Engineering Consultant Guidelines for Highway, Bridge and Water Projects

Volume 1 – Planning, Preliminary Engineering, Design and Tender

The electronic version of the Guide includes many links. Linked texts of this document are highlighted in blue.

Note: Links in the Guide were checked for accuracy before publication but are subject to change. To report broken links, contact Ministry of Transportation and Economic Corridors as indicated below.

For suggested changes or questions regarding content, contact the Project Management Office, Transportation and Economic Corridors, at

Email: ecgfeedback@gov.ab.ca

Section 1: General

1.1 Introduction

These guidelines, appendices, and references shall be used for the provision of engineering services on all Provincial highway, bridge, and water management projects where a Consultant is hired directly by the Department, regardless of whether the Consultant is hired for the entire project or a portion thereof. These guidelines may also be stipulated for use for projects not undertaken directly by the Department but where the funding agency (whole or partial funding) is Transportation and Economic Corridors (TEC). See 'Appendix A: General Engineering Processes', for an overview of engineering processes.

Should a discrepancy exist between this document and the documents prepared specifically for a project, for example the Terms of Reference for a project, the latter shall take precedence. Standards, guidelines, legislation, regulations, specifications and engineering practices evolve over time, and it is therefore not practical to expect all the contents of this document and the documents referenced to be up-to-date. The Consultant is responsible for using current standards, design codes, and guidelines and for ensuring that all current legislation and regulations are followed. A list of current Federal and Alberta Provincial legislation and regulations that are relevant to highway planning, preliminary engineering, design, construction, and operations is contained on the Department website. This list is not all-inclusive.

In the event of discrepancies, the hierarchy of documents shall be as follows, in descending order:

1. Legislation and Regulations
2. Consulting Services Contract
3. Engineering Technical Standards, Warrants, and Processes
4. 'Engineering Consultant Guidelines for Highway, Bridge, and Water Projects'

See 'Section 1.1.1: Definitions' for more information.

The Prime Consultant retained by the Department is responsible for the professional liability of all work performed under their Contract, including work by any Sub-Consultant. The checking of the Consultant's or Sub-Consultant's work by the Department or the signing of drawings by Department staff does not relieve the Consultant from any responsibility for the work. Therefore, these guidelines will generally use the terminology of "acceptance" rather than "approval" when referring to engineering Professional Work Products submitted to the Department by the Consultant.

The purpose of this manual is as follows:

- To outline the Department's expectations for the provision of engineering services for the planning, design, and tendering of all provincial highway, bridge, and water management projects where a consultant is hired directly by the Department.
- To ensure uniformity and consistency in the provisions of these services to the Department.
- To outline specific responsibilities and authorities of the Consultant when providing these services.

The Consultant's obligations are detailed in the Consulting Services Contract and Construction Contract documents. This manual outlines the deliverables and standards established by the Department which will typically fulfil the consultant's obligations and ensure that Department requirements are met in the desired manner.

This manual does not provide a complete record of all the processes, responsibilities and authorities of the Consultant and the Department in managing the delivery of a department construction contract. Other documents or manuals which must be considered include but are not limited to the following:

'Engineering Consultant Guidelines for Highway and Bridge Projects – Volume 2 – Construction Contract Administration'

This document provides guidelines covering the post-tender period.

'Traffic Accommodation in Work Zones Manual'

This document provides information and minimum standards for the provision of traffic accommodation through work zones on highways and bridges in Alberta.

The authorities, responsibilities, and processes contained in all these manuals are based on the Department's policy statements, authorities matrix, contract specifications, and contracts for engineering consultant services. Updates or revisions to existing contract specifications, the terms of the contract, policy statements or the authorities matrix may affect these processes, responsibilities, and authorities. In the event of any such changes which significantly affect the contents of these manuals, users will be advised accordingly.

This manual is not intended to replace or modify the contents of the Department's construction contracts or engineering consultant contracts. If a conflict or ambiguity exists between this manual and the Consulting Services Contract, the user shall contact the Project Administrator for clarification.

If the user notices any omissions, obvious errors, or recommendations for future updates, the user should forward to ecgfeedback@gov.ab.ca.

1.1.1 Definitions

The following words, when used in this document, shall have the meaning as defined below:

Alberta Land Surveyor		A person or corporation registered to perform land surveys in the Province of Alberta.
Approval		The subject work shall be "approved" by the Department for matters relating to things such as Department policy, funding, contract extensions or over-runs, right-of-way purchase, or Contract Design Change Proposals. The Department will also review and approve Design Exceptions as required. See 'Section 1.6.1: General' for more details.
Bridge Assessment		A technical review of bridge condition, functionality controlling issues, and technical parameters with respect to the crossing and roadway approaches. A key objective is to identify optimum strategies for preservation, rehabilitation or potential reconstruction of the crossing over the life cycle of the structure. See 'Section 11: Bridges' for more details.
Bridge Conceptual Design		An engineering process for bridges undertaken prior to the structural design phase including but not limited to bridge assessment, functional planning, geometric design, hydro-technical design, site location and survey, environmental determinations, preliminary geotechnical investigation, and development of optimized concepts for advancement to structural design.
Bridge Structures	Consist of:	
		Standard Bridge: Any bridge built using the Department's Standard Bridge Design Drawings and guidelines. The Department standard bridge design drawings include the SL, SLW and SLC bridge types.
		Standard Bridge-Sized Culvert: Culvert with a diameter (or summation of diameters) greater than 1500 mm and less than 4500 mm.
		Major Bridge: All bridge structures not included within the definitions of Standard Bridge or Standard Bridge Sized Culvert. These can include Major Bridge-Sized Culverts, or complex buried structures such as open bottomed culverts. Major bridges are typically built from site-specific drawings but can also be built from standard girder drawings with engineered modifications. Typically, Major Bridges are river crossings, highway interchanges, or railway crossings.

		Major Bridge-Sized Culvert: Bridge Sized Culvert with diameters (or summation of diameters) of 4500 mm or greater, or structures of lesser diameter having complex site restraints or specialized engineering requirements.
Checker		The Professional Engineer who conducts an independent engineering check and shares professional responsibility of the Professional Work Products with the Design Engineer.
Consultant		The person, organization or company with whom the Minister enters into a Contract to perform the services required by this Contract.
Consulting Services Contract		The contract between the Department and the Consultant for the provision of services on Department projects.
Construction Contract		The contract between the Department and the Contractor covering the performance of the work.
Contract Design Change Proposal		An alternate design or a design modification to the Department's tendered design or a component thereof. If required, the Contractor shall submit this proposal (through the Department's Project Sponsor) after the tender is awarded.
Contractor		The person, organization or company that has entered into a Construction Contract with the Department.
Department		Transportation and Economic Corridors. His Majesty the King in right of Alberta as represented by the Minister of Transportation and Economic Corridors, or his duly authorized representatives.
Design Engineer		The Professional Engineer who takes professional responsibility for the Professional Work Product.
Design Drawings		Drawings that encompass any original designs or design changes. These drawings shall be authenticated by both the Design Engineer and Checker indicating that the design has been prepared in accordance with all appropriate engineering and Departmental Standards.
Design Exception		An instance where a Design Engineer has chosen to use a parameter or product which is different from the prevailing practice. Documentation of the rationale used to support the design exception must be filed as part of the detailed design package for future reference.
Environmental Construction Operations (ECO) plan		Provided by the Contractor and consists of plans and written procedures that address environmental protection issues relevant to the specific activity being performed during construction of a project
Engineering Assessment		A formal assessment of various technical and safety parameters and/or performance data, generally using a predefined methodology or warrant system.
Engineer of Record (EOR)		The Professional Engineer who accepts professional accountability and responsibility for the Professional Work Product of a component of a project. Note: During the design and tendering phase of the project, this is typically the engineer who has designed the component. During the construction phase, the EOR may be the same individual as during the design and tender phase, but does not need to be. The EOR for the construction phase will take professional accountability and responsibility for any design changes that may occur during construction and must therefore be appropriately qualified and competent, and must sufficiently understand the design of the component.

Estimates		
“A” Estimate		A “Planning level Cost Estimate”, which is a “ball park” estimate, to be prepared before any design calculations are completed. The estimate shall be presented as a total project cost, including engineering, right-of-way, utilities, mobilization, construction contract costs, etc. See ‘Section 1.4.7: Cost Estimates’ for details.
“B” Estimate		A “Preliminary Design Estimate” which is prepared using all established preliminary quantities. The estimate shall be presented as a total project cost, including engineering, right-of-way, utilities, mobilization, construction contract costs, etc. See ‘Section 1.4.7: Cost Estimates’ for details.
“C” Estimate		A “Final Design Estimate” is produced after the final design is completed. The estimate shall be presented as a total project cost, including engineering, right-of-way, utilities, mobilization, construction contract costs, etc. See ‘Section 1.4.7: Cost Estimates’ for details.
Field Review Engineer		The Professional Engineer who takes responsibility for assuring that the finished construction complies with the Design Drawings and the contract specifications. Note: Changes to the design during construction must be addressed by the Engineer of Record.
FOIP		Government of Alberta legislation entitled ‘*Freedom of Information and Protection of Privacy Act*’.
Preliminary Engineering		Engineering assessments and investigations undertaken early in the design process, the purpose of which is to gather preliminary site surveys, geotechnical and other information used, and reaffirm the key design parameters that should be used on the project. Requirements for preliminary engineering will vary depending on the nature of the engineering assignment. See ‘Section 6: Preliminary Engineering’ and ‘Section 11: Bridges’ for more details.
Professional Work Products (PWP)		An output of a professional service that requires authentication and validation as described in this practice standard. Defined in the General Regulation as “plans, specifications, reports, or documents of a professional nature”, a PWP is any output of professional services with technical information relied upon by others, internally or externally, to make a decision or to take action. A PWP can be physical (e.g., paper, plastic film), electronic (e.g., electronic document, image), or digital (e.g., software, modelling, simulation, or any other computer application that cannot be reproduced in a physical or electronic format).
Project Administrator		A Department employee who has been designated by the Project Sponsor to administer the Project on a day-to-day basis.
Project Co-Sponsor		A Department employee primarily responsible for a particular component of work, such as highway or bridge work.
Project Design Brief		A document that is completed by the Consultant for major bridge projects. The document lists salient points and design

		assumptions prior to any detailed design work. The purpose of the document is to ensure that the Consultant and the Department agree on the main design assumptions before the design progresses to detailed work. A blank brief is included on Bridge Engineering website.
Project Sponsor		The Department employee designated by the Department to be responsible for the delivery of the project. The Project Sponsor is the Department's Senior Manager responsible for the project/assignment.
Record Drawings		Drawings that represent the completed constructed project (previously referred to as As-Constructed Drawings/Details). Record drawings shall be authenticated by the Field Review Engineer indicating that the constructed product complies with the Design Drawings and all appropriate Contract Plans and Specifications. Any approved field level changes should be incorporated in the Record Drawings.
Sub-Consultant		A person or company that enters into an agreement with the Consultant to carry out part of the work covered in the Consulting Services Contract.
Technical Standards, Guidelines and Warrants		Technical References and other Department documents listed on the Department website.
Tender Package		This package normally includes tender documents, plans, design summaries, cost estimates, environmental risk assessments, and covering memos.
Terms of Reference		A schedule in the Consulting Services Contract that outlines the description of the assignment, the scope of the work, schedules, and expected deliverables.
Utilities		For the purpose of this Guideline, "utilities" mean all power lines, telecommunications lines, pipelines, municipal facilities, and related support structures facilitating an infrastructure system owned by others, and include Department owned buried power cables.

1.2 Public Safety Requirements (Traffic Accommodation through the Work Zone)

1.2.1 General

Accommodation of traffic may be required at any time through the planning, inspection, preliminary engineering, design, contract tendering, construction, post construction, and warranty phases. Refer to 'Engineering Consultant Guidelines for Highway, Bridge and Water Projects – Volume 2 – Construction Contract Administration' on procedures for traffic accommodation operations for construction, post construction, and warranty phases.

Traffic control devices shall be constructed, installed, and maintained in accordance with the Department's latest version of the 'Traffic Accommodation in Work Zones' manual.

The Consultant shall be responsible for identifying situations that will require special traffic accommodation procedures to be implemented. These situations could involve major utility or pipeline relocations, bridge construction, the need to accommodate high traffic volumes, major grade line changes, lane closures, etc.

If traffic control is found to be inadequate, the Consultant shall take appropriate and timely action to rectify the situation.

- Planning, Preliminary Engineering, and Design Phase:
    - During planning, preliminary engineering, design, survey operations, field investigations and geotechnical investigation work, the Consultant shall be responsible for provision of suitable traffic accommodation measures.

- Preparation of traffic accommodation plans showing signing, delineation, traffic lanes, etc., for all detours, diversions or partial road closures, shall be undertaken by the Consultant.
- The Consultant shall install and maintain any required traffic control devices.
- Please refer to the latest version of 'Traffic Accommodation in Work Zones' manual and 'Engineering Consultant Guidelines for Highway, Bridge and Water Projects – Volume 2 – Construction Contract Administration'.

- Construction Phase:
  - Please refer to the latest version of 'Traffic Accommodation in Work Zones' manual.

1.2.1.1 Flagperson

When the Consultant is undertaking surveying/engineering/inspection/field reconnaissance/field investigation operations that may cause interruption, delay or hazards to the travelling public or anyone on the worksite, qualified flagpersons shall be provided as required for the direction and control of traffic. The Consultant shall ensure that flagpersons are instructed in the use of proper traffic control procedures appropriate for the prevailing conditions. Flagpersons shall have proof of certification from a recognized training program on traffic control procedures through construction zones. The Department currently only recognizes traffic control programs administered by the Alberta Construction Safety Association.

Flagpersons shall be dressed in accordance with the information and minimum standards in the 'Traffic Accommodation in Work Zones' manual.

1.2.2 Accident Investigation within the Project Limit

Should any third party accident involving highway users (vehicular or pedestrian) occur within the project limits, the Consultant shall investigate the accident and provide the Project Administrator and Department Safety Officer with a report on the prescribed forms within 72 hours of knowledge of the occurrence. If a fatal or major accident involving serious personal injury or major property damage occurs, the Consultant shall immediately notify the Project Administrator or the Department Safety Officer of the accident. The accident report will include a record of conditions at the time of the accident, photos, description of all pertinent signing, and other traffic control devices in place at the time. The 'Report of Motor Vehicle Traffic Collisions Occurring in Construction Zones' form is available in the 'Engineering Consultant Guidelines for Highway, Bridge and Water Projects – Volume 2 – Construction Contract Administration'.

1.3 Other General Requirements

1.3.1 Professional Registration

All Consultants engaged to provide engineering services for the Department shall be registered with the 'Association of Professional Engineers and Geoscientists of Alberta (APEGA)' , be licensed to practice, and shall abide by the Association's regulations, code of ethics, and by-laws.

Land surveyors who are doing legal surveys for the Department must be registered Alberta Land Surveyors.

1.3.2 Professional Seal

The Consultant shall seal, sign, and date all plans, drawings, specifications, designs, data, and any other engineering professional products they produce, review, and approve. The seal shall consist of the APEGA member stamp or seal, and the permit stamp. The Department will require the use of electronic submission of engineering documents with digital seals as described in 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'.

1.3.3 Construction Specifications and Contract Conditions

The current edition of the Department's 'Standard Specifications for Highway Construction', 'General Specifications and Specification Amendments for Highway and Bridge Construction', 'Standard Drawings for Highway Construction' and 'Standard Specifications for Bridge Construction' shall apply to all construction contracts. They may be modified and supplemented by Special Provisions, plans, specification amendments, or supplemental specifications.

The Consultant shall be the engineering representative engaged to oversee construction contracts on behalf of the Department. The Consultant cannot change any condition of the contract between the Department and the Contractor.

1.3.4 Aboriginal Consultation

1.3.4.1 First Nations Consultation for Projects on First Nations Lands

The Project Administrator, with the assistance of the Consultant, shall complete the necessary consultation in order to satisfy federal consultation requirements. During construction, the Department does allow the use of First Nations labour, equipment, and material resource supply (through mutual agreement with the First Nation jurisdiction) when undertaking construction activity through First Nations Lands.

1.3.4.2 Aboriginal Consultation on Crown Lands

The Department has a legal duty to consult First Nations, Metis Settlements, or Credibly Asserted Metis Communities (CAMC) peoples where contemplated conduct may adversely impact the exercise of Treaty rights or aboriginal rights recognized and affirmed by 'Section 35 of the *Constitution Act*, 1982'. To meet this legal duty and additional policy commitments made by the Government of Alberta (GoA), the Department must consult with First Nations, Metis Settlements, or CAMC when contemplating a decision that may have the potential to adversely impact the continued exercise of:

- First Nation's Treaty rights or traditional uses as defined in 'The Government of Alberta's Policy on Consultation with First Nations on Land and Natural Resource Management, 2013' and associated Guidelines; and
- Métis Settlement/CAMC members' harvesting or traditional use activities as defined in 'The Government of Alberta's Policy on Consultation with Metis Settlements on Land and Natural Resource Management, 2015' and associated Guidelines.

