVEMENTS
Sidewalks, Curbs, Gutters, Drainage Swales (Concrete), and Catch Basins Paved Roads and Lanes	Concrete Test Results (for repaired areas).
Paved Roads and Lanes	Asphalt Test Results (Top-lift and any repaired areas). Compaction Testing (repaired areas).
Paved Pathways	Asphalt Test Results (Top-lift and any repaired areas). Compaction Testing (repaired areas).
Gravel Pathways	Compaction Testing (repaired areas).
Gravel Roads and Lanes	Compaction Testing (repaired areas).
Overland Drainage Facilities (i.e., Swales)	Submission of FAC Form only.
Stormwater Management Facilities (i.e., Ponds)	Operation & Maintenance Plan Log. As-built pond survey confirming full required storage volume has remained during maintenance period. Verification from Engineering Consultant all Pond Control and alarm systems are operating and communicating per design (if applicable).
Overall Site and Lot Grading	As-builts Confirmation that public utility lots and municipal reserves have been graded as per the Final Grading Plan, top-soiled and seeded.
LANDSCAPING IMPROVEMENTS	



Landscaping	Landscaping Inspection Record indicating all required landscaping infrastructure and plantings are per design. Landscaping FAC inspections will be performed from May 1- Sept. 30 (Weather permitting). All FAC requests received after Sept. 30 will be conducted in the following year or as weather permits.
SPECIAL IMPROVEMENTS	
Fire Pump Houses	Maintenance Records. FAC inspection records from the Engineering Consultant confirm that the system is operating and communicating per design and Provincial requirements.
Fire Water Storage Ponds/Cisterns	 Maintenance Records. Operation & Maintenance Plan Log. FAC inspection records from the Engineering Consultant confirm that the system is operating and communicating per design and Provincial requirements. As-built pond survey confirming the complete required storage volume has remained during the maintenance period. Verification from the Engineering Consultant that all Pond Control and alarm systems are operating and communicating per design.
Water Treatment Plants	Maintenance Records. FAC inspection records from the Engineering Consultant confirm that the system is operating and communicating per design and Provincial requirements.
Sewage Lift Stations and/or Wastewater Treatment Plants	Maintenance Records. FAC inspection records from the Engineering Consultant confirm that the system is operating and communicating per design and Provincial requirements.
Lift Stations and Booster Stations	Maintenance Records. FAC inspection records from the Engineering Consultant confirm that the system is operating and communicating per design and Provincial requirements.

Offsite Improvements	
(i.e., roads, water mains, sanitary mains, stormwater infrastructure, etc.)	Varies depending on improvement. Requirements as per improvement categories listed above.

With the exception of landscaping (see Table 100-C for Landscaping requirements), after all of the items listed above are complete and submitted to the County's satisfaction, the Engineering Consultant shall submit a complete written request to the County to schedule an FAC inspection. In some cases, at the discretion of the County, the Engineering Consultant may make a written request for the inspection to the County prior to submitting the above paperwork, provided that all of the work is completed and the Engineering Consultant has inspected it and is satisfied there are no major deficiencies the County shall attempt to inspect within three weeks of receiving the written request, however, pending weather and seasonal conditions the County will make an inspection no later than within the time period as outlined in the Development Agreement. Either the Engineering Consultant or their representative must be present during the inspection and will be responsible for the following:

- Recording notes related to the inspection and providing a copy of the notes to the County following the inspection.
- Recording a list of deficiencies and/or defects noted during the inspection and providing a copy of the list to the Developer and the County following the inspection.

For inspections involving underground storm and sanitary systems, the Developer is responsible for ensuring that all manholes and catch basins are flushed/pumped clean prior to inspection. All inlets and outlets must be visible for inspection. The Developer shall make available necessary personnel with confined space certification for manholes and underground pipe inspections on pipes exceeding 900mm in diameter. Photography equipment shall be used for visual inspection purposes, with electronic photographs provided to the County post-inspection. Personnel shall be made available to open manhole lids and operate valves when underground infrastructure inspections are being carried out.

Prior to the Surface Improvements and/or Landscaping Improvements FAC inspection date, the Developer shall ensure that the entire Development and all disturbed areas are left in a neat and tidy condition, top soiled, grass catch is established, and all culverts are clean and undamaged, to the satisfaction of the County.

If defects or deficiencies in the Improvements are apparent to the County, the FAC forms may be rejected with a report of the deficiencies. The Developer shall promptly correct these deficiencies, and upon completion, the Developer's Engineer shall re-submit the FAC forms and request an FAC inspection. The County will carry out a second inspection to ensure the deficiencies are corrected. In some cases, at the County's discretion, the County may accept digital photographs of the repairs in lieu of a second inspection.

FAC inspections/reviews for each improvement category may be charged fees in accordance with the County's Master Rates Bylaw. The Developer must pay these fees prior to signing the FAC forms and any security release by the County.

If the FAC inspection shows that the Improvements have been completed to the County's satisfaction, the County shall sign and approve the FAC.

1012.2 Developer's Maintenance Period Responsibilities

Maintenance is a continuous operation for the Developer and must be a carried responsibility until the date of signing and acceptance of the FAC for each improvement. No releases from liability of any kind shall be given until all repairs or replacements required by the County have been made. FAC eligibility timelines are illustrated in Table 100-B.

TABLE 100-B	Final Acceptance Certificate (FAC) Eligibility Timelines
FAC IMPROVEMENT CATEGORY	FAC ELIGIBILITY TIMELINES ¹
Gravel Roads and Lanes	One year after CCC, eligible to apply for FAC. If deep utilities are installed under gravel roads or lanes, not eligible for FAC until deep utilities have received FAC.
Overland Drainage and Stormwater Management Facilities	Two years after CCC, eligible to apply for FAC.
Deep Utilities	Two years after CCC, eligible to apply for FAC. This improvement must have FAC acceptance or written permission from the County prior to placement of top lift.
Sidewalks, Curbs, Gutters, Drainage Swales (Concrete), and Catch Basins	Two years after CCC, eligible to apply for FAC. This improvement must have FAC acceptance or written permission from the County prior to placement of top lift.
Paved Roads and Lanes	Two years after paved road CCC, eligible for base lift asphalt Inspection. Upon satisfactory inspection, placement of top lift. After placement of top lift, immediately eligible to apply for FAC. (All concrete work and deep utilities must receive FAC prior to the placement of top lift).
Landscaping	Two years after CCC, eligible to apply for FAC.

 $^{\rm 1}$ FAC can be applied for on or after May 1 of the year the improvement is eligible for FAC.



The Developer shall be responsible for the proper and adequate maintenance to control dust and weeds in the Development so that dust and weeds originating therein shall not cause annoyance or become a nuisance to adjoining property owners and others in the vicinity, to the satisfaction of the County.

The Developer shall be responsible for proper and adequate maintenance and performance of any and all Improvements, including repairs and replacements to any Improvements which may, in the County's sole opinion, become necessary from any cause whatsoever, up until the issuance of the FAC.

Maintenance shall include, but not be limited to, the repair of failures of, or damage to, Improvements resulting from defective materials or improper installation or workmanship, the reseeding of areas with inadequate grass "catch," settlement of ditches and grading, gravelling, repairs or replacements of road surfaces, dust control, snow removal/sanding (including snow removal from immediate area of hydrants, Canada post turnouts, PUL access/parking areas, MR access/parking areas), prohibited and noxious weed control, cutting of grassed areas twice annually, regular maintenance and operation of underground systems, street sweeping annually and culvert clean-out annually. Performance shall include, but not be limited to, stormwater management, drainage capabilities, road surface durability, related aesthetic attributes and the ability of the Improvements to supply their intended service to the Development to the satisfaction of the County.

If during the construction, maintenance and/or performance period, any defects become apparent in any of the Improvements installed or constructed and the County requires repairs or replacements to be done, the Developer, within thirty (30) days after the delivery of the notice in writing to the Developer, or within such other time as is agreed to or specified by the County acting reasonably, shall cause such repairs or replacements to be done. For any defects deemed an emergency, in the sole opinion of the County, the County may require the Developer to make repairs and/or replacements immediately. If the Developer fails to complete such maintenance, repairs, or replacements within the specified time, the County may do the maintenance, repairs, or replacements and recover the full cost, including administrative fees in accordance with the County's Master Rates Bylaw, from the Developer on demand and/or by using the security.

Plowing and/or appropriate chemical anti-icing solutions and/or salt/sand mixtures must be used to facilitate safe driving conditions. In the case of snow removal, the Developer shall ensure that snowfall accumulations over 5 centimeters will be cleared within 48 hours. In the case of road maintenance or other defects deemed critical by the County, the Developer shall cause such maintenance, repairs, and/or replacements to be done within forty-eight (48) hours after the delivery of the notice in writing or verbal conversation. The Developer shall maintain each of the various Improvements until the issuance of the FAC at no expense to the County.

The Developer shall ensure that stormwater entering within and from the Development is managed in accordance with a Stormwater Management Plan that has been reviewed by the County and obtained the necessary Alberta Environment and Protected Areas approvals for the creation of trapped lows or ponding on or adjacent to road right-of-way or areas that have not been designated as stormwater management facilities will not be permitted. The Developer shall not divert water onto adjacent properties nor create a situation that may cause flooding of other lands. Should flooding occur as a result of the Developer's activities, it shall be the Developer's responsibility to rectify the situation and compensate those sustaining flood damage.

1013 CONDOMINIUM DEVELOPMENTS

Condominium developments are treated the same as all other developments, except that the responsibility for road and utility maintenance, as applicable, is typically turned over to the Condominium Association upon issuance of an FAC.



- 200 DRAWING REQUIREMENTS
- 201 GRADING DRAWING(S)
- 202 SURFACE IMPROVEMENTS DRAWING
- 203 TRAFFIC SIGNALS SITE PLAN
- 204 PAVEMENT MARKING AND SIGNAGE DRAWING
- 205 WATER DISTRIBUTION DRAWING
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- 209 PLAN PROFILE CONSTRUCTION DRAWING REQUIREMENTS

Section 200 Drawing Requirements



ROCKY VIEW COUNTY

200 DRAWING REQUIREMENTS

The County will generally require that City of Calgary CAD standards be applied to construction drawings during the design review phase and for as-built drawings during the CCC and FAC phases. Specific County expectations are described below.

Separate Cover Sheets (Plan Drawings) shall be submitted for each of the following:

- 1. Location Plan
- 2. Index Plan (Outlining Profile Numbers)
- 3. Tentative Legal Plan
- 4. Utility Right of Way Survey Plan (Shallow Utilities)
- 5. Utility Right of Way Survey Plan (Deep Utilities)
- 6. Utility Right of Way Survey Plan (Overland Drainage and or Stormwater)
- 7. Access Right of Way Survey Plan (as applicable)
- 8. Rough Grading Plan
- 9. Final Lot Grading Grade Plan
 - a. Original Ground Contours are to be shown on the grading plan
- 10. Surface Improvements drawing outlining:
 - a. Road, lane, curb and gutter, pathway, and sidewalk drawing
 - b. Road cross-sections (sections may be shown on a dedicated detail page)
- 11. Pavement marking and signage drawing
- 12. Water distribution system drawing
 - a. Potable water system
 - b. Fire suppression system (if separate from potable water)
 - c. Fire hydrant coverage area
 - d. Purple pipe system (if permitted)
- 13. Sanitary sewer system drawing
- 14. Sanitary catchment areas and pipe sizing calculations
- 15. Stormwater drawing Overland Drainage Plan
- 16. Stormwater drawing Underground system
- 17. Stormwater catchment areas and pipe sizing calculations
- 18. Stormwater drawing Ponds and pond details
 - a. Streetlight Plan
 - b. Landscaping Plan
 - c. Erosion and Sedimentation Control Plan
- 19. Other Control Plan details as required

Additional plans for water, sanitary, and stormwater treatment plants, lift stations, traffic signalization, etc., shall be included as required. Details that shall be included for specific cover sheets are listed below.
201 GRADING DRAWING(S)

201.1 General Drawing Requirements

- Identify details of edge conditions, back-sloping requirements, and areas where topsoil is to be placed and/or seeded.
- 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.
- Any unusual site conditions.
- Existing utility rights-of-way (easements).
- Existing survey control stations and markers.

201.2 Ground Contours

- Proposed grading contours.
- Identify natural features that are to be preserved and/or removed.
- Details of topsoil stockpile(s) include height, width, length, volume, and location.
- Location of all existing utilities (i.e., water, sanitary sewers, storm sewers, gas, electrical, pipelines, etc.).
- Proposed minimum finished floor elevations for buildings.
- Emergency spill locations and elevations.
- Proposed spot elevations at swales, property corners, and grade breaks for any important feature.
- Drainage pattern directions indicated with flow arrows.

201.3 Residential Grading Plans

- 1. Legal description (lot and block number) for each parcel of land.
- 2. Municipal address.
- 3. Back of sidewalk elevations at lot lines.
- 4. Lane/public utility lot elevations at lot lines.
- 5. Lot drainage pattern.
- 6. Location of power, telephone and television service
- 7. Location of hydrants, streetlights, transformers, switch gear cubicles, URDs, telephone pedestals, and cable television pedestals.
- 8. Indication of areas where the depth of fill exceeds 1.2 m (bearing certificates required).
- 9. Underground Service trench location (S).
- 10. Size of services entering the lot.
- 11. Driveway location (D).
- 12. Property corner elevation.
- 13. Electrical service location (*).
- 14. Bearing certificate required (BC).
- 15. Sump pump required (SP).
- 16. Original ground elevation (OG).

- 17. Minimum building opening elevation (MG/RMG).
- 18. Suggested front grade (FG).
- 19. Suggested rear grade (RG).
- 20. Groundwater elevation (GW).
- 21. Lowest top of footing (LTF).
- 22. Sanitary service invert 5m inside PL (SI).
- 23. Storm service invert 5m inside PL (STI).
- 24. Water line service to lot.
- 25. Water valve location and dimension from PL.
- 26. PRV (Pressure-Reducing Valve) if required.
- 27. Lot type (walkout/level/transition, back to front/sunshine).
- 28. Rear property corner elevation.
- 29. Direction of grading.
- 30. House number and Lot number.
- 31. Final Lot Grading Grade Plan should show original Ground Contours
- 32. Notes (M)

201.4 Cut/Fill Plans

- Cut/Fill Plans showing cut/fill design elevations and depth of cut or fill are required for all clearing and grading projects.
- Areas with fills greater than or equal to 2.0 m are to be highlighted on the drawing

202 SURFACE IMPROVEMENTS DRAWING

The surface improvement drawing package should contain the following:

- 1. Construction Boundary.
- 2. Street name.
- 3. Right-of-way alignments with dimensions.
- 4. Cross-section details
- 5. Carriageway widths edge of pavement to edge of pavement (EOP to EOP) or (LOG to LOG for Urban design).
- 6. Sidewalk and/or curb type and width.
- 7. Boulevard widths.
- 8. Approach details and locations.
- 9. Direction of stormwater flow along roadways.
- 10. Horizontal curve (HC) information.
- 11. Manholes and catch basins, ICDs, including type and identification number.
- 12. Subdrain locations and details.
- 13. Curb ramps and dimensions.
- 14. Drainage features including waterways, lakes, ponds, canals, swales, ditches, and culverts, noting the direction of flow and existing water levels at the time of survey.
- 15. Temporary access roads and/or turnarounds.
- 16. Pathways and/or sidewalks, including bollard locations and cross sections.

- 17. Typical cross sections for all roadway designations.
- 18. Mailbox turnouts.
- 19. Subdivision Entrance Signs.
- 20. Transit Stops.
- 21. Fencing.
- 22. Pavement structure design.
- 23. Separate Details page with proposed road cross sections.

203 TRAFFIC SIGNALS SITE PLAN

Traffic Signals shall generally be designed in accordance with the Alberta Transportation and Economic Corridors Standard drawings for traffic signals. In particular, the County requires:

- Lighting Electrode Location
- Traffic Controller Cabinet
- Cantilever Signal Pole
- 3 Section Horizontal R-A-G Display
- 3 Section Vertical R-A-G Display
- 4 Section Horizontal Display on Cantilever Arm R-A-G Display (Protective/Prohibitive)
- 3 Section Vertical Display on Pedestal Pole R-A-G Display (Protective/Prohibitive)
- Vehicle Phase
- Pedestrian Phase
- Proposed RPVC Conduit
- Proposed Communication Conduit
- Existing Conduit
- Intersection Design Criteria (table)
- Conductor Cable (table)
- Video Detector Zone Details (table)
- Coordinates (table)
- Signal Display
- Emergency Pre-Emption Display

203.1 Traffic Signal Elevations Drawing

Elevation drawing of signal poles showing:

- 1. Signal location relative to the Centre Line of Lane
- 2. Street name location
- 3. Details Drawing
- 4. Signal Type, Colours, LED, Mounting Hardware
- 5. Antena and Mounting Bracket
- 6. Pre-Emption
- 7. Camera
- 8. Directional Arrows
- 9. All vertical and horizontal dimensions
- 10. Product List (table)
- 11. Wiring inside Pole instructions

203.2 Traffic Signal Details

- Concrete Base details
- Other details as applicable.

204 PAVEMENT MARKING AND SIGNAGE DRAWING

- Construction Boundary.
- Pedestrian Crossings.
- Customized signage as required.
- Traffic signs.
- Pavement markings.
- Street name identification signs.
- Subdivision information signs.
- Construction signs.
- Detention pond warning signs.
- See also section 400.

205 WATER DISTRIBUTION DRAWING

- Construction Boundary.
- Main alignments with line assignment dimension from the property line.
- Hydrants.
- Valves.
- Pipe material and wall thickness identification.
- Pipe size.
- Pipe specifications.
- Pipe curvature radii for curved pipes.
- Fittings (tees, valves, bends, flushing assemblies, etc.).
- Elevations at Crossings with other utilities along with clearance.
- Hydrant coverage plan.

206 SANITARY SEWER DRAWING

- Construction Boundary.
- Sanitary catchment plan and calculations.
- Easements/rights-of-way.
- Invert and rim elevation at all manholes.
- Distance, pipe size, pipe material and grade between manholes.
- Pipe curvature radii for curved pipes.
- Main alignments.
- Stage, Area, and Discharge Table.
- Direction of pipe flow.
- Maintenance hole size and maintenance hole shape.
- Identify drop manholes (interior/exterior).
- Off-site connections.

Manholes located in trap low areas require sanitary seals and shall be indicated on the drawings.

206.1 Overland Drainage Drawing

- Construction Boundary.
- Major drainage routes.
- Swale and or ditch details.
- Location of trapped lows is shown in the table, including elevations, spill elevations, spill depths, spill volume, and 100-year volume and depths.
- Drainage catchment areas.
- Direction of drainage flow.
- If applicable, a Stage, Area, Volume and Discharge Table for traplows.
- Cross-section details.
- Emergency spill route.
- Trap low information low point elevation, spill elevation, 1:100 year depth, and Q, V,
 D.
- How all stormwater entering into and exiting from the subject lands will be controlled and disposed of, including:
 - o How drainage from its natural route(s) will be controlled.
 - o Original ground contours at 0.5 m intervals.
 - o Drainage easements.
 - o Proposed site grading contours and elevations, including direction of flow swales, ditches, culverts, and overland flow paths.

206.2 Storm Sewer Drawing – Underground Systems

- Construction Boundary.
- Storm catchment plan and calculations.
- Minor drainage system main alignments.
- Invert and rim elevation at all manholes.
- Distance, pipe size, pipe material (general note acceptable), and grade between manholes.
- Pipe curvature radii for curved pipes.
- Main alignments.
- Direction of pipe flow.
- Manholes, catch basin manholes, maintenance hole type, and identification numbers.
- Maintenance hole size.
- Catch basin leads.
- Off-site connections.

206.3 Storm Sewer Drawing – Ponds and Pond Details

- Inlet/outlet elevations.
- Discharge structure details.
- Side slopes.
- Base area and overflow area.

- Emergency spill elevation and route.
- Pond capacity.
- Pond bottom, average water level, high water level, freeboard, spill elevations and pond liner (if applicable).
- Drafting hydrant location, including turnouts.
- Maintenance road details.

207 EROSION & SEDIMENT CONTROL DRAWINGS

- ESC 1 Present Site Conditions.
- ESC 2 Intermediate Site Conditions.
- ESC 3 Final Site Conditions.
- ESC 4 ESC Details.

208 LANDSCAPE DRAWINGS

208.1 General Requirements

All landscape drawings shall be sealed and signed by a Registered Landscape Architect with current membership in the Alberta Association of Landscape Architects and/or Canadian Society of Landscape Architects.

208.2 Layout Plan

All County lands, berms, parks, roadway boulevards, utility lots, and buffers.

- Existing and proposed municipal improvements located within and/or adjacent to the site.
- Existing and proposed utilities, easements, and encumbrances.
- Adjacent land uses, roads, utilities, and structures.
- Show the proposed layout of all recreation infrastructure and site amenities, including but not limited to parks, schools and recreational facilities, playgrounds, baseball diamonds, sports fields, buildings, pathways, trails, bollards, gates, garbage receptacles, benches, basketball courts, outdoor rinks, tennis courts, mailboxes, signage, fencing, etc.
- Pedestrian crossing locations and details.
- Fencing or other property delineation specifications and alignment.

208.3 Planting Plan

- Existing trees, vegetation, and other natural features that are to be retained.
- Topsoil depths.
- Areas to be sodded/seeded with the specified seed mix.
- Tree and shrub planting plan including location of plant material with symbols, botanical name, common name, quantities, size, and spacing.
- Type and depth of mulch for shrub beds and tree wells.

Aquatic plantings and pond edge cross sections (where applicable).

208.4 Irrigation Plan

- Irrigation systems where applicable.
- Electrical service and intake details.

208.5 Lighting Plan (if applicable)

• Lighting details, including street lighting and park/pathway lighting.

208.6 Signage Plan

• Location, type, specifications of all interpretative, pedestrian crossing, County lands, directional, and safety signage.

208.7 Playground Construction Plan (if applicable)

- Location and details of playground equipment.
- Surfacing and edging material.
- Associated amenities (benches, garbage receptacles, landscaping, etc.).
- Manufacturers' information.

208.8 Recreation infrastructure

All recreation infrastructure and site amenities, including but not limited to parks, schools and recreational facilities, playgrounds, baseball diamonds, sports fields, buildings, pathways, trails, bollards, gates, garbage receptacles, benches, basketball courts, outdoor rinks, tennis courts, mailboxes, signage, fencing, etc.

209 PLAN PROFILE CONSTRUCTION DRAWING REQUIREMENTS

Plan View

See requirements as per above.

Profile View

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

- Stationing for road, lane, swale, and/or utility lot center lines.
- Vertical and horizontal scale indexing the survey datum:
- Typical H 1:500, V 1:50.
- Specify if a double vertical scale is being used.
- Existing Original Ground in Profile View.
- Vertical and horizontal point of intersection (PI) elevations for utility mains and surface improvements

- Length and grade between PI's for utility mains and surface improvements.
- Vertical curve information including chainage and elevations of BVC, PVI, and EVC length of curve; K values; and M values.
- Specify the actual high/low points on the vertical curve.
- Approach locations, including culvert locations with invert elevations.
- Ditch checks.
- Vertical alignments of manholes, valves, and hydrants.
- Hydrant flange elevations.
- Maintenance hole rim and invert elevations, maintenance hole size, pipe size type, and DR rating.
- Specify Design Q, Capacity, and Velocity for Storm Infrastructure.
- Utility main lengths, sizes, materials, and gradients.
- Road, lane, and swale station and grade ties.
- Specify bedding class for underground.
- Superelevation design table/criteria if applicable.

- **300 GEOTECHNICAL REPORTS**
- **301 COUNTY SPECIFIC REQUIREMENTS**
- 302 AUTHORSHIP
- **303 GEOTECHNICAL EVALUATION REPORT**
- 304 PRELIMINARY SLOPE STABILITY EVALUATION
- **305 DEEP FILLS REPORTS**
- **306 ENGINEERING VERIFICATION**
- 307 HYDROGEOLOGICAL REPORT
- 308 GEOTECHNICAL DEVELOPABLE AREA
- **309 GEOTECHNICAL COVENANT**

SECTION 300

Geotechnical Reports



300 GEOTECHNICAL REPORTS

301 COUNTY SPECIFIC REQUIREMENTS

This section lists the requirements specific to Rocky View County related to preparing and submitting geotechnical reports for land development applications. In addition to the requirements below, the County will refer to the City of Calgary Geotechnical Report Guidelines for Land Development Applications as applicable.

The geotechnical reports are provided to confirm that the proposed land development will minimize the risk to public safety and will not adversely impact the existing conditions of the adjacent lands.

The following lists the main types of geotechnical reports required for land development applications:

- Geotechnical Evaluation Report
- Slope Stability Report
- Deep Fills Report

Depending on the proposed development and characteristics of the parcel, a hydrogeological report may be required and should be provided by a Geotechnical Engineering Consultant with appropriate experience in hydrogeology.

302 AUTHORSHIP

A qualified Geotechnical Engineering Consultant must author geotechnical reports submitted to the County under sign/seal. Geotechnical reports should be submitted to the County electronically in PDF format unless otherwise requested by the County.

TABLE 300-A	Geotechnical Report Requirements				
DEVELOPMENT STAGE	MUNICIPAL REQUIREMENT				
Land Use and Redesignation	Preliminary Slope Stability Evaluation if slope exceeds 15% Preliminary Geotechnical Evaluation Report (limited scope evaluation with reduced borehole spacing needed to address the viability of the project from a geotechnical standpoint from a land-use redesignation perspective. Number of boreholes and spacing to be recommended by the Geotechnical Engineering Consultant based on the conceptual development plan).				
Subdivision/ Development Permit	Slope Stability Evaluation if slope exceeds 15% Geotechnical Evaluation Report				



303 GEOTECHNICAL EVALUATION REPORT

The County may require a Geotechnical Evaluation Report prior to commencing Subdivision or Development Permit approval. The Geotechnical Evaluation Report shall evaluate the subsurface conditions (soil and groundwater) based on information from test holes drilled within the project site. The geotechnical subsurface drilling program should consist of the following as a minimum:

- Test holes with a maximum grid spacing of 175 m per development area and
- Minimum 2 test holes for each proposed development.

The number and depth of test holes should be sufficient to appropriately evaluate subsurface conditions for the proposed development. Standard piezometers shall be installed in all test holes.

The Geotechnical Evaluation Report must include the following:

- A description of the objectives/scope of the report and the extent of the study area.
- A description of the terrain, topography, vegetation, and significant geographic features.
- A description of the evaluation methodology, including the subsurface investigation and laboratory test program.
- Subsurface investigations should include a test hole location plan, soil logs for each test hole, and laboratory testing results.
- All test holes should be surveyed (coordinates and elevations). A description of the interpreted geotechnical site conditions based on the field investigation and laboratory testing.
- Comments regarding the site's suitability for the proposed development, including commentary regarding developable areas and/or geotechnical covenants such as slope stability setbacks, deep fill areas, hydrogeology, etc.
- Relevant design recommendations for the proposed development may include foundation design, slope stability assessment/analysis, backfill specifications, deep utility installation, weeping tiles, sump pump, construction excavation, pavement structures, and sub-drain requirements.
- Any recommendations and discussion required concerning the proposed Development (e.g., site grading, foundations, frost protection, retaining walls, slab on-grade, construction procedures, concrete type, weeping tile requirements, pavement design, site drainage, testing and inspection to be carried out during construction).

The Geotechnical Evaluation Report may recommend additional studies, including topsoil assessment, environmental assessments, slope stability assessment/analysis, sewage/septic systems, hydrogeological assessment, pavement design, stormwater management, and other development constraints applicable to the proposed development not covered in the Geotechnical Evaluation Report. Geotechnical investigations are an integral component of proper stormwater facility design. In addition to the requirements outlined within the City of Calgary Stormwater Management & Design Manual, geotechnical reports must address soil permeability and salinity (or other potential contaminants), existing groundwater levels, groundwater conditions, and recommended use of monitoring wells. The report must also clearly state that stormwater facilities will not adversely affect surrounding properties due to water migration and/or provide any recommendations to confirm this (i.e., lining of ponds).

303.1 Required Testing Provided in Geotechnical Evaluation

The minimum testing required is as follows:

- Soil moisture contents at 1.5 m intervals throughout each borehole,
- A sufficient number of soil sulphate tests to represent the various soil types considering the proposed Development,
- An adequate number of California Bearing Ratio (CBR) tests to represent the road subgrade soils throughout the Development,
- Particle size analysis for each predominant soil type,
- Atterberg limits of fine-grained soils, and
- Measurement of groundwater table and analysis of its influence concerning the design of the proposed development.
- Per the discretion of Rocky View County, a groundwater monitoring program may be requested depending on the size, location, site features, and development type of the project site.

304 PRELIMINARY SLOPE STABILITY EVALUATION

The County requires a Preliminary Slope Stability Evaluation where any existing or proposed slopes within the proposed development exceed 15% and are greater than 2 meters in vertical height. If the Geotechnical Engineer can certify the stability of the slopes prior to, during, and after development, these areas can be considered part of the developable area.

Any areas with major erosion, past slope failures, slopes exceeding 30% and greater than 3 meters in height, and/or areas with slope stability concerns will require a Slope Stability Analysis Report.

The Preliminary Slope Stability Evaluation shall comprise, as a minimum, a site reconnaissance and survey of the project site. The Preliminary Slope Stability Evaluation Report should:

- Identify lands/areas that are suitable or not suitable for the intended development.
- Identify slopes within the site where existing or final design slopes exceed 15%.

- Identify past, current, and/or potential future areas of slope instability, including possible causes of instability (e.g., surface water, groundwater, erosion, soil stratigraphy).
- Identify areas requiring further investigation or slope stability analysis.
- Provide comments regarding the suitability of slopes for the intended development.
- Provide recommendations to mitigate potential slope stability concerns postdevelopment.

304.1 Slope Stability Analysis Report

The County requires a Slope Stability Analysis Report for areas with major erosion, past slope failure, slopes exceeding 30% and greater than 3 meters in height, and/or areas with slope stability concerns. If the Geotechnical Engineer can certify the stability of the slopes prior to, during, and after development, these areas can be considered part of the developable area.

The Slope Stability Analysis Report must consider pre- and post-development conditions. Any developments located adjacent to slopes should maintain a minimum Factor of Safety (Fs) of 1.5 (1.0 for seismic loading). The Slope Stability Analysis Report must include the following:

- Identify the objectives/scope of the slope stability analysis, including the location/extent of slopes being analyzed.
- The analytical methodology utilized in the slope stability analysis, including any test hole logs, input parameters, cross-section location(s), and critical slip failure.
- The Fs analysis results of slopes considering pre- and post-development conditions.
- The analysis must consider any existing natural/man-made or proposed features that may affect the slope stability (e.g., septic fields, irrigation, construction, stormwater, erosion, vegetation, and buildings).
- Provide a safe setback distance from the crest and toe of the slopes. The setback distance should be presented visually on a development plan.
- If development features are located in areas where the Fs is less than the approved Fs, the slope may be modified using remedial measures recommended by the Geotechnical Engineering Consultant. Any remedial measures to increase the Fs must consider the effect on adjacent man-made and natural features and be approved by the Geotechnical Engineering Consultant.
- Provide recommendations to mitigate potential slope stability concerns postdevelopment, which may include recommendations for slope drainage, surface water management, erosion protection, revegetation, etc.
- Clearly state whether the site is suitable before, during, and after development.

Slope areas can be considered part of the developable area if the slope stability report confirms the slopes' stability with a minimum Fs of 1.5 before, during, and after development. A certified letter from a qualified Geotechnical Engineer must be provided for the slopes' developable area.

The Developer and/or Builder are responsible for ensuring that all recommendations and mitigations in the Slope Stability Analysis Report are complied with. This will require registering a geotechnical covenant on the parcel of land.

304.2 Retaining Walls

The County requires a slope stability assessment for Retaining Walls with an exposed wall height greater than 1.2 m. The stability assessment shall include the Fs against failure, including sliding, overturning, bearing, and global slope stability.

The Retaining Wall design must be designed and signed/sealed by a qualified Geotechnical/Structural Engineer. The Retaining Wall should be designed in accordance with the current version of the Alberta Building Code.

305 DEEP FILLS REPORTS

The County requires a Deep Fills Report when the compacted fill depth exceeds 2.0 metres. The Deep Fills Report must include the following:

- Identify proposed fill locations, fill thickness, and fill type. The proposed fill type should be suitable engineered fill (refer to specs or gradation).
- Provide recommendations for backfill and compaction, including Standard Proctor Maximum Dry Density (SPMDD), moisture content, and fill lift thickness.
- Development areas should be compacted to a minimum of 98% SPMDD. Fillin areas where non settlement sensitive features are placed may be compacted to 95% SPMDD pending Rocky View County review and approval.
- Provide proper site preparation requirements prior to placing the engineered fill.
- identify the potential impact of engineered fill on the site's local hydrogeology.
- Estimate the magnitude and rate of anticipated settlement of the engineered fill and the underlying soil.
- Determine the lag time requirement after completion of fill placement and the start of development construction.