These procedures provide guidance when determining if a project specific activity should be referred to Indigenous Relations' (IR) Aboriginal Consultation Office (ACO) for a First Nations, Metis Settlements or CAMC Pre-Consultation Assessment (PCA). Strategic initiatives (planning studies and feasibility studies etc.) should be referred to IR's Strategic Engagement and Policy Innovation (SEPI) Branch for advice on early engagement with Indigenous communities and organizations.

The Project Administrator, with assistance from the Consultant and Project Sponsor as required, will complete consultation in accordance with the 'GOA's 2019 Proponent Guide to First Nations and Metis Settlements Consultation Procedures'.

1.3.4.3 Federal Government Indigenous Consultation Requirements

Transport Canada and Fisheries and Oceans Canada have stated their intention to conduct consultation activities in order to meet their respective obligations. Although rare, federal regulators have delegated consultation activities to TEC. Before agreeing to and taking on federally delegated consultation requirements, the Consultant must obtain explicit instructions from the Project Sponsor.

1.3.5 Records, Freedom of Information, and Protection of Privacy Act

1.3.5.1 Records Management

Any information that is collected or created by a Consultant, when providing engineering services to the Department, is subject to the Government of Alberta's Records Management Regulation, and must meet the Department's requirements. The Consultant must maintain or dispose of records according to standards acceptable to the Department and only under the authority of approved records retention and disposition schedules of the Department; or return records to the Department, as appropriate. Refer to 'Appendix K: Project Records Management' to ensure that records are retained accordingly.

1.3.5.2 Freedom of Information and Protection of Privacy

Information that is collected or created by a Consultant when providing engineering services to the Department, is in the custody or under the control of the Department, and are wholly subject to the '*Freedom of Information and*

Protection of Privacy Act (FOIP)'. These records must be managed in accordance with the access and privacy provisions of the *FOIP Act*. The Consultant must provide the Department any records that are requested under the access provisions of the *FOIP Act* that are in the custody of the Consultant. Should the Consultant receive an access, use, disclosure, or correction request under the *FOIP Act*, the Consultant shall not respond to it, but immediately contact the Department (Project Administrator) for further handling instructions. The Consultant must adhere to the rules of the *FOIP Act* in its management of personal information, which includes collecting with consent, ensuring that the personal information is accurate and complete and, making reasonable security arrangements against such risks as unauthorized access, collection, use, disclosure, disposal, and destruction. When collecting personal information from individuals, the Consultant must inform the individual of the name and telephone number of a contact person within the Minister's department who can confirm the purposes for which the information is being collected on behalf of the Minister. The Consultant shall, as soon as they become aware of any instances of a suspected or actual Privacy Breach involving the improper or unauthorized collection, use, disclosure, access to, or handling/disposing of personally identifiable information report it to Privacy Management Services at privacy@gov.ab.ca.

1.3.6 Manuals

All guidelines, manuals, or other documents referred to in these guidelines are the current edition or version unless specifically noted. Every attempt has been made to provide hyperlinks to the referenced resources in this guideline.

1.3.7 Updates

Updated information related to design and/or construction is released and made available by the Department through 'Design Bulletins' and 'Construction Bulletins' respectively. Bulletins are numbered sequentially and dated. The Bulletins will continue to be displayed until the information is superseded either by a more permanent document (e.g. Design Guide, Specification, etc.) or when more current information comes into use.

The Department will update these guidelines on an as required basis. Updates are normally done through the rewrite of the complete document on a regular basis. The Consultant shall ensure that the most recent version of the guidelines are used on all projects.

Consultants are required to monitor the Design and Construction Bulletins on a regular basis to ensure that they are following the latest Department practices.

To receive technical and other updates from TEC, please submit your email address to subscribe to the One Window mailing list.

1.3.8 Website

The Department's web address is Infrastructure and transportation | Alberta.ca.

1.4 Responsibilities

1.4.1 General

The Consultant shall complete the assignment as described in the Consulting Services Contract.

This excludes the following, which will be managed by the Department: contract tendering and award of all construction contracts, holdback release, contract security, *Public Works Act* claims, contract defaults, and contractor first party claims.

The Consultant shall supply all personnel, materials, and equipment required to provide the services in accordance with these guidelines.

The Consultant shall be responsible for all work performed under the Consulting Services Contract, including work done by any Sub-Consultants.

The Consultant shall also monitor all aspects of health and safety on the project.

1.4.2 Changes to the Consulting Services Contract

Any proposed changes to the Consulting Services Contract shall be brought to the attention of the Project Administrator by the Consultant. These changes shall be in writing, including but not limited to the estimated costs, the schedule impacts and others; and shall be submitted as soon as they become apparent, for review and approval. Change Requests having an impact on engineering costs of the project will be recorded on a cost control sheet submitted with the invoices. Change Requests submitted after-the-fact may be rejected at the Department's sole discretion.

The Consultant shall not proceed with changes to the Consulting Services Contract until an authorization to implement the changes is given by the Project Administrator. The Consultant's pursuit of this work prior to receipt of Department approval is at their own discretion and risk, financial or otherwise.

1.4.3 Background Information

The Consultant shall identify and review all historic records, archives, and information relating to the project. The Department's files and archives at the Twin Atria and in Regional offices will be available for the Consultant's review and use. Note that for records stored at the Twin Atria corporate record center, the Consultant shall submit a "Request for Corporate Information" forms as contained in 'Appendix B: Summary of Commonly Used Forms'. Records cannot be removed from Government of Alberta premises and shall be reviewed at either the Twin Atria or Regional office. Photocopies or digital scans of documents is permitted.

Electronic reporting is to be used when available. Access to Department software programs will be made available to Consultants unless restricted by licensing or other requirements. Draft submissions shall be in pdf format and unprotected.

1.4.4 Department's Project Sponsor and Project Administrator

For each project, a Project Sponsor and a Project Administrator will be designated by the Department to act as its Representatives and are accountable for all aspects of the work. The Project Sponsor is the Department's person responsible for providing direction and accepting the work both as to quality and payment. A Project Administrator, as delegated by the Project Sponsor, may do the day to day liaising with the Consultant and other stakeholders. The Project Sponsor and Project Administrator will interact with the various branches within the Department for assistance in resolving any administrative, technical, or contractual matters.

1.4.5 Project Initialization

The Consultant is responsible for ensuring that each activity and phase of the work is completed as scheduled. To do this, prior to any work commencing on a project, the Project Sponsor will normally call a Project Initialization Meeting with the Consultant, and any appropriate staff from the Department. The meeting is to clarify the assignment, expectations, staff roles, the scope of the work, the safety strategy, the reporting requirements, the standards to be used, the time frame for the overall project, as well as any significant milestone dates within that time frame for specific activities. This meeting is typically chaired by the Project Sponsor or Project Administrator, with the agenda developed by the Project Administrator in consultation with the Consultant. Project administration information such as Consulting Contract number sample forms, revised procedures, etc. will also be made available to the Consultant at this meeting. The Project Sponsor and Project Administrator will advise the Consultant of all issues that may affect the Consultant's work plan (e.g. tendering schedule, right-of-way negotiations, borrow purchase).

1.4.5.1 Decision Ladder

The Decision Ladder (DL) is a partnering tool used to assist the parties involved (Department and Consultant), in achieving a common goal: delivering engineering within the set dates. The DL should be used on any type of consulting project (functional design, detailed design, etc.). It may be initiated by either party, at the project initialization meeting, as a step in the communication/decision process to enable decisions to be made within a set time frame.

TABLE 1.1 DECISION LADDER

Level	TEC	Consultant	Time Guidelines
A	Project Administrator	Project Manager	5 days
B	Project Sponsor	Project Director	3 days
C	Executive or Regional Director	Corporate Support	2 days

Notes:

Specific individuals for each category to be determined at the initialization meeting.

Issues may be escalated up the decision ladder by either party. The initiating party shall be responsible for moving the decision up the ladder.

Internal Department communication is to occur at the appropriate level. Responses / approvals have an additional time guideline of 5 days with the exception of Design Exceptions and Change Requests which have response / approvals time guideline of 15 days.

Consultation with the Technical Standards Branch (TSB) of TEC should include the Consultant to ensure clear communication of the issue and resolution.

Where a decision timeline affects project delivery dates, new adjusted dates should be negotiated at the appropriate level.

Time period for levels shall be calculated in working days.

Project Manager - Typically an individual who manages one or more projects for the Consultant at a mid-management level, including management of Sub-Consultants, project budgets, and schedules. The Project Manager is engaged in the day-to-day project details.

Project Director - Typically a senior level individual who manages an engineering group for the Consultant and assumes responsibility for all phases and disciplines of the project.

Corporate Support – Typically a Consultant executive team member with authority to ensure resources are available for a project team to meet contractual and corporate objectives.

Time Guidelines - Time required for a decision shall be established at Level A and shall reflect the priority required.

Basic principles of the DL are that:

- Decisions are to be made at the most appropriate level of authority.
- Most decisions will be dealt with at Level A.
- Very few decisions will be handled at Level C.
- The timelines in the DL will be adhered to by all parties. They may be altered but only if all parties agree to the amended times.
- The parties must identify individuals for all levels of the DL at the time of project initialization.

It is expected that there will be an open flow of communication between the parties on a project. The respective individuals will keep their counterparts informed on all aspects of a project as it goes along.

When an issue arises and requires a decision, this will be communicated to the decision maker in writing. E-mail will suffice, but it may be necessary for a letter with signatures, dependent upon those individuals involved. This step initiates the DL process and should start at Level A.

Level A has five (5) days to determine the course of action/decision. If a decision is not rendered within five (5) days, the matter is automatically escalated by the requester to Level B. If the decision has been made and it is acceptable to both parties, then the process ends. If the decision is not acceptable to one party, they indicate to their Level A counterpart that they cannot agree with the decision and that they need to escalate to Level B. Level B has three days to gather the required information and to determine their decision. Again, if a decision is not made within the allotted time the matter will automatically be elevated to Level C by the requester. If the decision has been made it must be communicated to their counterpart in the appropriate fashion. It also must be communicated to the Level A staff.

If one party cannot accept the decision that has been rendered, the issue must be elevated to Level C. The process of elevation is identical to the escalation described above from Level A to B.

If the decision that results from this process is such that either party cannot abide by it, the matter may further be communicated to the Assistant Deputy Minister (ADM) by the Level C parties.

As noted, the use of this DL is encouraged to ensure timely decisions. The Decision Ladder is given in Table 1.1.

1.4.6 Approval or Acceptance

The following, and other unforeseen matters, shall be referred to the Project Administrator for the Department's approval or acceptance:

- Approval
    - Change of Project Personnel
    - Public and stakeholder participation programs
    - Significant changes to project funding requirements
    - Property Agreements
    - Design Exceptions
    - Changes to scope of work and fee increases or decreases
    - Changes to the specified start and/or completion dates for the contract and any other conditions related to construction schedules
    - Contract Design Change Proposals
    - Unit prices for bid items that were not included in the original tender
    - Contract claims resolution
    - Extra work (as per the Departments Authorities Matrix)
    - Contract Payments
    - Contract over-runs
    - Contract extensions
    - Railway Crossing Agreements
    - Utility Crossing Agreements
    - Site occupancy changes
    - Changes to the Construction Contract
- Acceptance
    - Planning report
    - Roadway preliminary engineering report
    - Environmental permits, licenses, and investigations
    - Engineering Assessment Report (see 'Section 5: Engineering Assessment')
    - Bridge Engineering Reports (see 'Section 11: Bridges')
    - Utility plans and adjustment methods
    - Other Contract and Design Changes (prior to tender)
    - Electronic file formats
    - Geotechnical investigation and report
    - Surfacing design package
    - Roadway Detailed Design Package
    - Final project design, cost estimates and tender package
    - Final Details

1.4.7 Cost Estimates

Accurate and timely submission of cost estimates, including current unit costs, is important for the Department's programming function.

The Consultant shall provide the following cost estimates:

- Planning Stage
    - "A" Estimates with all planning studies and bridge assessments

- Design Stage
    - “B” Estimates on completion of preliminary designs
    - “C” Estimates on completion of final design
    - Utility relocation and adjustment estimates
    - Land acquisition cost estimates
    - Environmental cost estimates and Indigenous consultation estimates

  Refer to ‘Section 10.13: “C” Estimate Submission’ for more details.

- Construction Stage
    - Progress and final estimates
    - Refer to the ‘Engineering Consultant Guidelines for Highway, Bridge and Water Projects Volume 2 – Construction Contract Administration’ for more details.

1.4.7.1 Estimates

The estimate shall be presented as a total project cost, including engineering, right-of-way, utilities, mobilization, construction contract costs, etc. Do not add any contingencies to the estimate. Any estimate may be updated one or more times to refine the assumptions made in estimation. If the project is anticipated to last more than one construction season, the cost estimate should show cash flow over the life of the project.

- “A” Estimate

For roadway grading, base, paving and bridge construction projects, the “A” Estimate may be based on a typical cost per kilometre, an all inclusive cost, and/or a typical square metre cost for the overall bridge deck area (overall bridge deck area is top of fill to top of fill and outside of curb to outside of curb), based on past average costs in the vicinity. The “A” Estimate can be produced at the Functional Planning stage. The “A” Estimate may be refined after an Engineering Assessment has been completed.

See ‘Appendix I: Sample Cost Estimates and Summary’ for an example.

- “B” Estimate

The “B” Estimate should be based on itemized quantities and unit prices resulting from the preliminary quantities and be sufficiently accurate to allow a reasonable comparison of viable options.

See ‘Appendix I: Sample Cost Estimates and Summary’ for an example.

- “C” Estimate

The “C” Estimate should be based on itemized quantities and unit prices resulting from the final design quantities and be sufficiently accurate to allow a reasonable comparison of final design cost and tendered cost. See ‘Section 10.13: “C” Estimate Submission’ for details.

See ‘Appendix I: Sample Cost Estimates and Summary’ for an example.

1.4.7.2 Cost Tracking Summary Sheet

An Engineering Cost Tracking Summary Sheet included in ‘Appendix B: Summary of Commonly Used Forms’ is provided to the Consultant that has columns for initial allotment by phase, previous month amount, amount this month, total to date, and amount remaining.

The Summary Sheet is updated by the Consultant with each subsequent change request adding a new separate line and attached to the monthly invoice.

1.4.8 Independent Design Check

A qualified and experienced Professional Engineer shall undertake an independent check of all designs, Contract Tender Package, drawings, and final details prior to submission of the work to the Department. Tender estimates and progress estimates on construction contracts, shall be prepared and independently checked by either a qualified and experienced engineer or technologist. The engineer completing the independent design check shall authenticate all the Professional Work Products in accordance with APEGA’s requirements. This Independent Design Check shall be

carried out by another Consultant as a Sub-Consultant when the design Consultant does not have adequate in-house capabilities to provide this check.

For Independent Design Check of roadway design, also refer to ‘Section 10.15: Independent Design Check’

For Independent Design Check of bridge conceptual design and bridge structural design, also refer to ‘Section 11.4: Independent Design Check’.

1.4.9 Review of Work by the Department

Any review of the Consultant’s work, signing of drawings, and the acceptance or approval of documents by Department staff, does not relieve the Consultant from any responsibility for errors or omissions by the Consultant. Professional Work Products may be accepted by the Department. The Department reserves the right to hire an independent consultant to conduct an independent design review.

1.4.10 Consultant Performance Evaluation

1.4.10.1 Purpose

The purpose of the Consultant performance evaluation is to objectively document the performance of the Consultant, provide meaningful feedback and identify areas for improvement to the Consultant, encourage the Consultant to maintain performance at a high level, and support the past performance portion of the Consultant selection process.

At the project initialization meeting, the Project Sponsor will identify the criteria / weighting / timing that will be used as the basis in the evaluation process.

1.4.10.2 Process

A common evaluation form is used for all Consultant performance evaluations. Evaluations are completed in the Program Management Application - Delivery (PMA-D).

Evaluations will be completed by the Project Administrator and the Consultant shall complete a Consultant self-evaluation. These evaluations shall be completed independently and provided to each other. All reasonable efforts will be exercised by the Project Sponsor, Project Administrator, and Consultant to come to a consensus on the final score.

- Evaluations for projects are to be completed annually, if expenditures are over $50,000 within the evaluation period (based on the discretion of Project Sponsor).
- Evaluations will only consider work completed since the last evaluation (or beginning of the contract if no prior evaluations have been conducted).
- A final evaluation for construction projects to be completed within one (1) month of contract acceptance and/or following submission of Final Details.
- A final evaluation for non-construction projects to be completed within one (1) month of project completion.