Following development approval, all deep-fill placement areas must have a record of compaction testing. After the fill construction is completed, the County must receive a compaction report certifying the placement of the engineered fill.

306 ENGINEERING VERIFICATION

The Developer shall retain a Geotechnical Engineering Consultant to review the final engineering drawings and conduct geotechnical monitoring during construction. The Geotechnical Engineer shall certify, in writing, that the plans and construction were completed in accordance with the recommendations made in the Geotechnical Evaluation Report and, if required, the Slope Stability Assessment/Analysis Report and Deep Fills Report.

This documentation is required before any Development Permit(s), Foundation, and/or Building Permit(s) will be issued.

307 HYDROGEOLOGICAL REPORT

The County requires a Hydrogeological Report when groundwater is a known potential concern. The Geotechnical Engineering Consultant with appropriate experience in hydrogeology should identify it.

The Hydrogeological Report should consider current groundwater elevations, seasonal fluctuations, existing topography, future grading, and any existing or future development features that may impact groundwater levels. The Geotechnical Engineering Consultant should design a groundwater monitoring program.

The Hydrogeological Report must include the following:

- A description of the objectives/scope of the report and the extent of the study area.
- A description of terrain, topography, vegetation, and significant geographic features.
- A description of the approach methodology, monitoring program, and modelling, if applicable.
- Test hole locations and the high groundwater table at each test hole should be delineated on a drawing.
- A description of the hydrogeological conditions and anticipated impact of the development.
- Commentary regarding the suitability of the development based on the hydrogeology.
- Recommendations for mitigation or additional studies that would be beneficial to the development.

308 GEOTECHNICAL DEVELOPABLE AREA

The Geotechnical Developable Area shall be a minimum of one contiguous acre.

The Geotechnical Developable Area may include areas with slopes greater than 15% if there is an accompanying Slope Stability Assessment or Slope Stability Analysis Report that certifies slope stability prior to, during, and after development to meet the required Fs of 1.5 to the satisfaction of Rocky View County. The Slope Stability Analysis Report must provide any geotechnical covenants or setback distances to maintain slope stability for such areas.

309 GEOTECHNICAL COVENANT

Based on the recommendations of the Geotechnical Report and to the satisfaction of the County, the Developer is responsible for any development and geotechnical covenant or restrictions to be registered on the title of each parcel.

Examples of a geotechnical covenant may include a line of stability (i.e., development setback), deep fill areas requiring construction lag time, stormwater infiltration, water restrictions, vegetation removal, etc.

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Section 400 Road Design Guidelines



400 ROAD DESIGN GUIDELINES

401 TRAFFIC IMPACT ASSESSMENTS

401.1 Purpose of a Traffic Impact Assessment

A Traffic Impact Assessment (TIA) aims to review and evaluate operational conditions within the analyzed area and assess the impact of a proposed development and/or changes to the transportation network. A TIA shall be completed in accordance with the latest edition of *Traffic Impact Assessment Guidelines* by Alberta Transportation and Economic Development¹ and the following sections below. Should there be a conflicting statement between Alberta Transportation and Economic Development's Traffic Impact Assessment Guidelines and the following sections below, the Applicant shall confirm with the County which statement will govern their TIA.

401.2 TIA Reports and Memorandums

In general, two levels of assessment may be required in support of a development:

- Comprehensive TIA Report: used for more extensive development with significant traffic impacts or at complex locations where the recommended improvements require a detailed analysis.
- 2) Memo Report: may be used for small developments with low traffic impacts at simple locations where the recommended improvements can be assessed in a memo format.

401.3 Need for a TIA

A comprehensive TIA report is typically required if a proposed development generates 100 or more trips per day. However, please note that full TIAs may be needed when less than 100 new trips are anticipated depending on site-specific circumstances, or any safety concerns. Various factors could trigger this, including access points and driveway location/spacing, drive-through queue, traffic circulation (both on-site and off-site), sightlines, existing road condition/capacity, history of traffic operations and safety records, etc.

At the County's discretion, a TIA Memorandum with a reduced scope of work can still be required for developments expected to generate less than 100 trips per day. The Engineering Consultant will discuss the Project with the County and determine whether a TIA is needed and, if so, the appropriate scope of work based on the development's scale and potential transportation impacts.

If the development is located close to a provincial highway and requires a TIA according to Alberta Transportation and Economic Development's TIA Guidelines, the scope of work should be discussed in collaboration with Alberta Transportation and Economic Corridors and the County.

In an Urban setting, a TIA should be completed in accordance with City of Calgary guidelines and will be required if development generates more than 100 trips / hour at any given peak period.

401.4 TIA Shelf Life

Generally, a TIA study accepted by the County will be valid for up to five (5) years. An updated TIA will be required if an acceptable amount of development has yet to occur within the five (5) year period or if significant changes to the development plan are proposed (e.g., land-use assumptions, etc).

401.5 TIA Scope

At the beginning of the Project, the Consultant must submit a scope document to the County specific to the proposed development. This document is to include, at a minimum, the following:

- The site location
- The proposed land uses
- Development schedule (known or assumed)
- The proposed study area (including intersections to be analyzed), include a map and description
- Future analysis horizon years
- Any proposed deviations from the County's TIA standard requirements, e.g., traffic growth rate, etc.

401.6 Study Area

The Study Area will be discussed with the County for review and approval before the Engineering Consultant conducts the TIA. It will include the area adjacent to the proposed development and involve all the proposed access points and selected intersections within the study area (as determined through consultation with the County). This includes off-site intersections that will be utilized by the trips generated from the development.

The study area should extend far enough, within reason, to contain all municipal and provincial roadways that will be noticeably affected by the travel generated by the proposed development.

401.7 Report Structure

The content of the TIA report should generally follow the structure as outlined in Alberta Transportation and Economic Development's Traffic Impact Assessment Guidelines and include the following sections:

- Introduction and Background Information on the Project:
 - Add summaries of previous reports that may be related to the current Project.
 - Confirmed scope of work.
 - Existing Traffic volumes (figure).
 - Capacity analysis.

- Future Horizon Background Operating Conditions (horizons to be determined):
- Forecast traffic volumes (figure).
- Proposed Development:
 - Site location (description and figure).
 - Site description add characteristics of the proposed development such as land uses, proposed intensities, access locations and accommodation of active transportation, transit (if applicable), etc.
 - Trip generation.
 - Trip distribution and assignment (table or figure).
 - Post-Development Operating Conditions:
 - Traffic volumes (figure).
 - Discussion of results and recommended improvements.
 - Traffic Signal Warrants and other warrants conducted for the recommended improvements.
 - Conclusions and Recommendations.
- Appendices should include:
 - Scope confirmation and terms of reference (either email or document).
 - Traffic counts, trip generation, and parking generation survey data (when applicable).
 - Signal timing plans (when provided).
 - Any spreadsheet files or calculations that will help understand the methodology followed for traffic analysis.
 - Synchro/SimTraffic and SIDRA outputs.
 - Signal and pedestrian warrant calculations.
 - Pages or excerpts from supporting documents (e.g., memorandums, ASP).
 - Figures to be included throughout the report:
 - Site location.
 - Trip generation and trip assignment.
 - Existing volumes, the site generated volumes, background horizon volumes, and post-development horizon volumes.
 - Site circulation (if applicable).
 - Road classification (if applicable).
 - Transit services (if applicable).

- A TIA report summarizing the analysis, including development description, assumptions used in the analysis, traffic volumes, micro-simulation results, etc.
- Summaries in the capacity analysis must include v/c ratios, LOS values, delay per movement (seconds), 95th percentile queue lengths as well as ICU% and corresponding LOS, and signal timing (if signal installation is required).
- A Registered Professional Engineer in Alberta must sign and stamp the Traffic Impact Assessment.
- An electronic copy of the Synchro files should be submitted with the TIA Report.
- County staff may also request a parking review if the proposed parking supply does not meet the zoning requirements.

401.8 Memorandum Structure

Developments expected to have minimal impact on the transportation network may warrant some basic transportation analysis to help quantify the impacts. The memorandum structure should include the following sections but is subject to change at the discretion of the County staff.

- Background
- Scope of work
- Existing traffic volumes
- Trip generation/distribution
- Post-development traffic volumes
- Capacity analysis
- Conclusions and recommendations

401.9 Analyzed Horizons

The analysis should be carried out for:

- Existing conditions using the existing traffic volumes.
- Opening day showing conditions on the opening day, which should include background and post-development traffic (background plus site-generated traffic).
- Each horizon should also include background and post-development traffic volumes so that the specific impacts of the proposed development can be assessed.
- Typical future horizons to be analyzed in the TIA are opening day + 10 years and opening day + 20 years. Additional analysis horizons may be required by County staff to be confirmed as part of the TIA scoping discussions; however, in general:
 - 10-year future background
 - 10-year post-development
 - 20-year future background

20-year post-development

401.10 County Traffic Projections

To estimate future background traffic volumes, the Consultant can either rely on the County's model or use a non-compounded growth factor based on historical volumes. Should historical information be unavailable, an average of 2.0% to 2.5% non-compounding annual long-term growth factor should be used in the analysis unless the County staff has adopted different growth factors. A 2.0% non-compounding yearly growth rate will be used when historical information is unavailable. The County has recently updated its Traffic Model to include growth projections consistent with the growth strategy provided by the Calgary Metropolitan Region Board (CMRB). The use of the County's traffic model to project future volumes may be appropriate in some instances. The method used to project future traffic volumes should be discussed with County staff during the scoping exercise.

401.11 Required Development Related Information

The Consultant should include the following information related to the proposed development:

- Development/Developer name
- Legal location
- Development type
- Development size (intensity of each land use)
- Staging (by planned year)
- Key map
- Site plan

401.12 Required Access Road Information & Safety Analysis

The TIA should contain information pertaining to the road(s) for which the proposed development access will be provided. Information which should be included but not limited to:

- The existing and the proposed configuration of the access intersection(s);
- Grades along the existing County and proposed access roads; and,
- Site access turning sight distance and stopping sight distances.

A safety analysis should be considered, including the following:

- Sight distance evaluation: Sight distance shall be evaluated at each intersection where a new road is proposed. The sight distance requirements shall follow the standards outlined in the most recent version of Alberta Transportation and Economic Development's Highway Geometric Design Guide.
- Access management: Access locations should be spaced sufficiently from existing intersections. The most recent version of TAC's Geometric Design Guide for Canadian Roads shall be used to determine the standards.

• Traffic calming measures: When warranted, the Consultant should provide recommendations for traffic calming measures in residential areas to minimize speeding and to improve pedestrian safety.

401.13 Traffic Count Data

When gathering or using traffic/pedestrian data, follow the traffic count guidelines outlined in the most recent version of the Alberta Transportation and Economic Corridors Traffic Impact Assessment Guidelines.

401.14 Traffic Generation

Local trip generation rate studies that reflect the proposed Land Use are preferred to estimate the traffic generation of the development. If local trip generation studies are unavailable, Institute of Transportation Engineers (ITE) traffic generation rates should be used to estimate the anticipated traffic generated by the proposed development. Reasons for using the different rates shall be documented and approved by the County prior to the commencement of the analysis.

401.15 Traffic Distribution and Assignment

The TIA should document traffic distribution and assignment assumptions, including pass-by and diverted linked trips. For a breakdown of internal and pass-by trips, refer to the guidelines outlined in the most recent version of the Alberta Transportation and Economic Corridors Traffic Impact Assessment Guidelines. The County's traffic model can also be used to determine trip distribution patterns from proposed developments.

401.16 Signal Warrant

Signal warrant analyses shall follow the procedure defined in the most recent version of the Transportation Association of Canada (TAC) documents. The Signal Warrant spreadsheet provided by TAC shall be used with data from a standard six-hour traffic count.

401.17 Intersection Geometry Warrant

Intersection geometry warrant analyses shall follow the process indicated in Chapter D of the most recent version of the Alberta Transportation and Economic Corridors Highway Geometric Design Guide. The spreadsheet created by Alberta Transportation and Economic Development, "Intersection Analysis—Rural Two-Lane Undivided Highway," shall be used for more accuracy when determining if an intersection requires geometric upgrades.

401.18 Roundabout Feasibility

A roundabout analysis should be considered for any existing or future signalized intersection showing a poor level of service in future horizon years. A reference that can be used as a guideline for this analysis is the National Cooperative Highway Research Program (NCHRP) Report 672: Roundabouts: An Informational Guide—Second Edition.

401.19 Capacity Link Analysis

A road link analysis shall be completed to determine the development's impact on the road's environmental capacity. The Rocky View County Servicing Standards shall be used to determine the appropriate volumes for each road type.

401.20 Intersection Capacity Analysis

Intersection capacity analysis should be carried out using Synchro or similar software packages based on the Highway Capacity Manual (HCM). SIDRA is the preferred software for the analysis of roundabouts, but other software may be utilized subject to the County's approval. Refer to the Alberta Transportation and Economic Corridors Traffic Impact Assessment Guidelines for the list of preferred software applications.

401.21 Synchro and SIDRA Parameters

The Synchro and SIDRA parameters shall follow those outlined in the City of Calgary Traffic Impact Assessment Guidelines unless Rocky View County directs otherwise.

401.22 Intersection Capacity Analysis Results

For developments that are predominately Urban in nature, with piped water and sewer services, the accepted v/c ratio is 1.00 with a minimum LOS of E. For predominately Rural developments, the accepted v/c ratio is 0.90 with a minimum LOS of D.

402 GENERAL ROAD DESIGN AND CONSTRUCTION REQUIREMENTS

The sections below list the road requirements within Rocky View County related to the preparation and submission of roadway designs and construction. Unless otherwise specified in this section, the County applies the most recent editions of the existing standards, specifications, and guidelines from the following organizations to County development projects:

- Transportation Association of Canada (TAC)
- Alberta Transportation and Economic Corridors (ATEC)
- City of Calgary
- Canada Post Delivery Planning Standards Manual for Builders and Developers

In situations with a discrepancy with overlapping design standards, designers and contractors shall not choose lesser design elements from two different standards or specifications and apply them together when the lesser elements were not intended to be applied together. In most cases, one design standard should be followed in its entirety to avoid selecting lower design or construction elements from the various standards, specifications, and guidelines. However, complimentary references to two different standards (i.e., AT and TAC) may be appropriate in some cases. The Developer is responsible for ensuring that the design, construction, and performance of all infrastructure constructed under the Development Agreement, Road Construction Agreement, or offsite works constructed under a Development Permit meets or exceeds these standards, specifications, and guidelines.

All road design and construction must be certified by and performed under the supervision of a qualified Engineering/Geotechnical Consultant. The design guidelines in this section are minimum requirements, and the Developer's Engineering/Geotechnical Consultant must certify that an adequate roadway design meets applicable standards, specifications, and guidelines provided to the County.

402.1 Urban vs. Rural Design

The County Road network is comprised of rural roads and urban roads. Generally, a rural road is defined as a road cross-section that utilizes roadside ditches and an urban road is defined as a road cross-section that utilizes curbs and gutters.

In some cases, County planning documents such as Area Structure Plans, Conceptual Schemes, Direct Control Bylaws, or Master Site Development Plans may specify a requirement for using either Urban or rural cross-sections. In the absence of a particular cross-section being defined by other County documents, a Developer and their Engineering Consultant can choose which cross-section to apply to their development based on what works best for the development and the development's stormwater management system at the discretion of the County.

402.2 Top Lift of Asphalt

Typically, all roads constructed as part of development projects require that the base lift of asphalt be placed prior to CCC and that after 2 years, prior to FAC, a top lift of asphalt is placed. In some cases, both the base lift and the top lift can be placed prior to CCC, subject to a 2-year maintenance period where all deficiencies are corrected prior to FAC. This will be limited to off-site road upgrades (i.e., not on internal subdivision roads) where full design AADT and Truck traffic percentages of the AADT will be imposed on the road upon completion of construction.

403 URBAN ROAD DESIGN GUIDELINES

In the areas where urban road cross-sections are used, the current editions of the City of Calgary and TAC standards, specifications, and guidelines are to be used, as noted in Table 400F. In cases where an urban road is being designed and interfaces with the Provincial Highway Systems, the County may apply the urban road design guidelines from the Alberta Transportation and Economic Corridors Highway Geometric Design Guide. The reference to the City of Calgary and Alberta Transportation and Economic Corridors (if applicable) criteria are in respect but not limited to the following design criteria:

- Cross-section elements
- Right-of-way width
- Pavement structure

- Utility placement/line assignments
- Lighting
- Noise attenuation
- Drainage infrastructure (e.g., catch-basins, subdrains).
- All public streets within a proposed residential, industrial, commercial, and/or institutional subdivision shall be paved.
- > All dead-end public roadways shall end in a cul-de-sac that meets the City of Calgary standards.
- Utilities must be installed within utility rights-of-way, outside the County Road allowance wherever possible

403.1 Road Approaches

The urban road approaches onto Urban cross-section roads shall be designed, located, and constructed per the City of Calgary standards, specifications, and guidelines. In addition:

- Road approaches shall be located greater than 150 m from bridges, bridge-sized culverts or at-grade railway crossings unless approved by the County.
- Maximum of 1 approach per residential lot unless there is a lane then a second approach to the lane can be installed.
- Maximum number of approaches for non-residential shall be consistent with Table 400B.
- All proposed road approaches to County roads within 1.6 km of a Provincial highway shall be referred directly to Alberta Transportation and Economic Corridors for a Roadside Development Permit or Waiver. Upon receipt of the Permit or Waiver, the Applicant shall contact the County for final approval.

The County must inspect and approve all road approach locations prior to construction. For road approach construction or improvements not conditional to Subdivision conditions or Development Permits, an application must be made to County Road Operations. The application can be found on the County's website: www.rockyview.ca.

403.2 Intersections - Urban

Intersections shall be designed to meet City of Calgary standards, specifications, and guidelines. The design shall meet the Level of Service identified in the Traffic Impact Assessment.

The Developer shall also conduct all applicable warrants to determine intersection geometry.

• Land required to construct the required intersection shall be dedicated as road ROW by the Developer, and the Developer shall bear all costs associated with obtaining the necessary land.

• The Developer shall coordinate the land acquisition agreement with the applicable landowner(s) and the County if the land is outside the ownership of the Developer and is required as part of the improvements for the proposed development.

403.2.1 INTERSECTION SPACING

The minimum centerline-to-centerline spacing of intersections shall be as follows:

TABLE 400-A Urban Intersection Spacing

ROADWAY CLASSIFICATION	AVERAGE ANNUAL DAILY TRAFFIC (AADT)	MINIMUM INTERSECTION SPACING (m)
Skeletal Road	≥30,000	800
Major Street (Divided)	20,000 - 35,000	300
Urban Industrial Arterial Streets	10,000 - 30,000	300
Urban Industrial / Commercial	3,000 - 12,000	60
Urban Local Arterial Streets	15,000 - 20,000	150
Urban Primary Collector Streets	8,000 - 15,000	120 (between Arterial and 1 st intersection on a Primary Collector); 60 all other
Urban Collector Streets	2,000 - 8,000	120 (between Arterial and 1^{st} intersection on a Collector); 60 all other
Urban Residential Streets	≤2,000	60

403.3 Canada Post Mailboxes – Urban

The Developer must consult Canada Post to determine if new Mailboxes are required.

- Canada Post Mailbox pad shall be built to an urban standard per Canada Post specifications in locations approved by Canada Post and the County.
- Mailbox Turnouts should be located on internal subdivision roads as opposed to Collector or higher standard roads.
- Mailbox locations shall be positioned to allow the safest vehicle access while ensuring postal service.
- Each mailbox installation is site-specific and must be reviewed and approved by Canada Post Corporation.

Mailbox access turnouts may be required and evaluated for each development's requirements.

404 RURAL ROAD DESIGN GUIDELINES

In the areas where rural road cross-sections are used, roads should be designed as per Table 400F.

For items not addressed in Table 400F, roads should be designed per Alberta Transportation and Economic Corridors and TAC standards, specifications, and guidelines applicable to rural road cross sections. The reference to these Standards is in respect but not limited to:

- Design Criteria
- Cross-section elements
- Pavement structure
- Lighting
- Noise attenuation
- Drainage infrastructure (e.g., ditches)

The following items shall also be considered in the road design:

- All internal public roads within a proposed, industrial, commercial, and/or institutional subdivision shall be paved.
- All internal public roads within a proposed residential subdivision shall be paved unless a Rural Low Volume Road is proposed and meets the VPD criteria.
- All dead-end public roadways shall end in a cul-de-sac that meets Figure 400.12 geometry as a minimum requirement and/or designed to the satisfaction of the County.
- The maximum acceptable grade in cul-de-sac bulbs is 5%.
- For typical right-of-way, Cross Section see Figures 400.1 400.11
- All finished paved road surfaces shall have a 2% cross-slope or crown unless otherwise noted herein or as otherwise approved by the County.

404.1 Road Approaches - Access Management

Access management practices promote traffic safety along roadways. In addition, limiting the number of approach accesses along a roadway reduces the number of driver decisions that need to be made and the number of conflict points with entering and exiting vehicles.

- Access to the County Network and Grid Road system shall be limited to the maximum number of approaches as per Table 400B.
- Access to internal subdivision roads for lots within the subdivision and access to Grid Roads shall be limited as per Table 400B. Internal Subdivision Roads refer to roads

created as part of new or previous subdivisions, and the roads are intended to provide access to the new lots.

- Residential driveways should be at least 5m of marked crosswalks and otherwise noted on site drawings
- Minimum separation between the edge of a driveway apron and any fixture within a boulevard should have safe clearances as per City of Calgary setback guidelines.

TABLE 400-B Maximum Number of Access Points

PARCEL	FRONTAGE (m)	MAXIMUM NUMBER OF ACCESS POINTS ONTO COUNTY GRID ROAD SYSTEM	MAXIMUM NUMBER OF ACCESS POINTS ONTO INTERNAL SUBDIVISION ROADS
Country Residential and Rural Residential	Any	1 (see note b & c)	1
Agricultural	< 400	1 (field), 1 (farmyard), 1 Residential	N/A
Agricultural	400 - 800	2 (field), 1 (farmyard), 2 Residential	N/A
Multi-unit Residential,	< 50	1	1
Commercial, Industrial, Public Service and	50 – 150	2	2
Institutional	> 150	2	3

Notes

- a) Due to topography/ other constraints, additional access points may be permitted on a case-by-case basis.
- b) Side or rear access to a single-family residential parcel may be allowed case-by-case.
- c) The number of access points for a home-based business will be assessed case-by-case.
- d) An Emergency Access is not an active access point so does not count towards the limits in Table 400-B.

404.1.1 ROAD APPROACH LOCATION

Road approach locations will be subject to the classification of the road on the subject lands they are bordering. The County may reject the road approach location and/or request that an alternative approach location be considered based on the road classification to which the approach is proposing connecting.

The County must inspect and approve all road approach locations prior to construction. For road approach construction or improvements not conditional to a Subdivision or Development Permit, an application must be made to County Road Operations. The application can be found on the County's website: <u>www.rockyview.ca</u>. The location requirements for a road approach are presented in Figure 400.13 and shall meet the following criteria:

1. Road approaches shall be located greater than 150 m from bridges, bridge-sized culverts or at-grade railway crossings unless approved by the County.

- 2. Road approaches on curves other than internal subdivision roads are undesirable and shall be avoided whenever possible. If the road approach cannot be located outside the curve, the County shall consider the location for approval once confirmation that safety issues have been evaluated, and design parameters clearly minimize any safety risk to the public.
- 3. Road approaches shall only be located within 45 m of the intersection of two public roads if no other alternative exists (see Figure 400.13).
- 4. All proposed road approaches to County roads within 1.6 km of a Provincial highway shall be referred directly to Alberta Transportation and Economic Corridors for a Roadside Development Permit or Waiver. Upon receipt of the Permit or Waiver, the Applicant shall contact the County for final approval.
- 5. A road approach providing access to a panhandle shall be centered within the panhandle unless a 2-party mutual approach is proposed; in this case, it should be centered on the property line of the two parcels sharing the access.
- 6. Minimum Site Distances shown in Table 400C are the minimum sight distances the County requires. However, as minimum site distance calculations are dependent on a number of factors, the approach shall be placed in a location that ensures sight distances and horizontal/vertical visibility at all accesses along a road meet the applicable requirements for intersection stopping and approaching sight distances as outlined in the Alberta Transportation and Economic Corridors Highway Geometric Design Guide.
- 7. Sight distance shall be measured with an object height of 1.3 m on the main road. The eye height for the approach or intersection is 1.05 m for passenger vehicles, 1.8 m for single-unit trucks and buses, and 2.1 m for truck semi-trailer combinations.
- 8. To determine the sight distance requirements for an approach, all types of vehicles that are expected to use the approach on a regular basis must be considered. Table 400C shows the minimum sight distance requirement for passenger vehicles, single-unit trucks, and buses. If other types of vehicles are expected to use the approach, the sight distance requirement must be determined in accordance with the Alberta Transportation and Economic Corridors Highway Geometric Design Guide.

TABLE 400-C

Minimum Sight Distance from Road or Approach

POSTED SPEED LIMIT ON MAIN ROAD	MINIMUM SIGHT DISTANCE REQUIREMENT FROM INTERSECTING ROAD/APPROACH (m)			
(Km/n)	PASSENGER VEHICLES	SINGLE UNIT TRUCKS/BUSES		
Less than or Equal to 40	80	120		
50	100	145		
60	135	205		
70	155	235		
80	175	265		
90	195	295		
100	215	320		

404.1.2 ROAD APPROACH DESIGN

The design requirements for a road approach are presented in Figure 400.14 and shall meet the following criteria:

- The geometric design of any commercial/industrial approach shall be based on the design vehicle using the access, and the pavement structural design shall be based on a soaked California Bearing Ratio certified by the Engineering Consultant.
- The surface width in the throat of the approach may be up to a maximum of 15 m wide for commercial, industrial, or agricultural road approaches, considering the design vehicle using the approach. At the discretion of the County, under special circumstances pending special requirements for site operations and design vehicles, a written request for a wider approach can be made. The request will need to be accompanied by a drainage design and a culvert design to demonstrate how drainage will work and how culvert maintenance will be addressed; however, in no case will an approach wider than 20 m be permitted.
- Approaches connecting to a paved or chip-sealed road shall have a paved surface.
- Approach pavement shall be installed by appropriate paving equipment.
- Road approaches shall be constructed at 90 degrees to the road. The County may relax the angle up to 20 degrees at its discretion.
- As shown in Figure 400.14, a maximum gradient of 4 percent shall be maintained along the road approach from the road's edge to the property line.
- A culvert shall typically be required unless the road approach is located at a high point or where drainage is otherwise directed away from the road approach location. At the discretion of the County, a larger diameter culvert may be required due to drainage

conditions such as a large drainage catchment or a major drainage route. In these cases, the County may require the Applicant to retain an engineering consultant to design the culvert.

- Where a mutual / shared approach is required, the affected landowners shall register an Access Easement Agreement and Plan with Land Titles defining the easement area, benefited and burdened parcels and the rights and responsibilities of the landowners to ensure free and unfettered access to their properties.
- Road approach structure: For approaches constructed as part of a Development Permit, Subdivision, or Development Agreement process, the approach pavement structure shall match the minimum pavement structure of the road to which the approach is tied. If the existing road's pavement structure does not meet the minimum standards for the road's classification, then the pavement structure of the approach shall meet the minimum design pavement structure for the classification of the road it is tied to.
 - For road approaches constructed **outside** of a Development Permit or Subdivision process, the structure shall be as per Table 400D

TABLE 400-D	nodd rippi				
TYPE OF APPROACH	SURFACE WIDTH (M)	TURNING RADIUS (M)	SIDESLOPE	SURFACE STRUCTURE CONSTRUCTED OUTSIDE OF A DEVELOPMENT PERMIT OR SUBDIVISION PROCESS	
Commercial Industrial	10	9	4:1	Based on a soaked California Bearing Ratio of 3. At minimum must match structure of road providing access to lot (see note c).	
Agricultural Recreational Utility Resource	8	6	3:1	Gravel Road: 75 mm Designation 4 Class 20 crushed gravel over 150 mm of Designation 6 Class 80 Pit-run Paved / Chip sealed Road: 90 mm of City of Calgary Type 'B' asphalt concrete pavement over 200 mm of Designation 2 Class 20 gravel	
Residential: Single / Mutual	6.1 / 7.0	3	3:1	 Gravel Road: 75 mm Designation 4 Class 20 crushed gravel Paved / Chip sealed Road: 75 mm of City of Calgary Type 'B' asphalt concrete pavement over 200 mm of Designation 2 Class 20 gravel 	

Road Approach Design Criteria (outside of a DP or Subdivision process)

Field	8 (minimum)	6	3:1	Gravel Road:
				100 mm Designation 4 Class 20 crushed gravel
				Paved / Chip sealed Road:
				75 mm of City of Calgary Type 'B' asphalt concrete pavement over 200 mm of Designation 2 Class 20 gravel
Temporary	Use road approach geometry above for equivalent permanent approach			

Notes:

- a) Turning radii shall meet the turning movement requirements for the expected vehicle accessing the development/subdivision and a pumper fire truck.
- b) The County shall approve temporary construction approaches on a case-by-case basis and shall meet all applicable requirements.
- c) The pavement structure for industrial and commercial approaches shall meet the minimum pavement structure of the existing road to which it is tied. If the existing road's pavement structure does not meet minimum standards, then the pavement structure of the approach shall meet the minimum pavement structure of the classification of the road it is tied to.

404.1.3 ROAD APPROACH CONSTRUCTION

Road approach construction shall meet the following requirements:

- 1. The approach shall be constructed in a manner that meets Alberta Transportation and Economic Corridors construction standards regarding subgrade and side slope construction and gravel and asphalt concrete pavement placement.
- 2. Road approaches are to be constructed using clean fill, free from organic material, rocks over 75 mm in diameter, waste and construction materials, and other deleterious materials.
- 3. All backfill material shall be placed in layers not exceeding 150 mm depth. Each layer shall be thoroughly compacted at an optimum moisture content of +/- 3% and compacted to a minimum of 98% Standard Proctor Maximum Dry Density (SPMDD).
- 4. When required, culverts shall be installed as per Figure 400.14.
- 5. The Applicant, at their sole cost, shall undertake all reasonable precautions to the satisfaction of the County during the road approach work to safeguard pedestrian and motorist travel through the work zone. This includes the use of temporary traffic accommodation.
- 6. The Applicant shall identify all utilities located within the vicinity of the road approach, notify the utility owners of the road approach work and obtain all necessary agreements and approvals as required. The Applicant is responsible at their sole cost for any repair or relocation of utilities impacted by the road approach work.
- 7. Road approach construction shall not impede existing surface drainage patterns through the area.

- 8. Upon completion of the road approach work, all disturbed areas shall be restored to a condition equal to or better than before the start of the road approach work to the satisfaction of the County. This restoration work shall include but not be limited to ditch and slope grading to match original contours, topsoil placement, removal of rocks over 75 mm in diameter, seeding with a County-approved mix (www.rockyview.ca), and fence repair/replacement.
- 9. For road approach conditions to a Subdivision or Development Permit, if weather conditions prevent the construction of an approach and all other conditions of the Subdivision or Development Permit are met, the Applicant has the option to enter into a Road Approach Construction Agreement at the discretion of the County.

404.1.4 ROAD APPROACH REMOVAL

The County may require the removal of an existing approach in the following cases:

- The approach is deemed unsafe due to structure, location, or sightlines.
- The approach is deemed to be no longer in use or abandoned.
- The approach has a negative impact on ditch drainage.
- To improve access management related to a Subdivision or Development Permit.
- The approach is constructed without prior County approval.

Approaches shall be removed, and the area shall be reclaimed at the sole expense of the landowner. Approach removal shall include but not be limited to the following:

- Removal and disposal of all fill material and any culverts.
- Re-establishment of the roadside slope, ditch bottom and backslope.
- Contouring the area to match the adjacent grades.
- Placing topsoil and seed on all disturbed areas.

404.1.5 TEMPORARY ROAD APPROACHES

The County may permit the construction of temporary road approaches for activities lasting less than 2 years. An application to construct a temporary road approach must be accompanied by a security deposit in the amount specified by the current Master Rates Bylaw and a letter from the Applicant stating when the temporary road approach will be removed. The security deposit will be returned to the Applicant once the Applicant has removed the temporary road approach and meets the requirements outlined in Section 405.5.

If the Applicant does not remove the temporary road approach within the allotted time, the Applicant will forfeit the security deposit, and the County may remove the temporary road approach.

Temporary road approaches shall meet the geometry criteria for the equivalent permanent approach as per Table 400D. Temporary road approaches are permitted to have a gravel surface, whereas the permanent equivalent would have a paved surface.