The evaluation form is based on six criteria themes, with each criteria theme weighted appropriately for the type of project involved. The weightings are developed by the Project Administrator, Project Sponsor and the Consultant at the project initialization meeting.

1.4.10.3 Evaluation Criteria Themes

The following table provides recommended weighting ranges (expressed as a percentage of the overall emphasis in project evaluation) for each of the six evaluation criteria themes.

TABLE 1.2 RECOMMENDED WEIGHTING RANGES FOR PROJECT EVALUATION.

Evaluation Themes	Recommended Weight Range	Planning	Design	Construction
Innovation	0 to 40%	20 to 40%	20 to 40%	0 to 10%
Deliverables	10 to 30%	20 to 30%	10 to 30%	10 to 30%
Construction Supervision and Contract Administration	20 to 50%	Not Applicable	Not Applicable	20 to 50%
Public Communications and Involvement	5 to 20%	10 to 20%	5 to 20%	5 to 20%
Project Management	10 to 30%	10 to 30%	10 to 30%	10 to 30%
Staff Performance	10 to 30%	10 to 30%	10 to 25%	20 to 30%

Note: When established at the Project Initialization Meeting, total weightings will equal 100%.

1.4.10.4 Consultant Performance Evaluation Rating Key

A five (5) point scoring scale is used in the evaluation of the Consultant's performance under the different criteria themes.

The following rating key should be used in the evaluation, with consideration for all components in the phase being rated.

TABLE 1.3 RATING KEYS FOR EVALUATING CONSULTANTS.

Rating Keys	Remarks
1 = Doesn't meet criteria	Completely unsatisfied with performance. Most to all things done very poorly. It would be unusual to score a 1 rating if the Consultant rated 3 or higher in any important component of this phase.
1.5 = Hardly meets criteria	Very unsatisfied with performance. Most things were done very poorly, with only a few things done well, but overall balance towards poorly.
2 = Partially meets criteria	Unsatisfied with performance. Some things done well but some to most things done poorly and overall, balance towards poorly. It would be unusual to score a 2 rating if the Consultant rated 4 or higher in any important component of this phase.
2.5 = Almost meets criteria	Almost meets requirements. Most things were done well with some things done poorly.
3 = Meets criteria	Meets requirements. Some things done poorly balanced out by some things done very well. On balance, the performance was satisfactory.
3.5 = Slightly exceeds criteria	Most things were done well with a few things done very well.
4 = Moderately exceeds criteria	Performed very well. Some things done well but was balanced out by majority of things done very well. It would be unusual to achieve a 4 rating if the Consultant rated 1 or 2 in any important component of this phase.

4.5 = Substantially exceeds criteria	Majority of things were done very well with a few things done exceptionally well
5 = Exceptionally exceed criteria	Outstanding performance. Some things done very well but was balanced out by majority of things done outstandingly. It would be unusual to achieve a 5 rating if the Consultant rated 1 or 2 or 3 in any important component of this phase. It would be unusual to achieve a rating of 5 on straightforward projects without many challenges or complexities. The logic is that it would be difficult to substantially exceed criteria on a straightforward projects without many challenges or complexities

1.4.10.5 Past Performance

Weighted average scores will be calculated to be used for shortlisting, and in Consultant selections on subsequent projects. All evaluations in a category will be included in the calculations of past performance (i.e. no evaluations will be removed from the calculations). Multiple evaluations, per evaluation period, on a single project will be averaged to create a score for that period.

Past performance is calculated from the weighted average using a rating curve, as follows (Table 1.4):

TABLE 1.4 RECOMMENDED WEIGHTING RANGES FOR PROJECT EVALUATION.

Past Performance Weighting of 30%		**Past Performance Weighting of 20%**	
Past Performance Rating	**Point Value**	**Past Performance Rating**	**Point Value**
0.0	0.00	0.0	0.00
1.0	0.00	1.0	0.00
2.0	5.00	2.0	3.33
3.0	15.00	3.0	10.00
4.0	25.00	4.0	16.67
4.5	30.00	4.5	20.00
5.0	30.00	5.0	20.00

Past performance scores used for shortlisting and proposal evaluations, are based on the weighted average of the Consultant's ratings for the specific category over the three previous years, with the following weightings:

- 60% weighting for previous year;
- 30% weighting for year prior; and
- 10% weighting for year prior to that.

Exceptions to the above are as follows:

- If the Consultant has no evaluations during one of the three years, the past performance score would be based on a 60% weighting of the most recent year and a 40% weighting for the remaining year.
- If the Consultant has evaluations during only one of the three years, the past performance score would be based solely (100% weighting) on that year.
- If the Consultant has no evaluations during the three previous years, they would be assigned the provincial average of all Consultants in the specific category.

A draft list of past performance scores will be provided to Consultants prior to putting the scores into production. The intent of this is to correct any errors or identify any missing evaluations prior to utilizing the scores for Consultant shortlisting or selections.

1.4.10.6 Appeal Mechanism

If the Consultant is not satisfied with the Department's evaluation on a specific project and wishes to pursue an appeal, the following process will be followed:

- Any appeal of a Consultant performance evaluation score shall be submitted by the Consultant in writing to the Executive or Regional Director with a copy to the Project Sponsor, Project Administrator, and the Director of Vendor Management and Outreach within two (2) weeks of the Consultant receiving the final signed copy (signed by the Department representative on the project) of the performance evaluation.
- Upon receipt of the appeal, the Executive or Regional Director will review the file and provide a response to the Consultant within two (2) weeks. This may involve discussions with the Consultant's corporate support, in an attempt to settle the dispute.
- If the Consultant is unsatisfied with the results of the appeal at the Executive or Regional Director level, the Consultant may appeal, in writing, to the Executive Director of the Procurement, Operations and Grants Branch, with a copy to the Executive or Regional Director, Project Sponsor, Project Administrator and Director of Vendor Management and Outreach.
- Within two (2) weeks of receiving the written appeal in Vendor Management and Outreach Section, the Executive Director of Procurement, Operations and Grants Branch will provide a response to the Consultant. This decision will be final.

The total time to complete an appeal should not be greater than six (6) weeks and the appeal process should be completed prior to scores being put into production whenever possible.

Performance evaluation scores that are under appeal will continue to be included in the calculation of past performance ratings until the appeal process has been completed and the performance evaluation score finalized.

1.5 Project Management Requirements

The Consultants work with the Project Administrators and Sponsors on a planning study/project tasks and are responsible for day to day decision-making necessary to complete the contract deliverables. Written communication between the Consultant and the Department shall be generally sent through the Project Administrator. If stipulated in the Terms of Reference or at the Project Initialization Meeting, there may be a requirement to send copies of correspondence to other persons.

During planning, preliminary engineering, and design activities, the Consultant shall advise the Project Administrator as required of progress on the project and discuss upcoming work, milestones, and critical issues. Regular meetings shall be held with the Project Administrator as required.

Generally, the Consultant is expected to provide progress reports on a monthly basis. Progress reports should provide a summary of active study tasks, amount of work completed and resources utilized to date on each phase of the study or a project, in addition to reporting overall progress. Through the life of a contract, the Consultant is expected to maintain and update the project management documents such as a Risk Register and Issue Log, as appropriate. Terms of Reference will provide additional information and detail about progress reporting requirements and documentation specific to the project or a study. Progress Review meetings shall be called by the Consultant at the conclusion of milestone events and when technical or other progress matters need to be reviewed. The Consultant shall review the work of Sub-Consultants before being brought forward to the Progress Review meetings for discussion. These meetings will generally be held virtually unless specifically requested to be held in person at Department offices or on site.

The Consultants are responsible for arranging and facilitating project and technical review committee meetings. Meetings are typically used to provide guidance on project specific issues, options development, stakeholder engagement, and any other related issues. These meetings typically consist of Project Administrators, consultant staff, and if required, department subject matter experts to provide technical feedback to ensure study tasks are completed as per Department standards and expectations. Other tasks that are required for the management of the study or a project include facilitating meetings, preparing presentation materials, and maintaining a complete record of day-to-day administration, recording meeting minutes, keeping track of important decisions, issues, and milestones during the contract.

Minutes of all meetings will be taken by the Consultant and circulated within five (5) working days. For reporting requirements concerning contract administration, refer to Engineering Consultant Guidelines for Highway, Bridge and Water Projects – Volume 2 – Construction Contract Administration.

All submissions to the Department shall be in electronic format, unless otherwise stated. Additional hard copy format may also be required, as specified by the Consultant Service Contract and/or the Project Administrator.

In cases where a Planning Study is underway, there may be a need to address roadside development issues or a subdivision referral. In such cases, the Consultant may be asked to advance some of the planning to address these issues. Alternately, the Consultant may be asked to provide support for developing responses to Action Requests (ARs). Such requests may be considered a change of scope, if the work required is beyond the original scope and triggers some additional analysis which would not have been conducted otherwise by the Consultant.

To allow for deviations from normal design standards or practices, at any time during a study or a project, the Consultant or Project Administrator may initiate a Design Exception (DE) request to seek Department approval as per requirements in the Departments 'Design Exception Guidelines'. However, it is important that the Consultant shall seek confirmation and approval of any scope change from the Project Administrator in writing before undertaking any work related to a Design Exception request. Following Design Exception approval, the proposed preferred plan will be subject to the Department's final approval.

1.6 Design Philosophy

1.6.1 General

Consultants are expected to achieve "best value" for the project dollars, considering total life cycle cost including operations and maintenance, while still achieving a safe, functional, and efficient design for the end-user. The guidelines, warrants, and practices contained in the Department's Design Guides (Highway Geometric Design Guide, Roadside Design Guide, Pavement Design Manual, Pavement Preservation Guidelines, Bridge Design manuals, Design Bulletins, etc.) should be followed. However, where there are significant constraints, especially in areas with rough terrain conditions (steep hills, muskegs, sharp river valleys, winding river crossings, widening of narrow roads, existing developed infrastructures, etc.), it may not be practical or desirable to maintain current standards.

In these circumstances, to ensure that designs are "optimized", the design engineer may request a Design Exception to adopt a design parameter that is more appropriate for the context, while addressing other factors such as safety, cost-effectiveness, consistency, operational concerns, etc.

1.6.2 Design Exception

Occasionally a design exception may involve the use of a design parameter, which exceeds normal standards or practices. The use of modified design parameters (lower or higher standards) shall be analyzed by the Design Engineer/proponent, documented (to show the rationale used for the exception - generally including economic justification, impacts on end-users and risk analysis), reviewed, and approved by the Department.

The design exception approval process shall include a written submission of a Design Exception Request Form with the following information:

- Description and details of the project including the project stage, type, location, length, and limits. In addition, highway service class or level, design speed, posted speed, cross-sections, and other improvements being considered should be included.
- Site plans, profiles, sketches, detailed drawings, and/or photographs of the site and the alternatives considered.
- Current and future projected traffic volumes, growth rate, traffic composition, and Turning Movement Diagrams (if applicable).
- Summary of the current standards / practices that are not being followed and what alternatives were considered and evaluated.
- Information on implications to future planned improvements to the roadway or corridor that may need to be considered.
- Cost estimate to build to standard versus to the Design Standards / Practice Exception.

- Assessment of the exposure and risk with respect to traffic volume, location, severity (worst case scenario), duration, etc. The evaluation may involve an assessment beyond the project limits. The evaluation may also include a Road Safety Audit.
- Summary of the collision history within the project limits.
- Description of any proposed mitigations (i.e. safety enhancements such as signing, markings, barriers, etc.) to reduce the potential impact and/or risk of not meeting the current standards and practices.

The document should be stamped by the appropriate professional. All requests must be recommended by the Project Sponsor and the Regional Director. The requests are then forwarded to the Executive Director, Technical Standards Branch for approval. Where the Design Exception involves a planning project or a planning aspect of any project, the Executive Director, Planning and Program Management Branch will be asked to co-sign, to indicate consensus.

Refer to the 'Design Exceptions Guideline' for more details on Design Exceptions.

1.6.3 Contract Design Change Proposals

The Standard Specifications allow the Contractor (after a tender has been awarded), the option of submitting a Contract Design Change Proposal for an alternative design or change to the Department's design. Refer to Volume 2 of the Engineering Consultant Guidelines regarding the Department's expectations of the Consultant.

1.7 Use of All Terrain Vehicles (ATVs) for Engineering Activities

The Department, in recognition of the substantial cost savings that can be made through the use of ATVs for engineering activities (e.g., field surveys), has made arrangements, for the delegation of authority, so that ATVs may be permitted to operate on the highway right-of-way under special permit. Consultants should make their request (see 'Appendix B: Summary of Commonly Used Forms' for a Sample Order) to the Project Sponsor for approval. The ATV Operator shall carry a copy of the Permit when conducting work. Project Sponsors may grant permission subject to certain conditions. The following conditions will generally apply:

- ATVs cannot work on the highway finished pavement surface (shoulder to shoulder).
- ATVs can cross highway surfaces, but must follow existing Legislation (Unnecessary highway crossings must be avoided. When crossing, the operator must take the shortest, most direct route).
- The registered owner(s) of the ATVs must ensure that ATV operators are trained and fully qualified to operate ATVs. A valid operator's license of a class higher than a learner's permit shall be obtained by an ATV operator prior to doing work in the highway right-of-way.
- The use of ATVs must be restricted to daylight hours only.
- All employees on the ATVs must wear fluorescent red-orange safety vests. The safety vest shall have the word "SURVEY" or "CONSTRUCTION" or "MAINTENANCE" on the back of the vest, or alternatively on the back of the ATV machine. These employees must also wear protective headwear that has been approved by one of the following organizations:
- Canadian Standards Association (CSA)
- American National Standards Institute (ANSI)
- Snell Memorial Foundation
- British Standards Association
- United Nations Economic Commission for Europe Regulation 22-05, Uniform provisions concerning the approval of protective helmets and their visors for drivers and passengers of motorcycles and mopeds.
- ATVs must be licensed, insured, and equipped as defined in the existing legislation.
- If unique safety hazards are identified, the Department reserves the right to refuse the use of ATVs for survey activities.
- The Work area where the ATVs are to be used should be limited to 3 kilometres in length. This is particularly important if the work zone is to be "signed". Unless surveyors (not ATVs-see item 1) are actually working on the road surface, the need for warning signs is minimal.
- The Department will require that the ATV users develop a safe work procedure for this specific operation. If several Consultants will be involved in this type of operation, a joint safe work procedure shall be developed to accomplish the work.

Additional conditions are currently being considered to ensure that survey crews will be easily distinguishable from other ATV users in the highway right-of-way. The use of an amber beacon, attached to a pole in the ATV machine, is also being considered at this time and may also be required. These conditions will be clearly stipulated in the permit.

1.8 Use of Unmanned Aerial Vehicle (UAVs) for Engineering Activities

The use of any Unmanned Aerial Vehicle (UAV) during engineering activities must comply with all federal regulations. This includes proper registration of any UAV used and a pilot certificate for the operator of the UAV. More information is available at the Government of Canada site Drone safety (canada.ca).

1.9 Permission to Survey

When doing any surveys for the Department, the Consultant shall consider the following:

- Permission is normally obtained from the owner/lessee as a courtesy prior to entering or passing over private lands or public lands that are leased, in order to undertake a survey.
- If cutting or clearing of trees or other vegetation is required for survey purposes, permission to do this work must be obtained from the Landowner/lessee.
- When surveying on Crown lands in the green zones, the Consultant must adhere to the requirements of the local forestry officials. When surveying on crown lands in the white zones, the surveyor shall obtain approval in writing from the Department responsible for administration for public lands in Alberta (Alberta Forestry, Parks and Tourism).

1.10 Data Sources

1.10.1 Data from Transportation Infrastructure Management System (TIMS)

1.10.1.1 Alberta Transportation (AT) Maps

Consultants who have access to a 'Transportation Infrastructure Management System (TIMS)' account can access a wide range of information and data from 'AT Maps'. For more information about 'AT Maps', Consultants should refer to Quick Reference Guide for AT Maps (available on TIMS home page). The following data layers are available through AT Maps:

- Structures
- Roadway, Intersections and Roadside facilities
- Appurtenances
- Geographic Boundaries
- Municipalities
- NTS, ATS, Cadastral base
- Surface Dispositions
- Other Transportation (Railway and Airports)
- Traffic (AADT, WAADT, WASDT, LOS)
- Hydrography and Terrain
- Aerial Photo Index
- Collisions
- Geohazard Sites
- Video-log points
- Road Conditions (Road Weather Information Systems (RWIS) Traffic Cameras)

1.10.1.2 Collision Data

Plotted highway collision data, outside of cities, is available in TIMS and the Network Expansion Support System (NESS) geometric report. Collisions inside cities are not plotted and the Consultant should contact the Project Administrator, to determine what is available.

1.10.1.3 Railway Crossings

Railway Crossings Inventory Application (RCIA) is a TIMS application designed to maintain and manage inventory data for at-grade railway-roadway crossings on the Department's network. The data includes crossing details, features, required actions and their results, and cost sharing information (i.e., seniority and grants).

The Consultant should contact the Project Administrator to obtain this information.

1.10.1.4 Traffic Signal Data

Detailed information about Traffic Signals on Alberta's Provincial Highways (under TEC's direction, control, and management (DCM)) can be accessed through the Highway Operations Section and their Traffic Signal System Application (TSSA). Details about construction, signal timing and features of a signal can be accessed by the planning study's Project Administrator by providing the intersection location and what details the Consultant needs about the signal.

1.10.1.5 Bridge Data

Bridge data in TIMS contains Bridge Inventory, Condition Inspection Data and a Bridge Inspection System database. For correspondence files and detailed drawings contact the Regional Project Administrator.

1.10.1.6 NESS Analysis

Network Expansion Support System (NESS) is a TIMS application that identifies roadway segments and intersections within the highway network that do not meet geometric, utilization, and/or safety thresholds. NESS is used to identify potential current and future highway deficiencies and provide data to conduct further engineering assessments. Consultants can access NESS reports through 'Alberta Infrastructure and Transportation Extranet login page'. Project Administrators, if required, can provide reports from NESS to Consultants.

1.10.2 LIDAR Derived – Data Sets

The following data sets are continually collected and are available by request from the Modelling and GIS Section.

1.10.2.1 Lidar Point Cloud Data

The Department has raw unclassified point cloud data for most of its highway corridors.

1.10.2.2 Lidar derived CSV Data

Various LiDAR derived datasets are available. These include information about provincial highways and bridges such as:

- Center line alignment
- Distress 50 meter
- Lane width, pavement width and shoulder width
- Rumble strips
- Sideslope and ditch depth 1 meter
- Vertical clearance and
- Width clearance under/over bridges

1.10.2.3 Pavement Cross-Slope

Pavement Cross-slope data is available in a csv format with 20 metre stations.

1.10.2.4 GPS Alignment

GPS Alignment data is available in a comma separated value (csv) format with 20 metre stations.

1.10.2.5 Horizontal / Vertical Curvature

Data is available in csv format for all highway segments. Consultants may request this data for sections specific to the study area.

1.10.3 Highway System Maps

National Highway System Map, Provincial Highway Classification maps as well as special designation maps are available on Alberta.ca (links below).

- National Highway System Map
- Provincial Highway Service Classification Map
- Roadside Management Classification Map
- Functional Classification - Existing Conditions Map
- High Load Corridor
- Long Combination Vehicle Program

Note: Classification maps only provide classification information outside metro areas.

1.10.4 Freeway Designation

Freeway and Access Locations Designation Order in council is available on Alberta.ca. (Link below):

- Alberta King's Printer: Orders in Council

1.10.5 Traffic Volume Data

Traffic volume data and existing turning movement counts on Alberta Highways is available on the government's 'Traffic Data Map'. If a turning movement count is not available for an intersection, the Consultant should confirm with the Department to see if the Department conducted a turning movement count that has not yet been uploaded to the 'Traffic Data Map'. Turning movement counts are uploaded once per year, so counts conducted in the current year may not be uploaded.

If, for any reason, data is not available for a location or the Consultant suggests locations where turning movement count data would be beneficial for the study or a project, the Consultant should identify those locations as soon as possible. The Department will make the final decision on where turning movement count data specific to a study is collected and will provide this data to the Consultant. If authorized, the Consultant shall do the traffic count following the procedures outlined in the 'Turning Movement Count Manual'. At the completion of the count, the data can be sent to the Project Administrator for factoring and to produce the turning movement summary diagrams. The data shall be formatted into an Excel file using the template in the 'Turning Movement Counts Manual'.

In some cases, the Consultant will be responsible for collecting other types of traffic data, such as origin-destination data, that is required for the study subject to approval of the study sponsor. The Consultant shall provide any collected traffic data and its associated reports to the Department and will become the property of TEC.

1.11 Transportation Model Data (ASET)

The Alberta Spatial Economic and Travel (ASET) Model is an analysis tool used by the Department for determining transportation impact on Alberta's economy, society, and the environment. ASET consists of two modules, Spatial Economic Model (SEM), and Travel Demand Model (TDM). The Modelling and GIS Section maintains the ASET model for conducting economic and travel demand analysis. More information about ASET (TDM and SEM) is available in the following sub-sections and in 'Appendix C: Planning and Design Requirements'.

1.11.1 Travel Demand Model (TDM)

The Travel Demand Model data typically includes population and employment data for traffic analysis zones, transportation network data, future peak hours, and daily traffic volumes by modes, etc. The Consultant must review the model data and make necessary adjustments prior to use for the study. The Department may also provide additional modelling analysis such as scenario analysis, select link analysis, emissions, etc. to support the studies as needed. The Department will provide travel forecast data to support the planning studies upon the Consultant's request. The Consultant's data request should specify horizon years and other study specific data requirements.

1.11.2 Spatial Economic Model (SEM)

The Spatial Economic Model component of ASET provides economic outputs such as consumer surplus, employment, and business development derived from transportation improvement. The Department may provide economic analysis to support the planning studies upon the Consultant's request.

1.12 Remotely Sensed Data

1.12.1 Provincial Satellite Mosaic

The Department acquires yearly province wide satellite imagery coverage at 1.5 meters resolution that can be used for any study area. Consultants under contract with the Department should contact the Modelling and GIS Section for availability.

1.12.2 Aerial Photography and 1m Digital Elevation Model (DEM)

Consultants can access the Department's inventory on the 'AT Air Photo and 1m DEM Index (Beta) (arcgis.com)' .For more information about data downloads or additional information, consultants should contact the Modelling and GIS Section.

1.12.3 Ortho Photography

The Department has ortho-photo coverage for various areas at varying resolution and acquisition dates. Consultants should contact the Modelling and GIS Section for availability.

1.13 Geotechnical Reports

The Geotechnical and Utilities Section, Technical Standards Branch, maintains field inspection reports for all active geohazard locations in the province. Consultants can access the geohazard inspection reports for each region from the Landslides Assessments link on the 'Geotechnical and Erosion Control' page of Government of Alberta website. This web page also provides public links to Geotechnical Engineering Best Management Practices and Erosion and Sediment Control guidelines. Requests for any additional geotechnical reports and instrumentation monitoring information can be made to the Geotechnical and Utilities Section. The Geotechnical and Utilities Section also manages files that may contain geotechnical information pertinent to planning studies. Access to these records requires completion of a Request for Corporate Information Form, as described in the 'Appendix K: Project Records Management'.

1.14 Environmental Information

1.14.1 Environmental Regulatory Tracking Application (ERTA)

Consultants can access existing applicable environmental information (i.e., environmental reports, permits, and approvals) through the 'Environmental Regulatory Tracking Application' (ERTA). The environmental information within ERTA may not be current, or complete but should be reviewed and considered to the extent practicable.

1.14.2 Identification of Possible Contaminated Sites

The Consultant shall access ERTA and Alberta Environment and Protected Areas' 'Environmental Site Assessment Repository' (ESAR) in order to identify any potential, pre-existing contamination within the project footprint. A summary of the findings shall be brought to the attention of the Project Administrator at which time further direction will be provided.

1.15 Right-of-Way Owned by the Department

Consultants can access 'GeoDiscover Alberta' to access information about right-of-way owned by the Department as well as other cadastral information for the entire province.

1.16 Pavement Condition Data

The Pavement Engineering Section maintains the Pavement Management Summary (PMS) Report for all provincial highways. The PMS report contains the location of pavement inventory sections, construction history descriptions including seal coats, a summary of traffic and performance indicators, major pavement distresses, as well as rough estimates for future rehabilitation needs. This report is only available to consultants through the Pavement Engineering Section.

1.17 Other Information / Data

Previously completed engineering work, relevant to the study, is typically listed in Terms of Reference and can be made available to the Consultant through the Project Administrator. This may include;

- Previously completed engineering assessments
- Previously completed studies
- As-constructed drawings.

Refer to ‘Section 7.2: Utility Survey’ to find more about Utility data.

Section 2: Planning

2.1 General

Planning studies are undertaken to answer specific network or project related questions and can range in complexity depending upon the planning study type and objectives. Planning studies often include stakeholder engagement to inform recommendations. Although planning study requirements are detailed in the Terms of Reference developed for each study, this guideline provides the general planning information, planning study requirements and department expectations with respect to planning study deliverables for consultants. ‘Section 1.10: Data Sources’ provides a list of information sources that are available to consultants.

2.2 Planning Study Types

Highway planning studies undertaken by the Department vary from network studies that may develop simple conceptual plans, followed by more detailed corridor level plans or route plans and eventually leading to various levels of functional planning studies to develop detailed functional plans as outlined below. However, it is acknowledged that there is often some overlap of activities due to differences in levels of detail for each study. In general, the Terms of Reference for a study will provide more specific detail to clarify study requirements.

2.2.1 Network Studies

Highway systems or network studies involve network-level analysis to define broad connections between areas. Network studies can include analysis of broad geographic areas such as for the entire province, a regional or sub-regional area, or a specific highway corridor or link for forming a basis for undertaking detailed planning. Network studies can be informed by physical challenges, origin and route continuity, impact of land use changes and growth, and can weigh economic benefits, broad environmental and social concerns, and relationships within the system when comparing options. Network studies typically provide high-level recommendations with general cost estimates, to give decision makers an opportunity for initial screening of projects. Network studies are also informed by the Department’s Spatial Economic and Travel (ASET) Model and takes into consideration, priorities from other Government of Alberta ministries, municipalities and stakeholders. These studies generally consider long-term (30-50 years) needs. They can also identify short-term (10-year) network deficiencies and recommend changes to highway classifications.

2.2.2 Concept Studies

Concept studies are used to quickly generate alternative schemes or concepts for highway improvements. New network connections, changes to existing alignments, or suitable interchange configurations are further developed through concept studies to identify a preferred alignment/configuration concept. This type of study includes a high-level evaluation of the options using five categories or accounts, as identified in the Multiple Account Evaluation (MAE) guideline: Financial, Environmental, User Benefits, Community Sustainability, and Economy. The outcome of this type of study is to define a preferred broad corridor for new construction. It also informs subsequent detailed planning. In some cases, a conceptual study may review specific corridors to identify high-level right-of-way requirements in order to establish development setbacks or recommend access locations. This may result in changes to the Freeway Access Location Designation Order, briefly discussed in ‘Section 2.10: Freeway Access Location Ministerial Designation Order’.

2.2.3 Corridor Studies

A corridor study (route or location study) is used mainly for new highway routes or river crossings, provides multiple alternative alignments within a specified corridor and concludes with a recommendation. This type of study requires sufficient design work to define right-of-way requirements and is subject to adjustments at later design stages. Environmental assessment, and public and indigenous engagement is a key component of corridor studies.

2.2.4 Functional Planning Studies

A functional planning study (FPS) is the most detailed category of planning and requires a consistent application of geometric guidelines. It requires considerable detail and accuracy and considers the long-term needs. Functional planning studies are usually focused on relatively short highway sections, and they are typically pre-defined by concept and/or corridor studies, as some projects may go through all three levels of planning. The greater level of

detail permits a more robust evaluation of the relative performance of options under consideration. The outcome of a functional planning study is to establish the horizontal and vertical alignment, cross-section, and the right-of-way boundaries based on a preferred alignment including intersection configuration and access management. The study recommendation will depend on the outcome of the Multiple Account Evaluation (MAE), briefly discussed in 'Section 2.7: Option Evaluation and Assessment Process'. Depending upon future land-use and traffic scenarios, a typical FPS recommends short/medium/long term improvements along with preliminary cost estimates.

Functional planning studies may involve defining highway twinning, widening, or multi-laning requirements. Functional planning studies typically include access management plans that address access consolidation. Most functional planning studies also address safety or operational deficiencies on an existing alignment or they may recommend a completely new alignment. A functional planning study may also be needed to recommend the configuration of an interchange and its rights-of-way boundaries for development control.

2.2.5 Operational Planning and Safety Studies

The Department may undertake operational planning or safety studies to address or resolve existing or potential safety and/or operational concerns on provincial highways. For example, operational or safety concerns on freeways such as traffic conflicts due to inadequate weaving distance, lengths of merge lanes, or addressing lane balancing concerns. Other examples may address specific network level operational concerns such as enhancing passing opportunities or addressing specific safety concerns identified by safety challenged locations or due to higher frequency of certain types of collisions.

2.3 Roadway Classifications

Classification of roadway segments is an important early part of the project development process. The Department uses three classification systems to define the character and importance of each segment in the system: National Highway System, Service Classification, and Functional Classification (part of the Roadside Management Classification Map). Additionally, several special designations are given to certain roadways in order to accommodate specific needs of Alberta's industries.

Highway planning and design parameters are dependent on the classification of each roadway segment. It is therefore imperative that consultants are familiar with the principles of roadway classification and the roadway classifications in place within the study area. A classification review can be included or added to the scope of a study if it is determined that the existing roadway classification may not be appropriate. A classification review should be completed as early in the planning process as possible, prior to detailed roadway planning or design, to ensure that appropriate standards are used and to avoid re-work. A classification review, by its nature, must consider a wider regional or area roadway network. Recommended changes to roadway classifications must be discussed with the Project Sponsor and the Director of Network and Highway Planning, and be approved in advance of detailed planning or design. Recommendations must also be clearly documented to inform updates to the Department's roadway classification maps and network inventory.

Refer to Chapter A of the 'Highway Geometric Design Guide', for roadway classification details about:

- National Highway System (NHS),
- Highway Service Classification, Service Classification Levels and Service Class Designation, and
- Functional Classification Types.

2.4 Typical Planning Study Deliverables

In general, the following deliverables are typically required for a planning study. However, there may be additional details about deliverables in the Terms of Reference based on specific study requirements.

Note: Plan and report identification numbers will be supplied to the Consultant. These numbers are to be indicated in all plans and documents and used in the naming of the electronic files. The naming convention shall be according to 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'. All plans are to be submitted in MicroStation format and submission requirements need to follow the 'Engineering Drafting Guidelines for Highway & Bridge Projects'.

2.4.1 Study Report

A final study report is required that details the options that were evaluated and the recommended plan based on sound engineering judgement and evaluation of other accounts.

The final report may contain the following:

- Executive summary
- Traffic forecasting and analysis
- Summary of preliminary concepts and option development
- Recommended ultimate and any interim stage plans
- Drainage and storm water management plans
- Right-of-way plans and Individual Ownership Plans (IOP)
- Bridge planning assessment
- Traffic noise assessment
- Geotechnical assessment
- Mass haul analysis and diagram
- Environmental assessment
- Safety / Collision analysis
- Planning level Road Safety Audit
- Access and service road requirements
- Historical resources review
- Utility impact assessment
- Summary of public and stakeholder engagement
- Summary of indigenous engagement
- Results of Multiple Account Evaluation
- Planning level cost estimates for interim and ultimate stage

2.4.2 Drawings or Plans

All drawings or plans shall follow the 'Engineering Drafting Guidelines for Highway & Bridge Projects'.

All study drawings or plans shall separately show the interim and ultimate stages, as per scale specified in the Terms of Reference. Plans should clearly show tie-ins with the existing or proposed road networks and include all pertinent geometric data such as curve radii, super-elevation, merge taper lengths, gore point, and centerline stationing. In areas of constraint or urban areas, the drawings or plans shall show the number of lanes in each direction, signalized and un-signalized intersections, road names, major adjacent facilities, access points, and access closures in each stage.

Plans are typically 1:5000 scale on digital mosaic or profile base sheets using 3ºTM NAD 83 standards with all roadway cross sections, profiles, and cut or fill limits. In areas of constraint, interchanges, or urban areas where additional detail is required, 1:2000 scale double line plans may be required. Consultants may also be required to provide sample functional plan drawings to illustrate the level of detail in drawings prior to finalization.

All functional planning studies require the preparation of mosaic plans unless otherwise specified. Plans shall show existing and proposed right-of-way dimensions as well as all pertinent geometric data such as curve radii, super-elevation, tapers, etc.

In addition to the detailed drawings or plans, consultants shall create a high-level overview index map suitable for use in briefing notes or external non-technical communication. The index map shall show individual sheet coverage, study limits, kilometer markers, and other important details, as needed.

- All functional plans must be MicroStation and ESRI file geodatabases including reference files, copies of any purchased imagery or elevation data shall be provided to the Modelling and GIS Section.
- All functional plans must include shape files for the recommended and alternative options.
- All report exhibits shall be in original file format for presentation or reproduction purposes.
- Centreline alignment information shall be provided in a format suitable for ESRI file geodatabase.

Some network and corridor studies may have different scale requirements depending upon study specifics, level of detail or study limits.