404.2 Intersections

Intersections shall be designed to meet Alberta Transportation and Economic Corridors and TAC standards.

- The design shall meet the Level of Service identified in the Traffic Impact Assessment.
- The Developer shall also conduct all applicable warrants to determine intersection geometry.
- The Developer shall dedicate the land required to construct the required intersection as road ROW and bear all costs associated with obtaining the land.
- The Developer shall coordinate the land acquisition agreement with the applicable landowner(s) and the County if the land is outside the ownership of the Developer and is required as part of the improvements for the proposed development.

404.3 Intersection Spacing

Table 400E illustrates the typical minimum centerline-to-centerline spacing of intersections. Actual intersection spacing shall be based on individual design conditions and TAC criteria.

TABLE 400-E	Minimum Intersection Spacing			
ROAD	WAY CLASSIFICATION	MINIMUM INTERSECTION SPACING (M)		
Arterial		400		
Collector		200		
Collector/Local/G	rid (<1,00 vpd)	60		

404.4 Canada Post Mailboxes - Rural

- The Developer must consult Canada Post to determine if new Mailboxes are required. If so, Canada Post Mailbox Turnouts may be required per Figure 400.22.
- Mailbox Turnouts should be located on internal subdivision roads as opposed to County Grid or Network Roads.
- Mailbox turnouts shall be positioned to allow the safest vehicle access while ensuring postal service.
- The start of the mailbox turnout must be at least 45 meters from any intersection, and acceptable sight lines shall be maintained at all times.
- Each installation of a mailbox turnout is site-specific and must be reviewed and approved by Canada Post Corporation.

• All mailbox turnouts must be constructed to the satisfaction of Canada Post Corporation and the County.

404.5 Ditches

All ditches shall be constructed with positive drainage as per Table 400F and shall not be designed with a permanent stormwater ponding level above zero (0 m) depth. Therefore, positive drainage must be maintained at all times within the ditches.

Ditch checks are required for any ditch with a 4% or greater grade or prone to erosion. They shall be considered part of the subdivision's design and addressed in the Stormwater Management Plan. Ditch checks shall be maintained by the Developer until the County finalizes the subdivision's acceptance (FAC). Ditch checks shall be designed and constructed in accordance with Alberta Transportation and Economic Corridors Standards.

404.6 Culverts

- 1. Approach culverts shall not be less than 450mm in diameter, and cross-grade culverts (culverts installed under County roads) shall not be less than 600mm in diameter.
- 2. Maximum desirable culvert length is 22m.
 - Culverts longer than 22 m that are required due to intersection/approach geometry, grading constraints, or road surface widths, may be accepted if intermediate maintenance access is provided into the culvert, or the culvert is provided with steam injection piping. All requests for Culverts longer than 22m will need to be approved by the County.
- 3. Culverts greater than or equal to 1.5m in diameter are considered bridge-sized culverts. They will require County approval and adhere to applicable Provincial and Federal regulations where required.
- 4. The pipe culvert material shall be either CSP or CMP, have a minimum wall thickness of 1.6 mm, and be supplied by the Developer.
- 5. HDPE: In some cases, at the discretion of the County, HDPE corrugated piping (with smooth wall interior) may be permitted if required due to the HDPE's lower Manning's N-value, or if there are concerns with native soil types leading to corrosion of metal pipes (i.e. in the case of saline soils). In these cases, the HDPE culvert must be provided with sloped manufactured ends, with either:
 - Copper-clad steel tracing wire (14 AWG) with 30 mil coating thickness along the top of the HDPE pipe; and/or
 - Metal ends
- 6. Pipe culvert material supplied will also include joining and anchoring materials.
- 7. All new culverts must be installed with sloped ends (slopes cut to match the approach side slope). Sloped ends must be manufactured, and no field cutting is permitted unless with the written permission of the County.
- 8. Supply and installation of culverts shall be in accordance with applicable Alberta Transportation and Economic Corridors standards and manufacturer's specifications. The minimum desirable slope of the culvert shall be 0.5% or constructed grade, whichever is greater.
- 9. Rock rip-rap shall adhere to Alberta Transportation and Economic Corridors Class 1M and consist of sound, durable stone with a minimum dimension of 100 mm, at least 50% having a minimum dimension of 200 mm, and none greater than 300 mm.

405 ROAD CONSTRUCTION

All rural and urban road construction shall adhere to the Alberta Transportation and Economic Corridors and the City of Calgary construction standards, respectively.

405.1 Road Structure Design

The road structure shall be designed to meet a 20-year service life, regardless of the minimum standard quoted. A pavement structure design report shall be provided to the County along with the construction drawings.

- The pavement structure design report shall provide recommendations for pavement structures considering the requirement that top lift of asphalt won't be placed for a minimum of 2 years following placement of base lift.
- For rural roads, Alberta Transportation Designation 6 Class 80 mm gravel material can be used in the Granular Base Course provided the pavement structure design report has accounted for it in the road structure design.
- All Road structure depths shall be certified by a Geotechnical Engineer and be acceptable to the County based on soaked subgrade CBR values obtained from the actual subgrade road material prior to entering the Development Agreement or Road Right-of-Way Construction Agreement. A subgrade soaked CBR value of 3.0 is acceptable.
- Additional Asphalt Concrete Pavement (ACP) depth may be required on/at major intersections as identified by the Developer's Geotechnical Engineering Consultant or the County.

The structures in Table 400F are intended to be the County's minimum structure requirement based upon the subgrade soaked CBR value 3.0, 20-year service life, and a 5% growth factor. The pavement structure design report shall verify actual structure required based on soils and projected AADT, projected Single Unit Truck percentages, and Tractor Trailer Combination Truck percentages (based on a TIA or otherwise provided by the Developer's transportation Engineering Consultant). The pavement structure is to be designed in accordance with the Alberta Transportation Pavement Design Manual prior to entering the Development Agreement or Road Construction Agreement.

ROADWAY CLASSIFICATION	Design ESALs	VPD	АСР Туре	Total ACP (mm)	Bottom Lift (mm)	Top Lift (mm)	Granular (mm)	Total (mm)
Country Residential	125,000	500	L1	90	60	30	300	390
Country Collector	1,000,000	2000	M1	140	100	40	330	470
Rural Industrial / Commercial	2,000,000	2000	M1	140	100	40	390	530
Rural Industrial / Commercial Collector	4,800,000	5000	H2	160	120	40	430	590
Rural Low Volume Note 1	5,000	50	N/A	0	0	0	100	100
Rural Moderate Volume Note 1,2	40000	500	N/A	0	0	0	360	360
Rural Transitional Paved	630,000	1000	L1	120	80	40	300	420
Rural Collector	1,600,000	2500	M1	140	100	40	350	490
Rural Primary Collector	3,200,000	5000	H2	160	120	40	400	560

Rural Pavement Structures

Note1: 50 mm of surfacing gravel to be applied prior to CCC, 50 mm of surfacing gravel to be placed prior to FAC.

Note 2 Granular material is 260 mm of Des. 6 Cl. 80 and 100 mm of Des. 4 Cl. 20

405.2 Quality Control

- All material testing shall be conducted to Alberta Transportation and Economic Corridors specifications for rural roads and the City of Calgary specifications for Urban roads.
- To ensure quality control, the County reserves the right to select a testing firm to conduct third-party visual inspections and/or materials testing and compile its data during and/or after construction. The Developer shall bear any costs associated with third-party inspections and testing. The County will invoice the Developer for the expenses related to Third-Party testing. If the Developer fails to pay for the costs of Third-Party testing, the County shall use the security held for that development. Test results will be available to the Developer and their Engineering Consultant(s) upon request. This quality assurance testing does not relieve the Developer(s) of their responsibility to conduct their quality control testing program and report the results to the County.
- Written confirmation must be provided that the specifications and minimum requirements have been met. The Developer shall use Geotechnical Engineering Consultants and a qualified laboratory licensed to practice in the Province of Alberta to conduct all inspections and required material testing. Testing for all aspects of the road construction must be carried out in accordance with City of Calgary Standards for Urban roads and Alberta Transportation and Economic Corridors Specifications for rural roads.

Coordination of all activities regarding the scheduling of inspections and materials testing is the responsibility of the Developer and/or their Engineering Consultant.

- The Geotechnical Engineering Consultant is responsible for interpreting test results and revising construction operations if necessary so that the product meets all required specifications.
- A proof roll shall be applied to all road subgrades. Acceptance of proof roll testing shall come from a Geotechnical Engineering Consultant who shall certify that the subgrade withstood test rolling without rutting and with only minor visible deformation and springing. Areas that fail will require the removal of soft material and replacement with suitable material or re-working and compacting the material until accepted in writing by the Geotechnical Engineer. Proof rolling will utilize a loaded test vehicle with an axle load of 8200 kg.

405.3 Deficiencies

- Defective work that has been rejected shall be promptly repaired, remedied, overlaid, or removed and replaced at the Developer's expense in a manner acceptable to the Developer's Geotechnical Engineering Consultant and the County and tested per the applicable standards.
- The Developer shall correct the deficiencies, remove and replace defective material, or overlay the deficient area or sections, all at their own cost; or
- The Developer shall have their Geotechnical Engineering Consultant review and certify subgrade construction before placing the first ACP lift.
- In some cases, the County may assess a financial penalty for minor deficiencies that don't warrant repairs/removals and are unrelated to sub-grade problems (i.e., minor segregation). The penalty may be based on 50% of the equivalent cost of milling and tack coating (2 applications), overlaying the area in concern at a depth of 40 mm of asphalt. The calculated values cannot be less than the most recent published values from the City of Calgary Development Agreement Standard Terms and Conditions and the Alberta Transportation and Economic Corridors Unit Price Averages for the Southern Region.
- All methods, materials and equipment used to correct deficiencies shall be subject to the approval of the Developer's Geotechnical Engineering Consultant and the County.
- The Developer shall bear all costs associated with field testing and related rework.
- Areas where test results show the compaction does not meet the required minimum may need to be removed and replaced to achieve the minimum required result, subject to the request of the Developer's Geotechnical Engineering Consultant or the County.
- The finished surface shall be true to cross-section, have a uniform texture and be free of visible signs of poor workmanship such as, but not limited to:
 - moderate or severe segregation
 - areas containing excess or insufficient asphalt

- improper matching of longitudinal and transverse joints
- roller marks, cracking or tearing
- poor aesthetic appearance as determined by the County

405.4 Road Stormwater Drainage

The Developer must demonstrate that the proposed road will not have any negative downstream or upstream impact on the existing stormwater drainage condition in the surrounding area. A Stormwater Management Plan shall be prepared to document how the additional stormwater runoff from the road will be managed within the project limits and identify the final downstream spill.

405.5 Signage & Line Painting

The Developer shall submit a Signage and Line Painting Plan for all developments resulting in new public road infrastructure depicting all permanent traffic control signs and line painting required for the Development to the County for approval. This includes, but is not limited to, regulatory signs, warning signs, guide and information signs and road name signs. Refer to Figure 400.19 for Sign Placement details. The Signage and Line Painting Plan shall include any off-site signing and line painting changes required due to the Development.

- The Signage and Line Painting Plan of the on-site and off-site roads shall include but not limited to the following:
- Existing signage and line painting/pavement markings are to remain in place.
- Existing signage is to be salvaged and relocated.
- Existing signage and line painting/pavement markings are to be removed.
- Proposed new signage and line painting/pavement markings.
- The Developer is responsible for erecting approved road name signs to reflect the County-approved names.

405.5.1 REGULATORY SIGNS

Regulatory signs consist of the Class R signs specified by Alberta Transportation and Economic Corridors and the Manual of Uniform

Traffic Control Devices of Canada. Examples include but are not limited to: "Stop," "Yield," "Pedestrian Crossing," "Maximum Speed," and "No Parking" signs. Regulatory signs shall be installed per Alberta Transportation and Economic Corridors Recommended Practice Guidelines for signs.

In addition, speed limit signs must typically be installed:

- 50 m to 100 m from the centerline of the intersecting roadway for rural areas.
- 50 m from the centerline of the intersecting roadway for Urban areas.
- At each entrance to a community.
- At locations where the speed limit changes as a result of the development.

405.5.2 WARNING SIGNS

Warning signs consist of the Class W signs specified by Alberta Transportation and Economic Corridors and the *Manual of Uniform Traffic Control Devices of Canada*. Examples include but are not limited to: "Curve," "Advisory Speed," "Checkerboard," "No Exit," "Concealed Road," "Pavement Ends," and "Hazard Marker" signs. Warning signs shall be installed per Alberta Transportation and Economic Corridors Recommended Practice Guidelines for signs.

Warning signs must be used sparingly, as overuse may promote disrespect for traffic control devices and loss of emphasis.

405.5.3 GUIDE AND INFORMATION SIGNS

Guide and Information signs consist of the Class I signs specified by Alberta Transportation and Economic Corridors and the *Manual of Uniform Traffic Control Devices of Canada*. Examples include but are not limited to: "Golf Course," Fire Truck Entrance," Cul-de-Sac," and "Rural Crime Watch Area" signs. Guide and Information signs shall be installed per Alberta Transportation and Economic Corridors Recommended Practice Guidelines for signs.

405.5.4 ROAD NAME SIGNS

Municipal road name signs installation requirements differ for rural and urban locations:

<u>Rural</u>

- Locate rural municipal road name signs as per Figure Figures 400.17 and 400.18
- Road name signs shall not be mounted to other traffic control signage or other roadway appurtenances such as power poles and fences.
- At signalized intersections, road name signs with a height of 230 mm shall be mounted to the traffic signal cantilever arms. The signs should be centered between the signal pole shaft and the nearest signal head or designated lane sign on the cantilever.

<u>Urban</u>

- At signalized intersections, road name signs with a height of 230 mm shall be mounted to the traffic signal cantilever arms. The signs should be centered between the signal pole shaft and the nearest signal head or designated lane sign on the cantilever.
- At un-signalized intersections, road name signs with a height of 150 mm may be mounted to the right-of-way control signage or as a posted standalone sign. The signs shall be installed at the location that provides the best visibility to road users.

Municipal road name sign materials and dimensions shall conform to Figure 400.18.

405.5.5 SIGN MATERIAL

Traffic sign and signpost material shall conform to Section 5.18 of Alberta Transportation and Economic Development's Standard Specifications for Highway Construction unless otherwise specified. All signs shall be retroreflective, with reflective sheeting meeting or exceeding the specifications of Section 5.18.2.8.

Traffic sign sizes shall conform to Alberta Transportation and Economic Development's Traffic Sign Catalogue unless otherwise approved by the County.

405.5.6 SIGN INSTALLATION

Traffic control signage for rural and Urban locations shall be installed as per Section 7.7 of Alberta Transportation and Economic Development's Standard Specifications for Highway Construction unless specified in these Servicing Standards.

<u>Rural</u>

150 mm x 100 mm pressure-treated wooden posts shall be used for rural locations. Holes shall be drilled in wooden posts as per Figure 400.20 to ensure that the posts break away when struck.

<u>Urban</u>

For Urban locations, round steel posts with a diameter of 60 mm (23/8 in.) shall be used. All steel post installations shall include a breakaway assembly as per Figure 400.20. Steel post installations on hard surfaces, such as concrete or asphalt, shall be mounted to the surface with a base plate. Base plates shall be secured with at minimum 16 mm (5/8") x 115 mm (4-1/2") concrete wedge anchors as per Figure 400.20.

Steel post installations on soft surfaces, such as grass or other landscaping, shall include a concrete base to prevent the post from turning in windy conditions. The concrete base shall not protrude above the finished surface, as per Figure 400.20.

405.5.7 SUBDIVISION ENTRY SIGNS AND ENTRANCE FEATURES

- Subdivision entry signs shall be located outside Municipal Reserves or Municipal Road ROW.
- Any permanent or semi-permanent subdivision entry signs are the responsibility of the condominium corporation, homeowners' association, and/or the Developer.

406 PANHANDLES

Panhandles created as part of subdivision applications shall provide a minimum right-of-way width (property line to property line) of 12.5 m. This width intends to provide a 6 m wide clear width road surface with allowance for v-ditches to provide access route criteria per the National Building Code (Alberta Edition). In addition, and in the case of two panhandles with one access point, the 12.5m right-of-way will provide the County Road standard width to be developed. In some cases, Area Structure Plans may have specific requirements for panhandle sizes, and in those circumstances, the Area Structure Plan specifications will govern.

In cases where no further subdivision off the panhandle is expected and there is no future chance of County Road development occurring due to geotechnical of topographic limitations, the County's administration, at their discretion, may reduce the requirement from a 12.5m panhandle width to a 10m width.

407 PRIVATE CONDOMINIUM ROADS

A private condominium road provides access to units within a bare-land condominium subdivision. The Developer is responsible for maintaining the condominium roads until the County issues the FAC. Upon issuance of the FAC, the Condominium Association will be responsible for ownership and ongoing maintenance of the road, road right-of-way and other improvements in perpetuity. Private condominium roads must meet the requirements of one of the road classifications outlined within this section to the satisfaction of the County.

408 EMERGENCY ACCESS & SECONDARY ACCESS

An **Emergency Access** is a temporary, emergency route to provide egress in and out of the development and must be constructed with an emergency breakaway access gate (Figure 400.16). The gate shall be located at the beginning of the emergency access and usually near the entrance point of the primary public road. The Emergency Access route is only to be accessed if the primary access route is blocked.

- Emergency Access roads shall be on a PUL lot or protected by an Access Right of Way Plan and Agreement that protects County and Public access through the Right-of-Way
- Emergency Access roads shall have a maximum gradient of 8%.
- Minimum of 6 m wide, designed to support a load of 38,556 kg (85,000 lbs) (see Figure 400.15 for cross-sectional requirements).
- Have an overhead clearance not less than 5.0 m
- Be connected to a public thoroughfare

A Secondary Access is a public road, accessible at all times.

408.1 Emergency and Secondary Access - Rural

Any rural development that will result in 30 lots or greater shall have two separate access routes to an existing through road. The separate access can be a Secondary Road built to County standard or an Emergency Access.

408.2 Emergency and Secondary Access – Urban or Institutional

- An Emergency Access is required if the total number of households or units exceed 100 and/or the primary access route is between 120m and 200m in length.
- A Secondary Access Route is required if the total number of households or units exceed 100 and/or the primary access route is over 200m in length.

409 DEAD-END ROADS

All **dead-end** roads must:

- Terminate in a cul-de-sac as per Figure 400.12
- Have min 5.0 m overhead clearance.
- Ensure any required bridges/culverts are designed to accommodate a minimum of 100year rainfall conditions.
- Have dead-end signage indicating no second outlet at the entrance of the road.

4010 SNOW STORAGE

In areas using urban road standards, special considerations must be given to snow storage, whether along the proposed road ROW or another designated location. This may require the dedication of a PUL to accommodate snow storage, and the stormwater management plan will be required to address the impacts of snow melt, contaminants, and deicing chemicals.

4011 PATHWAYS

Pathway design and construction shall generally follow the requirements provided by the City of Calgary's Development Guidelines and Standard Specifications: Landscape Construction.

4012 ENVIRONMENTAL RESERVES

For instances when Council has given direction and permission for a road crossing an ER, the road shall be in accordance with Figure 400.21. Water Act approval may be required if road crossings are proposed within the vicinity of wetlands.

4013 THIRD-PARTY UTILITIES

In this section, "utility/utilities" refers to public or private infrastructure used to provide transmission service, which includes (but is not limited to) telecommunications, power, gas, water, storm sewer, or sanitary sewer.

• Utilities must be installed within utility rights-of-way outside the County Road allowance wherever possible. Where this is not possible, and it is proposed that the utility be installed within the County road allowance, prior approval of the County will be required in the form of a consent letter or Road Right-of-Way Access Agreement. The submission package from the utility owner shall include the scope of work, detailed drawings, construction schedule, and Traffic Accommodation Strategy. The detailed drawings shall include utility line assignments of the proposed utility(s) and existing utilities to ensure no conflicts exist and minimum separation requirements are met.

- Utility owners must restore all ground disturbances or damage that occur as a result of the installation and placement of the utility in the County's road allowance to preexisting or better conditions to the County's satisfaction.
- The placement of any utility in the County's road allowance must not disturb any driving surface or road infrastructure without the County's prior approval.

4014 STREET LIGHTING

This section applies to street lighting only within County road allowances. For lighting requirements on private property and other developments outside the County road allowance, refer to other County policies and guidelines.

The design and construction of roadway lighting shall be conducted according to Alberta Transportation and Economic Corridors standards.

- Illumination warrant analyses shall follow the methodology outlined in the most recent version of the TAC Illumination of Isolated Rural Intersections document for rural intersections. For Urban intersections, full illumination is typically warranted. Refer to the most recent version of the Alberta Transportation and Economic Corridors Highway Lighting Guide.
- 2. New street lighting installation within any County road allowance will require prior approval of the County.
- 3. Where applicable, new street lighting shall consider "Dark Sky" requirements as per the International Dark-Sky Association (IDA). When conflicting, the travelling public's safety within the County road allowance shall govern.
- 4. The design and installation of the street lighting shall be satisfactory to the County and will meet the specific requirements of the utility service provider (Fortis Alberta or ENMAX, depending on service location), the County's Servicing Standards for Subdivision and Road Construction, and IESNA guidelines.
- 5. The street lighting installation shall utilize light fixtures and poles approved by the utility service provider (Fortis Alberta or ENMAX, depending on the service location).
- 6. If a developer requests custom street lights (light fixtures and poles not approved by the utility service provider), the County will review the request on a case-by-case basis. If the County allows alternative light fixtures and poles, the Developer shall enter into an agreement with the County specifying the terms and conditions for the alternate's use, maintenance, and operation.
- 7. All street light poles shall have breakaway bases and shall be Light light-emitting diode (LED) fixtures.
- 8. All street lighting shall be energized when the construction of the street lighting system is complete.
- 9. Where street lighting is required as a condition of subdivision, the Developer of the subdivision shall design, install, operate, maintain, and bear all costs associated with the street lighting, including the payment of the power consumption billing until the

development has been issued a Final Acceptance Certificate (FAC) by the County. At this time, the County shall assume the total costs of the ongoing operation and maintenance of the street lighting. Also, where the utility service provider is Fortis Alberta, the street lighting will be installed on the Investment Rate Option, meaning that the Developer shall be entitled to the lighting investment paid by Fortis Alberta.

- 10. Where street lighting is installed along condominium roads (private roads) outside the County's care and control, the Condominium Association or Corporation shall assume responsibility for the ongoing operation and maintenance of the street lighting, including payment of power consumption bills.
- 11. Where street lighting is requested to be installed in an existing development at the request of the residents who are organized under a local improvement bylaw program acceptable to the County, the residents will bear the installation costs, and the County will bear the costs of the ongoing operation and maintenance of the street lighting including payment of power consumption bills.

4015 TRAFFIC SIGNALS

Traffic signal design and construction, within a County Road allowance, shall be conducted according to Alberta Transportation and Economic Corridors standards and standard drawings.

4016 SUBDIVISION AND ROAD NAMING APPLICATION

The Developer shall apply for subdivision and street name(s) approval when the subdivision is conditionally approved to allow for enough time for the road naming to be approved prior to the Endorsement of the Subdivision. Contact the County's Geographic & Mapping for Road Naming Application requirements. The Developer is responsible for the supply and installation of the street name(s) blade(s). CCCs will only be issued if street name blades are posted along with other required signage. Street blades must comply with Figure 400.18.

4017 BRIDGE STRUCTURES WITHIN COUNTY ROAD ALLOWANCE

Bridge structures shall be designed to Alberta Transportation and Economic Corridors standards. All applicable environmental approvals shall be coordinated and obtained as required. Culverts greater than or equal to 1.5m in diameter are considered bridge-sized culverts. They will require County approval and adhere to applicable Provincial and Federal regulations where required.

4017.1 Bridge Construction

Bridge structures shall be constructed to Alberta Transportation and Economic Corridors standards. Immediately after construction, a Level 1 inspection of the new structure will be undertaken by a certified Class A or Class B bridge inspector recognized by Alberta Transportation and Economic Development's Technical Standards Branch – Bridge Engineering Section. The Level 1 inspection is a general inspection of the structure, which requires the completion of a BIM report that shall be submitted to Alberta Transportation and Economic Corridors for entry into Alberta Transportation and Economic Development's Transportation Infrastructure Management System – Bridge Management System (BIM).

4017.2 Bridge Inspection and Maintenance Registration

Alberta Transportation and Economic Development's Technical Standards Branch – Bridge Engineering Section shall be contacted to have the bridge structure registered in its Bridge Inspection and Maintenance System (BIM) – Transportation Infrastructure Management System (TIMS). BIM – TIMS is a database repository containing information on all bridge structures and bridge-sized culverts in Alberta. Once contacted, Alberta Transportation and Economic Corridors will assign a bridge file number that will be unique to the structure and will stay with the structure forever. This is a five-digit number that refers to the specific structure site.

A copy of the as-built drawings, including design documents and a BIM report, must be submitted to the County prior to the Construction Completion Certificate (CCC) being issued.

4018 TABLE 400-G ROAD CLASSIFICATION AND DESIGN ELEMENTS

TABLE 400G: Roa	ad Classification & Design Elements								Cross S	Section El	ements			Alig	gnment	
Classification	Description and Notes	Daily Traffic Volumes (VPD)*	Number of Lanes	Surface Type	Design Speed (km/h)	Posted Speed ¹⁰ (km/h)	Min. Corner Radius M)	Min Right-of-Way (M)	Min. Surface Width/ Min. Subgrade Width (M)	Side/Back Slope Ratio	Min. Bottom Ditch Width (m)	Minimum Ditch Depth	Minimum Radius (m)	Minimum Crest (K) Stopping Sight Distance	Minimum Sag (k) Stopping Sight Distsance	Max. / Min. Gradient (road ditch) / (%)
Internal Subdivision Roads																
Urban Back Lane (BL)	To provide direct rear access to abutting low to high density residential properties. Lanes also provide a service access for garbage collection, deliveries, loading/unloading, and may serve as an alternate alignment for shallow, deep, or overhead utilities.	≤500	1	Gravel	30	-	See	e City of	f Calgary Desi For structure	gn Guideli see City (nes for Sub of Calgary I	odivision S Roads Co	Servicing F	Road Classific Standard Spe	ations – Lane ecifications	s (Alleys)
Urban Residential Streets (UR)	To provide direct access to adjacent residential properties (R-URB, R-SML, RMID & R-MRU lots in the County Land- Use Bylaw). To collect and distribute traffic from residential properties to Collector and Residential Streets	≤2,000	2	Paved	50	50	See C	City of C For stru	Calgary Design cture see City	Guideline of Calgary	s for Subdi ⁄ Roads Co	vision Ser	vicing Ro	ad Classificati I Specification	ons – Reside Is File 454.10	ntial Streets 05.002
Urban Collector Streets (URC)	To connect local streets within a community, and to connect those streets to the transportation network beyond the community. To serve secondary traffic generators such as neighbourhood commercial centres, parks, golf courses and neighbourhood-to-neighbourhood traffic within the community	2,000 - 8,000	2	Paved	50	50	See F	City of For stru	Calgary Desig cture see City	n Guidelin of Calgary	es for Subo Roads Co	livision Se Instruction	ervicing Ro Standarc	oad Classifica I Specification	tions – Collec s File 454.10	tor Streets 05.002
Urban Primary Collector Streets (UPC)	Collects traffic from other Collectors.	8,000 - 15,000	2 or 4	Paved	50	50	See	City of (For stru	Calgary Desigi cture see City	n Guidelin of Calgary	es for Subo Roads Co	livision Se Streets nstruction	ervicing Ro	oad Classifica I Specification	tions – Primai is File 454.10	y Collector 05.002
Urban Local Arterial Streets (ULA)	To provide significant connections between residential communities and destinations where traffic volumes are at the low end of Arterial streets. To provide Arterial connections while allowing more opportunities for access than a Divided Arterial Street	15,000 - 20,000	4	Paved	50	50	Se	ee City of Calgary Design Guidelines for Subdivision Servicing Road Classifications – Local Arterial Streets For structure see City of Calgary Roads Construction Standard Specifications File 454.1005.009								
Urban Industrial / Commercial (UI/C)	To serve direct access to adjacent industrial and commercial properties To collect and distribute traffic from industrial and commercial properties to Arterial Streets.	3,000 _ 12,000	2	Paved	50	50	See I	See City of Calgary Design Guidelines for Subdivision Servicing Road Classifications – Industrial Streets For structure see City of Calgary Roads Construction Standard Specifications File 454.1005.009								
Urban Industrial Arterial Streets (UI/A)	To expedite the movement of vehicles between major traffic generators and between industrial subdivisions. To serve adjacent commercial and industrial lands and to collect and distribute traffic from other Arterial Streets and Industrial Streets to lesser category streets or directly to traffic destinations	10,000 _ 30,000	4	Paved	50/60	50/ 60	See	See City of Calgary Design Guidelines for Subdivision Servicing Road Classifications – Industrial Arterial Streets For structure see City of Calgary Roads Construction Standard Specifications File 454.1005.009					rial Arterial 05.009			



Country Residential (400.1) (CR)	To provide direct access to adjacent residential properties for internal rural or country residential roads (for R-RUR & R-CRD lots).	<500	2	Paved	50	40	10	25	7.00 / 9.17	3:1	2.5*	1	90	7	13	8 / 0.6
Country Collector (400.2) (CC)	To connect local streets within a rural residential community, and to connect those streets to the transportation network beyond the community.	500 - 2,000	2	Paved	60	50	15	25	8.00 / 11	3:1	2.5*	1	130	11	18	8 / 0.6
Rural Industrial / Commercial (400.3) (RI/C)	To serve direct access to adjacent industrial and commercial properties To collect and distribute traffic from industrial and commercial properties to the transportation network beyond the industrial community.	200 - 2,000	2	Paved	60	50	15	30	10.00 / 14.09	4:1	2.0*	1	130	11	18	8 / 0.6
Rural Industrial/Commerc ial Collector 400.4) (RI/CC)	To serve adjacent commercial and industrial lands and to collect and distribute traffic from other Arterial Streets and Industrial Streets to lesser category streets or directly to traffic destinations.	2,000 - 5,000	4	Paved	60	50	15	36	18.00 / 22.57	4:1 / 3:1	2.0*	1	130	11	18	8 / 0.6
Municipal Grid Roads																
Rural Low Volume (400.5) (RLV)	Local low volume road to accommodate up to ≤50 VPD on non through road.	<50	2	Gravel	40	30	10	20	6 / 6.33	3:1	2.0*	0.80	55	4	9	10 / 0.6
Rural Moderate Volume (400.6) (RMV)	Moderate traffic volume grid road. Through and non through road with less than 500 VPD.	<500	2	Gravel	60	50	10	20	10.5 / 10.83	3:1	V ditch	0.77	130	11	18	8 / 0.6
Rural Transitional Paved (400.7) (RTP)	Moderate traffic volume grid road. For use when there are limitations of existing ROW and a paved standard is required.	<1,000	2	Paved	60****	50	10	20	8.0 / 11	3:1	V ditch	1	130	11	18	8 / 0.6
Rural Collector (400.8) (RC)	Moderate traffic volume Network B road as per the Regional Transportation Off-Site Levy Bylaw.	501 – 2,500	2	Paved	60****	50	15	30	9.0 /14.3	4:1	2.5*	1	130	11	18	6 / 0.6
Rural Primary Collector (400.9) (RCP)	High traffic volume regional Network A road as per the Regional Transportation Off-Site Levy Bylaw.	2,500 - 5,000	2	Paved	60****	50	15	36	11.4/19.0	6:1/ 4:1	2.3*	1	130	11	18	6 / 0.6
Rural Arterial (400.10)	6 lane arterial road as per the Regional Transportation Off- Site Levy Bylaw.	>12,000	6	Paved	***	***	***	***	32.20/***	4:1	*	*	***	***	***	***
Rural Arterial (400.11)	4 lane arterial road as per the Regional Transportation Off-Site Levy Bylaw.	5,000 – 12,000	4	Paved	***	***	***	***	23.8/***	3:1	2.0*	*	***	***	***	***

Notes: * - may vary; ** - Classifications with VPD higher than the above noted classifications will be evaluated by the County on a case-by-case basis; *** - to be determined at the time of detailed design based on TAC and Alberta Transportation standards, specifications, and guidelines; **** - higher design speeds may be used subject to detailed design and review based on Alberta Transportation & TAC standards, specifications, and guidelines; **** - higher design speeds may be used subject to detailed design and review based on Alberta Transportation & TAC standards, specifications, and guidelines. The design parameters listed in Table 400G above are intended to be used as a guideline only as minimum requirements. It is the Consulting Engineer's responsibility to use standard engineering practices to apply the design parameters as required on a case by case basis.