2.4.3 Right-of-Way Request

Planning studies that will identify land required to accommodate the study recommendations, will require a basic Right-of-Way Request to be prepared as per the Terms of Reference and described in 'Appendix C: Planning and Design Requirements'. The deliverables must include a Right-of-Way Cost Estimate. The Consultant shall submit the Right-of-Way Request package to the Project Administrator for review and approval by the Project Sponsor and the Property Manager. When a functional plan identifies a highway alignment through a Green Area (i.e., Public Lands administered by Government of Alberta (GOA), Environment and Protected Areas (EPA)), the Consultant shall obtain a reservation from AEP, Land Dispositions Branch (process under development). The reservation records serve to protect Transportation and Economic Corridors (TEC)'s interest in the lands, allowing the future highway construction to occur.

2.4.4 Interim and Ultimate Staging Plan

To reach the ultimate study recommendations, planning studies may need to identify one or more construction stages. In these instances, the Consultant will identify triggers assumed for each stage of construction and include planning level cost estimates and suggested responsible parties, such as developers or other municipal stakeholders. The justification for each stage leading to the ultimate recommended plan, shall be clearly documented under staging plans in the report.

2.4.5 Contour Plans

Some planning studies will require the preparation of contour plans. Standards shall be reviewed with the Department prior to undertaking this work.

2.4.6 Location Survey

Some planning studies will require a location survey. The Consultant shall refer to the Location Survey requirements in 'Appendix C: Planning and Design Requirements'.

2.4.7 Public Consultation Report

The Consultant shall submit a separate report to summarize the public and stakeholder input process undertaken on the study. This report shall include records of communication with the local authorities, stakeholders, regulatory agencies, First Nations, Indigenous groups, and the public. These records shall include:

- Minutes of meetings
- Record of discussions
- Record of Consultation
- List of issues or concerns identified by Landowners during open houses
- All public open house materials such as presentations, display boards, fact sheets, survey results, and inputs received from public.
- All original questionnaires, sign-in sheets, letters, etc. are to be bound separately and submitted to the Department (this information is to be kept confidential as per FOIP requirements).

Consultants should refer to 'Section 2.5: Planning Study Process 'and 'Appendix C: Planning and Design Requirements', 'Table C1: Typical Consultation/Actions' for information about typical consultant notifications or actions as well as communications procedures and details of deliverables for public open houses. It should be noted that the study process may vary depending on study specifics.

2.4.8 Indigenous Engagement Report

A planning study may require extensive Indigenous engagement. In this regard the Consultant shall prepare a separate Indigenous Engagement Report for record keeping purposes. An Indigenous Engagement Report shall include:

- A report that summarizes the findings
- Complete records of communication summary of engagement activities
- Minutes of meetings
- Records of discussions, emails, and correspondence (with First Nation Group(s) and/or First Nation community, Metis Settlement, and/or Metis community).

- Correspondence with Alberta Indigenous Relations (IR), Aboriginal Consultation Office (ACO), Strategic Engagement, and Policy Innovation (SEPI) Branch.
- List of issues and concerns identified through engagement
- All open house materials such as notification letters, presentations, display boards, fact sheets, and input received.
- All original questionnaires, sign-in sheet, letters etc. are to be bound separately and submitted to the Department as this information is confidential and protected under the FOIP Act.

2.5 Planning Study Process

The Network and Highway Planning Section maintains a list of existing highway improvement and network deficiencies, to determine both functional planning and network planning needs. While some minor or high-level network planning studies may be undertaken internally, most complex and major functional planning studies are conducted by contracting pre-qualified engineering consultants, specialized in transportation planning. Since planning studies vary significantly in scope and complexity, studies can take up to two (2) years to complete.

Studies are typically led by the Regional Infrastructure Sections (i.e., Infrastructure Managers, Engineers and Technologists who act as the study Sponsor and Project Administrator). Some studies may be led by Technical Standards Branch or Network and Highway Planning staff. Study Leads define the study scope, identify study tasks, and provide guidance and direction during the course of study. Study Leads are responsible for ensuring stakeholder engagement is completed while ensuring timely completion of studies.

Planning studies are usually completed under the direction of a Technical Review Committee (TRC) to facilitate decision-making on contentious issues and to guide the Consultant. TRCs consist of technical staff and subject matter experts from the Department, Consultant, and technical staff from affected local authorities (or municipalities). In some circumstances, a TRC member may also include a representative who is an external stakeholder that is somehow affected by the study.

Studies often include public engagement to better understand area considerations and to receive feedback about potential options. The public engagement process can range from sharing planning information online, to in–person or virtual open houses, depending upon the study complexity and range of issues that may arise. All studies will require capturing any public input using an electronic survey and/or by mail.

Planning studies often require presentations to municipal councils, major stakeholders, MLAs, and senior department executive. Typical study processes and notification protocols are briefly described in ‘Table C1: Typical Consultation Notification/Actions’ of ‘Appendix C: Planning and Design Requirements’. The purpose is to show approximate timings and actions from Consultant or sponsor led departmental steps required to obtain executive approvals during the course of the study. This process may vary based on specific study needs.

2.6 Typical Planning Study Tasks

Although planning study tasks may differ from one study to the other, the following sub-sections list the planning study tasks typically required by the Department. The Terms of Reference for a planning study will have more specific information with respect to study tasks. However, the Consultant should not consider them self restricted to only tasks listed in the Terms of Reference. It is the Department’s expectation that Consultants will review all available data and relevant reports and may identify or recommend changes or improvements, to tasks that could enhance a planning study.

2.6.1 Traffic Analysis

Most planning studies require conducting traffic analysis and preparing exhibits, indicating existing and forecast traffic volumes for a short-term and long-term scenario. For studies involving complex interchanges and signalized intersections, the Consultant is expected to develop micro-simulation models to support recommendations. The Department provides traffic model forecasts that the Consultant will use in the study. However, the traffic forecasts referenced from other studies, as well as model outputs, may need to be re-affirmed and/or adjusted to account for local variations and developments. The Consultant shall ensure that all model forecasts are reasonable and validated against any other available information. The Consultant may request traffic forecasts from TEC)’s Transportation Model. It is important that the Consultant’s data request should specify horizon years and other study specific data requirements. Model data typically includes population and employment data for traffic analysis zones, transportation

network data, future peak hours and daily traffic volumes by modes, etc. The Consultant must review the model data and make necessary adjustments prior to using for the study. The Department may also provide additional modelling analysis such as scenario analysis, select links, emissions, etc., to support the study.

2.6.2 Collision Analysis

The Consultant may be asked to conduct an analysis of the collision history and patterns reported to have occurred, within the intersection polygon or the study area, for the most recent available data, for the last five (5) years or longer. The analysis shall contain the frequency of collisions, the severity, the collision rate and any possible trend or pattern in the collision types and must consider non-animal/vehicle collisions only. Study recommendations shall include potential measures to mitigate collisions and improve safety of all road users. In cases where the animal/vehicle collision frequency is significantly higher than average, the Consultant shall conduct a separate Animal Vehicle Collision (AVC) analysis to confirm AVC-prone locations (AVCPLs) and recommend potential counter measures required to mitigate Animal Vehicle Collisions. More information is available at Alberta Wildlife Watch (AWW) Program website.

2.6.3 Geometric Design Criteria

The Consultant shall provide the recommended Geometric Design Criteria for the study. As part of the study deliverables, the Consultant shall provide horizontal and vertical alignment details including, but not limited to typical cross sections, and functional plans, according to the drafting guidelines; for all feasible alternatives. Functional plan drawings shall be prepared according to the drafting guidelines for all feasible alternatives and shall include all interim/ultimate staging plans, as relevant.

2.6.4 Access Management

The Consultant shall provide recommendations for access management requirements, within the study area, consistent with the functional, service and administrative classifications of the highway. In addition, the Consultant should review and assess the operational characteristics of the highway and/or intersections and make recommendations for appropriate improvements.

2.6.5 Utility Impact Assessment

Depending on the type of study and level of detail required, the Consultant shall identify locations of all existing and future planned utilities (e.g. major utilities), and their impact on the planning study; with, possible conflicts and action plans to address these conflicts. As outlined in the terms of reference, the Consultant shall complete a Utility Impact Assessment in accordance with the 'Utility Coordination Process Manual'. The Consultant is required to contact the affected Utility Owners and confirm the location and status of their utility infrastructure (i.e. existing and planned), and to obtain high-level cost estimates for the utility impacts.

2.6.6 Environmental Evaluation

The Consultant shall complete an Environmental Evaluation (EE) as per the 'Reference for Environmental Evaluation of Highway Infrastructure Projects'.

In general, all planning studies require a Desktop Environmental Evaluation (EE), which includes one (1) site visit to verify site specific details. The Consultant shall coordinate environmental work with TEC's Project Administrator and Regional Environmental Coordinator for study specific information about this task.

2.6.7 Environmental Regulatory Tracking Application (ERTA)

The Consultant shall use the Environmental Regulatory Tracking Application (ERTA) to investigate, track, maintain, and report on project regulatory details and documents including but limited to:

- Environmental Evaluations/Environmental Assessments
- Environmental permits/approvals
- Environmental Risk Assessments
- Environmental Construction Operations Plans
- Contaminated sites
- Monitoring results
- Release reporting

- Environmental Site Assessment reports

Once authorized by TEC's Project Administrator or Regional Environmental Coordinator, the Consultant shall upload/input the final versions of regulatory documents into ERTA.

2.6.8 Geotechnical Evaluation

Depending on the study requirements, the Consultant may undertake a geotechnical desktop study to identify any major constraints presented by the ground conditions. The desktop study is a review of available information to develop an understanding of the regional geology, to describe geotechnical risks to the highways in study area (including the presence and severity of geohazards), and to identify information gaps. The geotechnical desktop study provides the basis for scoping the subsequent field drilling investigation and laboratory testing program that is proportionate to the project complexity and the quality of existing information. A well-executed desktop study will help identify key geotechnical risks and formulate future ground investigations in a cost-effective way. Refer to 'Section 8.2: Geotechnical Desktop Study' for guidance on the recommended scope of the geotechnical desktop study and accompanying report.

2.6.9 Drainage and Storm Water Plan

Depending upon specific needs of a study, the Consultant may undertake analysis to determine existing drainage patterns and develop a storm water drainage plan consistent with current environmental guidelines, highway geometric design guidelines, and design bulletins of the Department. It should also identify affected tributaries/creeks and water sheds, and document mitigation measures, if any.

2.6.10 Bridge Conceptual Planning

As part of a planning study, the Consultant shall undertake a bridge conceptual planning functional level assessment, for all existing and proposed bridge size structures within the study limits. The assessment shall include developing the optimal long-term strategies for the project and identify which structures are to be constructed, modified, eliminated, or reconstructed. The review should include proposed interchange structures and a determination of their ability or flexibility to facilitate widening etc., to accommodate interim and/or ultimate stage plans. For bridge size structures over watercourses, hydro technical design parameters shall be established along with preliminary hydro-technical analyses of any proposed structures.

For more information, Consultants should refer to 'Section 11: Bridges' and the 'Bridge Conceptual Design Guidelines'.

2.6.11 Railway Crossing Assessment

The Consultant may need to undertake a functional planning level assessment, of all existing or potential railway crossings impacted by the study. The assessment should be undertaken by qualified professionals having expertise in representing road authority interests with regard to railway crossings. The assessment shall include documentation of existing agreements and plans, seniority, past bridge assessments and inspection summaries where applicable, existing and proposed future train traffic volumes, as well as, railway future plans and needs. Options to grade separate where warranted, shall be developed and optimized including over vs. under, consideration of closure of at-grade crossing impacts, stage-ability, realignments etc. Plan/sketch and text content deliverables shall be in accordance with the current Bridge Conceptual Design Guidelines pertaining to functional planning and railway grade separations. The Consultant shall adhere to all applicable provincial and federal legislation.

2.6.12 Noise Assessment

In urban areas, the Consultant may need to conduct a noise assessment consistent with TEC's 'Noise Attenuation Guideline for Provincial Highways under Provincial Jurisdiction within Cities and Urban Areas' to identify any mitigation measures that must be undertaken by the Department, Developer, or the Municipality to avoid future traffic noise concerns or complaints. The Noise Attenuation Guidelines for Provincial Highways under Provincial Jurisdiction within Cities and Urban Areas is included in 'Appendix C: Planning and Design Requirements'.

2.6.13 Indigenous Engagement

Benefits of highway planning are not realized until the time of implementation. However, for the planning study to be effective at the time of implementation (i.e., to achieve these benefits at that time), Indigenous engagement is necessary to ensure Indigenous concerns are addressed. Benefits of highway planning are often derived from a reduction in overall project costs, better stakeholder acceptance, and unnecessary project delays (e.g., difficulties in obtaining the necessary approvals at the time of construction).

Indigenous engagement is undertaken to understand and consider the potential adverse impacts that an anticipated Crown decision may have on First Nations' Treaty rights or traditional uses, and Métis Settlement/Credibly Asserted Métis Communities (CAMC) members' harvesting or traditional uses. Examples of Traditional uses of the land are burial grounds, old camp sites and cabins, and other historical sites. More information on the Government of Alberta's Indigenous Consultation processes can be obtained from the Government of Alberta's sites:

- 'The Government of Alberta's Policy on Consultation with First Nations on Land and Natural Resource Management, 2013'
- 'The Government of Alberta's Policy on Consultation with Metis settlements on Land and Natural Resource Management, 2015'

In addition:

- The Consultant shall consult with Alberta Indigenous Relations (IR), Strategic Engagement and Policy Innovation (SEPI) Branch and obtain their advice regarding which Indigenous communities and organizations to engage and the scope of engagement.
- The Consultant shall identify all First Nation Group(s), First Nation community(s) and Metis Settlement/Credibly Asserted Metis Communities (CAMC) members' that are to be engaged, as recommended by SEPI.
- The Consultant shall prepare Notification letters (sent by TEC) to all Indigenous communities and organizations notifying them that a study is being undertaken and requesting them to indicate if they are willing to participate.
- Following the advice provided by SEPI, the Consultant shall design and carry out an Indigenous engagement process to ensure that comments, issues and concerns are identified, and documented for consideration in the plan development. Input shall be gathered commensurate to the type and length of the study. For example, a corridor study that involves several alternate alignments through an environmentally sensitive area, and affecting multiple communities, requires more extensive engagement than a functional planning study for an interchange or grade widening.
- Conduct individual meetings on the plan alternatives and recommendations as required.
- The Consultant shall arrange and conduct open houses in-person and/or through virtual or online tools as deemed appropriate by the Department. During the engagement process, presentations to band councils and TEC executive may be necessary.
- The Consultant shall prepare an Indigenous Engagement Summary report.

2.6.14 Public Engagement

The Consultant shall design and carry out a public input process to identify impacted stakeholders, and ensure public and adjacent Landowner concerns are identified, documented and considered, where possible, in the development of the plans. Public input shall be gathered commensurate to the length and study type. Public open houses shall be arranged in-person and/or through virtual or online tools as deemed appropriate by the Department. This process is generally approved by the Technical Review Committee (TRC) prior to implementation. During the public engagement process, presentations to municipal councils, major stakeholders, elected officials, and senior executives of TEC may be necessary.

2.6.15 Communication Plan

The Consultant shall prepare an overall communication plan that should be in place with all communications materials forwarded to the Project Administrator and to Communications. Details of materials required in a communication plan are described in Communications Procedures for Public Open Houses and Stakeholder consultations in 'Appendix C: Planning and Design Requirements'. Prior to advertising, the Consultant shall submit a draft advertisement to communications branch at least five (5) weeks prior to the newspaper publishing date. Typically, newspaper publishers require ad copy one (1) week or more before the run date.

Consultants must inform the Project Administrator and Communications of any media contact by forwarding all information about the inquiry.

2.6.16 Right-of-Way Request

The Consultant shall prepare the Basic Right-of-Way Request as described in 'Appendix C: Planning and Design Requirements' of the Engineering Consultant Guidelines. Right-of-way plans must show all right-of-way dimensions and land areas that will be required for provincial highway infrastructure upgrades. A Right-of-Way Cost Estimate must be part of the deliverables as well.

2.7 Option Evaluation and Assessment Process

The Consultant will develop, evaluate, and provide rationale for each option, in detail, and will facilitate a multiple-account evaluation session(s) as part of this process. The generation of options should consider factors such as Access Management, Intersections, Interchanges, Operational Analysis, Collisions/safety Analysis, and Assessment of other Socio-Community impacts. In general, the Multiple Account Evaluation process is completed in two stages by the project team, where;

- Stage 1 consists of developing an option evaluation framework i.e. Objective Setting, Option Development and Identification of Performance Criteria, and
- Stage 2 consists of an option evaluation and selection process i.e. Consensus-Based Agreement on Ranking of Options based on performance.

2.8 Transportation and Economic Corridors' Benefit Cost Model

While alternative evaluation processes will help the Consultant in streamlining the comparative assessment of competing alternatives, the 'Benefit Cost Model User Guide' ensures a consistent approach that the Consultant shall use to undertake benefit cost analysis of top-ranking planning alternatives, to support recommendations. This analytical tool will provide additional information to summarize the economic merits of one option versus the other. Such information can facilitate evidence-based decision making, which is often very important for planning studies. Multiple stakeholders including (directly or indirectly impacted) Landowners, businesses, and a wide range of road users are affected in planning studies and many conflicting ideas or opposing solutions need to be compared. A consistent analysis approach will help in evaluating options based on economic merits.

2.9 Optional or Additional Planning Study Tasks

Depending upon the specific needs of a planning study, the Consultant may be asked to include costs in the proposal for additional tasks. Optional or additional tasks are generally identified as deletable items in the planning study Terms of Reference. The Consultant must seek approval in writing from the Project Administrator before undertaking any work on deletable tasks. The following sub-sections list optional or deletable tasks. Each is briefly described and may be included in the study Terms of Reference.

2.9.1 Value Engineering

The Consultant shall include a one (1) full-day design review/value engineering session early in the plan development phase of the study to incorporate potential innovative approaches and ideas to further enhance the project. Costs should include a certified facilitator, non-departmental attendee costs, and facility costs.

2.9.2 Road Safety Audit

The Consultant shall undertake a Planning Stage Road Safety Audit (RSA) for the project, which addresses the interim and final stage plans. This task shall include a safety evaluation of the basic design elements such as alignment, number of lanes, facility classification, access management, project limits, design speed, posted speed and other design criteria. Some of the modifications that may be suggested can include a different alignment, a roundabout or an interchange, or an additional pedestrian/bicycle facility, etc. The safety audit shall be conducted in accordance with the Transportation Association of Canada (TAC) publication, Canadian Road Safety Audit Guide' and must be conducted by qualified and independent road safety auditors.

2.9.3 Origin–Destination Study

For some studies, the Consultant shall be responsible to collect data (licence plate survey, Bluetooth/Wi-Fi detection, or location data/big data) and complete an origin-destination study. In some cases, origin-destination survey data may be required as input into traffic modeling (e.g., micro simulation) in order to establish or compare actual traffic patterns and anticipated turning movements.

2.10 Freeway Access Location Ministerial Designation Order

The designation of access locations (interchanges) to ministerial designated freeways is governed by the '*Highways Development and Protection Act*' (HDPA). The Act stipulates that the locations of these accesses are to be designated through a Ministerial Order. Consultants working on studies or projects involving existing or proposed freeways should be aware of current orders in place, including prescribed access (interchange) locations. Reports and recommendations must clearly identify all approved access locations, as well as any recommended freeway access location changes (additions or removals). These new or removed interchanges must be marked as recommended only, subject to cabinet approval.

2.11 Highway Designations

TEC protects existing and proposed highways through Provincial Highway designation (Section 2 of the *Highways Development and Protection Act*) whereby TEC assumes direction, control and management of the designated highway. Additionally, Provincial Highway Connectors are roadways that are considered to be part of the numbered highway network but are under municipal jurisdiction (such as Highways 15 and 21 in Fort Saskatchewan). Planning studies should clearly identify all designated (existing and proposed) provincial highways and provincial highway connectors, as well as any recommended changes to the provincial highway network and provincial highway connectors, including all affected provincial and municipal roadways. The Consultant is required to produce suitable GIS information for all proposed highway alignments in order to facilitate updating of the Department's mapping and inventory.

Note: During the course of a planning study, the Consultant may be asked to provide comments on roadside development and utility applications, e.g., provide right-of-way width and highway profile.

2.11.1 Special Designations

In addition to Service and Functional Classifications, there are special designations which also apply to select highway segments or particular intersections. These are Long Combination Vehicle (LCV) routes and High Load Corridors (HLC). The LCV and HLC designations are an important part of the project development process that needs to be identified in the early phase of the study (prior to detailed functional planning or preliminary design). Additionally, a highway segment may also be part of a Log Haul route that has particular specialized log haul intersections, which shall be considered. Planning studies should clearly identify LCV, HLC, and Log Haul routes, as well as any recommended changes to these networks. Further details and route information for the special designations are given in Chapter A of the 'Highway Geometric Design Guide'.

2.11.1.1 Long Combination Vehicle Routes

Long Combination Vehicle (LCV) Routes are designated highway sections where LCVs are only allowed to operate under permit and use particular intersections and interchanges. LCVs consist of a tractor and two or three semitrailers or trailers that exceed the basic length limitations specified by provincial regulatory agencies. In Alberta, all main (or through) rural intersections are designed to accommodate the medium turning paths of semi-trailer combinations. Specifically, the WB-21 design vehicle is used to check the layout of channelized intersections, which include medians, islands or separate turning roadways and interchanges. Median openings on wide median rural divided highways are generally designed to accommodate both the WB-21 and WB-23 design vehicles. An exception to the above occurs where an intersection or interchange will serve long combination vehicles, (or log haul trucks as referenced below), in which case the appropriate turning template should be used. For details on the LCV program, including a map of highways currently designated as LCV routes refer to the 'Long Combination Vehicle Program' webpage.

2.11.1.2 High Load Corridor

The High Load Corridor consists of Alberta highways, which have been designed or retrofitted to accommodate highway traffic that may be up to 9.0 m high (unless noted otherwise e.g., 8.0 - 12.8 m). The highway design features include power lines installed underground, overhead utility lines which are installed higher, traffic signals with rotatable bases, traffic barriers with additional offset (as required), bridge modifications, gates for counter flow, on and off ramp by-passes to avoid structures, and roundabout modifications. For the latest listing and maps of highways designated as High Load Corridor, refer to the 'High Load Corridor' webpage.

2.11.1.3 Log Haul Routes

Log haul routes consist of highway segments with particular intersections that allow safe access to processing mills, and from cut blocks where log haul using special oversize log haul trucks, is only allowed under special permits. The special design features include channelized intersections, which include medians, or separate turning roadways that provide a separation between a highway user and the log sweep. The design of intersections and guideline for selection for special log haul intersections is covered in Chapter D, Section D.5.3 of the 'Highway Geometric Design Guide'.

2.12 Study Signoff

All study recommendations require acceptance from the Department, as well as planning study endorsement. The Consultant shall refer to the signoff guidelines included in 'Appendix C: Planning and Design Requirements'.

Section 3: Right-of-Way

3.1 Basic Right-of-Way Request

3.1.1 General

For projects requiring the acquisition of right-of-way, the Consultant shall prepare a Right-of-Way Request document detailing “any” or “all” property requirements for the project.

Generally, the Project Administrator will identify the need for a right-of-way request by specifying this work in the project Terms of Reference. For projects involving a planning study, the Consultant hired to do the study may be asked to prepare the basic right-of-way request under the Terms of Reference for that project.

Right-of-way requests (see ‘Appendix C: Planning and Design Requirements’) must include all right-of-way requirements shown relative to existing land parcels as follows:

- Highway basic right-of-way width
- Proposed service road right-of-way (if required)
- Proposed intersection improvement right-of-way (if required)
- Optional purchase of isolated cut-off-areas
- Area calculations from each certificate of title
- Safety Rest Area (SRA) sites (if required)
- Storm Water Management Facilities (if required)

Prior to issuing the Right-of-Way Request, the Consultant shall review the following items:

- Land titles and registered survey plans are checked to ensure that the existing property boundaries are shown correctly on the mosaics.
- The Functional Planning Report is reviewed for access requirements, intersection improvements, cut-off areas, creek diversions, existing developments, replacement of service road dedications, etc.
- Land ownership, as shown on the mosaics, is updated as per current Land Titles registration. The date of the title search will be shown on the mosaics under the title block.
- Special care must be taken with any property where there is a riparian boundary to ensure the land currently under title is properly depicted. If appropriate, a riparian boundary survey should be completed to identify changes to the land under title. On projects where works will be constructed within the bed and shore, ensure that the bed and shore areas have been clearly identified.

3.1.2 Request Documents

The Right-of-Way Request document must address access closures, access consolidations, new access construction requirements, and any special measures for interim access. All Right-of-Way Requests must be color coded (as to the type of request) in accordance with the Department's established format. See ‘Appendix C: Planning and Design Requirements’.

3.1.3 Lead-Time

A lead-time of 18 months is desirable (12 months minimum) for all Right-of-Way Requests to allow sufficient time, should expropriation be necessary. Longer lead-time may be required for projects through Federal jurisdiction (e.g. Indian Reserves, Military Installations, etc.) and urban centres.

3.1.4 Right-of-Way for Projects on Non-Patent Crown Land

Upon approval by the Department, the Consultant shall;

1. Complete a Crown Land search to identify prior right holders.
2. Prepare any forms for reservation and/or disposition affecting Crown Land, as directed by the Property Manager.
3. Prepare a plan that meets Alberta Forestry, Parks and Tourism’s plan requirements.

4. Submit the completed application package, which includes the plan (see Survey/Sketch Plan Content Requirements) and any other relevant information that may assist in the application review to the appropriate authority with a copy to the Project Sponsor and the Property Manager.
5. Obtain the necessary consent(s) to withdraw from third party interests and submit to the appropriate authority with a copy to the Project Sponsor and the Property Manager.

The reservations and/or dispositions will be issued listing all conditions the Department is obligated to meet.

Negotiations shall be based on 'Section 3.3.1: General'.

This work shall be done as early in the process as possible.

3.2 Supplementary and Final Right-of-Way Requests

3.2.1 General

The Consultant shall prepare the supplementary (if required) and final Right-of-Way Requests during the detailed design to address unforeseen factors such as:

1. Change in project limits
2. Additional scope of work
3. Expropriation proceedings which necessitate an increase or decrease from basic right-of-way (and which require finalization of right-of-way needs)
4. Excessive cuts and fills along the main alignment and for roads that require grade-line improvement
5. Sight distance or grade-line restrictions that might necessitate changes in intersection location
6. Intersection modification requirements
7. Proposed borrow locations
8. Projects located near major urban centres (land parcels are smaller, higher in price, and contain numerous owners to deal with)

3.2.2 Right-of-Way for Projects on Non-Patent Crown Land

When amendments to the Right-of-Way Request affects Crown Land, the Consultant will be required to either amend the existing dispositions by submitting a Provisional/Registered Roadway Amendment application, or if a disposition is not in place, apply for the reservation as noted.

3.2.3 Request Documents

The Right-of-Way Request document must also address earth borrow requirements, easements, and back-slope agreements. All Right-of-Way Requests must be color coded in accordance with the Department's established format. See 'Appendix C: Planning and Design Requirements'.

3.3 Acquisition of Right-of-Way

3.3.1 General

Land required for the project may be acquired by either the Department or the Consultant on a project specific basis as described in the project Terms of Reference. When being handled by a Consultant Land Agent (CLA), the Department may assist in negotiations with Landowners.

A CLA must have a valid Alberta Land Agent's license, be a Commissioner for Oaths, and must have an Alberta Driver's License. CLAs must be, or be under the supervision of, a member of the International Right-of-Way Association (IRWA), the Appraisal Institute of Canada (AIC), or another appraisal organization recognized by the Department.

As part of the duties of the Consulting Land Agent, the CLA shall:

- Meet with the Landowners (and those who hold a third-party interest) or their agents to assess their concerns, and to negotiate the terms of land agreements. The "Principles of Compensation" as set forth under the '*Expropriations Act'*, Revised Statues for Alberta 2000, Part 2, Section Paragraphs 41 to 58 inclusive (as applicable to each specific property), shall form the basis of compensation packages.
- Establish priorities and set up schedules to ensure the Landowners most affected are addressed first.
- Start negotiations in a timely manner to ensure possession dates for land do not delay or compromise established departmental construction schedules.
- Perform a review of all affected titles, including all encumbrances effecting land acquisition, crown land dispositions, legal survey, and other plans.
- Review the sketches and/or preliminary plans showing the land to be acquired or the interests affected; and advise the Department of additional information which may be required for negotiations.
- Review any appraisal requirements with the Department. The Department will arrange for the reports required. These plans or reports shall be available for negotiation purposes; however, they remain the property of the Department.
- Prepare recommendations for compensation for each Landowner affected. The Department will provide comments, and/or review and approve the CLA's recommendation prior to presenting the proposal to the Landowner or the Landowner's agent.
- Prepare all draft agreements with associated documentation necessary for negotiations and a final agreement. The associated documentation may include, but is not limited to:
    - Offer to Sell Agreements
    - Section 30 Agreements
    - Moving Agreements
    - Agreements for Survey
    - General Release of all Demands
    - Fencing Agreements
    - Preliminary Agreements For Temporary Rental of Haul Roads, Camp, Plant, or Stockpile
    - Agreements of Easement for Construction and Maintenance of a Public Work
    - Provisional/Registered Roadway Application
    - Consent to Withdrawals
    - Permission to Enter, Test, and Survey
    - Preliminary Agreement for Use in the Taking of Earth Borrow
    - Approach/Access Relocation
    - Cattle pass removal
- For all grading projects, the issue of earth borrow shall be discussed during negotiations with the Landowner. In cases where the Landowner is receptive to providing a borrow source, the CLA shall complete a "Preliminary Agreement for Use in the Taking of Earth Borrow" agreement with the Landowner.
- Provide a summary of the services performed pertaining to the project upon completion of the land acquisition process.
- Maintain frequent communication with the Department's representative during negotiations with Landowners and provide:
    - Photographs of all land and improvements affected by the project
    - Detailed notes to file documenting all conversations, meetings, and discussions pertaining to the project
    - Monthly status reports to track progress of the right-of-way acquisition process as defined in 'Appendix C: Planning and Design Requirements' in the Right-of-Way Process Acquisition Summary
- Submit monthly invoices and Contract Summary Reports in a timely fashion.
- Prepare briefing notes and draft letters for ministerial responses and reports when required by the Department.
- Sign an agreement addressing confidentiality requirements and conflict of interest disclaimer if required.
- Attend monthly team meetings in the Regional Office when invited to do so.
- Provide a history of negotiations upon completion of the negotiations or as requested by the Department.
- Direct all contact from the media to the Department's contact person listed in the agreement.

To improve the line of communication, a process has been designed to encourage the Landowners to contact the regional property managers rather than the MLA's. At an open house, the Department may distribute a pamphlet outlining the land acquisition process and answer questions about property related issues. In advance of the CLA's first visit, a letter of introduction from the regional property manager as well as the pamphlet will be distributed to the

Landowner. The Landowner is encouraged to contact the CLA, and then the Regional Property Manager, should a dispute arise. The CLA also needs to be aware of what flexibility they have in the engineering plans when negotiating with Landowners.

Private land is acquired by one of the following methods:

1. Offer to Sell
2. Section 30 Agreement
3. Full Expropriation

The most desirable method is the Offer to Sell. This is where the Landowner voluntarily agrees to sell the required land at the price offered by the Property Agent. After construction, the right-of-way boundary is surveyed and if the area is greater than what is in the Offer to Sell, an adjustment payment is forwarded to the Landowner.

If unable to obtain an Offer to Sell, and if compensation is the only outstanding issue, the Property Agent may request the Landowner to sign a Section 30 Agreement. By executing such an agreement under the '*Expropriation Act*', the Landowner gives up possession of the required right-of-way at a mutually agreed date but reserves the right to have final compensation determined by the Land Compensation Board.

The last resort in acquiring right-of-way is Full Expropriation. In this situation the Landowner refuses to sell the required land (i.e. objection to the proposed alignment). The issue may go before an inquiry, at which time the Department must present sufficient evidence to justify the expropriation (financial compensation is dealt with at a later stage). In some cases, it can take up to a year from the date of the notice of intention to expropriate, to the date when possession of the land is obtained.

For both Section 30 Agreements and Full Expropriation, the Consultant is responsible for supplying plans showing the final right-of-way requirements from the subject properties. Special care must be taken in confirming the final right-of-way requirements since it can be difficult and sometimes impossible to obtain additional right-of-way at a later date. This is especially true in the case of Full Expropriation.

The Consultant shall refer to the '*Expropriation Act*' and contact the Regional Property Manager for the current process to be followed for expropriation.

3.3.2 Timing

Consulting Services Contracts shall include land acquisition services for all outstanding right-of-way for all projects to be delivered within a three (3) year window from activation of the contract. For projects beyond the three (3) year window, land acquisition may be considered in those cases where the Landowner approaches the Department and expresses an interest in negotiating on a willing seller/willing buyer basis and funding has been allotted. The negotiations are based on fair market value, and the purchase has been pre-approved by the appropriate Department staff. These acquisitions will be negotiated by in-house land agents in most cases.

Any change to the functional plan or design considered during right-of-way negotiations (such as changing the median spacing to minimize the required right-of-way to appease a Landowner so that construction can proceed), shall be referred to the Project Sponsor and the Property Manager.