Section 400 – Road Design Guidelines

4019 FIGURES 1-22: ROADS - DETAILED ENGINEERING SCHEMATICS – SEE APPENDIX

Please see **Appendix** for the Detailed Engineering Schematics for the following road classifications:

Figure 400.1 Country Residential Figure 400.2 Country Collector Figure 3: 400.3 Rural Industrial / Commercial (30m) Figure 4: 400.4 Rural Industrial / Commercial (36m) Figure 5: 400.5 Rural Low Volume Figure 6: 400.6 Rural Moderate Volume Figure 7: 400.7 Rural Transitional Paved Figure 8: 400.8 Rural Collector Figure 9: 400.9 Rural Primary Collector Figure 10: 400.10 Rural 6 Lane Arterial Figure 11: 400.11 Rural 4 Lane Arterial Figure 12: 400.12 Typical Rural Cul-De-Sac Dimensions Figure 13: 400.13 Road Approach Location Figure 14: 400.14 Typical Rural Road Approach Design Criteria Figure 15: 400.15 Emergency Access Route Figure 16: 400.16 Emergency Breakaway Access Gate Figure 17: 400.17 Typical Rural Installation of Municipal Road Name Signs Figure 18: 400.18 Typical Name Sign Details Figure 19: 400.19 Sign Placement Details Figure 20: 400.20 Sign Installation Details Figure 21: 400.21 Modified Road Standard Crossing Environmental Reserve (ER) Figure 22: 400.22 Rural Mailbox Turnout

- 500 WASTEWATER AND SEWAGE
- 501 SUBMISSION REQUIREMENTS
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- 503 REGIONAL WASTEWATER SYSTEMS & CONNECTIONS
- 504 DECENTRALIZED WASTEWATER DISPOSAL SYSTEMS
- 505 PRIVATE SEWAGE TREATMENT SYSTEMS
- 506 MODEL PROCESS FOR SUBDIVISION AND PRIVATE SEWAGE
- 507 PACKAGED SEWAGE TREATMENT PLANT
- 508 LOW IMPACT DEVELOPMENT
- 509 GREYWATER

Section 500 Wastewater and Sewage



500 WASTEWATER AND SEWAGE

Wastewater and sewage are regulated Provincially. The Developer is responsible for ensuring that all wastewater and sanitary sewer facilities and infrastructure are designed and constructed in accordance with the Provincial legislation, manufacturer's design guidelines, Alberta Environment and Protected Areas guidelines and approvals, and sound design and construction practices. All wastewater and sanitary sewer disposal proposals must identify systems in accordance with Alberta Environment and Protected Areas regulations and guidelines and Provincial legislation as applicable. Plans, engineered drawings, specifications, and a letter report prepared by the Engineering Consultant must be submitted to the County and Alberta Environment and Protected Areas (as applicable) for review and approval prior to construction.

The Developer is responsible for ensuring that the requirements of all Provincial legislation, regulations, guidelines, and standards for wastewater and sanitary sewer systems are complied with including but not limited to:

- Alberta Private Sewage Treatment Systems Standard of Practice.
- The Model Process for Subdivision Approval and Private Sewage.
- Environmental Protection and Enhancement Act.
- Standards and Guidelines for Municipal Waterworks, Wastewater, and Stormwater Drainage Systems.
- Municipal Government Act.
- Subdivision and Development Regulation.

The County reviews development on a case-by-case basis to determine the requirements for wastewater servicing. The County bases this review on existing area densities, drainage issues, the scope of development, and other matters of concern as deemed appropriate.

The Developer is required to identify the proposed wastewater system for their development at the time a development or subdivision application is made to the County. This section lists the procedures and design requirements related to wastewater servicing for a proposed development. Unless otherwise stated by the County, the engineering consultant shall certify all reporting, testing, and engineering design.

Both the Municipal Government Act and the Subdivision and Development Regulation provide the County with the authority to ask the subdivision proponent to undertake a site evaluation and provide information proving the parcels' suitability for parcels for the Private Sewage Treatment System (PSTS), if applicable. The Municipal Government Act allows the County to ensure that subdivisions relying on PSTS are properly investigated and that the proposed parcel(s) are deemed suitable for on-site sewage treatment at the time of subdivision. It also puts the onus on the Developer to prove the viability of the subdivision proposal to the satisfaction of the County. The County requires that sewage disposal for each proposed lot is feasible, is not a public health danger, and is not a concern for public safety.

501 SUBMISSION REQUIREMENTS

The following table provides a summary of the County's expectations for each stage of development:

TABLE 500-A Submission	n Requirements
DEVELOPMENT STAGE	MINIMUM INTERSECTION SPACING (M)
Land Use and Redesignation	 Written conceptual submission outlining the estimated wastewater generation rates and proposed sewage treatment system. Conceptual reports and studies as required by the County in support of the Developer's proposed wastewater sewage system. All documents to be submitted prior to scheduling a public hearing. Appropriate Private Sewage Treatment Assessment if onsite soil treatment is proposed and the County has concerns about site suitability for on-site sewage systems.
Subdivision	 Appropriate Private Sewage Treatment Assessment if on- site soil treatment is proposed. Detailed reports and studies as required by the County in support of the Developer's proposed wastewater sewage system. For future municipal treatment systems, a Cost Feasibility Report for the construction, operation, maintenance, and replacement of the proposed wastewater sewage system. All documents to be submitted prior to scheduling subdivision hearing.
Development Permit	 Detailed engineering design drawings/reports. Provincial, Federal, and other regulatory approvals. All documents to be submitted prior to issuance of the Development Permit.

501.1 Cost Feasibility Report

A Cost Feasibility Report is a key component of the review of comprehensive wastewater treatment and management systems. This report must outline the life-cycle cost of construction, operation, maintenance, and replacement of proposed wastewater management systems that will become Municipal Infrastructure. In addition, the Report's primary objective is to identify the estimated break-even point (when the system will have enough users paying utility bills to cover the costs of system maintenance, operation, and reserve funding) and to estimate future utility rates to verify those rates fall within normal, reasonable, and tolerable levels. The report will be endorsed by the engineering consultant and reviewed by the County. If required, a third-party review will be completed. The Developer will bear the cost of preparing this report and any

subsequent third-party review. The County will use the report to review the long-term financial feasibility and sustainability of the Developer's proposed wastewater management systems.

502 DESIGN REQUIREMENTS

Except where stated otherwise, all design criteria, materials, installation, and testing shall be in accordance with the most recent editions of the following as amended:

- Alberta Environment and Protected Areas Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta.
- The City of Calgary's Standard Specifications Sewer Construction.
- The City of Calgary's Wastewater Lift Station Guidelines.
- The City of Calgary's Design Guidelines for Subdivision Servicing.
- The City of Calgary Design Guidelines for Development Site Servicing Plan.
- The City of Calgary's Sanitary Servicing Study Guidelines.
- The City of Calgary Sewer Bypass Guidelines.
- Handbook of Polyethylene Pipe, Plastics Pipe Institute
- Alberta Private Sewage System Standard of Practice.
- The Model Process for Subdivision Approval and Private Sewage.
- Rocky View County Policy 449 "Requirements for Wastewater Treatment Systems"
- Other policies, standards, or guidelines as deemed applicable by the County.

The more conservative standard shall prevail where discrepancies exist between these standards and other guidelines, standards, and regulations listed in this section.

The design of wastewater collection, treatment, and disposal systems shall favour providing a long service life, ease of maintenance, and ease of operation over initial start-up costs. Ultimately, it is the Engineering Consultant's responsibility to certify the system's design to ensure that upon final acceptance (FAC) of the development by the County, the future public responsibilities for maintenance fall within normal, reasonable, and tolerable levels.

In addition to the standards, guidelines, and documents listed above, the County has developed its own set of specific requirements as listed in subsequent sections.

503 REGIONAL WASTEWATER SYSTEMS & CONNECTIONS

The County considers a Regional Wastewater System to consist of a communal wastewater collection system that collects sewage from multiple development areas and conveys the sewage to a regional treatment facility. In general, Regional Wastewater Systems and connections need to follow the guidelines and recommendations of a Master Servicing Strategy. A Master Servicing Strategy is an analysis of servicing options, potential infrastructure locations/alignments, and ultimate discharge strategies for water and wastewater. The County can be contacted by the Engineering Consultant to obtain copies of relevant Master Servicing Strategies.

All regional facilities are required to be on County-owned/controlled property. Discharge locations and treatment methods must meet or exceed Alberta Environment and Protected Areas and Municipal guidelines and regulations. The Developer is responsible for all construction and operation costs of all Regional Wastewater Systems before issuing a Final Acceptance Certificate (FAC) or breakeven point, whichever occurs last. At the time of the Construction Completion Certificate (CCC), the ownership is typically transferred to the County (unless otherwise specified in a Franchise Agreement or other County/Developer Agreement); however, the Developer remains responsible for operations, operational costs, maintenance costs, repair, and replacement costs until the issuance of FAC or break-even point whichever occurs last. The Cost Feasibility Report is expected to guide the transfer of all assets and operational costs to the County. The Development Agreement will outline the details and operational structure recommended by the Cost Feasibility Report.

For general purposes, when a Regional Wastewater System is being considered, the documents listed in Section 503.0 are used for minimum design requirements. It should be noted that these minimum guidelines may only apply to some situations, and sound engineering design practices are required to ensure the proper treatment and disposal of the wastewater. All wastewater collection, treatment, and disposal system designs require Alberta Environment and Protected Areas registrations, permits and licenses for construction and operation. The Developer is responsible for all necessary approvals and for ensuring that the design meets all requirements of all Provincial and other regulatory bodies.

503.1 Connection To Regional Wastewater System

When considering a connection to the Regional Wastewater System, the Developer shall contact the County for an appointment to discuss plant capacity, lift station requirements, connection locations, levy requirements, and other pertinent items.

503.2 Manhole Lids

All manhole lids shall include 'Rocky View County' and the County Logo forged into the lid. Contact the County for information on lid suppliers.

503.3 Lift Stations

Lift stations serving multiple lots shall be located on County-owned/controlled property (County Lift Stations). The Developer is responsible for all construction and operation costs of all County Lift Stations prior to the issuance of a CCC. At the time of CCC, the ownership is typically (unless otherwise specified in a Franchise Agreement or other County/Developer Agreement) transferred to the County; however, the Developer remains responsible for operations, operational costs, maintenance costs, repair, and replacement costs until the issuance of FAC.

County Lift Stations will consist of a below-ground wet well and adjacent electrical and control(s) panel at a minimum. Additional components or an on-site building may be required; the Developer must confirm the individual requirements of each lift station with the County during design. Typically, the requirement for a building will be triggered by complex lift stations that require a significant amount of electrical and monitoring equipment that can't be accommodated in control

panels. A stamped design report must be provided to the County for review and approval prior to the start of any construction.

The lift station will consist of the following components at a minimum:

503.3.1 WET WELL

- An FRP (fibreglass reinforced plastic) or sulphate resistance concrete wet well.
- Wet well lining to prevent infiltration/exfiltration.
- A stainless steel access hatch with a minimum size of 750x750 mm or 10 mm larger than the largest piece of equipment required to enter the confined space, whichever is larger.
- All wet wells deeper than 5 m shall include a platform safety grate with hatches for pump removal. Hatches in the platform shall not be offset from the wet well lid access hatch to ensure proper pump removal and proper fall arrest device operation.
- An engineered anchor for a davit or lifting device for person entry and exit from the wet well with fall arrest.

503.3.2 PUMPS

- All stations will provide 100% pumping redundancy with a minimum of two identical pumps, including size.
- Pumps must be specifically designed for wastewater pumping with applicable technology for the design application.
- Non-clogging pumps shall be considered for residential lift stations.
- Grinder pumps shall be installed where deemed necessary for the lift station's proper function.
- Pumps shall have a minimum inlet of 100 mm.
- Pumps shall be connected to a chain hoist-guided rail system with a self-connect/ disconnect function.
- Each pump shall have a VFD (variable-frequency drive).
- Pump duty point, motor size, and power requirements shall be included in the design drawings.
- A lift station control philosophy shall be provided to the County for review and approval prior to commissioning.

503.3.3 LIFT STATION PROCESS/MECHANICAL

- Lift station piping shall be 304 stainless steel, Schedule 40 (minimum). Piping may transition to PVC or HDPE a minimum of 1 m outside of the lift station.
- Isolation and check valves are required to isolate each pump from the lift station system and prevent unintentional reverse flows.

- An isolation valve is required for the discharge force main.
- Flow meters, including bypass piping for discharge flow meters, shall provide both flow and totalizer data.
- Pressure gauges and transmitters.
- Stainless steel air relief valves.
- Level float switches and a level transmitter. Pump operation shall default to operation based on float levels in the event of SCADA error or failure.
- An H2S monitor with an external readout shall be installed where wet well access hatches are indoors.
- A blower/heater shall be installed to provide the required number of air exchanges for the area classification.

503.3.4 LIFT STATION ELECTRICAL/CONTROLS

- An approved system shall be used to diagnose pump failure.
- An auto-dialer shall be used for alarm callouts.
- Fault alarms shall consist of pump failure, high level, and loss of power at a minimum.
- The installed Programmable Logic Controller (PLC) shall be compatible with the County's SCADA system and other County systems.
- An Uninterruptible Power Supply (UPS) shall be installed if the station is equipped with a PLC.
- Electrical control panels must be compatible with the pump configuration and include:
- 110 V spare receptacle
- Hand, Off, Auto, and Emergency Stop on the Motor Control Centre (MCC)
- Standby power shall be included, using a natural gas fuel source where possible.
- All electrical components in the wet well shall be intrinsically safe.

503.3.5 FORCE MAIN

- The lift station force main shall be a minimum of 100 mm in diameter to prevent clogging.
- Force main pigging criteria shall follow the City of Calgary guidelines.

503.3.6 COMMISSIONING

• Pump station testing shall consist of a three-day commissioning test followed by a fifteenday commissioning period. Should any problems or faults arise within the fifteen-day period, the issue must be resolved, and the period must be restarted until it can be completed without any faults.

- An approved representative shall commission all materials.
- Commissioning reports for each piece of equipment, as well as the entire lift station as a whole, shall be provided to the County.
- The County shall receive an O&M (Operations and Maintenance) Manual for the lift station within three months of its successful commissioning.

At a minimum, all lift stations must meet the standards outlined in Alberta Environment and Protected Areas Wastewater System Standards and Alberta Environment and Protected Areas Wastewater System Guidelines, which are the most recent editions.

Lift station design shall also reference the City of Calgary Wastewater Lift Station Design Guidelines, where requirements still need to be listed above.

503.3.7 COUNTY ACCEPTANCE

The testing requirements for all sewer mains, manholes, and related structures shall be in accordance with acceptance testing requirements set by the City of Calgary for sewer construction, which include:

- Visual inspection of surface features, manholes, and larger sewers.
- Image-based video inspection of the smaller sewers up to 1500 mm diameter). Pipes larger than 1500 mm in diameter shall be inspected, and observations recorded during a walk-through by a Pipeline Assessment & Certification Program (PACP) certified operator or by image-based video inspections where authorized by the Engineering Consultant (subject to obtaining acceptable data quality).
- Deflection testing of PVC sewers and Image-Based Sewer Inspection.
- An infiltration/exfiltration test is to be performed if visible signs of water are seen entering the pipe or if the County notes environmental concerns.
- Pressure testing of force mains and siphons shall follow the exact requirements of pressure testing of water mains.

504 DECENTRALIZED WASTEWATER DISPOSAL SYSTEMS

A Decentralized Wastewater Disposal System consists of a communal wastewater collection and disposal system that collects and treats effluent from two (2) or more lots and discharges to an approved discharge location. All primary and secondary treatment facilities are required to be on County-owned/controlled property. Any proposal for Decentralized Wastewater Disposal Systems requires prior approval from the County. The County prefers regional solutions and connections over the Decentralized Wastewater Disposal System where possible.

Discharge locations and treatment methods must meet or exceed Alberta Environment and Protected Areas's and Municipal guidelines and regulations. The Developer is responsible for all construction and operation costs of all Decentralized Wastewater Disposal Systems prior to the issuance of a CCC. At the time of CCC, the ownership is typically (unless otherwise specified in a Franchise Agreement or other County/Developer Agreement) transferred to the County; however, the Developer remains

responsible for operations, operational costs, maintenance costs, repair, and replacement costs until the issuance of FAC or the breakeven point, whichever occurs last. The Cost Feasibility Report is expected to guide the transfer of all assets and operational costs to the County. The Development Agreement will outline the details and operational structure recommended by the Cost Feasibility Report.

Alberta Environment and Protected Areas dictates guidelines for systems other than on-site wastewater treatment systems (i.e., those systems not covered in the Alberta Private Sewage Systems Standard of Practice). Any systems that serve more than one property (Decentralized Sewage Disposal Systems) automatically fall under the jurisdiction of Alberta Environment and Protected Areas. All wastewater collection, treatment, and disposal system designs require Alberta Environment and Protected Areas permits, registrations, and licenses for construction and operation. The Developer is responsible for all approvals and to ensure that the design meets all requirements of all Provincial and other regulatory bodies.

505 PRIVATE SEWAGE TREATMENT SYSTEMS

For developments where private sewage treatment systems are permitted, Private Sewage Treatment Systems (PSTS) shall be in accordance with the latest version of the Alberta Private Sewage Standard of Practice (SOP). The method of treatment proposed shall be determined based on land use designation, site development constraints, the County's Land Use Bylaws, the County's Policies and Procedures, or at the discretion of the County.

The County generally requires sewage holding tanks for Industrial, Commercial, and Institutional developments. Where proposed, other treatment methods may be considered; however, an assessment of the proposed treatment system shall be submitted along with confirmation that the type of system, disposal, volume, and wastewater strength is in accordance with the latest version of the SOP.

Single-lot industrial, commercial, and institutional developments (not located in comprehensive business parks) may utilize two separate PSTS, one holding tank for managing high-strength wastewater and a separate PSTS system to manage the wastewater that meets the typical domestic wastewater strength and volumes. To confirm the type of system selected will meet the County's standards, the PSTS must be assessed following the Level Four assessment guidelines outlined in the Model Process for Subdivision Approval and Private Sewage.

505.1 Limits for Private Sewage Treatment Systems

If a proposed subdivision will result in the creation of any lot(s) less than 3.95 acres, a standard PSTS will not be supported for subdivision purposes. The proposed subdivision will require a Decentralized or Regional Wastewater Treatment System; however, if neither of these two options is feasible, subject to a successful Model Process study, a Packaged Sewage Treatment Plant must be used for each newly created lot along with a deferred servicing agreement for future requirement of connection to a decentralized or regional system once available.

The use of PSTS soil-based systems on residential lots less than 1.98 acre will only be permitted if the lot creation approval occurred prior to approval of the previous 2013 Servicing Standards.

505.2 Types of Private Sewage Treatment Options

- Sewage Holding Tank: Industrial, commercial, and institutional developments or areas permitted in the County's Land Use Bylaws.
- Septic Tank and Field: >3.95 Acres.
- Packaged Treatment Plant: >1.98 Acres and < 3.95 Acres.

505.2.1 HOLDING TANK DESIGN CAPACITIES

For developments, it shall be demonstrated at the Development Permit stage that holding tanks will have a capacity suitable for the intended use. The capacity of all tanks should be large enough to make effective use of trucking service and provide a reserve volume. Tanks should be sized to be at least 7 times the estimated peak daily sewage flow unless a clearly written Maintenance Plan is provided by the Engineering Consultant to explain how a smaller storage capacity will be managed. With very high daily sewage flow, it is unlikely that the holding tank capacity will allow for seven days of storage, so the Maintenance Plan must be thorough and include emergency response measures. The plan should also include a wastewater hauling contract, specifying the hauling frequency, expected daily sewage flow, and the estimated distance from the site to receiving facility to ensure there is a hauler available that can manage this volume of effluent.

506 MODEL PROCESS FOR SUBDIVISION AND PRIVATE SEWAGE

The County follows the Model Process Guidance Document and Model Process Technical Resource of the most recent edition of The Model Process for Subdivision Approval and Private Sewage. This document will be a guideline for Subdivisions or rezoning applications proposing to rely on soil-based Private Sewage Treatment Systems. In addition to the requirements of the Model Process, the County has updated the Level of Assessments in the Model Process to be more specific to County procedures, as noted in Table 500-B.

506.1 Model Process Assessments for PSTS

- > Low Density development is defined as having 30 or fewer lots in given quarter section
- > High Density development is defined as having 30 or higher lots in given quarter section
- The Model process does not apply to lots greater than 20 acres in size; however, a developer may still need to provide a Level 1 assessment if the County requires additional information

The flowchart below outlines the different levels of assessment and variation criteria; whereas, Table 500-B below provides greater detail to what is required for the report following each assessment.



 The proposed use is expected to generate more than 5.68 m3 (1,250 gallons) of sewage per day per parcel

Model Process Criteria for PSTS Assessments

Assessment Level	Criteria	Density	Report information required	Assessment Qualifications
Level 1 Variation	Landowner simply wants to subdivide homestead from remainder of property and there is an existing PSTS on the homestead parcel Or, Subdivision application where there is an existing PSTS on either lot	Low	 A drawing/sketch showing location and size of existing PSTS. Show measurements to pertinent features (i.e. distance from property line, wells (within 60m), surface water & type (within 150m), buildings, right of ways, etc.) List the clearance distances required for existing system 	Certified PSTS Installer or applicant
Assessment Level	Criteria	Density	Report information required	Assessment Qualifications
Level 1	1 st parcel out or one additional parcel where system density does not exceed 4 PSTS in the surrounding 160 acres	Low	 A drawing/sketch showing location of surface water (springs, dugouts or wells) providing water for domestic use within 150m of proposed system Show measurements to pertinent features (i.e. distance from property line, wells or proposed wells (within 60m), surface water & type (within 150m), buildings, right of ways, etc.) Location, size, type and clearance distances required for proposed system Location of test pit(s), borehole(s) and/or core samples Land use/type of development proposed Sewage volumes estimated for proposed system Location and size of PSTS reserve system area (if any) List limitations for proposed system 	Certified PSTS Installer
Assessment Level	Criteria	Density	Report information required	Assessment Qualifications

Level 2	 Subdivision of one additional parcel where density exceeds 4 PSTS in the surrounding 160 acres Or, 2-30 lots > 3.95 ac in size in a low density area Location, size, type and clearance distances required for proposed system Location of test pit(s), borehole(s) and/or core samples Identify number of parcels on the quarters Land use/type of development proposed system Location and size of PSTS reserve system Location and size of PSTS reserve system area (if any) List unitations for proposed system
Variatio	ns for Level 1 and Level 2 requiring a higher level of assessment are based on:
1)	There is no available reserve area to replace failed system
2)	The parcel is in a sensitive area (i.e. Bragg Creek, Elbow River Alluvial Aquifer, etc.) or due to surface
21	water source being within 150 meters of proposed PSTS boundary
3)	The proposed system is expected to generate more than 5.68 cubic meters of sewage per day per new
4)	parcer The initial report or available information suggests difficult site soil or hydrogeological conditions /i.o.
4)	shallow bedrock shallow water table high clay content or high gravel content soils etc.)
5)	Parcel has significant presence of historical or existing wetlands
5)	Darcal has more than 20% of the developable land surface with slopes greater than 15%

6)	Parcel has more than 20% of the developable land surface with slopes greater than 15%	

Assessment Level	Criteria	Density	Report information required	Assessment Qualifications
Level 3	 Subdivision of additional parcels < 3.95 ac in size, in a high-density area 	High	 A subdivision area showing lot boundaries, location of surface water (springs, dugouts or wells) providing water for domestic use within 0.8km of proposed system 	CET, P.Eng or Soil Scientist

Variations for Level 3 assessment requiring a Level 4 assessment are based on:

- 1) Existing high-density development in the area, or the municipality is aware of future higher density development in the area
- Sensitive environmental circumstances exist (i.e. Floodplain, Floodway, overland flow risk area, Lakefront property, food plain, existing concerns regarding high levels of nutrient loading) or parcel is within 500m of an environmentally sensitive surface water body
- 3) Small parcel size may limit selection of system types and area available for reserve system
- 4) Known soil or environmental conditions that limit system suitability (i.e. Difficult topography, shallow bedrock, shallow water table, high clay content or high gravel content soils, etc.)
- 5) The proposed use is expected to generate more than 5.68 cubic meters (1,250 gallons) of sewage per day per parcel

Assessment Level	Criteria	Density	Report information required	Assessment Qualifications
Level 4	Multi-lot residential exceeding 30 parcels and with any identified risks pertaining to suitability of PSTS such as, but not limited to, soil hazards (i.e. soils with restriction to vertical water movement or depth to bedrock, impermeable layers or saturated soil, etc.), extremely high water table, slopes higher than 15%, setback limitations, high concern for effect on surface water	High	 A subdivision area showing lot boundaries, location of surface water (springs, dugouts or wells) providing water for domestic use within 0.8km of proposed system Show measurements to pertinent features (i.e. distance from property line, wells or proposed wells (within 60m), surface water & type (within 150m), buildings, any existing PSTS, right of ways, etc.) Location, size, type and clearance distances required for proposed system Location and size of PSTS reserve system area (if any) Location of test pit(s), borehole(s) and/or core samples Identify number of parcels on the quarter section and adjoining quarters Land use/type of development proposed Sewage volumes estimated for proposed system and dimensions of the land area required for PSTS system at the expected volumes List limitations for proposed system List surface slopes, cuts, banks and drainage characteristics also considering slope stability concerns Provide Soil mapping or soil series for the area as well as soil description, moisture conditions, estimate of high ground and any conditions that would adversely affect suitability At least 50% of the lots created must be investigated using test pits in locations based on the most likely area for installation of the PSTS Comments pertaining to accepted water quality impact assessment report 	P.Eng or P.Ag

507 PACKAGED SEWAGE TREATMENT PLANT

As per the SOP, a Packaged Sewage Treatment Plant is a manufactured unit that is used to substantially improve the effluent quality beyond the effluent expected of a septic tank. Packaged Sewage Treatment Plants shall be certified to meet one of the certification criteria as listed in the SOP.

507.1 Design Criteria

For systems that receive less than 25 cubic meters per day of wastewater, the design criteria, materials, installation, and testing shall be in accordance with the most recent edition of:

- Alberta Private Sewage Systems Standard of Practice
- Safety Codes Act
- Private Sewage Disposal Systems Regulation
- Permits and Alberta's Safety Codes System
- County Policy "Requirements for Wastewater Treatment Systems"
- Other Policies and Procedures approved by the County as applicable.

508 LOW IMPACT DEVELOPMENT

Conventional construction methods and designs are being subject to new technologies to help reduce our ecological footprint as rural areas become more intensely populated. Sustainability should be clearly articulated as a guiding principle for project development, as sustainable design principles affect all phases of project development, from design to construction, operations and maintenance, and demolition and disposal.

509 GREYWATER

Greywater is domestic wastewater generated from laundry, washing, and bathing activities and does not include wastewater from toilets, urinals, or kitchen sinks. Greywater may be reused for activities such as toilet flushing, irrigation, and industrial process use (subject to Alberta Environment and Protected Areas/Alberta Health Services/ Rocky View County approval). To clearly differentiate potable and non-potable water lines, reclaimed water pipes are colour-coded purple and may be referred to as purple pipe systems.

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Section 600 Water Supply and Waterworks



600 WATER SUPPLY AND WATERWORKS

601 WATER TREATMENT AND DISTRIBUTION SYSTEMS

Water is a Provincially regulated resource. Waterworks systems are typically approved, permitted, and licensed by Alberta Environment and Protected Areas to withdraw, treat, and distribute water, whether from a groundwater source or a surface water source. Alberta Environment and Protected Areas' Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems address the performance, design, operation and monitoring of waterworks systems. In general, the waterworks system must provide sufficient quantities of water to meet users' needs, including fire protection where required. The water quantity requirements should be based on an overview of all existing and possible future domestic, institutional, commercial, and industrial demands.

Except where stated otherwise, all design criteria, materials, installation, and testing shall be in accordance with the most recent editions of the following as amended:

- Water Act
- Alberta Environment and Protected Areas Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems
- Alberta Environment and Protected Areas Codes of Practice
- National Building Code Alberta Edition
- Guidelines for Canadian Drinking Water Quality
- City of Calgary Design Guidelines for Subdivision Servicing
- City of Calgary Standard Specifications for Waterworks Construction
- City of Calgary Standard Specifications & Design Guidelines for Potable Feedermain Construction.
- Cit of Calgary Cathodic Protection & AC/DC Interference Mitigation, Inspection, & Test Plan.
- Handbook of Polyethylene Pipe, Plastics Pipe Institute
- Fire Underwriter's Survey (FUS) Water Supply for Public Fire Protection
- National Fire Code of Canada (NFC)
- National Fire Protection Association (NFPA) Codes and Standards
- Other policies, standards or guidelines as deemed applicable by the County.

In addition to the above-noted documents, the system should be designed based on the experience and professional knowledge of the Engineering Consultant. It should be noted that these are minimum guidelines, and site-specific situations may require additional engineering and study. Where standards overlap, the more conservative standard shall apply.

A water system can consist of treatment plants, reservoirs, booster stations, transmission mains, trunk water mains (feeder mains), mains, and appurtenances. Any waterworks system or parts of a

system should, wherever possible, be designed to permit future expansion to serve areas outside the Subdivision development boundary.

A meeting with the County is required if a development proposes constructing a regional or subregional water treatment plant, reservoir, chlorination station, booster station, and/or distribution facility. The required infrastructure shall be in accordance with the Alberta Environment and Protected Areas standards as supplemented by those of the City of Calgary. The Developer shall provide the proposed design criteria to the County for review. Following this review, the final design criteria acceptable to the County will be provided to the Developer.

The design of water systems shall favour providing a long service life, ease of maintenance, and ease of operation over initial start-up costs. Ultimately, it is the Engineering Consultant's responsibility to certify the system's design to ensure that upon final acceptance (FAC) of the development by the County, the future public responsibilities for maintenance fall within normal, reasonable, and tolerable levels

602 PIPED WATER SYSTEM SUBMISSION REQUIREMENTS

The following table provides a summary of the County's expectations for each stage of development:

TABLE 600-A	Piped Water Submission Requirements							
DEVELOPMENT	STAGE		MINIMUM INTERSECTION SPACING (M)					
Land Use and Redesignation		•	Written conceptual submission outlining the estimated water demands and proposed water treatment system.					
		٠	Conceptual reports and studies as required by the County in support of the Developer's proposed water system.					
		•	All documents submitted prior to scheduling public hearing.					
		٠	Confirmation from a County approved piped water supplier* that capacity is available for the proposed development.					

	 Detailed reports and studies as required by the County in support of the Developer proposed water system.
Subdivision	 For future municipal treatment systems, a Cost Feasibility Report for the construction, operation, maintenance, and replacement of the proposed water system.
	 All documents to be submitted prior to scheduling subdivision hearing.
	 Confirmation from a County approved piped water supplier* prior to subdivision endorsement that capacity has been purchased and that there is a contract in place to supply the development with the required water supply.
	 In the event that piped water supply will require construction of pipes outside of the development area, separate agreements may be required prior to entering into a Development Agreement
	Detailed engineering design drawings/reports.
Development Permit	Provincial, Federal, and other regulatory approvals.
	 All documents to be submitted prior to issuance of the Development Permit.

*Note: There are many private water suppliers in the County, the applicant will need to confirm with the County early on in the development process if a piped water supplier is approved to support additional development in the County.

603 COST FEASIBILITY REPORT

A Cost Feasibility Report is a key component of the review of comprehensive water treatment systems. This report must outline the life-cycle cost of construction, operation, maintenance, and replacement of proposed water treatment systems that will become Municipal Infrastructure. In addition, the Report's primary objective is to identify the estimated break-even point (when the system will have enough users paying utility bills to cover the costs of system maintenance, operation, and reserve funding) and to estimate future utility rates to verify those rates fall within normal, reasonable, and tolerable levels. The report will be endorsed by the engineering consultant and reviewed by the County. If required, a third-party review will be completed. The Developer will bear the cost of preparing this report and any subsequent third-party review. The County will use the report to determine the long-term financial feasibility and sustainability of the Developer's proposed wastewater management systems.

604 PIPED WATER DISTRIBUTION - DESIGN FACTORS

Unless otherwise stated below, the design of the water distribution system shall follow the requirements outlined within the City of Calgary Standard Specifications for Waterworks Construction documents.

604.1 Hydraulic Analysis Requirements

The Developer shall perform a hydraulic network analysis using a computer model simulation approved by the County for all developments connecting to Municipal water utility networks to ensure domestic and fire flow requirements are met (Table 600 B). A report outlining the analysis results shall be submitted to the County with the Subdivision design drawings.

604.1.1 **RESIDENTIAL CONSUMPTION RATES:**

•	Average Daily Demand (ADD)	315 litres/capita/day
•	Maximum Day Demand (MDD)	630 litres/capita/day
•	Peak Hour Demand (PHD)	1,260 litres/capita/day

Lower per capita consumption rates, as approved by the County, can be used if the Developer is able to demonstrate that water conservation measures have been required and implemented throughout the development.

604.1.2 Non-Residential Consumption Rates:

For non-residential developments, unless stated in the area's Master Servicing Strategy (if available), consumption rates shall be evaluated by the Engineering Consultant based on the proposed development density and other relevant factors, the Alberta Environment and Protected Areas Expected Volume of Sewage Per Day from the Wastewater Systems Guidelines for Design, Operating and Monitoring should be used where applicable unless more detailed site-specific expected volumes are known for the project.

604.1.3 FIRE FLOW REQUIREMENTS

The following chart outlines the minimum required capacity to deliver required fire flows. When designing the system, considerations include water source reliability, volume of stored water, capacity to deliver fire flows simultaneously with MDD, redundancy of all major components of the system, looping and distribution, single-point failure analysis, hydrant distribution, maintenance, and condition.

Piped Water Submission Requirements

ТҮРЕ	FIRE FLOW	DURATION	FIRE STORAGE
Country Residential*	50 L/s (3,000 L/m)	1.5 h	270 m3 + MDD
Single Family Residential	100 L/s (6,000 L/m)	2.0 h	720 m3+ MDD
Multi-Family Residential	166 L/s (10,000 L/m)	2.0 h	1,200 m3+ MDD
High Density Residential (Apartments)	250 L/s (15,000 L/m)	3.5 h	2,700 m3+ MDD
Industrial Commercial Institutional**	166 L/s-250 L/s (10,000 L/m-15,000 L/m)	2.0 to 3.5h	1,200-2,700 m3+ MDD

*If the Developer proposes a hydrant system or is required at the discretion of the Council. Country Residential is considered any lot 1.98 ac or greater and has a nominal building separation of 10.1 m or greater.

**Range in fire flows depending on the scale of the project (i.e., "light" industrial/commercial/institutional (ICI) versus "regular" ICI).

604.1.4 MINIMUM PRESSURE REQUIREMENTS

- Maximum Daily Demand + Fire Flow 150 kPa (22 psi)
- Minimum Residual Pressure under Peak Hour Demand 300 kPa (44 psi)

For predominantly industrial development areas, the minimum residual pressure under peak hour demand requirements may be higher at the County's discretion. Pressure-reducing valves are to be installed for systems providing delivery pressures above 550 kPa (80 psi).

The lot owner developing the individual lot will be required to provide on-site booster pumps/storage and other requirements to meet the Alberta Building Code or other applicable codes such as NFPA (National Fire Protection Association) if the distribution system cannot provide adequate pressure/flow.

Minor pressure losses through valves and fittings must be accounted for.
604.1.5 WATER STORAGE

The total water storage volume shall be calculated per Alberta Environment and Protected Areas guidelines and standards.

604.1.6 FLOW VELOCITIES

Mainline flow velocities should not exceed 3.0 m/s during peak flow conditions and maximum day plus fire flow conditions. Fire sprinkler flows shall be in accordance with building and fire code requirements.

604.2 Distribution Mains

Distribution mains shall be continuous (looped) whenever possible. Dead-end mains, when unavoidable in Urban areas, shall be designed in accordance with the City of Calgary criteria. In rural areas, the dead-end mains shall be designed in consultation with the design criteria of the local water provider and be based on a network analysis that verifies that required volumes can be delivered at the minimum pressure requirements.

An air release valve may be required based on the Engineering Consultant's water infrastructure design. The Engineering Consultant is required to submit proposed disinfection/flushing procedures to the County for review, along with engineering design drawings. All water lines are to be flushed after streets are constructed and before issuance of building permits. Before being placed into service, the entire distribution system shall be disinfected according to industry standard practices.

Stubs to the boundary of a development shall be provided to accommodate future connections.

Service connections to residential lots are to be installed a minimum of 3.5 m inside the property line unless further offset is required due to utility rights of ways. All curb stops (control valves to individual lots) shall be located within the Municipal ROW or an easement area located within 6 m of the municipal roadway. Residential water services shall be 20 mm or larger as needed. Pressure-reducing valves are required where static pressure is greater than 80 psi.

604.3 Valves & Fittings

Valves shall be able to be operated by opening Counterclockwise.

604.3.1 ALIGNMENT & PLACEMENT

Main valves shall be the same size as the main and located such that no more than 30 singlefamily lots and one hydrant are involved in a shut-down, and a maximum of four (4) valves are required to shut down any section of line.

The design standard shall be two (2) valves at a tee and three (3) valves at a cross, unless the County approves otherwise. A valve and at least one length of pipe shall be installed at the interim limits of construction.

An isolation valve is required on the water main between adjacent hydrants.

604.3.2 PROTECTION

Where required by the Engineering Consultant, or as soil testing indicates, all cast iron valves and fittings shall be wrapped with Denso Anti-Corrosion Product or approved equivalent to prevent corrosion. All metallic fittings, such as valves, hydrants, and service connections, shall be cathodically protected in accordance with industry-standard practices.

604.4 Meter Units

All water connections to the County water system will require the installation of a water meter. Contact the County for water meter specifications and requirements.

604.5 Booster Stations

Booster stations within the County will consist of a fully redundant pumping system housed within a building containing all required mechanical, electrical, and control components. Additional components may be required on a site-by-site basis; the Developer must confirm the individual requirements of each station with the County during design. A stamped design report, including an operational control philosophy, must be provided to the County for review and approval prior to the start of any construction.

The booster station will consist of the following components at a minimum:

604.5.1 BUILDING ENVELOPE AND SITE

- The building envelope shall match the surrounding residential development, where required.
- The building and site shall provide access for pump removal.
- The building shall be fenced and secured from the surrounding area.

604.5.2 PUMPS

- All stations will provide 100% pumping redundancy with a minimum of two pumps of the same size.
- Each pump shall have a VFD (variable-frequency drive)
- Pump duty point, motor size, and power requirements shall be included in the design drawings.

604.5.3 BOOSTER STATION PROCESS/MECHANICAL

- Booster station piping shall be NSF 61 stainless steel, Schedule 40 (minimum). Piping may transition to PVC a minimum of 3 m outside the booster station.
- Isolation valves (gate or butterfly) are required to isolate each pump from the system for servicing.

- Check valves are required to prevent unintentional reverse flows in the system.
- Flow meters, including bypass piping for maintenance and replacement. Flow meters shall provide both flow and totalizer data.
- Pressure sensors and transmitters.
- Stainless steel air and vacuum relief valve.
- A pressure relief valve is required, connected to the pressure sensor on pump discharge.
- Ports for water sampling and chlorine injection.
- Building HVAC as required.

604.5.4 BOOSTER STATION ELECTRICAL/CONTROLS

- Auto dialer shall be used for alarm callouts.
- Fault alarms shall consist of pump failure and loss of power at a minimum.
- PLC, HMI, and remote access through SCADA shall be compatible with other County systems.
- A UPS shall be installed if the station is equipped with a PLC.
- Standby power shall be included, using a natural gas fuel source where possible. Fuel shall be stored away from all water piping.
- Building alarms shall consist of unauthorized entry, smoke, flooding, and power failure at a minimum.

604.5.5 COMMISSIONING

- Booster station testing shall consist of an approved representative commissioning all equipment and materials, followed by a fifteen-day commissioning period. Should any problems or faults arise within the fifteen-day period, the issue must be resolved, and the period must be restarted until it can be completed without any faults.
- The County shall receive commissioning reports for each piece of equipment and the entire station.
- The County shall receive a booster station O&M (Operations and Maintenance) Manual within three months of the lift station's successful commissioning.

605 HYDRANTS

605.1 Approvals

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

605.2 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. Where hydrants are installed within a commercial/industrial area within 2 m of an approach, the hydrant shall be protected from damage by bollards. Fire hydrants installed in rural areas with rural road cross sections shall be installed in turnouts 2 m off the edge of road pavement (subject to clear zone requirements) and be protected from damage by bollards where turning movements are prone to cross over the hydrant. Bollard placements are not to interfere with access to fire hydrant ports. The bollards shall be painted yellow/orange with black trim, similar to hazard signage.

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

605.3 Fire Hydrant Specification

Hydrant types shall be as per the County's Fire Hydrant Suppression Bylaw unless otherwise approved in writing by County management. Hydrant specifications shall be as per the County's Fire Hydrant Suppression Bylaw; for specifications not available in the Bylaw, City of Calgary criteria are applied. Hydrants shall be able to be operated by opening Counterclockwise.

The drafting hydrant shall meet the standards defined in NFPA documents in areas utilizing drafting hydrants.

606 WATER TREATMENT REQUIREMENTS

For general purposes, when a water treatment and distribution system is being considered, the Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems shall be used as minimum design requirements. It should be noted that these minimum guidelines may only apply to some situations, and sound engineering design practices are required to ensure the proper treatment and distribution of the water. All water treatment and distribution system designs will require Alberta Environment and Protected Areas permits and licenses to construct and operate, as well as Municipal approvals. The Developer and its Engineering Consultant are responsible for ensuring that the design meets the requirements of all Provincial and Local Authorities.

606.1 General Water Treatment Design Criteria

There are several components to a water treatment and distribution system. Some important requirements that a proposed system will be expected to address are as follows:

- Performance Standards
- Usage
- Water Source
- Filtration

- Disinfection
- Operating and Monitoring

The County requires a detailed submission of the proposed water treatment system prior to any County acceptance.

607 ACCEPTANCE TESTING

The cleaning, pressure testing, disinfecting, and commissioning requirements for all water mains shall be in accordance with Acceptance Testing requirements set by the City of Calgary for water construction, which include:

- Preliminary flushing to remove air and all foreign material.
- Pressure testing of the water main (PVC) to the greater of 150% of normal working pressure or 150 psi. Test pressure must be maintained for a period of two hours with allowable leakage. A water main with greater than allowable leakage will not be accepted.
- Disinfection of the water main with a 25 mg/L calcium hypochlorite solution for a period of 24 hours. Flushing of the water main until a turbidity level of 1.0 NTU or less and a residual chlorine level of 0.4 mg/L is achieved.
- Water sample testing.
- The water main will be commissioned once the County approves the water test results.

608 GROUNDWATER WELLS

Alberta Environment and Protected Areas regulates the diversion of groundwater and surface water sources in accordance with Section 23 of the Water Act. Residential uses of groundwater or surface water are permitted up to a volume of 1250 m3/year. This use has priority over other licensed or traditional agricultural users.

Agricultural, communal, commercial, institutional, and industrial uses will require licensing from Alberta Environment and Protected Areas to withdraw water from groundwater or surface water sources for purposes other than domestic use.

For subdivision applications proposing lots of less than 0.4 hectares (1 acre), individual groundwater wells are not permitted by the County.

608.1 Ground Water Wells for Domestic Use (Household)

Except where stated otherwise, all design criteria, materials, installation, and testing shall be in accordance with the most recent editions of the following:

- The Water Act and relevant regulations
- Municipal Government Act and Subdivision and Development Regulations

- Alberta Environment and Protected Areas Protection Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Facilities
- Alberta Environment and Protected Areas Environmental Reference Manual for Review of Subdivisions in Alberta
- Water Wells That Last for Generations: A guide for private well owners in Alberta.
- Health Canada Guidelines for Canadian Drinking Water Quality
- Alberta Environment and Protected Areas Water Wells and Ground Source Heat Exchange Systems Directive (December 11, 2018)
- Rocky View County Policy and Procedures

608.2 Groundwater Assessment & Submission Requirements

The Groundwater Assessment Report encompasses both an Aquifer Supply Evaluation (Phase 1) and an Aquifer Testing (Phase 2) as required at the various stages of development listed in Table 600C.

TABLE 600-C Groundwater Submission Requirements

DEVELOPMENT	GROUNDWATER
Master Site Development Plan/ Conceptual Scheme	Phase 1 Supply Evaluation
Land use / Re-designation	 For less than 6 lots in a quarter section No requirements For 6 lots or more in a quarter section: Phase 1 Supply Evaluation If previously submitted as part of a Conceptual Scheme, confirmation and/or an update to the previously submitted Phase 1 Supply Evaluation is required. Requirements for the update will be determined based on surrounding development activity at the time of the land use application.

	For less than 6 lots:	
		 Well drilled on each lot with Well Driller's report confirming flow of 4.5L/min (1 igpm) or greater For 6 lots or more:
		 Well drilled on each lot with Well Driller's report confirming flow of 4.5L/min (1 igpm) or greater
		Phase 2 Aquifer testing
	Subdivision Endorsement	This testing includes water quality analyses results from the source water. Should any questions arise concerning the interpretation of the water quality results of these analyses, the local Public Health Inspector should be contacted. For any test criteria that does not meet the Canadian Drinking Water Guidelines, the Countywill require written comments on the drinking water quality and any remedial requirements. At the discretion of the County, a caveat on title may be required advising of the quality of the water from the well.

The minimum requirement for 4.5L/min (1.0 igpm) is based on the County's safety factor of 2 from the recommendations noted in Water Wells that Lasts for Generations

If an approved professional defined under the Water Act believes that the aquifer assessment area needs to be extended beyond these minimum limits in any of the above, it is the responsibility of the approved professional to adequately address this extended area.

608.3 Water Well Installation

All wells shall be installed by a licensed water well driller. The well specifications shall conform to the construction, design, and material specifications described in the Alberta Government's Water Wells and Ground Source Heat Exchange Systems Directive (December 2018).

Setbacks of the water well from various substances should be maintained as described in Table 2 of the Directive and is reproduced below in Table 600-D.

Note: in no case can the setbacks be less than what is required in the Alberta Private Sewage Treatment Systems Standard of Practice.



TABLE 600-D Water Well Setbacks

SOURCES	MINIMUM DISTANCE REQUIRED (M)
Watertight septic tank or sewage holding tanks	10 metres
Sub-surface weeping tile effluent Disposal field or an evaporation mound	15 metres
Above ground storage tanks containing petroleum substances	50 metres
Sewage effluent discharge to the ground surface	50 metres
Sewage Lagoon	100 metres

Accurate locations of the wells shall be determined and a map showing the subdivision boundaries and well locations shall be provided in the report to confirm that the well is properly located with respect to being within the Subdivision and, if present, have appropriate minimum setbacks as shown on the above table.

608.4 Aquifer Supply Evaluation (Phase 1)

The Phase 1 Aquifer Supply Evaluation should reflect the following three major objectives in the report and clearly provide statements in the conclusion of the report pertaining to this:

- whether groundwater underlying the Proposed Subdivision Area can supply water for household purposes to each proposed lot and associated household during peak demand periods and over the long term (where each household has its own water well), each household can supply a maximum of 1250 cubic metres of water per year in accordance with Section 23 of the Water Act
- 2) whether the diversion of 1250 cubic metres of water per year for household purposes under Section 21 of the Water Act for each of the households within the Subdivision will interfere with any household users, licensees or traditional agriculture users who exist when the Subdivision is approved
- 3) whether groundwater diversion by the proposed Subdivision is consistent with an applicable approved Water Management Plan.

608.4.1 Assessment of Existing Local Groundwater Data

The purpose of this component of the Subdivision Groundwater Supply Evaluation is to have a qualified Engineering Consultant collect, summarize, and evaluate existing hydrogeological information within the Evaluation Area. This Evaluation Area includes the Proposed Subdivision

Area and surrounding land within a minimum of 1.6 km (1 mile) from the subdivision boundary. The Consultant should address whether there is sufficient existing hydrogeological information to achieve the three major objectives of the report. If there is, the Consultant should determine, relative to these objectives, the implications for the proposed Subdivision.

608.4.2 WATER WELL LOCATIONS / EVALUATION AREA

A more detailed assessment of aquifer potential should be undertaken using water well driller's reports and all other hydrogeologic data available for the Evaluation Area. Information from the driller's reports should be summarized through a combination of text, tables, maps, cross-sections, and other drawings.

The summary should include the following information for the Evaluation Area:

- (a) Well construction details.
- (b) Lithologic logs, well depths, static water levels, well yields.
- (c) Depth, thickness, lithology, extent and type (confined or unconfined) of any aquifers available to the proposed development.
- (d) Based on existing well information, aquifer coefficients (transmissivity, theoretical 20-year safe yield).
- (e) Chemical analyses of well water (if existing well) or water quality results from other wells in the area.
- (f) Hydrogeologic cross-sections.
- (g) Eligible copies of all water well driller's reports pertinent to the Evaluation Area.
- (h) Review of Water Licenses and Registrations within a 1.6 km radius of the area.
- (i) Evaluation of the connection of the water supply aquifer to surface sources.
- (j) Comment on whether aquifer supplies are at risk from surface contaminants (i.e., septic field effluent).
- (k) A field inspection of the Evaluation Area is recommended to verify well locations (refer to point 1), topographic conditions, etc.

608.4.3 AQUIFER TESTING IF EXISTING LOCAL GROUNDWATER DATA INSUFFICIENT

If the Geological or Engineering Consultant Determines there is insufficient hydrogeological information to achieve the objectives of the report, the Engineering Consultant should conduct one or more aquifer tests according to the procedure set forth below, with the Developer's consent.

The description of the aquifer test and the interpretation of the aquifer test data should be presented in the report as per Section 610.5. Knowledge of the local hydrogeological setting gained from the first step can help identify site-specific requirements for well design and aquifer testing and assist with the interpretation of aquifer test results (for instance, whether a

gravel or bedrock aquifer is anticipated or whether the aquifer is likely to be confined or unconfined).

608.4.4 QUALITY ASSURANCE STATEMENT IN THE REPORT

The County requires high-quality, trustworthy information to make a good decision. A poor study may ultimately result in residential lots that have poor developability due to a lack of groundwater resources or the groundwater supply of existing users being jeopardized. To ensure that the study is of professional quality, the Engineering Consultant must sign and stamp the work and include a Quality Assurance Statement. The statement should assure the County that the Engineering Consultant has performed and/or supervised the evaluation in conformance with these guidelines.

If the report does not follow the requirements listed above and/or does not contain a Quality Assurance Statement, the County will identify this as a major deficiency and not accept the report until it has been remedied.

608.4.5 SUBMISSION OF THE REPORT TO THE COUNTY

The Developer must submit copies of the Subdivision Groundwater Supply Report to the County in PDF format.

608.5 Aquifer Testing (Phase 2)

This section describes the various facets of the aquifer testing procedure and the type of description and analysis that the Geological or Engineering Consultant Should include in the report.

608.5.1 GENERAL DESCRIPTION OF AQUIFER TESTING

The aquifer testing procedure outlined in this section involves using at least one production well pumped at a constant rate for a minimum of 12 hours. The pumping rate should be done at a minimum rate of 4.5 litres per minute. A detailed description of the test, interpretation of the test results considering the local hydrogeological setting, analysis of water quality and recommendations should be included in the Groundwater Supply Evaluation.

The testing should ensure that adverse effects, such as the discharge of saline water to the environment or the pumping of very large volumes of water that create overland flooding issues, are not caused during the test.

608.5.2 AQUIFER TESTS – POSSIBLE USE OF MORE THAN ONE PRODUCTION WELL

More than one production well may be needed to properly evaluate the groundwater supply potential for a proposed residential subdivision because of well interference, aquifer discontinuity, marginal groundwater supply, the extent of the Proposed Subdivision Area and/or the distribution of existing neighbouring groundwater users.

608.5.3 Use of an Existing Well as a Production Well

For a proposed residential subdivision, an existing well on the subject parcel may be used as a production well if it meets the following criteria:

- 1) There is sufficient information, including all well construction details, lithologic log and depth of the production zone, available to interpret the aquifer test results properly.
- 2) The existing well meets current standards for use in terms of above-ground surface casing and appropriate setbacks from facilities, as listed in Alberta Environment and Protected Areas's Water Wells and Ground Source Heat Exchange Systems Directive. However, the use of wells in well pits for further testing is not permitted, as these wells would not be expected to be able to supply water over a long time period for a new proposed Subdivision.

608.5.4 Use of New Wells as Production Wells

If existing well(s) cannot be employed, then new well(s) must be installed in an area where the well can be utilized in the future, following appropriate setbacks from potential septic tank and field locations, property lines, house placement, cut and fill locations, stormwater flooding areas, etc.

All drilled water wells, private or otherwise, used for water supply must be constructed by a licensed water well driller. The wells must be constructed according to Alberta Environment and Protected Areas's Water Wells and Ground Source Heat Exchange Directive.

If the proposed Subdivision is large and extends beyond a single quarter section, more than one production well may have to be used (refer to the preceding subsection).

608.5.5 Possible Use of Observation Wells

Depending upon the circumstances, the Geological or Engineering Consultant may decide that one or more observation wells should be used to assess the degree to which the aquifer being tested by the production well is continuous beneath the proposed Subdivision. An observation well should generally be located at a distance of 15 metres (50 feet) to 150 metres (500 feet) from the production well and be completed in the same aquifer. The distance between the production well and observation well should be at least 1.5 times the aquifer thickness.

608.5.6 DETAILED DESCRIPTION OF AQUIFER TEST

This component of the Aquifer Testing Report should contain detailed information on each aquifer test of an existing or new well. This should include well construction details, lithologic logs, aquifer test description, water level measurements, and interpretation of results, including any graphical data plots and chemical analysis. The methods of obtaining information described below are flexible, as field conditions and professional judgement should dictate the Geological and Engineering Consultant's approach to aquifer evaluation.

608.5.7 CONSTRUCTION DETAILS OF EACH WELL

Details on the construction of each production and observation well involved in aquifer testing are required. This includes the length and diameter of all casing, liners, and seals and descriptions of all fittings, pumps, screens, filter packs, and other materials used in constructing each well. In addition, details of the method and the length of time each well was developed should be included.

608.5.8 DETAILED LITHOLOGIC LOGS OF EACH WELL

Detailed lithologic logs of each well are essential to delineate potential water-bearing zones and to correlate the subsurface geology between adjacent wells or test holes. Due to the inherent difficulty in obtaining samples from deeper levels with most types of drilling equipment, electric logs (resistivity, spontaneous potential) and gamma logs are invaluable aids in distinguishing the depth of lithologic variations and determining aquifer thickness.

The Water Well Drillers Report, provided by the licensed water well driller, should contain sufficient lithologic and construction details. If this information is not provided in the Water Well Drillers Report, the data should be obtained by other means, such as contacting the driller for the information or undertaking a camera inspection of the well.

608.5.9 AQUIFER TEST DESCRIPTION

The aquifer test must consist of a minimum of 12 hours of pumping and 12 hours of recovery unless 90% recovery has been attained before the end of the recovery phase. The Consultant in the field may extend the duration of an aquifer test beyond the minimum to obtain more reliable aquifer parameters to determine an accurate 20-year safe yield. This is recommended if the proposed lot density exceeds 25 parcels per quarter section. In addition, regardless of lot density, a longer test may be necessary due to hydrogeologic factors such as barrier boundaries or fracture permeability (groundwater movement through fractures and pores). These factors may be suspected in the area or detected during aquifer testing (in this case, the rate of water level decline increases substantially during the latter part of the test; the test should be continued until a trend is firmly established).

The pumping rate at which the test is conducted should be held constant. The rate should be at least twice the average production rate (at least 4.5 litres per minute) required to supply the proposed Subdivision. Calculated theoretical 20-year safe yields significantly greater than the pumping rate maintained during the aquifer test are considered unreliable. A step drawdown test helps determine a suitable pumping rate for the constant-rate aquifer test.

Several natural factors can cause deflections in the time draw-down curve, such as boundary effects, fracture permeability, dewatering in water table aquifers and continual development of the well. As it can be difficult to separate these effects from one another, constant monitoring must maintain the pumping rate variation at less than 5%. The actual pumping rate (or pressure readings on a flow restrictor) should be documented every 10 minutes for the first hour of pumping. After one hour, readings should be taken during drawdown measurements. The level at which the pump is set within the production well should also be documented.

Water levels obtained from observation wells during the pumping test can provide additional information on the aquifer and should be collected if the opportunity is present to collect this data.

608.5.10 SCHEDULE OF WATER LEVEL MEASUREMENTS

To properly evaluate aquifer test results, water level measurements of the production well(s) (and observation well(s) if utilized) should be recorded to the nearest 1 cm during the pumping and recovery phases of the aquifer test. Both the pumping and recovery phases should be of equal duration unless 90% recovery has been attained before the end of the recovery phase.

The following time schedule should be used to take drawdown and recovery measurements.

Pumping and Recovery Measurement Time Schedule Table

- 1 to 10 minutes every minute
- 10 to 30 minutes every 5 minutes
- 30 to 60 minutes every 10 minutes
- 1 to 2 hours every 15 minutes
- 2 to 4 hours every 30 minutes
- 4 to 12 hours every hour
- 12 to 24 hours every 2 hours
- 24 to 36 hours every 4 hours
- 36 to 48 hours every 6 hours
- more than 48 hours every 8 to 12 hours

The use of pressure transducers, with readings at 1-minute intervals, is acceptable.

608.5.11 INTERPRETATION OF AQUIFER TEST DATA

Numerous test methods are available to determine aquifer parameters. Suitable test methods are dependent on aquifer conditions and wellbore construction. The selection of the appropriate interpretation technique should be left to the geological or engineering Consultant but should consider the following factors:

- Whether the aquifer is confined or unconfined.
- The presence of boundaries is either impermeable boundaries such as a limited aquifer or a constant recharge boundary such as recharge from a surface water source.
- Details of well and wellbore characteristics such as well diameter.
- Characteristics of flow near the well bore include partial completion of the well over the aquifer, multiple aquifer conditions, or well bore skin effects caused by chemical or biological encrustations.
- As a wide selection of test methods can be undertaken, either test methods described in standard texts (i.e. Analysis and Evaluation of Pumping Test Data,

Kruseman, G.P. and de Ridder, N.A.) or references should be provided to the appropriate publication to describe the pumping test interpretation.

While the choice of aquifer interpretation method is left to the geological or engineering Consultant, an explanation should be provided to justify the analysis method.

If the pumping test indicates changing conditions and aquifer conditions have not been established with sufficient certainty, consideration could be given to conducting a longer test or a test at a different pumping rate.

In some interpretation methods, aquifer parameters are provided in the test results, which can only be calculated accurately with the use of an observation well, such as aquifer storativity. If an observation well is not available, appropriate storativity values available from the literature or nearby pumping tests for the same aquifer can be used.

Caution should be advised in using methods where recharge boundaries are inferred (such as lakes or leaky aquifers) as this source may not be present over a long-term (20-year) period as required to determine the long-term yield of the well.

608.5.12 INTERPRETATION OF LONG-TERM WELL YIELD

Determination of the long-term yield of the well involves an extrapolation of the 12+12-hour testing results to a period typically taken 20 years. While the test may provide good data on aquifer characteristics close to the water supply well, the potential for variation from this interpretation is introduced by changing aquifer conditions away from the wellbore, including barriers, leakage and recharge events. Long-term climate changes may influence Some of these parameters, which are speculative to predict. Nevertheless, if these factors are reasonably estimated, they can be introduced into the long-term yield calculations.

In their Guide to Groundwater Authorization (March 2011), Alberta Environment and Protected Areas has provided a few formulas to calculate long-term yield. One of these formulas recommended to use which is satisfactory is the Modified Moell Equation:

Q₂₀ =

<u>0.7 x Q x Ha</u>

 $S_{100min} + (S_{20yrs} - S_{100min})$ Theory

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Q ₂₀	Theoretical 20-year safe yield
0.7	Safety Factor
Q	Pumping rate from test
На	Available head
S _{100min}	Actual drawdown after 100 minutes of pumping
S _{20yrs}	Calculated theoretical drawdown after 20 years of pumping at rate Q

The theoretical drawdown at 20 years and 100 minutes is taken by extrapolating the interpretation method used for the aquifer to 20 years. The two S100min (actual and extrapolated from the model) are taken to account for well bore inefficiencies and skin effects which are usually manifested within the first 100 minutes of pumping.

If an aquifer storativity value is present an alternative acceptable method commonly used is the Cooper and Jacob non-equilibrium equation:

Q20 = <u>0.7 x T x Ha / log (2.25 Tt/rw2S)</u>

0.183

Where:	
Q20	Theoretical 20-year safe yield
0.7	Safety Factor
На	Available Head
Т	Aquifer Transmissivity from pumping test
S	Aquifer Storativity from pumping test
t	time (20 years or 7305 days)
rw	well bore radius

This formula is for metric units and all units should be consistent (i.e., Transmissivity in m2/day, well bore radius in meters, time in days, etc.).

Aquifer storativity can be calculated if an observation well is used in the pumping test. Aquifer storativity values calculated from the pumping well pumping test data are usually in error and should not be used. Storativity values show a moderate range for a particular aquifer, and it may be acceptable to use average storativity values for an aquifer if known.

Other formulas may be more appropriate given the aquifer conditions. Numerical models are also acceptable and should be considered where sufficient data is available to illustrate the complexity of the aquifer or groundwater demand conditions.

It may be acceptable in multiple Subdivision parcels where wells on each parcel has its own water supply to reduce the testing requirements on some of the wells. Conditions where this would be allowable would be where all wells are on a common aquifer and the wells are not located more than 500 m from each other.

In such a case at least one of the wells will require a 12+12 hour pumping test with water levels measured in other wells and a response observed confirming that the wells are on a common aquifer. The use of the other wells as observation wells will allow for calculation of the aquifer storativity parameter such that a solution method to calculate long term yield such as the Cooper-Jacob equation could be employed. In such a case interference calculation should be made to account for withdrawal of water by all wells in the aquifer. This can be done either using the Cooper-Jacob equation by adding additional terms at varying distances from one well to calculate the maximum drawdown on that well, or by using a numerical

solution method (i.e. finite difference or finite aquifer) to determine the drawdown throughout the aquifer as a whole and at specific wells.

As per the Water Wells and Ground Source Heat Exchange Systems Directive a short-term pumping test (2 hours flow + 2 hours buildup with a pumping rate of at least 4.5 litres per minute) is still required on all wells. If in the professional's judgement that all wells are on a common aquifer and short-term pumping tests were done on some wells the data from these short term pumping tests should also be analyzed. The interpretation from these short-term pumping tests should conform with the results obtained from the well in which the long-term pumping test was undertaken.

Potential Interference with Other Groundwater Users

Pursuant to Section 23(3)(a) of the Water Act, the Geological or Engineering consultant must assess whether the diversion of 1250 cubic metres of water per year for household purposes under Section 21 of the Water Act for each of the households within the Subdivision will interfere with any household users, licensees or traditional agriculture users who exist when the Subdivision is approved.

This assessment can consist of reviewing water level data, either from a summary of static water levels when a well is installed or from an evaluation of water levels from Alberta Environment and Protected Areas's Groundwater Observation Well Network (GOWN). If several wells are interpreted to be on a common aquifer, interference effects can be calculated either through analytic equations or numeric models.

608.5.13 CHEMICAL AND BACTERIOLOGICAL ANALYSES

Chemical and bacterial analysis of the water is recommended to provide the water well user with an understanding of their water supply related to water quality and if treatment or remediation of the well system is required.

A water sample should be obtained for chemical analysis toward the end of an aquifer test. Samples should be collected in appropriate containers supplied by the health unit or testing lab and submitted for analysis to the health unit or lab as soon as practical after sampling. Samples should not be allowed to freeze or be subjected to excessively high temperatures or sunlight. Samples for analysis of dissolved metals containing sediment (suspended or settled) should be filtered immediately upon withdrawal from the well. All water samples must be treated and analyzed in accordance with the local Regional Health Authority's requirements.

For typical Subdivision applications, the well water should be analyzed for "Routine" analysis (salts, pH, conductivity, iron, and manganese), E. coli, and Total Coliforms. Other analyses may be undertaken, especially if site conditions indicate a potential for other chemicals of concern to be in the water supply or well.

Containers for water samples collected for bacteriological analysis, sampling procedures, and submission requirements may be obtained from the local Alberta Heath Services or commercial labs. Should any questions arise concerning interpreting the results of these analyses, the local Public Health Inspector should be contacted.

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Section 700 Stormwater Management



700 STORMWATER MANAGEMENT

Alberta Environment and Protected Areas regulates stormwater management. The Developer is responsible for ensuring that all stormwater facilities and infrastructure are designed and constructed in accordance with Alberta Environment and Protected Areas' regulations and guidelines, as well as Rocky View County Servicing Standards. Where appropriate, the Developer is responsible for obtaining the necessary permits and approvals from the Federal government. The Developer is responsible for ensuring that the requirements of all Provincial and Federal regulations, guidelines and standards for stormwater management systems are complied with. Alberta Environment and Protected Areas may require registration and notifications for stormwater facilities for construction, operation, or reclamation of storm drainage systems. The Developer shall confirm that the stormwater facility has been registered or a letter certified by the Engineering Consultant that registration was not required.

701 STORMWATER DESIGN REQUIREMENTS

The Sections below list the requirements for stormwater management within Rocky View County related to the preparation and submission of stormwater management designs and reporting. Unless otherwise specified in this section, the County applies the most recent editions of the existing standards, specifications, and guidelines from the following organizations to County development projects:

- Alberta Environment and Protected Areas
- City of Calgary
- Alberta Guide to Wetland Construction in Stormwater Management

In situations with a discrepancy with overlapping design standards, designers shall not choose lesser design elements from two different standards or specifications and apply them together when the lesser elements were not intended to be applied together. In most cases, one design standard should be followed in its entirety to avoid selecting lower design or construction elements from the various standards, specifications, and guidelines. However, complimentary references to two different standards may be appropriate in some cases.