3.3.3 Special Considerations for Federal Lands

Additional time may be required for right-of-way acquisition on Federal Lands because of the greater complexity of the process. Each project should be assessed on its own merit and dealt with accordingly.

3.3.4 Borrow Requirements

To facilitate land negotiations with property owners, an early indication of earth borrow requirements is desirable. Coordination between the Consultant, Project Administrator and Property Agent can expedite this procedure. The Consultant is generally required to arrange for borrow agreements.

For conditions and application requirements for obtaining borrow on crown land, please refer to 'Section 4.8: Borrow Excavations'.

3.3.5 Approvals Required

All land purchases and borrow agreements shall be referred to the Property Manager for approval, prior to presenting a proposal to the Landowner and after the agreements are signed by the Landowners. All right-of-way shall be obtained prior to proceeding with tender, unless otherwise approved by the Project Sponsor.

3.4 Legal Survey

3.4.1 General

This section will apply when legal survey is included in the Terms of Reference.

Except for expropriation surveys, and subject to any special instructions issued by Transportation and Economic Corridors, the Consultant shall be responsible for the Legal Survey of the right-of-way acquired as related to the project and shall supply and install associated materials to complete the work. A Legal Survey shall be done by a registered Alberta Land Surveyor.

The Consultant shall ensure that the Legal Survey is carried out in accordance with the provisions of the *Surveys Act*, the '*Land Titles Act*', the Land Titles Procedures Manual', the '*Public Works Act',* the 'Alberta Land Surveyor's Manual of Standard Practice', and any other applicable legislation.

The Consultant shall also be responsible for:

- Preparing the Public Works affidavit, the discharge of caveat documents and any other documents that may be required to protect the Department's interest in the land acquired.
- Registration of the Plan of Survey at the appropriate Alberta Land Titles Office.
- Discharge of the caveats protecting the acquired right-of-way.
- Preparing all necessary documents that may be required to facilitate the closure of a road.
- Submitting the Plan of Survey to the appropriate authority along with a Registered Road Application. If the Plan of Survey covers the disposition in its entirety, the disposition must be cancelled. If the survey plan covers only a portion of the disposition then the disposition must be amended.
- Ensure all conflicts are resolved with non-department dispositions prior to plan registration.
- Providing one (1) copy of the registered legal survey to the appropriate Regional Property Manager.

3.4.2 Referencing Existing Survey Monuments

Key statutory monuments are to be identified and referenced prior to construction where there is a chance of monuments being destroyed during construction.

3.4.3 Alignment

In determining the final alignment and extent of the project, the Land Surveyor shall take into account the following:

1. Area purchased
2. Designed alignment and boundaries, including curve and deflection information
3. Area used for construction
4. Centre-line of the final grade
5. Area fenced.

The Consultant shall advise the Project Administrator of any significant deviations before completing the survey.

3.4.4 Posting Boundaries (Installing Iron Posts)

The Consultant shall ensure that:

- All service roads within a primary highway survey, will be posted and labelled as "service roads".
- Existing road plans are consolidated into the new survey, as per 'Alberta Land Titles Procedure Manual SUR-5 No.4'.

3.4.5 Plan Preparation

A Legal Survey plan, if required, shall be in a registerable format and comply with all of the requirements as stated in the Land Titles 'Policy and Procedures Manual for the Submission of Digital Plans of Survey for Registration'.

Headings for plans prepared for the Department are to include:

- The nature of the plan, e.g. "Plan showing Survey of Public Work (Road), Stockpile Site" etc., as delivered by the *Public Works Act*.
- The file number of the Department, preferably at the bottom right-hand corner of the plan (e.g. "Transportation and Economic Corridors (TEC) File No. _____").
- Affidavit for the plan prepared for the Department along with a copy of the plan of the unregistered Plan of Survey shall be submitted to the Department for review, approval, and execution.

3.4.6 Affidavit for Acquiring Lands

One of the following affidavits will apply, depending on whether the lands were acquired by agreement or expropriation.

3.4.6.1 Normal Affidavit

I hereby certify that this plan represents a survey of land required for public work pursuant to the Public Works Act and the lands covered by this plan were acquired by agreement with the owner(s) thereof.

Dated _____ 20 ___ _____ (seal)

Department Representative

3.4.6.2 Affidavit When Lands are Being Expropriated

I hereby certify that this plan represents a survey of land required for public work pursuant to the Public Works Act and the lands covered by this plan were acquired by expropriation pursuant to the *Expropriation Act*.

Dated _____ 20 ___ _____ (seal)

Department Representative

3.4.7 Expropriation Surveys

The Consultant shall contact the Landowner to explain the purpose of the survey and obtain permission to proceed with the survey. If permission is not obtained, the Consultant shall advise the Project Administrator for further direction.

Marker posts and lathe shall not be used unless permission to place, has been obtained. If statutory iron posts are placed without marker posts, the iron posts should be countersunk and the excavation should be filled to its original state.

Any damage done such as line clearing, disturbing crops, etc., shall be recorded showing the date and extent of the damage. This will be a part of the Survey Report.

3.5 Expropriation Process

When negotiations are not progressing, a review under the “Pre-Expropriation Process” will be lead by the Property Manager and will include the Project Sponsor; Project Administrator, Infrastructure Manager; Property Agent; Director, Highway Planning & Design, Technical Standards Branch; Manager, Expropriation and Regional Services, Properties Division; Consulting Design Engineer; Consulting Planning Engineer; and Alberta Justice and Solicitor General. The review will document Landowner issues, compensation proposed, and a comparison of positions including:

- Appraisal reports and alternatives considered;
- The history of negotiations and file chronology; and
- The design and planning alternatives including technical standards

The decision to proceed with expropriation shall be supported by the Assistant Deputy Minister, TEC and the recommendation will be forwarded to the Properties Division of Infrastructure to manage the formal Expropriation process.

Following the Notice of Intention to Expropriate, the Landowner may exercise their right to object to the expropriations. At this point, an Inquiry Officer will be appointed, and the Consulting Engineer, on behalf of the Department, will be responsible for defending the alignment at the hearing.

3.6 Reporting Requirements

Upon completion of the project, a copy of the Plan of Survey will be submitted to the Department along with appropriate affidavits.

Any information that might affect the cost of the survey or incur liability to the Department shall also be included.

Section 4: Environmental Requirements

4.1 Environmental Management System

The Department's Environmental Management System (EMS) outlines environmental measures that apply to Department projects. The EMS applies to Department staff and all Consultants contracted by the Department. The Consultant is responsible for understanding their EMS roles and responsibilities.

4.2 Environmental Assessment

The Consultant shall complete an environmental assessment as per the 'Terms of Reference for Environmental Evaluation of Highway Infrastructure Projects*'.*

The Consultant shall coordinate environmental work with the Project Administrator and the Regional Environmental Coordinator (REC). All final reports shall be signed by a member registered with the Alberta Society of Professional Biologists or the Alberta Institute of Agrologists.

4.3 Regulatory Contact / Approvals / Authorizations

Contact with the relevant federal and provincial government departments (e.g. Fisheries & Oceans Canada, Environment and Protected Areas) shall be initiated at the direction of the Project Administrator and shall be maintained to ensure that all environmental considerations and requirements (e.g. authorizations, decisions, and advisory letters) are adequately addressed throughout the design and construction phases. The Consultant must obtain permission from the Department prior to each contact with regulatory authorities.

The Consultant is responsible for identifying and facilitating the process to secure all applicable permits, approvals, and authorizations required for the project, including department supplied borrow sources. The Consultant shall ensure that all permits that have been issued for the work are incorporated into the tender documents.

4.3.1 Environmental Regulatory Applications

The following procedures shall be followed by the Consultant when facilitating the process to secure regulatory approvals, authorizations, and permits for the project:

- The Consultant will collect and assess environmental information for a project and will make recommendations for mitigation and/or offsetting for environmental impacts to the Project Administrator and the REC prior to contacting the regulatory agency.
- The Project Sponsor in consultation with the REC will determine the mitigation and/or offsetting measures that may be discussed with the regulatory agency and direct the Consultant's next actions accordingly.
- The Consultant assembles the necessary information to support application, complete with all relevant information, for the REC's review. The Consultant shall revise the information in accordance with the REC's direction.
- The Project Sponsor will sign and submit the application to the regulatory agency or may elect to delegate the submission of the regulatory application to the Consultant.
- Where online regulatory systems are in place, the Consultant shall obtain Departmental approval to enter and submit applications on behalf of the Project Sponsor.
- Any amendments to regulatory approval will follow the above protocol.

4.4 Environmental Construction Operations Plan

The Consultant will, during the development of the tender package, determine if the project activity is listed on Transportation and Economic Corridors' Environmental Construction Operations (ECO) Plan Exemption List – available on the 'Highway and water infrastructure projects – Environmental requirements' site.

Work activities identified on the ECO Plan Exemption List do not require the Contractor to prepare an ECO Plan. Where uncertainty exists with respect to ECO Plan applicability, the Consultant shall contact the REC for direction. If the project is exempt, the Consultant shall identify the exemption within the project's Environmental Risk Assessment.

4.5 Decontamination of Equipment Used Within Bed and Shore

The Consultant shall follow Environment and Protected Areas *Decontamination Protocol for Work in or Near Water* at the Stop the Spread of Whirling Disease website that is applicable to their scope of work. The Consultant shall ensure any personal field gear, trucks (survey), quads, drilling equipment (track or wheeled), or other equipment used meets the requirements of the decontamination protocol as necessary.

The Government of Alberta is committed to preventing the spread of whirling disease in Alberta beyond the infected watersheds. Environment and Protected Areas has developed the Decontamination Protocol for Work in or Near Water for equipment used within the bed or banks of a waterbody. The Consultant shall:

1. Refer to Environment and Protected Areas' Whirling Disease Decontamination Risk Zone Map posted on the Stop the Spread of Whirling Disease website to identify the Risk Zone the Project is located within and include this information within the tender documents.
2. Ensure that any measures required to meet Environment and Protected Areas' Decontamination Protocol for Work in or Near Water are incorporated into the Environmental Risk Assessment and addressed in the Contractor's ECO Plan documents.
3. Insert appropriate Special Provisions, where required, to outline the Contractor's responsibility to implement Environment and Protected Areas' Decontamination Instructions for Industrial and Construction Operations as well as use of the Decontamination Record Template. The current Special Provision is SPE-024.

4.6 Environmental Risk Assessment

The Consultant shall complete a project Environmental Risk Assessment (ERA) as part of the detailed design work, and for inclusion into the project's tender document. The ERA shall be discussed with the Project Administrator. The ERA shall identify the environmental sensitivities that must be addressed within the Contractor's ECO Plan, and identify all project relevant Special Provisions. The Consultant must identify and list all compliance requirements associated with the valued ecosystem components (VECs) identified in the project's environmental assessment/report(s) that must be addressed by the Contractor. Each item listed below must be addressed within the ERA, including, identification of those items that are Not Applicable. A qualified professional, registered in Alberta, must sign and date the ERA.

Items include but are not limited to:

- A list of all relevant federal/provincial environmental legislation that applies and a list of permits/authorizations that have been issued for the project.
- Identification of federal/provincial listed/protected wildlife species (amphibians, birds, mammals, reptiles, etc.) known to frequent the project area.
- Identify when pre-disturbance wildlife sweeps should occur and if additional surveys are required.
- Identification of federal/provincial listed aquatic species known to frequent the area.
- Identification of known wildlife features (e.g. nests, Critical Habitat, dens, etc.) of federal and provincial listed species.
- Whirling Disease requirements.
- The location of federal/provincial listed vegetation species known to exist within the project footprint.
- The location of all wetlands within the project footprint. Those wetlands that are not to be disturbed must be clearly highlighted.
- The location of groundwater wells, natural springs, and areas of high ground water tables.
- The location of watercourses and waterbodies within the project area. This information shall include provincial watercourse classification, associated Restricted Activity Periods, and Critical Habitat.
- A summary of the borrow pre-disturbance assessment.
- A summary of the soil stripping plan.
- A summary of the vegetation assessment and weed survey.
- Identification of Clubroot infected areas through consultation with Alberta Agriculture and Irrigation, and the local Agricultural Fieldmen.
- Identify locations of known contamination.

4.7 Assessment, Conservation, and Reclamation of Topsoil and Subsoil

The '*Environmental Protection and Enhancement Act*' requires an operator to conserve and reclaim specified land, and unless exempted by the regulations, to obtain a Reclamation Certificate. 'Environmental Protection Guidelines for Pits' (Information Letters) that address Roadways, Pits, Borrow Excavation, Disposal of Excess Soil Materials from Roadways, and Conservation and Reclamation Guidelines for Alberta have been developed by Environment and Protected Areas.

4.7.1 Soil Stripping Plan

During project design the following procedures shall be followed on Department projects that contain a grading component.

The Consultant shall employ a soils specialist to perform a complete assessment of the soil within the highway right-of-way and borrow excavation.

The assessment will include a description of how the topsoil and subsoil layers are to be handled, including details of temporary and permanent stockpile locations. Topsoil and subsoil shall be salvaged and stockpiled separately, within a minimum 3 metre distance separating the different stockpiles.

The 'Alberta Transportation Pre-Disturbance Assessment Procedures for Borrow Excavations' and the 'Alberta Transportation Post-Disturbance Assessment Guide for Borrow Excavations' outline the techniques to be followed in developing the soils assessment.

The Consultant shall design the project such that all topsoil in the Right-of-Way is salvaged and redistributed in the Right-of-Way. Prior to drafting the contract special provisions, the Consultant shall liaise with the Project Administrator to confirm actual requirements.

4.8 Borrow Excavations

The Consultant must obtain permission from Environment and Protected Areas before entering on, testing, or operating a borrow excavation on Crown land.

A pre- and post-disturbance assessment shall be conducted on all borrow areas that pertain to the project.

Conservation of topsoil and subsoil material from borrow excavations is mandatory. The haul road utilized to access the borrow excavation is considered an integral part of the borrow and must have the topsoil and subsoil treated in the same manner (as the borrow).

4.8.1 Department Supply of Borrow

The Department's intent, where feasible, is that Department supply of borrow is identified for projects/tenders with estimated quantities of 10,000 m^3 or more. The Consultant shall prepare a pre-disturbance assessment of the proposed borrow as detailed in the 'Alberta Transportation Pre-Disturbance Assessment Guide for Borrow Excavations' document.

The Consultant shall prepare a post-disturbance assessment report for the area disturbed by operation of the borrow excavation as detailed in the 'Alberta Transportation Post-Disturbance Assessment Guide for Borrow Excavations' document.

4.8.2 Contractor Supply of Borrow

The Consultant is not required to conduct pre/post assessment of Contractor Supply of borrow.

4.9 Grass Seed and Fertilization Plan

For all projects that have a "Seeding" component larger than 1 hectare, as part of the design and tender process, Consultants shall conduct a vegetation assessment of the existing right-of-way. Based on the results of the assessment, the Consultant will be able to specify the appropriate grass seed mix and the appropriate fertilizer (if required) in the tender package.

Where the disturbed area will be greater than 1 hectare and where “Seeding” is either specified or is considered incidental to the Work; the Consultant will be required to perform the following additional tasks as part of the design and tender package preparation:

- The Consultant shall perform a vegetation assessment of the right-of-way to determine the presence of native plant communities, and to determine the limits for reseeding with either native seed mixture or agronomic seed mixtures. Vegetation characteristics on adjacent properties shall be considered when determining whether to use native or agronomic seed mixtures.
- In those areas where reseeding with agronomic seed mixtures is appropriate, the Consultant shall perform topsoil analysis on the basis of a minimum of one sample per kilometer, and where there are distinctive soil type changes.

Where topsoil samples have similar consistency along an uninterrupted length of the project, the individual samples shall be blended together. An uninterrupted length is defined as a portion of the right-of-way with consistent soil types, and no geographical obstacles such as watercourses or major intersections. Each remaining topsoil sample (individual and/or blended) shall be tested to determine the appropriate fertilizer composition and application rate. Based on the results of the vegetation assessment and the topsoil analysis, the Consultant will develop a seeding and fertilizing plan for the project. The seeding and fertilizing plan will be incorporated into the tender documents. The mixtures lists, seed mixtures zones map and Special Provisions are included in ‘Appendix F: Vegetation Assessment’.

4.10 Weed Survey

During the pre-tender phase a weed survey must be completed, within the growing season, along the right-of-way for those projects where grading work is required, including Department controlled borrow excavations and aggregate pits in order to establish a bench mark for post-activity assessment. The Landowner (where an agreement exists) and the Project Administrator shall be advised of the presence of prohibited noxious weeds and noxious weeds that are listed within Schedule 1 and 2 in the ‘Weed Control Regulation‘.