The Developer is responsible for ensuring that the design, construction, and performance of all infrastructure constructed under the Development Agreement, Road Construction Agreement, or offsite works constructed under a Development Permit meets or exceeds these standards, specifications, and guidelines. All design and construction must be certified by and performed under the supervision of a qualified Engineering Consultant licensed to practice engineering in Alberta. The design guidelines in this section are minimum requirements, and the Developer's Engineering Consultant must certify that an adequate stormwater design is provided to the County and meets applicable standards, specifications, and guidelines.

Applicable standards, specifications, and guidelines include but are not limited to:

- Environmental Protection and Enhancement Act
- Alberta Environment and Protected Areas Wastewater and Stormwater Drainage Regulations
- Alberta Environment and Protected Areas Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems

- Alberta Environment and Protected Areas Code of Practice for Outfall Structures on Water Bodies
- Alberta Environment and Protected Areas Code of Practice for Wetland Replacement Works
- Alberta Environment and Protected Areas Water Act
- Stormwater Management Guidelines for the Province of Alberta
- Subdivision and Development Regulation
- Fisheries Act, Department of Fisheries and Oceans
- Navigable Waters Act
- City of Calgary Standard Specifications for sewer construction
- City of Calgary Standard Design guidelines for subdivision servicing
- City of Calgary Design Guidelines for Development Site Servicing Plans
- City of Calgary Stormwater Management & Design Manual

701.1 Submission Requirements

All development will be reviewed on a case-by-case basis by the County to determine the requirement of a drainage study as per Section 700. The County will base this review on existing area densities, existing drainage issues, scope of development and other matters of concern as deemed appropriate by the County.



701.2 Submission Timing for Reports/Studies/Plans

TABLE 700-A Submission Timing for Reports/ Studies/ Plans	
DEVELOPMENT STAGE	MUNICIPAL REQUIREMENT
ASPs	Master Drainage PlanStaged Master Drainage Plan (SMDP)
Land-use planning and redesignation	 SMDP if required "Conceptual Level" Stormwater Management Report (SWMR) prior to scheduling public hearing
Subdivision (10 lot or more)	 "Conceptual Level" SWMR prior to scheduling subdivision hearing SWMR as a condition of approval or prior to subdivision hearing if required by the County
Subdivision (less than 10 lots)	• SSIP as a condition of approval or prior to subdivision hearing if required by the County
Development Agreement	SWMR or SSIPDetailed design drawings
Development Permit	• SWMR / SSIP / LSSIP as required

NOTE: If one of the above plans has already been completed, the applicant will need to check with the County for any requirements for updates or modifications to the existing plans.

701.3 Stormwater Design Considerations

All stormwater designs must adhere to the following general requirements:

- To minimize the transference of drainage issues from one location to another.
- To not burden downstream properties with decreased water quality, increased flow rates, and/or volumes resulting from the development of upstream properties.
- To ensure that downstream properties being developed do not restrict or block natural upstream runoff that would have otherwise naturally flowed through their site.
- Control stormwater to eliminate adverse effects on the development site and off-site lands due to runoff from more frequent but less intense storms.
- Control stormwater runoff to prevent damage to property, physical injury, and loss of life.
- In no circumstances shall the water quality of the runoff from the site be of lower quality than pre-development.
- All manhole lids shall include the name 'Rocky View County' and logo.

 Storm sewers shall be designed as separate sewer systems. Effluent from sanitary sewers or any potentially contaminated drainage from industrial, agricultural, or commercial operations shall not be discharged to storm sewers or any Municipal stormwater infrastructure.

701.3.1 NATURAL DRAINAGE COURSES

Natural drainage courses identified by a Biophysical Impact Assessment or topographical survey should be protected unless they have otherwise been approved for removals/impacts as per applicable Provincial/Federal processes and their conveyance abilities have been accounted for in the stormwater management system design.

701.3.2 WETLANDS

Work in or around wetlands may require the prior approval of Alberta Environment and Protected Areas or other regulatory (including Federal) bodies. The Developer is responsible for obtaining all the necessary permits and approvals before commencing any work.

When wetlands, natural depression areas, and drainage courses are altered due to development, there is an associated loss in natural runoff storage volumes, evaporation, evapotranspiration, and infiltration. These natural runoff storage and disposal abilities must be replaced as part of the development's stormwater system in addition to the runoff flows and volumes associated with the proposed development. The Developer's Engineering Consultant is expected to conduct a survey and water balance analysis of the lands to determine the extent and capacities of the existing features and provide a stormwater management design that accounts for losses in natural storage capacities so as not to adversely impact other lands.

701.3.3 SHEET-FLOW TO CONCENTRATED DISCHARGE

More intense land development typically changes existing sheet-flow patterns to point discharge. This results in a concentrated flow where stormwater leaves the development area. Concentrated flows are also commonly associated with increased runoff volume. This combination leads to runoff passing through the downstream drainage courses for a longer time period than it did in pre-development conditions, which could lead to exceeding the discharge capacity of the system, saturation, and/or erosion. It is important to recognize that receiving waters and drainage courses are part of a development's drainage system and that consideration of drainage does not end at the boundary of the development under design.

The stormwater design must mitigate the impacts of the change in sheet flow to concentrated discharge by studying the entire downstream drainage course all the way to a receiving water body (as defined in the Alberta Environment and Protected Areas Code of Practice for Outfall Structures on Water Bodies). For areas where post development discharge is proposed to pass through private property, the County may require stormwater utility/overland easements and agreements to be acquired from the affected landowners. Acquiring the stormwater utility easements and agreements will be the developer's responsibility.

701.3.4 ULTIMATE DISCHARGE LOCATIONS AND RECEIVING WATER BODIES

In stormwater design, identification and mitigation of the impacts of stormwater discharges on receiving waters are required. Erosion, flooding, water quality, and quantity are the main concerns. Receiving waters form a part of the drainage system, and drainage considerations do not end at the boundary of the development under design.

It is imperative that the required capacities of downstream discharge routes be determined based on field assessment and professional judgment. This should include analysis of both route capacity and restrictions due to crossings and flat areas prone to flooding, as well as consideration for erosion potential along the discharge route, to verify that the route can accommodate the post-development flows and to provide recommendations on how the route should be protected with stormwater utility/overland easements and agreements.

702 STORMWATER CONVEYANCE

702.1 Minor System Conveyance

Stormwater design is expected to follow the current Alberta Environment and Protected Areas and City of Calgary Stormwater Guidelines. The minor system shall be sized based on the 1:5-year design storm.

The minimum storm sewer diameters are based on City of Calgary criteria.

702.2 Major System Conveyance

Stormwater design is expected to follow the current Alberta Environment and Protected Areas and City of Calgary Stormwater Guidelines.

The Developer is responsible for obtaining and registering all stormwater utility easements on private properties.

It is the Developer's responsibility to register a Restrictive Covenant/Utility Right-of-Way on each lot with swales and prevent the erection of fencing over or on such swales.

Roadway ditches can only be used to convey stormwater; it is not acceptable to store stormwater within roadside ditches.

703 STORMWATER DRAINAGE STUDIES

Hierarchy Of Stormwater and Drainage Studies

- 1) Watershed/Water Management and Drainage Plans
- 2) Master Drainage Plans
- 3) Staged Master Drainage Plans
- 4) Subdivision Stormwater Management Report
- 5) Pond Report

- 6) Site-Specific Stormwater Implementation Plans
- 7) Detailed Engineering Design Drawings

Note: The most conservative criteria shall govern when a contradiction or discrepancy exists between the above documents.

703.1 Watershed/Water Management Plans

A Watershed/Water Management Plan:

- Considers functional watershed area(s)
- Identification of environmental concerns
- Assessment of current and future drainage requirements
- Establish criteria for drainage improvements
- Sets goals and objectives for the watershed for both water quality and quantity
- Recommends water conservation objectives
- Addresses riparian health and function as they play an important role in protecting and conserving water resources
- Establishes watershed boundaries
- Typically prepared in collaboration between government and non-government organizations

703.2 Master Drainage Plans

The purpose of a Master Drainage Plan (MDP) is to ensure that the optimal drainage system identifies present and future drainage requirements based on artificial (roads, homes, etc.) and natural (ravines, hills, etc.) features. The drainage area included is determined by the existing drainage catchment area or boundaries imposed by a Watershed Management Plan, if applicable. An MDP is developed by evaluating alternatives that provide an acceptable level of service while meeting the objectives of the watershed drainage plan and satisfying constraints imposed by topography, existing and proposed land uses, land ownership, and other local considerations. The MDP is a regional planning tool that should be used to guide more detailed stormwater planning for developing areas. An MDP:

- Adheres to applicable Watershed/Water Management Plans
- Establishes catchment and sub-catchment boundaries
- Identification of local water-related resources to be protected (i.e. wetland and riparian areas)
- Describes catchment area functionality (i.e., how drainage patterns within each catchment function in the context of the entire drainage system)
- Establishment of future drainage requirements (i.e., recommended regional overland drainage facility locations, culverts, stormwater trunks, regional ponds, etc.)
- Establishment of criteria for drainage improvements

- Defines volume runoff targets, release rates, water quality criteria and drainage routes for development within the Plan area.
- Will model major drainage routes with the establishment of maximum sustainable flows for both perennial, seasonal and ephemeral streams.
- Identifies major receiving water courses and water bodies
- Defines regional/major storage and treatment facility requirements (size, type, location, and land requirements)
- Identification of the performance requirements of storage and treatment facilities and the design requirements for more detailed stormwater studies
- Identifies and models trunk sewer routes, and/or open channel routes, and land requirements for drainage purposes
- If sufficient land-use planning information is available, preliminary designs of the major facilities may be developed in the plan.
- Identifies required infrastructure upgrades on any and all drainage routes within the catchment and existing constraints of the local and regional drainage system.
- The minimum scope of the Master Drainage Plan is to identify and locate major drainage facilities, including trunk sewer routes, open channel routes, storage facilities (and their associated floodplain levels and areas), and land requirements for drainage purposes.
- The County typically prepares Master Drainage Plans.

703.3 Staged Master Drainage Plan

The purpose of a Staged Master Drainage Plan (SMDP) is to ensure that the drainage system is identified to meet present and future requirements for the sub-catchment. The identified drainage courses could include natural drainage routes, and the SMDP should identify how these natural drainage courses would be maintained, enhanced, legally protected, and possibly restored. The drainage area included would either be determined by existing drainage sub-catchment boundaries or boundaries imposed by a Master Drainage Plan. The SMDP is developed by evaluating alternatives that provide an acceptable level of service while satisfying constraints imposed by topography, existing and proposed land uses, land ownership, and other local considerations. A SMDP:

- Adheres to applicable Watershed/Water Management Plans and Master Drainage Plans
- Establishes sub-catchment boundaries and defines the acceptable level of service for each sub-catchment
- Identifies existing runoff volumes, release rates, water quality and drainage routes for development within the sub-catchment.
- Defines volume runoff targets, release rates, water quality criteria and drainage routes for development within the sub-catchment

- Models major drainage routes based on the 1:100-year storm event
- Identifies major receiving water bodies
- Defines sub-regional storage facility requirements such as regional ponds (size, type, location, and land requirements)
- Identifies any and existing man-made or natural drainage routes and any required infrastructure upgrades and protective measures (i.e., easements) on these drainage routes within the sub-catchment
- Is prepared at the Developer's expense with Terms of Reference agreed upon by the County
- Identifies and locates major drainage facilities, open channel routes, storage facilities (and their associated floodplain levels and areas), and land requirements for drainage purposes. If sufficient land-use planning information is available, preliminary designs of the major facilities may be developed in the plan.

703.4 Subdivision Stormwater Management Report

Subdivision Stormwater Management Report (SWMR) is required for most Subdivisions with 10 or more lots of development and will correspond to an applicable set of engineering drawings. The SWMR must include a detailed hydrologic and hydraulic analysis for the development. A SWMR:

- 1. Adheres to applicable Watershed/Water Management Plans, Master Drainage Plans, and Sub-Catchment Master Drainage Plans.
- 2. Provides the design of the development's stormwater management system, including identifying how individual lot drainage will be integrated into the stormwater management plan, road drainage, off-site drainage tie-in, etc.
- 3. Establishes development-specific stormwater ponds, with the system's design maximizing the catchment areas each pond serves to reduce the number of ponds required to service the study area.
- 4. May establish Low Impact Development Best Management Practices.
- 5. Ensures pre-development flows and volumes are not exceeded under postdevelopment conditions.
- 6. Defines runoff volume targets, release rates, water quality criteria, and drainage routes for development within the drainage area (unless specified in MDP or SCMDP).
- 7. Addresses the volume controls and release rates identified in the MDP or SMDP and will discharge stormwater into the approved drainage routes identified in the MDP or SMDP.
- 8. Identifies development-specific stormwater management infrastructure requirements.
- 9. Identifies all existing drainage routes (on-site and downstream) and identifies how they will be protected or otherwise accounted for

- 10. Identifies emergency overland flow routes.
- 11. Identifies required infrastructure upgrades on all man-made and natural drainage routes.
- 12. Addresses conveyance, storage, treatment, and potential reuse of stormwater. It includes setting lot grades, sizing culverts, and designing detention/retention facilities.
- 13. Ensures that pre-development on-site storage volumes will not be reduced.
- 14. Addresses the lowest opening on buildings in relation to ponding elevations.
- 15. Ensures downstream drainage routes have been field inspected characterized, and any constrictions or potential impacts have been assessed and mitigating measures have been recommended
- 16. Analyzes the capacity and characteristics of the downstream receiving drainage course or creek and identifies works needed to avoid downstream flooding, erosion, sedimentation, and soil saturation problems.
- 17. Ensures that outlets are developed that do not adversely impact downstream lands or drainage routes.
- 18. Addresses the management of snow storage, salt, de-icing, and sanding contaminants to ensure that the stormwater management system is not adversely affected.
- 19. It is prepared by the Developer's Engineering Consultant.
- 20. It is required for each subdivision/development phase.

For a "Conceptual Level" Stormwater Management Report, the items listed above will be based on preliminary engineering. The details of the preliminary engineering will be determined by the level of development intensity. It is prepared for planning purposes and typically does not include detailed design drawings.

703.5 Site-Specific Stormwater Implementation Plan

Site-Specific Stormwater Implementation Plan (SSIP) is a drainage and servicing plan generally prepared to support Development Permits or small residential subdivisions of less than 10 lots on a site-specific basis. A SSIP:

- 1. Adheres to applicable Watershed/Water Management Plans, Master Drainage Plans, Sub-Catchment Master Drainage Plans, and/or Stormwater Management Report
- 2. Provides stormwater design for on-lot development at the Development Permit Stage
- 3. Addresses conveyance, storage, treatment, and potential reuse of stormwater. This will also include setting lot grades, sizing culverts, protecting drainage courses, and designing detention/retention facilities that properly manage the runoff.

- 4. Ensures that post-development flows and volumes do not exceed predevelopment flows and volumes
- 5. Defines rate and volume runoff targets, release rates, water quality criteria and drainage routes for development within the drainage area (unless already specified in an existing MDP or SCMDP)
- 6. Addresses chemical and contamination management, oil/grit separators, and other items related to ensuring runoff from individual lots does not cause any adverse effects
- 7. Addresses the management of snow storage, salt, de-icing, and sanding contaminants to ensure no adverse effects are caused to the stormwater management system
- 8. Mitigates potential impacts of stormwater on proposed and/or existing sewage disposal systems
- 9. Ensures that pre-development on-site storage will not be reduced
- 10. Addresses the lowest opening on buildings in relation to ponding elevations
- 11. Ensures that outlets/outfalls are developed that do not adversely impact downstream lands or drainage routes
- 12. Corresponds to an applicable set of engineering drawings
- 13. It is prepared by the Developer's Engineering Consultant.
- 14. If not already completed as part of an SWMR or SCMDP, it includes an analysis of the capacity and characteristics of the downstream receiving drainage course and identification of works needed to avoid downstream flooding, erosion, sedimentation, and soil saturation problems.

703.6 Limited Scope Site-Specific Stormwater Implementation Plan

A Limited Scope Site-Specific Stormwater Implementation Plan (LSSIP) is a drainage and servicing stormwater plan generally prepared to support minor Development Permits that may have downstream stormwater impacts and where a full SSIP is not warranted. A LSSIP:

- Adheres to applicable Watershed/Water Management Plans, Master Drainage Plans, Sub-Catchment Master Drainage Plans, and/or Stormwater Management Report.
- Provides stormwater design for on-lot development at the Development Permit stage.
- Ensures that post-development flows and volumes do not exceed pre-development flows and volumes.
- Ensures that pre-development on-site storage will not be reduced.
- Ensures that proposed development does not adversely impact downstream lands or drainage routes.
- May correspond to an applicable set of engineering drawings.
- It is prepared by the Developer's Engineering Consultant.

704 TECHNICAL STORMWATER ANALYSIS REQUIREMENTS

704.1 General Methodology

Analysis needs to ensure that post-development conditions do not exceed pre-development conditions. If the proposed development is located within an MDP or other overarching document, then the stormwater infrastructure must meet all requirements of the MDP or other overarching document (i.e., release rate, average annual volume, water quality measures, etc.).

704.2 Rational Method

For most developments, the Rational Method is not an acceptable form of stormwater analysis in Rocky View County. However, exceptions may be provided for single-lot developments less than 2.0 ha. Such exceptions will require written approval from the County. All other cases will require the use of computer modelling.

704.3 Modeling Programs

The following list of stormwater modelling programs is acceptable for use in Rocky View County:

- 1 XPSWMM
- 2 EPA SWMM
- 3 PCSWMM
- 4 SWMHYMO
- 5 Water Balance Model

Other modelling programs may be considered but require the County's written approval.

704.4 Single Event Analysis

Single-event model is defined as a simulation of a short-duration storm event (i.e., hours to days) with subjective start-up conditions. In single-event modelling, a single-design storm event (synthetic or historical), often with a 1-hour to 24-hour duration, is applied to determine the response of a drainage system. The storm event model usually has a 1:100-year return frequency for major (overland) system analysis and a 1:5-year return frequency for minor (piped) system analysis. This is at the discretion of the County, and additional frequency analyses may be required to be completed.

Single-event simulation must be used to model minor and major drainage systems and water quantity for all stormwater management facilities. It must be compared to the continuous analysis, and the most conservative values shall govern. The guidelines of the City of Calgary Stormwater Management & Design Manual should be used when performing a single-event analysis.

704.5 Continuous Modelling Analysis

Continuous model is a simulation that models dry and wet hydrology processes using a long-term continuous record of atmospheric data (i.e., months to years). Continuous simulation and a water balance analysis are required to be performed using historical precipitation data from 1960 to the most current vetted data available. The precipitation data must include both rainfall and snowfall (evaporation data will be required for systems designed to rely on evaporation for discharge). Continuous simulation must be used to model water quality (sediment removal) and quantity for all stormwater ponds and to analyze annual runoff volumes.

Continuous simulation must be used for all stormwater management storage facilities. Statistical (or frequency) analysis is required when determining storage volumes for stormwater ponds using continuous simulation. Continuous simulation generates maximum yearly storage volumes; a statistical analysis must then be performed to determine the required 100-year volume. The City of Calgary Stormwater Management & Design Manual guidelines should be used when performing a continuous modelling analysis, and the city's statistical analysis process should also be used.

704.6 Facility Sizing

All stormwater storage must be sized based on the larger of:

- The volume required under continuous simulation modelling/statistical analysis (required 100-year volume) per the City of Calgary's Stormwater Management & Design Manual and statistical analysis guidelines.
- The required volume is based on single-event modelling with a 1:100-year return frequency, as per the City of Calgary's Stormwater Management & Design Manual.

704.7 Imperviousness

The following minimum percentage of impervious must be used for modelling purposes unless otherwise approved by the County based on actual data from approved site plans:

Industrial Areas	95%
Commercial/Business Districts Areas	85-95%
Multi-Family Residential	65-75%
Urban Residential (less than 0.25 acres)	55-76%
Other Areas	To be recommended by the Developer's professional engineer and approved at the discretion of the County

705 STORMWATER QUALITY

The stormwater facilities temporarily store stormwater for water quantity rate control, water quality enhancement, and in some cases, opportunities for runoff volume control and stormwater reuse before discharge. The selection of a facility type is a function of quantity control, water quality, and erosion control. The stormwater quality analysis and facility design shall be in accordance with the City of Calgary's design standards and applicable Master Drainage Plans, if available.

705.1 Geotechnical Investigation

Geotechnical investigations are an integral component of proper stormwater facility design. In addition to the requirements outlined within the City of Calgary Stormwater Management & Design Manual, geotechnical reports must address soil permeability and salinity (or other potential contaminants), existing groundwater levels, groundwater conditions, and recommended use of monitoring wells. The report must also clearly state that stormwater facilities will not adversely affect surrounding properties due to water migration and/or provide any recommendations to confirm this (i.e., lining of ponds).

706 POND INFRASTRUCTURE REQUIREMENTS

706.1 Dry Ponds

All dry ponds must be designed in accordance with The City of Calgary's Stormwater Management & Design Manual or Alberta Environment and Protected Areas Guidelines. Dry ponds will require additional stormwater facilities to address water quality and can't be used as a sole end-of-pipe solution. Any dry pond that is proposed to be located on a Municipal Reserve lot must meet the following requirements:

- Ponds must be dry within 48 hours of a 1:100 storm event based on the designed discharge rate.
- The pond may be designed to accommodate multiple uses (i.e. recreation fields)
- Maximum depth at full inundation of 0.5 m.

706.2 Wet Ponds

All wet ponds are required to be designed in accordance with The City of Calgary's Stormwater Management & Design Manual and Alberta Dam and Canal Safety Guidelines or Alberta Environment and Protected Areas Guidelines.

706.3 Wetlands

All engineered and constructed wetlands must be designed according to The City of Calgary's Stormwater Management & Design Manual as well as the Alberta Guide to Wetland Construction in Stormwater Management Facilities.

706.4 Zero-Discharge/ Evaporation Ponds

In areas where off-site servicing is not available, zero-discharge facilities, including a wet pond/evaporation pond, may be considered at the County's discretion. Zero-discharge facilities are only to be used where no approved downstream conveyance route has been identified or where the drainage route is not protected by easements as required by the County.

Irrigation and/or other methods to reduce the footprint of these facilities can be considered when sizing these facilities based on two conditions:

• The long-term viability of stormwater reuse and/or runoff reduction techniques needs to be demonstrated to the satisfaction of the County.

All evaporation ponds must be designed in accordance with The City of Calgary's Stormwater Management & Design Manual.

706.5 Natural Depressions Used for Storage

If natural depressions are used for storage, whether in their original condition or amended, and they are storing water from roads or other municipal infrastructure, they will be subject to inspections and CCC and FAC processes to ensure they are functioning as per the design intent. They will also need to be located on the Stormwater Overland Drainage Right-of-Way and Agreement.

707 GENERAL POND REQUIREMENTS

707.1 Infiltration Requirements

Wet ponds, wetlands, and evaporation ponds must be designed with a maximum infiltration of 1x10⁶ cm/s permeability. A clay or rubber liner (HDPE) can be used. If a clay liner is used, it must have a nominal thickness of 0.6 m or thicker if required by the Geotechnical Consultant. In all cases, the designer shall assume zero infiltration loss when sizing storage requirements.

707.2 Evaporation Rates

Evaporation rates are based on the monthly lake evaporation calculated by Alberta Environment and Protected Areas, Environment Canada Data, or City of Calgary Data (all for the Calgary Area). When modelling is completed for wet ponds, wetlands, and evaporation ponds, the model must be programmed to assume the ponds are at their normal water level at day zero (0).

707.3 Pond Alarm Systems

Pond Alarm Systems are only required in situations where public safety may be compromised by pond levels exceeding design capacities. This may include situations where there is no adequate overland escape route.

707.4 Pond Signage

All ponds must be appropriately signed based on their design function (i.e., evaporation, dry, or wet). All signs must meet the requirements per the City of Calgary pond signage requirements using Rocky View County logos. Signage is required at the entrance and any other critical points deemed necessary by the Developer's Professional Engineer or the County.

708 EMERGENCY SPILLWAY PROVISIONS

The feasibility of an emergency overflow spillway is to be evaluated for each storage facility design, and where feasible, such provisions are to be incorporated into the pond design. As per City of Calgary specifications, an emergency spillway will be required for all ponds designed to accommodate storms less than a 1:500-year storm event.

709 LOT GRADING FOR STORMWATER

- Carefully designed and controlled lot grading is an important component of the major system. The Grading Plan will need to match the intent of the SWMR/SSIP.
- The Developer is responsible for bringing the lot grades to those indicated on the rough Grading Plan.
- The Developer shall make the Grading Plan available to all new lot owners/builders.
- In a country residential setting, the natural topography may justify alternative stormwater routing using grassed swales. In these cases, the Developer is responsible for ensuring positive drainage in accordance with the examined SWMR/SSIP from each lot, which is accounted for and directed to a stormwater management facility (i.e., swale, ditch, and pond).

7010 COUNTY OWNED STORMWATER INFRASTRUCTURE

7010.1 Requirement For a Municipal Pond

When a residential subdivision is 10 or more lots, and the stormwater management report requires the need for a stormwater pond, the pond must become a Municipal Pond located on a PUL or connection to a regional stormwater facility will be required. Municipal Ponds are also required when a subdivision of more than 10 lots results in new municipal roads. With residential subdivisions creating nine (9) or fewer lots, stormwater ponds and other treatment/storage facilities will typically be placed on a private lot and protected with a Stormwater Utility Right-of-Way and Agreement. Preference is given to one common pond protected by a Stormwater Utility Right of Way rather than multiple ponds on more than one lot. In some cases, the County may require a Municipal Pond in accordance with an MDP or SCMDP. With commercial/industrial subdivisions, stormwater solutions will be evaluated on a case-by-case basis; however, the Development will be required to maintain a 1:100-year storage based on the allowable release rate for the area.

7010.2 Drafting Hydrants

In some cases, when a development requires in lieu of municipal-type fire system measures, ponds may be required to be provided with drafting hydrants. Drafting pond hydrant requirements are specified in the County's Fire Hydrant Water Suppression Bylaw. Drafting Hydrants can only be used when the Fire Department has approved their use and location.

7011 INTEGRATED STORMWATER MANAGEMENT DESIGN

Integrated watershed-based stormwater management identifies the relationships between natural and built environments. It mimics the naturally vegetated watershed with designs that protect the ecosystem and avoid impacts on aquatic habitat and water quality. Integrated stormwater management focuses on both stormwater quality and quantity. Integrated stormwater management reduces the volume and rate of runoff from the built environment by:

- Minimizing the creation of impervious areas.
- Installing hydraulic disconnects that either return local runoff from impervious surfaces back into the groundwater or allow its reusability within the site.
- Storing runoff and releasing it at a reduced rate.

Identifying the resources to be protected and potential threats to those resources is necessary. This approach still incorporates traditional drainage objectives but also achieves ecological protection. Natural wetlands are typically transformed into stormwater management facilities (subject to applicable Provincial approval processes). This results in changes in the natural characteristics and degradation of wetlands functions. A preserved wetland constitutes an example of an integrated stormwater design. Low Impact Development (LID) practices allow the stormwater volume to be retained on-site on a lot-by-lot basis. In addition, post development runoff conditions mimic the rates and volumes of the pre-development conditions. Therefore, the site maintains its existing natural systems, hydrology, and ecology. Examples of LID practices include:

- Grassed swale/ bioswales
- Absorbent landscaping
- Bioretention
- Porous pavement
- Stormwater/rainwater reuse
- Green roofs

In cases where multi-lot subdivisions will result in new internal roads being created and unproven LID or lot by-lot retention are proposed, due to the uncertainty of the unproven methods and due to the potential for lot-by-lot retention (or other lot-by-lot systems) to be compromised in the future, the County will not allow corresponding reduction in sizes of conveyance, storage, volume, or release rate criteria unless appropriate utility rights-of-way protect them. There is a party made responsible for perpetual maintenance of the system to the satisfaction of the County.

When proposing Low-Impact Development, the Developer's Engineering Consultant shall carry out all low impact development design and implementation in accordance with the City of Calgary Guidelines and the Public Health Guidelines for Water Reuse and Stormwater Reuse.

7012 CONSTRUCTION OF STORMWATER FACILITIES

The stormwater facilities' construction must use good industry-standard techniques and practices. The supervision of the works by a qualified Engineering Consultant is required to ensure compliance with the plans approved by the County. Any adjustments or omissions to the design must be proposed by the Engineering Consultant, examined by the County and/or Alberta Environment and Protected Areas for compliance, and reflected in the 'as-built drawings' and any other documents required to process CCC and FAC by the County. As-built drawings shall be based on detailed and accurate post-construction topographical surveys.

Stormwater infrastructure is deemed critical and prioritized in the Construction Management/Schedule.

7013 MAINTENANCE OF STORMWATER FACILITIES

The performance and maintenance of any stormwater management system component constructed under a Development Agreement is the responsibility of the Developer until the issuance of the Final Acceptance Certificate (FAC). The maintenance period will provide an opportunity to observe the performance of the as-constructed system. If the system fails to perform satisfactorily under actual conditions, the maintenance period may be extended at the discretion of the County. Alternatively, the unsatisfactory performance may result in the County requiring upgrades and retrofits to the stormwater system. At the time of the Final Acceptance Certificate (FAC) application, verification of full design depth and/or volume of stormwater ponds shall be provided with the application package. If the full required capacity is not verified, it will be the Developer's responsibility to clean/dredge the pond so that full capacity is provided.

In the case of Development Permits, where stormwater is managed on the private site, stormwater management will remain the landowner's responsibility. The landowner is expected to keep the system operating in a condition that is in keeping with the SSIP.

The overall maintenance of the stormwater infrastructure shall accommodate the County's rural nature. Easily maintained stormwater infrastructure is a significant benefit to the County and the community as a whole.

7014 MUNICIPAL ACCEPTANCE AND TESTING

In addition to the testing requirements discussed in Section 100, where deemed necessary by the County, exfiltration and/or infiltration tests shall be conducted on storm sewers. These tests may not be required if video inspections are done immediately prior to CCC/FAC application, and no other deficiencies are observed. Testing of storm sewers will be required when a high-water table is expected or encountered, and there is visible evidence of water entering the pipe. For acceptance testing, elastomeric gasket joints for pipe and fittings shall meet the requirements of ASTM D3212, except that the internal hydrostatic pressure shall be 100 kPa (15 psi).

7015 INDEMNIFICATION

Failure to properly assess, design, construct, and maintain a stormwater management system may result in long-term problems for the development and downstream lands. Consequently, remedial works may be required, and the developer will bear the cost.



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SECTION 800 Construction Management


800 CONSTRUCTION MANAGEMENT

801 CONSTRUCTION MANAGEMENT PLAN

The Construction Management Plan (CMP) outlines the proposed site practices and measures to be undertaken during site development. The plan details site housekeeping practices and how nuisances will be managed such as noise, dust, traffic, and tracking of debris offsite that directly impacts adjacent roads, adjacent residents, and the surrounding community(s). The CMP is a living document that typically will change through the lifespan of a project due to unforeseen circumstances. The following should be included as a minimum:

- 1. Developer, company name and/or developer name with contact information.
- 2. Consultant, company name and/or consultant name with contact information.
- 3. Contractor, company name, prime contact with contact information (if contractor has been selected by the time the report is submitted).
- 4. Project description.
- 5. Site description.
- 6. Construction schedule.
- 7. Working hours/shifts.
- 8. Identify adjacent properties along with land use type.
- 9. Identify potential impacts to the surrounding properties and mitigative measures.
- 10. Site housekeeping:
- 11. Management of material that will be stockpiled, stripped and/or graded
- 12. Weed management and control.
- 13. Erosion and sedimentation control measures.
- 14. Management of dust¹, noise, and traffic.
- 15. Management of construction debris (garbage).
- 16. Equipment and material storage.
- 17. Location of site trailer if applicable.
- 18. Potable water and sanitary services provided if applicable.
- 19. Identify vehicular access locations and parking plan for personnel and equipment.
- 20. Security to prevent public accessing site.
- 21. Emergency Plan including muster point and emergency services available in area.
- 22. Traffic Accommodation Strategy
- 23. Hauling of Material and Equipment
- 24. Management and handling of hazardous materials if applicable.

25. Protection of natural and sensitive areas such as water courses, water bodies, and wetlands.

¹ The use of Rocky View County potable water for dust control purposes is not permitted. The developer/ engineering consultant/contractor will need to determine the water source.

802 STOCKPILE TREATMENT, STRIPING & GRADING WORK ON MUNICIPAL PROPERTY

Topsoil stockpiles, stripped areas, and graded areas within road rights-of-way, Public Utility Lots, Municipal Reserves, and Environmental Reserves, shall be seeded within 45 calendar days of completion of the works. To ensure a grass catch, disturbed areas may also require watering at the discretion of the County. If these areas are not seeded within 45 days, the Country reserves the right to utilize the securities held by the County and complete the necessary work.

Topsoil and parent soils shall not be removed from County controlled property including Municipal Reserves, Environmental Reserves, and road rights-of-way, without written permission from the County.

Stockpiling of topsoil, other material/items, and construction equipment on Municipal Reserves, Environmental Reserves, and road rights-of-way are not allowed without written permission from the County.

Under a Development Agreement, the developer is responsible for controlling weeds and cutting grass on Municipal property until the County issues the Final Acceptance Certificate.

Environmental Reserves shall remain in their natural state, shall not be impacted by construction, or be subjected to any surface disturbance in any manner without prior permission from Council.

803 WEED MANAGEMENT

Noxious and restricted weeds shall be managed and controlled prior to going to seed. Prior to construction, the Developer and/or their representatives shall undertake a weed inspection of the site by qualified personnel. The Developer shall prepare a pre-construction weed inspection report to be submitted along with the Weed Management Plan. The plan shall include the planned treatment of weeds for the growing season for disturbed areas on the site such as stockpiled soils, stripped lands and sensitive areas. The Developer shall also be responsible for managing and controlling weeds that have migrated off the site.

The Developer shall identify weed control options based on the type of weeds, weed control timelines, and the contractor responsible for weed control throughout the development's construction. The methodology and treatment intervals must be identified for each growing season of the project.

804 TRAFFIC ACCOMMODATION STRATEGY (TAS)

Construction activities proposed within the County's rights-of-way that impact normal traffic movements (pedestrian or vehicle) require the Developer to submit a Traffic Accommodate Strategy

(TAS) at the County's discretion. This applies to work carried out under a Development Agreement, Development Permit, and Road Right-of-Way Construction Agreement.

A TAS must adhere to the latest edition of Alberta Transportation and Economic Development's Traffic Accommodations in Work Zones Manual. In general, a TAS consists of:

- Project description and scope of work.
- Identification of Prime Contractor and Sub-Contractor responsibilities.
- Project Schedule as it relates to traffic control.
- Advance public notification strategy.
- Details for temporary traffic control devices including support type, height requirements, installation, covering, inspection, sign log submission and removal.
- Assignment of responsibilities for traffic control.
- Day/night procedures including illumination requirements.
- Strategy to accommodate vehicles around tack and fog coats and non-standard lane widths.
- Consideration for special user issues, site specific hazards and non-typical conditions.
- Details for work staging.
- Identification of detour routes.
- Drawings showing the location of temporary signs, traffic control signals, message boards, pavement markings, delineators, and other traffic control elements used to accommodate traffic during the work.
- Identification of construction access and vehicle/equipment parking.
- Flag person and pilot vehicle requirements.
- Details for the haul route and process for truck turning movements within the work area.
- Emergency response strategy and procedures for reporting accidents.

Prior to any traffic disruption, whether this includes partial lane closure or full road closure the Developer shall provide to the County:

- A minimum three weeks written notification of the traffic disruption.
- Traffic Accommodation Strategy for review, commenting, and acceptance three weeks in advance of the traffic disruption.
- Advance notice to the public at least two weeks prior to the disruption.
 Notification shall typically be provided through variable message signage or at the discretion of the County. At a minimum, each impacted direction must identify:
- Contracting company performing the work and a 24-hour contact phone number.

- Start and end dates of the closure.
- Information regarding any detour route.

The above presents the general requirements of a Traffic Accommodation Strategy. Additional information may be required on a project-by-project basis.

804.1 Timing of TAS Plan Submission

TAS plans will not be Conditions of subdivisions or prior to Release Conditions on Development Permits, given that they need to be prepared in concert with the responsible contractor, typically at later stages in the process. However, TAS Plans need to be submitted to the County for review at least two weeks before construction.

805 HAULING OF MATERIAL AND EQUIPMENT

When construction activities performed under a Development Agreement, Development Permit or a Road Right-of-Way Construction Agreement involve the hauling or movement of material or equipment on County roads, a Road Use Agreement and/or Road Use Permits may be required.

The Developer shall contact the County's road operations group at roadoperationsDL@rockyview.ca prior to commencing hauling activities to determine the need for a Road Use Agreement and/or Road Use Permits and to confirm the presence of County Road Ban restrictions.

806 EROSION & SEDIMENT CONTROL (ESC)

For Developments the County requires (hectarage based on disturbed area):

0 – 0.39 ha: Good House Keeping Letter (form below)

0.4 – 2 ha: Good House Keeping Form + ESC Drawings

>2.0 ha: ESC Drawings and Written Notice with Reporting Template below.

806.1 Drawing Requirements

As a minimum, the following drawings are required in the County:

- ESC1 Present Site Conditions
- ESC2 Intermediate Site Conditions
- ESC3 Final Site Conditions
- ESC4 General notes and details

In addition to the above, pending on the project's complexity, the County may also refer to the City of Calgary Guidelines for erosion and sediment control for additional drawing requirements.

806.2 ESC Reporting

The County's template for ESC reporting is provided below. Depending on the complexity of the project, the County may also refer to the City of Calgary Guidelines for erosion and sediment control for additional reporting requirements.

806.2.1 GOOD HOUSEKEEPING FORM (FOR DEVELOPMENT 0-0.39 HA)

This form must be completed and sent to Rocky View County for sites between 0-0.39 hectares.

Include a map showing site and soil disturbance boundaries including area in hectares. Failure to fully complete this form along with the plans at the time ESC documentation is submitted to Rocky View County will result in return of your documents and delay the review process.

Project Information

Project Name	L	Legal Land Location	
Development Permit #	Ν	Municipal Address	
Project Description	S	Site Size (ha)	
	S	Soil Disturbance area size (ha)	

	Name
Owner / Developer	
Project Manager	
Engineering Consultant	
Site Superintendent	
ESC Inspector	
Rocky View Contact	

Contact Name / Number / Email

806.2.2 WRITTEN NOTICE FORM (FOR DEVELOPMENT > 2.0 HA)

Erosion and Sediment Control (ESC) - WRITTEN NOTICE

This Written Notification is for the purpose of submitting the information required in Schedule 806 of the Servicing Standards for Development over 2.0 Ha. Failure to fully complete this form along with the plans at the time ESC documentation is submitted to Rocky View County will result in return of your documents and delay the review process.

Project Information

Project Name	Legal Land Location
Development Permit #	Municipal Address
Project Description	Site Size (ha)
	Soil Disturbance area size (ha)



Contact Name / Number / Email



Authentication by Qualified Designer

The undersigned agrees and certifies that:

- 1. The ESC Plan for the development has been completed and a copy has been provided to the Owner
- 2. The ESC Plan complies with Rocky View Servicing Standards Section 806
- 3. The ESC plan has been drafted by a professional with experience in the design and implementation of erosion and sediment control who holds a designation as a Certified Professional in Erosion and Sediment Control (CPESC) or is a Professional Engineer (P.Eng.), Licensee (P.L.(Eng.)), or a Professional Agrologist (P.Ag.)
- 4. The information provided in the Written Notices is true to the best of their knowledge
- 5. ESC1, ESC2, ESC3, ESC4 Attached

Signature	Date Authenticated	Permit to Practice / Professional Stamp or Number

806.2.1 ESC REPORTING TEMPLATE

The County's template for ESC reporting is provided below. In addition to the below, depending on the complexity of the project the County may also refer to the City of Calgary Guidelines for erosion and sediment control for additional reporting requirements.

1.0 General Information

	Company & Contact Name	Office Telephone #	Cellular Telephone #	E-mail
Owner/Developer				
Project Manager				
Engineering Consultant				
ESC Consultant				
Site Superintendent				
ESC Implementation, Inspection & Maintenance Contact				
Rocky View County Contact: ESC Review & Inspection		Rocky View to i	insert if unknown	
Rocky View County pumping/draining site Contact	Offsite pumping/draining is not permitted unless approvals have been obtained by the County			e been obtained by the
Project Name:				
Legal Land Location				
(ie.NW-27-25-02-W5)				
(Lots 1&2 Block 5 Plan)				
Project Address:				

Development Permit or Development Agreement/ File reference number	Rocky View to insert if unknown
Estimated Construction Schedule	
Project Area (ha)	

2.0 QUALIFICATIONS AND INSURANCE

a) Qualifications, experience, certifications	Provided: Yes No	Do not continue until information is provided.
 b) Professional License # c) Name of Licensing organization/association d) Proof of Insurance 	Provided: Yes No	Do not continue until information is provided.

Note: The information required in the general information and section 2.0 <u>must</u> be forwarded to be reviewed and accepted by Rocky View County prior to the applicant completing the report or plans for the first time. This information <u>must</u> then be sent to the County with every package.

3.0 EXISTING SITE CHARACTERISTICS

a) Are there any areas within or around the site that may be critical and have a potential for serious erosion and/or sedimentation problems. (i.e. steep slopes, ravines). Are there existing eroded slopes or other areas where sediment deposition has occurred? (provide location and photos).

b)	Are there existing storm facilities (ponds or outfalls), storm manholes or inlets or sanitary sewer manholes within or around the site that may require protection prior to commencement of construction activities. (provide locations)
c)	Identify neighboring areas. Include neighboring developments (residential, commercial or agricultural developments), roads (paved or graveled), rivers, streams, lakes, creeks, reserves, wetlands, parks, storm ponds, etc.
d)	Describe existing topography. Note the direction of existing overland flows and slopes within and surrounding the site and where existing flows cross property lines.
e)	Describe existing land use. This section will describe the land. Is it pasture, crop, bare, are there trees, grass, buildings, etc.? Include description of buildings adjacent to the development as well. Has any grading been done? Are there existing stockpiles. Are there existing ESC controls installed on the site?

4.0 PROPOSED SITE CHARACTERISTICS

- a) Provide a brief description of the purpose, nature and extent of the proposed development. This section will clarify what will be present on the site after the construction project is complete. Include phasing and timing for the proposed development.
- b) Where applicable, describe the permanent stormwater management system and its ultimate discharge location (with outfall numbers) to the river, stream, lake etc. (Permanent stormwater management facilities, storm ponds require an amending approval by Alberta Environment prior to use for sediment control)
- c) Describe the proposed general overland flow directions. Make special note of steeper slopes (over 10%) and any locations that drain towards adjacent properties, environmental areas or water bodies.

d) Is ground water or surface water expected to be encountered during construction? If so, what measures will be employed during the de-watering process?

e) Is bed rock expected to be encountered during construction? If so, avoid locating sediment traps or basins in areas where bedrock exists.

5.0 EROSION AND SEDIMENT CONTROLS

a) Provide a description of all temporary erosion and sediment control measures that are to be employed during and after construction. Include the RUSLE FAC values for C and P that will be assigned to these measures when soil loss calculations are completed. For C & P values used, The City of Calgary (most current version) Standard Specifications Erosion and Sediment Control are a recommended resource. For ESC measures not listed in these specifications additional information must be provided with the submission. Source controls for erosion should be the first line of defense. Run-on and Run-off to and from the site must be addressed with perimeter controls.

NOTE: On all ESC construction drawings provide a set of drawing notes detailing a list of the construction steps that the drawing represents. This list should describe when all ESC measures shown on the drawing will be installed and how their installation interacts with the anticipated construction activities. The goal is to give the reader clear instructions on how to stabilize the site during the construction phase(s) that the drawing represents. An example is provided below.

Example for a rough grading ESC plan.

- 1. Perimeter silt fencing installed along the property line.
- 2. Topsoil is stripped from the Phase 1 area and stockpiled in the location shown.
- 3. Once topsoil stripping is complete the topsoil stockpile shall be hydroseeded and a silt fence installed around the downstream side.
- 4. Rough grading of the site to begin. Estimated duration 25 days.
- 5. As areas are completed sediment traps will be constructed and surface roughening applied to all exposed areas.

Ongoing inspection and maintenance of ESC measures will occur throughout this period.

b) Include the RUSLE FAC values for R and K that will be assigned. For construction sites in Rocky View County, use 320 as an annual R-value. For the K value, provide a description of the soils that will be encountered based on the geotechnical evaluation and use nomograph included in Appendix A to determine K value for the site. Sieve tests are recommended (% of sand, silt, clay) for an accurate estimation of the K value. Porosity tests are recommended for infiltration values (slow, moderate, fast). Include % and size of rock. If quantitative soil information is not available for your site and you

are unable to determine a K-value, The County will accept a K-value of 0.079 for the purpose of
RUSLE calculations.

c) Include RUSLE FAC soil loss calculations for the site. Annual soil loss cannot exceed 2.0 tonnes per hectare for any site that will have storm sewer infrastructure/storm ponds etc. installed or any site where storm water flows into any environmentally sensitive area. Refer to Appendix B below for the minimum reporting requirements for the RUSLE FAC calculations. The City of Calgary RUSLE Calculator spreadsheet is also an accepted way to present this information.

d) Provide the proposed location, height and volume of proposed stockpiles. Indicate the length of time the stockpiles will be left in place. Indicate the erosion and sediment control measures that will be employed to stabilize the stockpiles for wind and water erosion. Indicate the timing of implementing those measures.

e) Provide a description of any permanent erosion control measures to be employed. (E.g. rip-rap, turf reinforcement matting, channel/slope stabilization). Include the RUSLE FAC values for C and P that will be assigned to these measures when soil loss calculations are completed.

6.0 INSPECTIONS AND MAINTENANCE

a) Provide a record sheet for inspections that includes the following information: Include the initial inspection for this site in the space provided. All inspections must include a description of each control measure, photographs, date of inspection, weather conditions, temperature, maintenance requirements, who it was sent to for maintenance and when it was sent to them. Indicate that the inspection report will be kept on site at all times possible. Indicate that inspections will be completed each week (6-8 day window) and after significant precipitation events (12mm of rainfall or greater) and after thaw/melting events. An example of an acceptable inspection sheet is given below.

806.2.2 EXAMPLE OF EROSION CONTROL INSPECTION REPORT

INSPECTION COMPANY'S NAME COMPANY ADDRESS OFFICE TELEPHONE, CELL PHONE, FAX NUMBER E-mail: Sample of Erosion Control Inspection Report					
Developer: <i>Developer's name</i> Site: <i>Site Name</i>					
Inspection Date: <i>Date of site inspection</i> Inspector: <i>Name of inspector</i>			Job Number: <i>if applicable</i>		
Site conditions: Description of what stage construction is at and what contractors are on site. Weather conditions: Sunny/cloudy/windy, temp° C					
Installation/ Photo Number	Installation Type	Installatior Date	Condition/ recommendation	Sent to/Date	
Site location- Rip Rap /6918	West ditch rip rap at <i>site</i> <i>location</i>	Month/yea	Rip rap was added and placed to aid in overland r drainage being captured in rip rap swale and is in good condition.	None at this time.	

/6919			Inspector will monitor for effectiveness. Dirt tracked onto curb and asphalt leading up to Rip Rap /Curb and asphalt must be cleaned.	Contractor name / Date sent.
Lots 33 to 35				
/6922 /6901 /6901 /6902 /6902 /6902 /6809 /6899	V-ditch/berm with check dams and furrowing on lots 33 to 35	Month/year	Furrowing is complete. V- ditch/berm with check dams installed as per ESC plan. Minor breach in V-ditch at bottom of drainage zone 30 lot 33. Breach must be repaired.	None at this time. Contractor name / Date sent.
Lots 30 to 32	V-ditch/berm	Month/vear	Furrowing is complete. V-	None at this
/6897	with check dams and	wonu/year	ditch/berm with check	time.

Joint<	furrowing on lots 30 to 32		dams installed as per ESC plan. Breach in V-ditch at bottom of drainage zone 36, lot 31. Breach must be repaired.	Contractor name / Date sent.
Site location- Access /6781	North access/ site location	Not installed	Location is being used for access. A gravel pad of 40 mm drain rock 100 mm thick must be installed to limit tracking onto asphalt if access is used	Contractor name / Date sent.
39R-a 3467	Type C catch basin	Month/year	Install donut insert & back pad Clean curb	Contractor name / Date sent.

39R-b					
3468	Turc C cetch		Deputingent 9 hook and		
	basin	Month/year	OK	None	
39T-b 3469					
	Type C catch basin	Month/year	Clean insert, curb and asphalt	Contractor name / Date sent.	
Street Name					
/3509	Streets along Street Name	N/A	Streets are dirty along Street Name and need to be cleaned	Contractor name / Date sent.	
Silt fence at site location					
/3644	Silt fence at site location		Free standing silt fence was installed at north side of <i>site location</i> where there is no chain link fence and is in good condition.		
/3645			Silt fence that was attached to chain link fence is damaged at one location and must be repaired.	Contractor name / Date sent.	

Runoff was releas landscaped area point. Clean sec from the disch location and rep fence.	sed into at this liment arge air silt

b) General:

- i. All catch basin barriers are inspected weekly. Barriers will be removed once top lift of asphalt is installed and as the lots adjacent to them are vegetated and the road is staying clean. Barriers will not be installed in driveways.
- ii. Note: A copy of this inspection report and the ESC plan must be kept on site at all times reasonable possible. Rocky View County or other regulatory bodies may request a copy of inspection documents or plan at any time. Copies of inspection reports will be produced upon request. Copies may be requested by phoning (inspector's phone number) or by Email: (inspector's email address)
- iii. Revisions to the ESC plans must be forwarded to the Rocky View County ESC inspector responsible for the approval.
- iv. Due to the close proximity of residential subdivisions dust control is critical. Water trucks or other dust control measures must be employed to reduce the migration of dust while construction is under way during dry conditions.
- v. Rocky View County requires that permission be obtained prior to pumping any surface runoff into the storm sewer system. This includes pumping collected rainwater off of lots and into the street. This permission can be obtained through Operations/Facilities Services. Phone: 403-230-1401
- c) Provide contact names, phone and fax numbers and email address for the inspection company and individual responsible for inspections on the site. Please note: Inspections must be completed by the company that is responsible for the completion of this report and plan. Inspections must be made available to the Rocky View County inspector on request.
- d) Indicate how builders, contractors and sub-trades will be notified when they are causing erosion or sedimentation issues/infractions. Separate memos for builders, contractors and sub-trades must be completed by the erosion and sediment control inspector. They must include the site address, contact name and email/fax number, the date it was sent and what action was required.

e) Describe the consequences for non-compliance.

An example of an acceptable inspection sheet is given below.

INSPECTION SHEET EXAMPLE

Builder/	Builder/	Address: Civic Add	dress		
Contractor	Contractor Name	Contact: contact n	ame an	d email ad	dress/fax number
Photo Date	Oct 17/09		2		
Photo #	3666				
Condition	Dirt tracked onto sidewalk, curb & asphalt at site address.	· ·			
Comments	Builder/ Contractor to clean sidewalk, curb & asphalt at site address.				2009 10 17
Outside cont	ractor to be empl	oyed to clean lot:	Yes No	Date	
		Signature		L	1

	DECION	OUEOVIICT
PLAN	DESIGN	GHEGNLISI

Complete the check list and ensure all information noted is on the plans.

ESC Plan Check List (Legend on all drawings):

Name of the Development (phase # etc.)

Developer's Name

Name of the ESC consultant contact, email address and phone number

Name of the engineering consultant contact, email address and phone number

Legal description and address (if applicable)

Development Permit/Agreement Number

Designed by, drawn by, checked by, base drawing provided by, scale, date drawn, job number, revision number, drawing number.

Symbols for ESC measures to be implemented.

Symbols for existing storm inlets/manholes and sanitary sewer manholes

Symbol for RUSLE slope locations/numbers

Symbol for development boundary

Symbol for overland flow direction

Revision box with number, date and type of revision

Issued box with number, date and issued for box

Notes: assessments and recommendations based on what ESC guidelines, Trap low note, when ESC measures will be removed, inspection note (timing), inspection note indicating who will produce the inspections when required and where they will be kept, note indicating revisions will be forwarded to Rocky View County inspector, note indicating plan to be kept on site at all times possible

ESC Plan Check List (Drawing ESC 01, 02, etc.):

Professional stamp, license number and signature of designer
North arrow
Construction steps required to implement each drawing
Site boundary
Drainage catchment boundaries
Site area
Back slope locations on adjacent properties. (note: these areas must be included in the drainage
zones)
Numbered RUSLE slope arrows indicating overland flow direction, slope gradient(%), slope
length and LS value Slopes must be indicative of overland flows on site after grading and
utilities are installed but prior to finish grading around buildings.
Street names within and surrounding the site. Indicate types of roads, i.e. paved, gravel etc.
Lanes must be labeled
Proposed stockpile locations with note indicating quantity(s) and height(s) of stockpile(s).
Locations (symbols) of ESC measures to be implemented.

All of the information noted in this template has been completed and is true and correct.

Signature of Applicant

Date

Report and plans to be signed and stamped by the CPESC or Engineering Consultant.

807 SOIL LOSS ESTIMATION

Soil loss calculations (using the revised universal Soil Loss equation – Rusle) are required on all projects. The primary function of a soil loss calculation is to determine what erosion and sediment control measures are necessary to meet the A value objectives. The designer requires a sound understanding of soil loss calculations. Soil loss calculations are the most misunderstood and erroneous erosion and sediment control plan components. The most misunderstood are the LS, C and P values. The designer must have a sound understanding of the R and K values as well as:

- Site grades and overland flow paths during the construction process.
- The calculations for each drainage area will include the longest and steepest slopes with the highest LS values.
- Knowing which overland flow paths will exist throughout the majority of the construction process, when the existing vegetation is removed, the site is being graded, and upon grading completion.
- Knowing what soil and areas will be exposed longest throughout construction up to the landscaping and vegetation stage.
- Which C and P measures will be employed and their proper RUSLE value.
- The timing and location of the installation of C and P measures are critical to the plan's success. For example, sediment traps must not be installed in locations where they will be destroyed by building or infrastructure construction.

A good plan will employ measures that can remain in place throughout the construction process up to the vegetated stage. C and P measures must be employed that make sense. Measures must be cost effective and not prohibit the construction of the project. Mulches and cover should not be applied in active areas until the majority of construction activities are complete in a given area. P measures will be more effective in this case.

RUSLE EQUATION: A= R*K*LS*C*P

A-Value

The A-Value is estimated annual soil loss in tonnes/hectare. The annual soil loss tolerance levels for construction sites in Rocky View County are:

A = 2 tonnes/hectare/year for sites where there is or will be on-site or adjacent storm sewer infrastructure/ storm ponds etc. 2 tonnes/hectare/year is also required on any site where storm water flows into any environmentally sensitive area. Rocky View County will decide on any questionable areas.

Indicate the estimated annual soil loss in tonnes/hectare, and provide the data used in the soil loss calculation.

R-Value

Provide an annual R-value or a value specific to the length of soil Disturbance. The R-value is a numerical representation of rainfall erosivity. Local R-values are generally available as monthly and annual values. The R-Value is derived from historical data of rainfall intensity and duration records for individual storms. R-values are affected by storm energy and intensity, the amount of rainfall, snowfall, and runoff during different seasons. For construction sites in Rocky View County, use 320 as an annual R-value.

<u>K-Value</u>

Provide the index for soil erodibility based on a specific soil's susceptibility to erosion. The K-Value represents the susceptibility of the soil to erosion from raindrop impact and overland flow and accounts for various soil characteristics. K-values shall be justified with copies of the applicable information from the site geotechnical and soils report (such as a description of the soil types onsite, grain size analysis, soil structure, permeability and test hole logs with the corresponding location plan). The nomograph included in Appendix A should be used to determine the K value for the site. If quantitative soil information is not available for your site and you are unable to determine a K-value, The County will accept a K-value of 0.079 for the purpose of RUSLE calculations.

LS-Value

The LS-Value is a numerical representation of a slope's length, gradient and shape. Erosion potential increases with increasing slope length and gradient. On construction sites, support practices such as sediment traps, cat-tracking, furrowing, terracing, and installation of compost socks or fiber rolls/wattles along slope contours, reduce effective slope length. RUSLE provides LS-values for highly disturbed construction site slopes, based on input slope lengths and gradients. As construction sites can typically be split into areas of different topography, it is necessary to use some separate RUSLE calculations for each area: This will help to determine the level of ESC practices required for each area. The worst-case scenario shall be selected for each area when determining LS values.

C-Factor

The C-Value represents erosion control practices that provide temporary or permanent cover of exposed soils, thereby controlling erosion at the source (e.g., temporary and permanent vegetation, mulching, hydroseeding, rolled erosion control products). Provide details on what cover and management factors will be used and where the C-factor being used was referenced.

P-Factor

The P-value represents 'support practices' and provides credit for practices that are used to control construction site run-on and run-off or capture, settle and/or filter sediments and other contaminants from stormwater (e.g. sediment traps/basins, silt fence, terracing, cat-tracking, check dams, contour furrows). Provide details on what support practice factors will be used and where the P-factor was referenced.

When designing sediment traps, the size shall be designed according to the effectiveness and desired P-value in accordance with the most current City of Calgary ESC guidelines. This provides consultants with greater flexibility in their designs.

The City of Calgary 2022 (or most current version) Standard Specifications Erosion and Sediment Control are a recommended resource. For ESC measures not listed in these specifications additional information must be provided with the submission.

807.1 Soil Loss Tables and Information

Example Soil Loss Sample table using Revised Universal Soil Loss Equation for application in Canada (RUSLE FAC). Note: table format may change depending on consultant's preference, however the information presented in the example shown is the minimum information required that shall be presented in the RUSLE calculations. The example provided below represents the minimum amount of information required in the RUSLE Table. The City of Calgary RUSLE Calculator spreadsheet is an accepted way to present this information.

TABLE 800-A RUSLE Table									
SLOPE ID	RAINFALL R- VALUE	SOIL ERODIBILITY (K-VALUE)	SLOPE (%)	LENGTH (M)	LS VALUE	EROSION CONTROL COVER (C-VALUE)	SEDIMENT CONTROL PRACTICE (P-VALUE)	DESCRIPTION OF ESC PRACTICES USED	SOIL LOSS WITH CONTROL PRACTICES TONNES/ YR
Slope 1	320	0.079	0.50%	10.00	0.07	1.0	0.9	-No Cover (C=1.0) -Surface Roughening (P=0.9)	1.59
Slope 2	320	0.079	2.55%	20.00	0.29	0.002	0.90	-Erosion Blanket (C=0.3) – Surface Roughening (P=0.9)	0.013
Slope 3	320	0.079	8.30%	40.00	1.36	0.05	0.6	-Gravel (C=0.05) -Silt Fence (P=0.6)	1.03
Slope 4	320	0.079	25.00%	105.00	12.04	0.001	0.1	-Hydromulch (C=0.001) -Sediment Pond (P=0.1)	0.03
Total soil loss Estimates in tonnes/yr					2.66				

When containment systems are proposed, provide a table summarizing volume provided along with P-Value used. An example is provided below showing the minimum information required. The City of Calgary Sediment Containment System Information and Sediment System Design Information Sheet is an accepted way to present this information.

TABLE 800-B P-Value Example						
SEDIMENT CONTAINMENT ID	CONTRIBUTING CATCHMENT AREA (HA)	VOLUME PER HA (M3/HA)	P- VALUE			
1	0.15	150	0.6			
2	0.38	200	0.6			
3	0.82	500	0.3			
4	0.78	1750	0.1			

The P-value associated with a sediment containment system shall be based on the following table. When the volume provided by a sediment containment system falls between the values listed the higher P-value shall be used. No interpolation between P-values is allowed. This information follows the City of Calgary ESC Standard Specifications for Sediment Containment Systems.

TABLE 800-C P-Values

EXAMPLE DESIGN VOLUME (M3/HA)	P VALES
No Pond	1
100	0.7
150	0.6
200	0.6
300	0.5
400	0.4
500	0.3
750	0.2
1000	0.1

Except where stated otherwise, all design criteria, materials, installation, and testing shall be in accordance with the most recent editions of the following as amended:

 Alberta Environment and Protected Areas Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems.

- Alberta Transportation and Economic Development's Design Guidelines for Erosion and Sediment Control for Highways.
- The Department of Fisheries and Oceans Land Development Guidelines for the Protection of Aquatic Habitat.
- City of Calgary Guidelines for Erosion & Sediment Control.
- The experience and professional knowledge of the Developer's Engineering/ Certified Professional Sediment and Erosion Control (CPSEC) Consultant who is ultimately
- taking responsibility through their professional endorsement of the erosion and sediment control design.
- Other policy, standards or guidelines as deemed applicable by the Municipality.

It should be noted that these are minimum guidelines and site-specific situations may require additional engineering and study. Where standards overlap, the more onerous standard shall apply.

SECTION 900 CONTENTS

- 900 ENVIRONMENTAL AND HISTORICAL ASSESSMENTS
- 901 **BIOPHYSICAL ASSESSMENT**
- 902 ENVIRONMENTAL SCREENING (ES)
- 903 BIOPHYSICAL IMPACT ASSESSMENT (BIA) REQUIREMENTS
- 904 ENVIRONMENTAL PROTECTION PLAN (EPP)
- 905 ENVIRONMENTAL SITE ASSESSMENT (ESA)
- 906 HISTORICAL RESOURCES IMPACT ASSESSMENT

Section 900 Environmental

Assessments



900 ENVIRONMENTAL ASSESSMENTS

The Developer must address the concern and protection of environmentally and culturally sensitive areas during land development projects. The studies used to define significant areas and concerns must be conducted by qualified professionals under the guidelines and standards imposed by the respective Provincial authorities. These studies shall be provided, where required, before redesignation and during any subsequent Subdivision development activity. All development applications submitted to the Municipality shall comply with the requirements set out in the most recent editions of Provincial Regulations and Guidelines that may pertain to that application and activity.

An Environmental study addresses issues such as water resources, wildlife habitat management, species at risk, native and invasive vegetation, environmentally significant areas, sensitive ecological areas, and others as necessary. Historical and archaeological studies address the existence of Historical Resources such as archaeological sites, paleontological sites, historical buildings and other structures, and Indigenous traditional use sites.

There are several different forms of environmental studies. This section outlines some of the more common studies that may be required. Following an initial project review, site-specific studies may be required for further in-depth investigation prior to acceptance. All requirements of Alberta Environment and Protected Areas must be satisfied.

• The County may require any one or combination of environmental studies for any anticipated project.

The environmental review process is designed to identify environmental components that could be affected by the proposed development, predict potential project effects on them, recommend ways to avoid or minimize negative project effects, and identify if any valued ecosystem components will be negatively affected by the project, assuming all mitigation measures are successful.

While all environmental components are important, assessing every possible effect on every component is not practical. Assessments must therefore focus on the components that have the greatest relevance in terms of value and sensitivity to the particular circumstances of the development under review. A widely recognized approach is to identify **Valued Ecosystem Components (VECs)**, defined as environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historic, archaeological, or aesthetic importance. A list of relevant VECs include:

- Wetlands (any wetland Alberta Wetland Classification System)
- Environmentally significant areas (ESA) Provincial or Municipal
- Presence of rare or endangered species, plants, animals, etc.
- Archeological or paleontological features
- Watercourses
- Native vegetation communities
- Any other environmentally sensitive feature(s)

The County's Environmental Assessment framework contains three levels of environmental review, each requiring increased intensity effort (Figure 24). The level of environmental review required depends upon the type of project and the nature of the existing environment.

- 1) Initial project review
- 2) Environmental Screening (ES)

3) Biophysical Impact Assessment (BIA)



Figure 24: Flowchart outlining Rocky View's Environmental Assessment Framework



TABLE 900-A

Environmental Assessment requirements for developments in Rocky View County

LEVEL OF ENVIRONMENTAL ASSESSMENT	EXISTING ENVIRONMENTAL CONDITIONS	SCOPE OF PROJECT	DEVELOPMENT STAGE/ EXAMPLES
No Environmental Review	Development located on previously disturbed lands, and no new environmental impacts proposed	No change in existing land use (i.e. installation of some types of Agricultural infrastructure on Agricultural land)	Minor maintenance or upgrade projects
Initial Project Review (Further assessment may be required)	Project located in potentially sensitive area or is a new but small limited Disturbance on land with the potential for one or more VEC present. Potential impacts are small and easily mitigated through avoidance	No change in existing land use but land characteristics will be changed that could impact VECs (i.e. stripping and grading)	Agricultural and First Parcel Out. Normal setbacks and conditions apply. (i.e. if wetland on property, then work will not occur in the wetland's catchment)
Environmental Screening (Further assessment may be needed at later project stages)	Project located in potentially sensitive area or is in a new Disturbance on the land. Potential impacts exist and mitigations need to be further evaluated.	Initial planning project, where changes in existing land-use are proposed. Development planning tool. For projects where avoidance of impacts is possible.	At Subdivision or Development Permit. Area Structure Plan. May be required at Redesignation in some circumstances. Desktop screening to guide environmental planning.
Biophysical Impact Assessment	Project located in area with VECs present, potential impacts and mitigations need to be further evaluated.	Change in land-use; Construction for proposed new land use; Large-scale capital projects.	Redesignation in some circumstances. When developments require a Concept Plan, Master Site Development Plan, Area Structure Plan.

901 INITIAL PROJECT ENVIRONMENTAL REVIEW

The initial stage of the project review is to identify physical and ecological characteristics of the proposed project site. Air photos, concept drawings, and site visits may be required.

When an ES or a BIA is determined to be required for submission with the application based on development type as listed in Table 900A. Variations of these assessments may be required at the discretion of County staff based on site and project specific conditions. If potential impacts to VEC's are noted then an initial project review may trigger an ES or BIA, similarly an ES could trigger a BIA.

The initial project environmental review allows for screening of the proposed project and the environmental features within the project area. To determine if further environmental assessment is necessary, for small projects with a minimal chance of requiring a BIA, the County will require an initial project review to confirm that no VEC's intersect the project. The County may request specific information from the proponent during this review. For specific projects, (e.g., first parcel out) may not require further environmental assessment if appropriate avoidance with suitable setbacks can be shown. For other projects with temporary disturbances with no lasting footprint, an initial project environmental review may be required, unless an environmentally sensitive feature is identified and triggers further studies. A desktop review of key databases will be conducted by the proponent and provided to the County to show that no VEC's intersect with the project footprint. The following data searches will be completed and provided:

- 1) Wetlands, waterbodies or watercourses, including rivers, streams, lakes or any water body including ephemeral and intermittent water bodies (e.g., including searches of the Alberta Merged Wetland Inventory, ABMI Wetland Inventory, and Fisheries and Wildlife Management Information System hydrology layers).
- 2) Potential Wetlands (Alberta Merged Wetland Inventory/ABMI Wetland Inventory) or other water bodies (Lakes, streams, rivers, ephemeral drainages, etc.).
- Within or adjacent to an Environmentally Sensitive Area based on Provincial or Municipal mapping.
- 4) Rare plants or plant community element occurrences within 10 km of the project area based on Alberta Conservation Information Management System (ACIMS) database search, and potential suitable habitat occurs on the proposed project site.
- 5) Listed fauna species with historical observations within the project area based on Fisheries and Wildlife Management Information System (FWMIS) database search.
- 6) Native vegetation community present within project area.
- 7) Other environmentally sensitivities features.

If any of the above are identified an ES may be required if the County feels there is a risk of a VEC being impacted.

902 ENVIRONMENTAL SCREENING (ES)

An Environment Screening (ES) may be required as a minimum for projects where BIAs are not a requirement, as determined by County staff. Still, some form of permanent alteration to the landscape or land use is to occur on the land (unless it is a first parcel out). The ES will be a desktop review of the proposed project and existing environmental conditions. The ES can be submitted in letter or short report format. If any BIA triggers are identified in the ES, a BIA will also be required for the project.

Triggers for a BIA include the presence of any of the following Valued Ecosystem Component (VECs) on the subject lands:

- 1) Wetlands, waterbodies or watercourses, including rivers, streams, lakes or any water body including ephemeral and intermittent water bodies.
- Rare plants or plant community element occurrences within 10 km of the project area based on Alberta Conservation Information Management System (ACIMS) database search, and potential suitable habitat occurs on the proposed project site
- Listed fauna species with historical observations within the project area based on Fisheries and Wildlife Management Information System (FWMIS) database search
- 4) Within or adjacent to an Environmentally Sensitive Area based on Provincial or Municipal mapping
- 5) Native vegetation communities
- 6) Other environmentally sensitivities features.

Note: VECs should not be impacted. If any are found during an ES, a BIA will be triggered. All impacts and mitigation will be detailed in the BIA.

902.1 ES - Purpose, Size and Scope

- Scope of the proposed activity (e.g. land development; transportation/utility construction, etc.).
- Purpose, cause, or reason for the proposed Disturbance.
- Size of development is given in a real measurement (acres, hectares).

Description of the Disturbance (temporary or permanent).

• Indicates who is involved in the project (municipality and/or private contractors) and what level(s) of management and supervision are involved.

902.2 Proposed Location

- A map identifying where the project is within Rocky View County.
- Legal land description to identify exactly where the project is proposed.

902.3 Project Activities

- Description of the on-site materials that are expected to be exploited/removed/ extracted during the project (e.g. removal of gravel, sod or soil, tree cutting, water drainage, etc.).
- Phasing of the project includes preliminary planning, on-site activity, follow-up maintenance, monitoring, and reclamation. Approximate dates of each activity stage must be specified so that an appropriate evaluation of all environmental impacts may be undertaken.
- Anticipated requirements for short and long-term site maintenance (e.g. mowing, weed and pest management, irrigation, planting, etc.).

902.4 Land Use

• A description of the change in land use, vegetation cover and surface water based on aerial photo analysis.

902.5 Biological Resources

- Alberta Conservation Information Management System (ACIMS) database search for species and ecological communities that are tracked, watched, or listed.
- Fisheries and Wildlife Management Information System (FWMIS) database search for species that are tracked, watched, or listed.
- Environmentally Significant Areas and other natural heritage mapping (e.g., provincial parks) review for the region.
- Applicable caveats on the land title (e.g., protective notation, natural area).
- Land cover, vegetation community, habitat mapping.

902.6 Hydrology, Water Bodies and Wetlands

- Identify and map all standing water features, water bodies, water courses, wetlands or other natural hydrological sources, surface drainage patterns, and other features (whether seasonal, intermittent, or permanent).
- Identify any naturally occurring water bodies or wetlands, including permanent water bodies or wetlands claimed by the Crown under the Public Lands Act.

902.7 Topography

- A physical description of existing topographic expression, slope, aspect, and landscape position in a regional and local context.
- Escarpments (slopes equal to or greater than 15 percent), ravines, coulees, etc. should be identified and mapped.

• Viewscapes can be qualitatively discussed.

902.8 Geology

- A description of surficial geology and geomorphological processes in the region.
- Sub-surface geological features in the region.
- Glacial landforms with stability issues and other sensitive geological features should be identified and mapped.

902.9 Pedology

- A description of the soil communities and types based on the Agricultural Region of Alberta Soil Inventory Database (AGRASID) or other relevant soils surveys in the area.
- Saline soils, seepage areas and other sensitive soil features should be identified and mapped.

902.10 Historical & Archaeological

- Identification of the current Historic Resources Value (HRV), including archaeology, paleontology, or culture.
- Identification of any Historic Structures in the area.

902.11 Other Features

• Descriptions of natural and anthropogenic features which are of interest or importance to the site and are not included in the previous categories (e.g. unique habitat features, items of special concern, power lines, buildings, roads, etc.).

902.12 Existing Policy

• Identify existing federal, provincial, and municipal policies that may direct or influence the proposal.

903 BIOPHYSICAL IMPACT ASSESSMENT (BIA) REQUIREMENTS

A BIA will be a requirement for certain types of projects as determined by Rocky View County staff, or when an ES triggers it. The BIA provides a detailed study and review of a project, including alternatives. It predicts, interprets, and evaluates environmental impacts and provides mitigation measures where impacts cannot be avoided. A BIA report must:

- 1) Describe the proposed activity and provide rationale, including alternatives considered that may have less impact
- 2) Identify and characterize the existing environment

- 3) Determine the scale and impact of the potential effects of the activity on the environment
- 4) Recommend mitigation measures that would reduce or eliminate impacts of the activity on the environment
- 5) Identify compensation measures where impacts cannot be avoided
- 6) Identify cumulative effects caused by the accumulation and interaction of multiple stressors affecting the parts and the functions of ecosystems
- 7) Describe how mitigation measures will be monitored over time to ensure effectiveness

The BIA must provide clear assessment methodology following standard or generally accepted methods used in environmental assessments in Alberta. The contents of the BIA are generally similar to those included in an Environmental Screening report, except that the BIA provides more detailed information on the existing environment (included site visit and appropriate field surveys for VEC's present), an assessment of impacts on VECs, mitigation recommendations, and may require an Environmental Protection Plan.

Site visits to inventory biophysical conditions require specific timing throughout the year and may require multiple visits to assess all required VECs. As determined by County staff, the requirement and content of a BIA may be modified due to site conditions, development plans, or other factors. Rocky View County staff may defer BIAs if warranted.

903.1 Professional Requirements

The County requires that all ESs and BIAs are signed-off and stamped by a qualified senior Environmental Professional with technical competencies in impact assessment, and a registration in good standing with a Professional Regulatory Organization (PROs) in Alberta (e.g., Professional Biologist, Professional Agrologist). The field workers who conduct the technical surveys of the study would preferably be registered with one of the PROs in Alberta or supervised by one of the PROs in Alberta who signs off on their work and must be technically competent to conduct the field surveys, including having the appropriate skills and experience for all work being done.

The field workers who classify, delineate, or survey wetlands must have technical competency for these tasks and be Environmental Professionals registered with one of the PROs in Alberta. Wetland practitioners must either be an authenticating Professional as outlined in the Professional Practice Standard for Wetland Science, Design and Engineering Work in Alberta, or supervised by one. A Qualified Aquatic Environmental Specialist (QAES) must complete Aquatic field surveys with a Professional designation in Alberta.

903.2 Elements of the BIA

903.2.1 PROJECT PURPOSE, SIZE AND SCOPE

- Scope of the proposed activity (e.g. land development; transportation/utility construction, etc.).
- Purpose, cause, or reason for the proposed Disturbance.

- Size of development is given in a real measurement (acres, hectares).
- Description of the Disturbance (temporary or permanent).
- Indicates who is involved in the project (municipality and/or private contractors) and what level(s) of management and supervision are involved.

903.2.2 PROPOSED LOCATION

- A map identifying where the project is within Rocky View County.
- Legal land description to identify exactly where the project is proposed.

903.2.3 PROJECT ACTIVITIES

- Description of the on-site materials that are expected to be exploited/removed/ extracted during the project (e.g., removal of gravel, sod or soil, tree cutting, water drainage, etc.).
- Phasing of the project includes preliminary planning, on-site activity, follow-up maintenance, monitoring, and reclamation. Approximate dates of each activity stage must be specified so that an appropriate evaluation of all environmental impacts may be undertaken.
- Anticipated requirements for short and long-term site maintenance (e.g., mowing, weed and pest management, irrigation, planting, etc.).
 - Restoration Plans or Environmental Protection Plans, where required.

903.2.4 LAND USE

• A description of the change in land use, vegetation cover and surface water based on aerial photo analysis.

903.2.5 BIOLOGICAL RESOURCES

- Alberta Conservation Information Management System (ACIMS) database search for species and ecological communities that are tracked, watched, or listed.
- Fisheries and Wildlife Management Information System (FWMIS) database search for species that are tracked, watched, or listed.
- On-site vegetation surveys with additional emphasis on vegetation community types, rare plants (locally, provincially, federally), rare plant communities and invasive plants following standard Alberta methods and protocols including:
- Guidelines for rare plant surveys in Alberta.
- Recommendations for botanical surveys in areas of proposed development.
- Listing of restricted, noxious and nuisance weeds as per the Weed Control Regulation, regulated under the Alberta Weed Act.
- On-site vegetation surveys, with additional emphasis on habitat value, wildlife corridor importance, and species at risk (locally, provincially, and federally).
- On-site vegetation surveys to be completed within the growing season from May 1 to September 30.
- On-site wildlife surveys with additional emphasis on documenting species diversity, wildlife habitat value, wildlife corridor importance, species at risk (locally, provincially, federally).

903.2.6 Hydrology, Water Bodies and Wetlands

- Identify and map all standing water features, water bodies, water courses, or other natural hydrological sources, surface drainage patterns, and other features (seasonal, intermittent, or permanent).
- Identification of springs, alluvial aquifers or any other groundwater influences.
- Identify any permanent naturally occurring water bodies or wetlands claimed by the Crown under the Public Lands Act.
- If wetlands are identified, prepare a Wetland Assessment and Impact Report as per the Provincial Alberta wetland assessment and impact report directive (2017) or as amended, or Wetland Assessment Impact Form, as appropriate.
- Identify and delineate wetlands according to the most recent or amended Alberta wetland identification and delineation directive, and classify wetlands based on the Alberta Wetland Classification System.
- Prepare a hydrological assessment of the wetlands including the drainage area contributing to the wetland site
- Provide a statement of hydrological, ecological and economic benefits
- Describe vegetation and wildlife associated with wetlands including presence of rare or endangered species
- Provide historical aerial photographs of the site, and assess permanency of wetlands according to the Alberta Guide for Assessing Permeance of Wetland Basins (most recent or amended version), and submitting Water Boundaries Crown determination as required; and
- Provide reference photographs of the wetlands showing the wetland margin and immediate upland area.

- A physical description of existing topographic expression, slope, aspect, and landscape position in a regional and local context.
- Escarpments (slopes equal to or greater than 15 percent), ravines, coulees, etc. should be identified and mapped.
- Viewscapes can be qualitatively discussed.

903.2.8 GEOLOGY

- A description of surficial geology and geomorphological processes in the region.
- Sub-surface geological features in the region.
- Glacial landforms with stability issues and other sensitive geological features should be identified and mapped.

903.2.9 PEDOLOGY

- A description of the soil communities and types based on the Agricultural Region of Alberta Soil Inventory Database (AGRASID) or other relevant soils surveys in the area.
- Saline soils, seepage areas and other sensitive soil features should be identified and mapped.

903.2.10 HISTORICAL & ARCHAEOLOGICAL

- Identification of the current Historic Resources Value (HRV), including archaeology, paleontology or culture.
- Identification of any Historic Structures in the area.

903.2.11 OTHER FEATURES

• Descriptions of natural and anthropogenic features which are of interest or importance to the site and are not included in the previous categories (e.g. unique habitat features, items of special concern, power lines, buildings, roads, etc.).

903.3 Impacts, Mitigation and Monitoring

The physical impact of the development activity on biological resources, hydrology, topography, geology, pedology, or other features. This includes elimination/alteration of unique landforms, alteration of drainage patterns, erosional processes, paleontological (surficial and sub-surficial) alterations, slope stability, loss of intact/native soils, alteration or Disturbance of soil profiles, salinity, erosion, compaction, windthrow hazard, etc.

- Methods of available damage mitigation or recovery using standardized or specialized techniques.
- Summary of actual and potential impacts to the site that are inevitable yet permanent; may include long-term species diversity, loss of habitat, loss of system connectivity, loss of public access, obstruction of wildlife movement, introduction of weeds or pests, long-term maintenance requirements, removal of natural features, and aesthetic impacts.
- Description of the project site's follow-up maintenance, monitoring and reclamation, as required.

All reports will be prepared in accordance with the Alberta Wetland Assessment and Impact Report Directive (most recent or amended version) and signed off by an authenticating Professional.

903.3.1 WETLAND IMPACT

- A comprehensive description of actual and potential impacts from development activity to the hydrology, water bodies, wetlands and wetland complexes.
- Any impacts to wetlands should be described in sufficient detail for an Application for Approval under the Water Act meeting assessment requirements outlined in the Alberta Wetland Mitigation Directive and the Alberta Wetland Assessment and Impact Report Directive, most recent or amended versions.
- Include a Wetlands Mitigation Plan that documents how wetlands will be avoided or how wetland impacts will be minimized or compensated.
- Include a statement indicating why it is not possible to avoid or minimize impacting the wetland(s).

Developments that impact a wetland will be required to provide various levels of assessment depending on the type of activities to ensure the protection of biodiversity and wildlife habitat while maintaining water quality and quantity. The County has a legislative mandate from the Province of Alberta to protect Provincial water resources when development is proposed on lands in proximity to wetlands. Forms and Reports are in accordance with Provincial Regulations and will include one or both of the following:

- 1) Wetland Impact Assessment and Impact Form (WAIF)
- 2) Wetland Assessment and Impact Report (WAIR)

903.3.2 BIOLOGICAL RESOURCE IMPACT

Comprehensive account of actual and potential impacts from development activity on natural vegetation communities, wildlife habitat, overall biodiversity, sensitive plant and animal populations, movement corridors, rare or threatened plants and animals, long-term plant and wildlife community stability.

903.3.3 TOPOGRAPHY IMPACT

A comprehensive description of actual and potential impacts to existing landform, slope, aspect, and position within the landscape.

903.3.4 GEOGRAPHICAL AND GEOLOGICAL IMPACT

The physical impact of the development activity includes the elimination/alteration of unique landforms, alteration of drainage patterns, microclimatic effect, erosional processes, paleontological (surficial and sub-surficial) alterations, and slope stability.

903.3.5 PEDOLOGICAL IMPACT

The physical impact of the development activity on soils includes loss of intact/ native soils, alteration or Disturbance of soil profiles, salinity, erosion, compaction, windthrow hazard, etc.

903.3.6 RESIDUAL (IMMITIGABLE) IMPACT

- Summary of actual and potential impacts to the site that are inevitable which may
 include impacts to long-term species diversity, loss of habitat, loss of system
 connectivity, loss of public access, obstruction of wildlife movement, introduction of
 weeds or pests, long-term maintenance requirements, removal of natural features,
 aesthetic impacts.
- Predict whether there will be significant residual impacts even after mitigation measures are implemented.

903.4 Mitigation and Monitoring Recommendations

Accepted Methods - Methods of available damage mitigation or recovery using standardized techniques including signage and fencing, grading and loaming, sod stockpiling, seeding with native mixtures, native plantings, wetland soil reuse, limited-impact construction, etc. Methods are well-known to industry contractors who are involved in tender bidding for projects.

Experimental Methods - Methods of available damage mitigation or recovery which are specialized, require outside expertise, or have site-specific value; may include sod transplants, loam shredding and re-application, specialized native seed harvesting and application, LID principles, bioengineering, wetlands soil reuse, use of organic fertilizers and erosion control devices, other unconventional methods.

903.4.1 WETLAND MITIGATION

- Any impacts to wetlands and associated mitigation measures should be described in sufficient detail for an Application for Approval or License under the Water Act meeting assessment requirements outlined in the Alberta Wetland Mitigation Directive (most recent or amended version).
- Include a Wetland Mitigation Plan that documents how wetlands will be avoided, or how impacts will be minimized or compensated.
- Include a statement indicating why it is impossible to avoid or minimize impacting the wetland(s).
- Document how wetland compensation will be achieved according to the Alberta Wetland Mitigation Directive (most recent or amended version).
- Address additional wetland mitigation/compensation requirements per County Wetland Conservation and Management Policy #420.

903.4.2 MAINTENANCE AND MONITORING

Description of the follow-up maintenance, monitoring, and reclamation of the project site. These recommendations should be captured in an Environmental Protection Plan, if applicable.

- Wetland monitoring, in accordance with the Wetland Monitoring Plan associated with the Water Act
- Approval for Wetland Disturbance includes identifying goals for successful integration of retained wetlands or creation of constructed wetlands.

903.4.3 DESCRIPTION OF CUMULATIVE EFFECTS

Cumulative effects are the changes to the environment caused by past, present and reasonably foreseeable future human activities. The description of potential cumulative effects should include the changes to the environment caused by the proposed activity or development when combined with other past, present, and reasonably foreseeable human activities.

The framework for describing cumulative effect is as follows:

- Identify regional environmental issues of concern
- Select appropriate regional VECs (these VECs may be the same as those identified for the BIA or regional jurisdictions and stakeholders may identify them)
- Identify spatial and temporal boundaries to describe cumulative effects
 - Spatial boundaries may be the contributing watershed of the site, Rocky View County, or Southern Alberta.
 - Temporal boundaries may be identified relevant to regional land use management strategies, such as the Rocky View County 2060 Growth Management Strategy
- Identify other human activities and developments that may affect the same regional VECs (other activities and developments may include agricultural, recreational, resource extraction, transportation, residential, commercial and industrial development)
- Describe how the proposed activity or development may contribute to cumulative effects on identified regional VECs
- Identify regional mitigation measures expected to reduce or eliminate cumulative effects (for example, regional watershed management plans); and
- Predict the environmental significance of the proposed activity or development's contribution to cumulative effects.

903.4.4 EXISTING POLICY

The Biophysical Assessment must align with all relevant legislation, policies and plans at all levels of Government. As Government Regulations are routinely updated and altered, it is the proponent's responsibility to ensure the Biophysical Assessment adheres to all updates. Current legislation, policies and plans include, but may not be limited to:

- Rocky View County 2060 Growth Management Strategy
- Municipal Development Plan
- Area Structure Plans
- Wetland Conservation and Management Policy
- Riparian Land Conservation and Management Policy
- Bow Basin Watershed Management Plans
- Elbow River Basin Water Management Plans
- Nose Creek Watershed Water Management Plans
- Government of Canada Fisheries Act, c.F-14
- Migratory Birds Convention Act, 1994, c.22
- Navigable Waters Protection Act, RSC 1985, c.N-22
- Species at Risk Act, 2002, c.29
- Government of Alberta
- Environmental Protection and Enhancement Act, RSA 2000, c.E-12
- Municipal Government Act, RSA 2000, c.M-26
- Public Lands Act, RSA 2000, c.P-40
- Water Act, RSA 2000, c.W-3
- Weed Control Act, RSA 2008, c.W-1
- Weed Control Regulation, Alta. Reg. 19/2010
- Wildlife Act, RSA 2000, c.W-10
- Historical Resources Act, RSA 2000, c H-9
- Guidelines for Rare Vascular Plant Surveys in Alberta (ANPC, 2012)
- Alberta Wetland Assessment and Impact Report Directive (Government of Alberta, 2017)
- Alberta Wetland Identification and Delineation Directive (Government of Alberta, 2015)
- Guide of Assessing Permanence of Wetland Basins (Alberta Environment and Protected Areas, 2014)
- Alberta Wetland Classification System (ESRD, 2015)
- Alberta Wetland Mitigation Directive (Government of Alberta, 2018)
- Alberta Wetland Assessment Impact Form (Government of Alberta, 2023)

References

Alberta Environment and Protected Areas and Parks (Alberta Environment and Protected Areas). 2014. Guide of Assessing Permanence of Wetland Basins. Land Policy Branch, Policy and Planning Division. 28 pp.

Alberta Environment and Protected Areas and Sustainable Resource Development (ESRD). 2015. Alberta Wetland Classification System. Water Policy Branch, Policy and Planning Division, Edmonton, AB.

Alberta Native Plant Council. 2009. Recommendations for Botanical Surveys in Areas of Proposed Development. Alberta Native Plant Council, Edmonton, AB. Available on-line at https://anpc.ab.ca/wpcontent/uploads/2015/01/ANPC_Recommendations4BotanticalSurveys_ Mar2009.pdf

Alberta Native Plant Council. 2012. ANPC Guidelines for Rare Vascular Plant Surveys in Alberta – 2012 Update. Alberta Native Plant Council, Edmonton, AB. Available on-line at http://www.anpc.ab.ca/content/ resources.php

Government of Alberta. 2015. Alberta Wetland Identification and Delineation Directive. Water Policy Branch, Alberta Environment and Protected Areas and Parks. Edmonton, Alberta.

Government of Alberta. 2017. Alberta Wetland Assessment and Impact Report Directive. Water Policy Branch, Alberta Environment and Protected Areas and Parks, Edmonton, Alberta.

Government of Alberta. 2018. Alberta Wetland Mitigation Directive. Water Policy Branch, Alberta Environment and Protected Areas and Parks. Edmonton, Alberta.

Government of Alberta. 2023, Wetland Assessment and Impact Form. Water Policy Branch, Policy and Planning Division, Edmonton, AB

904 ENVIRONMENTAL PROTECTION PLAN (EPP)

The Environmental Protection Plan (EPP) describes conceptual environmental protection measures that will limit the environmental disturbances associated with the project's design and construction. In addition to being suitable for design and construction, these conceptual environmental protection measures can be used for project activities during preconstruction, construction, operations, and reclamation, and for all other project components.

The EPP is based upon the potential environmental impacts identified in the Biophysical Impact Assessment (BIA) and identifies preliminary project environmental measures to support project engineering design and construction planning. This can include protection measures relating to:

- Protection of wildlife and wildlife habitat
- Clearing vegetation
- Weed and invasive species management
- Handling and storage of soil
- Wetlands and watercourses
- Fish and fish habitat
- Air quality management

- Handling and storage of petroleum, oil, lubricants, and other chemicals
- Management of solid waste

905 ENVIRONMENTAL SITE ASSESSMENT (ESA) – PHASE 1 & PHASE 2

An Environmental Site Assessment (ESA) evaluates available information that outlines the nature of any hazards to determine if any adverse effects have occurred. It would be advisable to refer to Alberta Environment and Protected Areas Environmental Site Assessment Standard (March 2016) and Tier 1 and Tier 2 Soil and Groundwater Remediation Guidelines (January 2023).

The County may require a Phase 1 or Phase 2 ESA for changes of use, subdivisions, or development around:

- Railways
- Gas stations
- Gas or oil wells, or old pipelines
- An intensive use to another use (industrial site changing to residential)
- Any other lands the County feels may be contaminated from a previous use

If a Phase 1 ESA identifies the likelihood of contamination on site, a Phase 2 ESA would be required. Phase 2 would include physical works, on-site investigation, and testing to identify contamination. If contamination is identified, it may recommend a Phase 3 ESA.

> A Phase 3 ESA would provide remedial work to ensure site remediation and report summarizing works completed, including remediation certificates from Alberta Environment and Protected Areas.

906 HISTORICAL RESOURCES IMPACT ASSESSMENT

In areas considered historically sensitive by the County, Alberta Ministry of Arts, Culture and Status of Women, or areas identified in the Calgary Regional Planning Commission Report 6.88.13 "Environmentally Significant Areas", the County will require a Historical Resources Impact Overview be submitted with the application for the proposed redesignation, subdivision, or development. This may lead into a Historical Resources Impact Assessment if the Overview identifies anything that requires further investigation.

The Historical Resources Impact Assessment shall be in accordance with the Statement of Justification for *Historical Resources Act* requirements to obtain Alberta Historical Resources Requirements. A qualified Archaeologist shall conduct the study with a valid Archaeological Research Permit from the Province of Alberta. The Historical Resources Impact Assessment can be conducted and included with a Biophysical Impact Assessment, if required, or under separate cover.

APPENDIX



1000 APPENDIX

Figures 1-22: Roads - Detailed Engineering Schematics

- Figure 400.1 Country Residential
- Figure 400.2 Country Collector
- Figure 3: 400.3 Rural Industrial / Commercial (30m)
- Figure 4: 400.4 Rural Industrial / Commercial (36m)
- Figure 5: 400.5 Rural Low Volume
- Figure 6: 400.6 Rural Moderate Volume
- Figure 7: 400.7 Rural Transitional Paved
- Figure 8: 400.8 Rural Collector
- Figure 9: 400.9 Rural Primary Collector
- Figure 10: 400.10 Rural 6 Lane Arterial
- Figure 11: 400.11 Rural 4 Lane Arterial
- Figure 12: 400.12 Typical Rural Cul-De-Sac Dimensions
- Figure 13: 400.13 Road Approach Location
- Figure 14: 400.14 Typical Rural Road Approach Design Criteria
- Figure 15: 400.15 Emergency Access Route
- Figure 16: 400.16 Emergency Breakaway Access Gate
- Figure 17: 400.17 Typical Rural Installation of Municipal Road Name Signs
- Figure 18: 400.18 Typical Name Sign Details
- Figure 19: 400.19 Sign Placement Details
- Figure 20: 400.20 Sign Installation Details
- Figure 21: 400.21 Modified Road Standard Crossing Environmental Reserve (ER)
- Figure 22: 400.22 Rural Mailbox Turnout



All roadway structure depths shall be certified by the Geotechnical engineering consultant and be acceptable to the County based on soaked subgrade CBR values obtained from the actual subgrade road material, prior to entering the Development Agreement or Road Construction Agreement.

Backsloping agreement or extra ROW required must be obtained by the developer at their sole cost.

Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.



All ditch slopes and ditch bottoms requires topsoil dressing and seed.





BM

ISSUE/REVISION DESCRIPTION

REVISIONS

drainage does not enter onto private property. This may involve modifications within the road ROW to manage drainage.

Notes:

400.2

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400.2

TITLE

All roadway structure depths shall be certified by the Geotechnical engineering consultant and be acceptable to the County based on soaked subgrade CBR values obtained from the actual subgrade road material, prior to entering the Development Agreement or Road Construction Aareement.

Backsloping agreement or extra ROW required must be obtained by the developer at their sole cost.

-

1 24/11/29

No. YY/MM/DD

Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.

All ditch slopes and ditch bottoms requires topsoil dressing and seed.

ENGINEERING SERVICES

COUNTRY COLLECTOR

(CC)

25.00 m R/W 8.00 m ROAD





GRANULAR BASE DEPTH OF 390mm

400.3



All roadway structure depths shall be certified by the Geotechnical engineering consultant and be acceptable to the County based on soaked subgrade CBR values obtained from the actual subgrade road material, prior to entering the Development Agreement or Road Construction Agreement.

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For local roads with less than 50 vehicles per day.

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Backsloping agreement or extra ROW required must be obtained by the developer at their sole cost.

Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.

All ditch slopes and ditch bottoms requires topsoil dressing and seed.

Till DESIGN BY: D DRAWIN BY: BM CHECKED BY: DRAWIN BY: NC CHECKED BY: NC DATE: 11/2024 SCALE SCALE 11/2024		- -	
FIGURE NO. 400.5	(RLV) 20.00 m R/W 6.00 m ROAD	ROCKY VIEW COUNTY	Des. 4 Cl. 20 50mm of surfacing gravel to be applied prior to CCC, 50mm of surfacing gravel to be placed prior to FAC.

3% Typ.

ROAD STRUCTURE DETAIL

1



Stormwater evaluation may be required to ensure road drainage does not enter onto private property. This may involve modifications within the road ROW to manage drainage.

<u>Notes:</u>

All roadway structure depths shall be certified by the Geotechnical engineering consultant and be acceptable to the County based on soaked subgrade CBR values obtained from the actual subgrade road material, prior to entering the Development Agreement or Road Construction Agreement.

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All ditch slopes and ditch bottoms requires topsoil dressing and seed.







BM

ISSUE/REVISION DESCRIPTION

REVISIONS

Stormwater evaluation may be required to ensure road drainage does not enter onto private property. This may involve modifications within the road ROW to manage drainaae.

Notes:

400.7

GURE DRAWN BY

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BM

11/2024

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SCALE:

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TITLE

All roadway structure depths shall be certified by the Geotechnical engineering consultant and be acceptable to the County based on soaked subgrade CBR values obtained from the actual subgrade road material, prior to entering the Development Agreement or Road Construction Aareement.

Backsloping agreement or extra ROW required must be obtained by the developer at their sole cost.

-

1 24/11/29

No. YY/MM/DD

Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.

All ditch slopes and ditch bottoms requires topsoil dressing and seed.

ENGINEERING SERVICES

RURAL TRANSITIONAL

PAVED

(RTP)

20.00 m R/W 8.00 m ROAD





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Backsloping agreement or extra ROW required must be obtained by the developer at their sole cost.

Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.

All ditch slopes and ditch bottoms requires topsoil dressing and seed.



2% Typ.



Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.

All ditch slopes and ditch bottoms requires topsoil dressing and seed.



2% Typ.



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Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.

All ditch slopes and ditch bottoms requires topsoil dressing and seed.

400.1	TI DESIGN BY: DRAWN BY: BM CHECKED BY: DATE: 11/2024 SCALE: 1:200 FIGURE NO. 400.10 FIGURE NO. CHECKED BY: DATE: 11/2024 SCALE: 1:200 FIGURE NO. CHECKED BY: DATE: 1:200 FIGURE NO. CHECKED BY: CHECKED BY: CHECK	- -	STRUCTURE TO BE DETERMINED AT TIME OF DESIGN
Scale: 1:200 FIGURE NO. 400.10		ROCKY VIEW COUNTY	



All roadway structure depths shall be certified by the Geotechnical engineering consultant and be acceptable to the County based on soaked subgrade CBR values obtained from the actual subgrade road material, prior to entering the Development Agreement or Road Construction Agreement.

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Slopes may be increased or decreased under exceptional circumstances if approved by the municipality in writing.

All ditch slopes and ditch bottoms requires topsoil dressing and seed.

DESIGN BY: C DRAWN BY: BM CHECKED BY: N CHECKED BY: N DRAWN BY: BM CHECKED BY: N DRAWN BY: BM CHECKED BY: 11/2024	ENGINEERING SERVICES	 1 24/11/20 - No. YYAMADO ISSUEREVISION DESCRIPTION REVISIONS	 BM DRN DES CHK APPD	STRUCTURE TO BE DETERMINED AT TIME OF DESIGN
FIGURE NO. 400.11	4 LANE ARTERIAL 40.00 m R/W 23.80 m ROAD	ROCKY VIEW C	OUNTY	













END SECTION

400.18

FRONT / BACK VIEW











www.rockyview.ca