The location of prohibited noxious weeds and noxious weeds within the right-of-way where grading work is required and/or within Department controlled borrow excavations and aggregate pits shall be clearly delineated by the Consultant in order for the Contractor to destroy all prohibited noxious weeds, control all noxious weeds, and prevent the scattering of nuisance weeds during the construction phase.

The ‘*Weed Control Act*‘ also states that the movement of a machine or vehicle is prohibited if the movement is likely to cause the spread of a noxious or prohibited noxious weed. Equipment, materials, and vehicles exposed to noxious weeds or prohibited noxious weeds shall be cleaned prior to leaving an infested site.

4.11 Contaminated Sites

If, during the course of any investigations or work the Consultant believes, or has a reason to believe, that any property may be contaminated, the Consultant must immediately report the contamination to the Project Administrator. Further direction will be given to the Consultant at that time.

4.12 Environmental Regulatory Tracking Application

The Consultant is responsible for tracking, maintaining, and regularly uploading project-level environmental documents, reports, regulatory permits, non-compliance incidents, and commitments into the 'Environmental Regulatory Tracking Application' (ERTA). This includes but is not limited to:

- Environmental Evaluations
- Environmental Regulatory Permits
- Environmental Risk Assessments
- Environmental Construction Operations Plans
- Monitoring and Inspection Results
- Meeting Minutes/Notes with Stakeholders
- Release Reporting
- Post Construction Monitoring Reports
- Environmental Site Assessments
- Setting and maintaining deadline reminders, such as permit expiry dates, for automatic email notification

Section 5: Engineering Assessment

5.1 General

The purpose of an Engineering Assessment is to determine the scope of work of a design and construction project at the conceptual level in advance of preparing a Terms of Reference for the project.

Note: Engineering Assessments are not normally included as part of a Design/ Construction Supervision engineering assignment, however, if they are, this will be stated in the Terms of Reference for the assignment.

5.2 Roadway Engineering Assessments

A Roadway Engineering Assessment typically includes a review of the roadway geometric and operational characteristics using safety, traffic, and roadway engineering principles with the purpose of identifying measures which could improve road operations and safety for all road users.

The fundamental parameters that are normally established at the planning/Engineering Assessment stage are as follows:

- Design speed, posted speed
- Design designation (surface width, overlay acceptable or widening required)
- Geometric improvements needed
- Lighting (warranted or not)
- Traffic signals, roundabouts, interchanges (required or not)
- Safety improvements
- Bridge requirements and assessments
- Railway at-grade crossings (improvements warranted or not)
- Surfacing strategy and basic pavement structural design

A more comprehensive description of roadway engineering assessment information is provided in the following sections.

5.2.1 Geometric Assessment

Geometric Assessments are primarily undertaken on existing highway segments identified for pavement rehabilitation and/or geometric improvements. Usually, the Region identifies the need to conduct a Geometric Assessment and initiates a project under a separate engineering agreement. Alternatively, Geometric Assessments may be done as a first step with Preliminary Engineering of a detailed design project.

The scope of a Geometric Assessment and type of analysis required, will depend on the nature and cost of the work being considered. The requirements for a project will be described in detail in the Terms of Reference. Additional information is contained in Chapter G of the 'Highway Geometric Design Guide' and in the Roadside Design guide.

Contact the Project Administrator for access to available department information to assist in the review.

Information on the existing roadway elements and appurtenances can also be gathered from existing records. Some information, for example super-elevation rates on existing curves and intersection sight distances available at intersections, can only be measured accurately from an on-site survey. A full survey (e.g. preliminary survey) is not required at the Engineering Assessment stage, however, a limited amount of survey work may be needed to check existing cross section elements (e.g. side slopes), barrier, existing intersection configuration, sight distances, culvert condition, existing pavement width, roadside hazards, utility and illumination.

5.2.2 Road Safety Audit

The purpose of Road Safety Audits is to identify potential road safety issues and make suggestions within a functional plan, design, or prior to opening of a highway transportation project.

The latest version of 'The Canadian Road Safety Audit Guide: A Book in the Canadian Road Safety Engineering Handbook (CRaSH)' issued by Transportation Association of Canada (TAC) shall be followed for all road safety assessments associated with changes to roadways or interchanges.

5.2.3 In-Service Safety Review

In-Service Safety Reviews are engineering studies of an existing highway segment or its component with the purpose of identifying cost-effective countermeasures that would improve safety and operations for all road users. An In–Service Safety Review is generally done as a stand-alone assignment under a separate engineering contract. The scope of an In-Service Safety Review is defined in detail in the Terms of Reference for that project.

An In-Service Safety Review is focused on a particular safety or operational problem, occurring at a defined location such as an intersection, interchange, curve, or bridge. Typically, a problematic location is identified through the process of network screening. Safety or operational problems at a candidate location may also be identified by members of the public, municipal officials, or elected representatives.

An In-Service Safety Review involves a structured review and analysis of the collision history, in particular, a breakdown of collision types and rates in conjunction with a review of the existing geometric parameters and analysis of traffic operational efficiency. An In-Service Safety Review could also include traffic conflict observations and a human factors assessment. The study usually results in the identification of geometric or operational deficiencies and the development of countermeasures to address these problems.

In-Service Safety Reviews make use of the following types of information:

- Core Data Requirements
- Site physical characteristics
- Surrounding land use
- Road classification
- Design and posted speed
- Vertical and horizontal alignments features
- Cross-section elements including lane configuration and width, shoulders and super-elevation
- Geometry of auxiliary lanes at an intersection and sight distances
- Transit facilities including bus stop locations
- Roadside elements such as embankments, boulevards, ditches, barrier (type, location and condition) and fixed object hazards
- Pedestrian facilities and control
- Roadway lighting
- Traffic information and operational characteristics
- Traffic volume, hourly and daily
- Traffic composition (vehicle types)
- Bicycle traffic volumes
- Turning movement diagram at an intersection
- Pedestrian volumes (vulnerable road user volumes such as schoolchildren, and elderly)
- Level of service
- Pavement markings
- Posted speed, general and advisory, running speed (85th percentile and average
- Parking regulations
- Traffic control devices and their locations
- Traffic signal characteristics
- Collision Information
- A five (5) year collision history
- Breakdown of non-animal and animal collisions
- Collision types and severity
- Collision diagram (showing direction of travel of vehicles involved in a collision)

The Department has compiled a five (5) year historical record of the safety performance of all plotted single and double digit Provincial highways (highways outside of cities) to identify operational problems at both spot locations and along segments of highways. Summaries of collision data for primary highways are available from TIMS: Reporting, AT Maps, or NESS (Alberta Transportation Extranet). Please contact the Department to obtain highway collisions inside cities.

Supplementary Data Requirements:

- Traffic conflicts (near misses) observations
- Additional traffic measurements (e.g., speed measurements, gap analysis)
- Stakeholder input
- Human factors review
- Technical information reported by the police including date, time, weather, light condition, pavement condition, collision severity, and travel direction
- In some situations, it may be important to analyze traffic operational efficiency to determine if any of the operational factors contribute to safety problems. The efficiency of traffic operations shall be evaluated using a capacity analysis in accordance with the procedures of the latest version of the 'Highway Capacity Manual: A Guide for Multimodal Mobility Analysis' or the 'Canadian Capacity Guide for Signalized Intersections (CCG)'.

Depending on the nature of the problem and socio-economic needs, an In-Service Safety Review may also require stakeholder input or consultation. The scope of the stakeholder consultation will be described in detail in the Terms of Reference for that project.

An In-Service Safety Review will identify appropriate types of countermeasures and improvements to mitigate the existing safety problems, to best meet the needs of all road users and the Department.

The countermeasures should be grouped into workable improvement strategies based on the time frame for their implementation (i.e., short, medium, and long term strategies).

Short term, inexpensive strategies provide opportunity to improve safety at locations where the cost of major upgrading is not justified or warranted. Examples of short-term, low cost measures are signing, chevrons, pavement markings, rumble strips, animal reflector posts, etc.

Medium and long term improvement strategies are typically more expensive and may require planning and design work, possibly the acquisition of right-of-way and public consultation. Examples include the addition of a left-turn lane, installing a new signal and even grade-separation or roadway re-aligning.

In many instances, an improved safety performance can be achieved with the implementation of the immediate countermeasures, which often reduce the need for more expensive long-term improvements. Therefore, it is preferred that an In-Service Review identify countermeasures that could be effectively applied in the short term.

Where major improvements are warranted, the extent of these improvements, together with the estimated capital cost and internal rate of return for the improvement, shall be provided. The internal rate of return shall be calculated according to the Department's latest version of 'Benefit Cost Model User Guide' considering total societal costs and benefits over the life of the project.

Although the main focus of an In-Service Safety Review is to determine engineering countermeasures, an analysis may also reveal the need for education and enforcement strategies to counter specific driver or pedestrian behaviours. Recommendations for enforcement and education should be supplementary to thorough road-engineering based recommendations.

5.2.4 Railway Crossings

At those locations where the proposed roadway alignment crosses a railway, or where it is proposed to widen an existing railway crossing, a special survey shall be completed to provide details of any railway crossing signals, control boxes or power sources present. The complete details of survey requirements and typical plans for railway crossings are shown in 'Section 2 of the Engineering Drafting Guidelines for Highway and Bridge Projects'. Information on Road/utility crossing agreements, cost sharing arrangements with railway owners and at grade crossing standards are available at the websites of 'Canadian Transportation Agency (CTA)' and 'Transport Canada (TC)'.

Refer to ‘Section 10.5: Railway Crossings’ of this document for further details.

5.2.4.1 At-grade Railway Crossing Applications

Where an existing public at-grade railway crossing is under consideration for safety improvements, an Engineering Assessment is undertaken to establish the need for improvements and to decide on the appropriate type of treatment.

The assessment includes preliminary assessment of need, and preparation and submission of applications for safety improvements at new or existing crossings. The assessment involves consultation with all parties involved, especially those who may be cost sharing on the improvement. The initial assessment may include an on-site joint inspection.

Where there is general agreement that safety improvements should be made at an existing public at-grade crossing, a formal application must be prepared and submitted to Transport Canada, the Railway Company, and any other party involved as per current federal regulations. The Transport Canada Railway Safety Directorate should be contacted during the preliminary engineering stage. Public at-grade railway crossings on national railways (such as CPR and CNR) are under federal jurisdiction. Improvements to existing crossings or construction of new ones require not only agreement from affected railway companies but also adherence to federal guidelines and standards.

If the proposed road work will affect a railway crossing, the railway company shall be consulted in a timely manner for their review of potential impacts to their operations, review of engineering requirements, and cost estimate. Railway input on drainage treatment, planking material, utilities, and signal hardware placement is also needed to avoid potential conflicts, costly re-construction, or delays in waiting for an agreement.

Since certain railway safety improvements (signals, sight line improvements, etc.) are partially funded by Transport Canada and the Railway Company, application for improvements shall be submitted well in advance as the approval process can take up to 18 months. If Transport Canada is not cost-sharing, there is no need to submit an application to them. If a cost-apportionment dispute develops and a submission to the Canadian Transportation Agency (CTA) for resolution is made, a turn-around time of 90 days should be expected.

A general review of traffic, train volumes, and the safety record of the crossing will also help determine the need for signals and other protection works.

The latest version of ‘Grade Crossing Standards‘ for at-grade crossings and ‘Grade Separation Assessment Guidelines‘, Transport Canada should be followed for the preliminary engineering assessment and application. For Grade Separated structures additional information are available in ‘Section 11: Bridges’. For information in plain language please refer to ‘Transport Canada‘ website.

Refer to ‘Section 11: Bridges’ of this document for grade separated railway crossings.

5.2.5 Highway Lighting, Traffic Signals and Pedestrian Crossing Control

The assessment of the need for installation or upgrade of existing highway appurtenances is frequently required at the engineering assessment stage of a design project and may also be required as part of an operational review on an existing in-service highway. For this reason, the analysis of the need for Highway Lighting, Traffic Signals and Pedestrian Traffic Control may be undertaken under a separate engineering contract. The following section and referenced documents should be used for evaluating highway illumination, traffic signals and pedestrian crossings.

5.2.5.1 General

The Department receives requests from municipalities and the general public regarding the installation of traffic control devices such as highway lighting, traffic signals, roundabouts, and pedestrian crossing control at selected locations throughout the province. These requests usually require an investigation of existing traffic data, a warrant analysis, and good traffic engineering judgment, to assess the required need. A warrant analysis is used to compare the operation, safety and uniform application of highway lighting, traffic signals, and pedestrian crossing control with other locations in the province. However, the warrant calculation (number of priority points obtained) is not absolute and requires sound engineering judgment on the safety and operational implication of installing the traffic device. The use of warrants for street lighting, traffic signals, roundabouts, and pedestrian crossing control is necessary to develop consistency in prioritizing of installation/upgrading/maintenance of these traffic devices. A warranted application also promotes drivers’ compliance with traffic control devices that could help solve operational safety problems.

5.2.5.2 Scope Outline

The following general steps are required to assess whether highway lighting, traffic signals, or pedestrian crossing protection devices are warranted.

- Review background information relating to the candidate location. This information can be requested through the Project Administrator and Central Records.
- Review current operations with the District Operations Manager, Operations Engineer, Maintenance Contract Inspector, or other Department staff.
- Review with appropriate stakeholders involved (e.g. discuss with school administration if the request is a pedestrian crossing in the vicinity of a school).
- Public consultation is not normally required as part of the assessment.
- Obtain the most recently available collision summary from Transportation Safety Services. Review collision types to ascertain whether the requested traffic control would address the collision type.
- The Department will provide access to traffic information for the analysis. If traffic information is unavailable, or if a manual count has not been undertaken within the previous three (3) years, an up-to-date traffic count would be desirable. A traffic count, if required, is generally done through existing contractors (under contract to the Department). However, in some cases a special count may be done by the Consultant using Departmental procedures if specifically requested by the Project Administrator.
- Obtain aerial photos, maps, plans, drawings, etc. to determine the geometry and development in the area. Note other sources of signals and lighting in the area.
- Undertake a site reconnaissance to observe the overall operations at the location at an appropriate time. Note that an examination of the site may be required during darkness (e.g. for illumination).
- Undertake warrant calculation using appropriate warrant procedure.
- Assess other various options including lower cost alternatives such as other intersection improvements possibly relating to other traffic control devices, roundabouts, lane markings, delineation, minor geometric adjustments, etc., to address the problem and possibly postpone the need for traffic signals and/or lighting.
- Provide an estimate of costs, need year, and staging for the suggested traffic control scheme, including other possible low-cost alternatives for better operations.
- The Department specifications for materials used in lighting should also be compatible with the standards set by the industry. This will ensure that service equipment used will serve both old and new lighting systems, and that the replacement material is readily available.
- Report the results of the engineering assessment in a draft document for review by the Project Administrator and others.
- Modify draft report to include Project Administrator's and others comments.

Turning Movement Diagram or speed data collection may be required at selected sites, based on a request from the Project Administrator.

5.2.5.3 Highway Lighting

Transportation and Economic Corridors (TEC) adopted the Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting (2006) and will apply to all projects which involve lighting installations on the provincial highways. The general design guidelines from the 'Provincial Highway Lighting Guide' (including general design requirements, construction and maintenance) are still the primary guidelines to be used on the provincial projects. The following summarizes the lighting design topics and new guidelines from the TAC Guide that should be used when planning or designing a lighting system on a provincial highway:

- New Guidelines for Planning and Design of Roadway Lighting
    - Warrants for Roadway Lighting adopted from the TAC Guide for the Design of Roadway Lighting (2006)
    - Section 9.1, Sub-section 9.1.3, Pedestrian Related Definitions should be applied in conjunction with the roadway definitions (roadway definitions as provided in the provincial guide).
    - Section 9.4.4, Roadway and Interchange Warrant Form.
    - Figure 9.9 Warrants for Lighting Arterial, Collector and Local Roads – the warrant procedure should be used on all provincial arterial and collector highways (two lane two[1]and three-digit highways).
    - Figure 9-10 Warrant for Lighting Expressways-Highways.
    - Figure 9-11 Warrant for Lighting Freeways.
    - Figure 9-12 Warrant for Lighting Interchanges.

- Section 9.4.6 Partial Lighting of Freeway On-Ramps and Off-Ramps.
- Section 9.4.7 Gaps in Continuous Lighting on Roadways between Intersections and Interchanges – the guidelines should be used when determining the need for in-fill lighting.
- Section 9.4.7 Underpass, Overpass and Bridge Lighting – the TAC guidelines incorporate the recommendations from research studies, IESNA RP-22 Report and should be used when determining the need for lighting on bridges, underpasses and overpasses.
- Section 9.5.5 Transition Lighting – Table 9.4 Recommended Minimum Lengths of Transition Lighting.
- Chapter 11, Roundabout Lighting – the new TAC Guide includes a comprehensive set of guidelines devoted to the design of lighting at roundabouts. The guidelines should be used for projects involving lighting installations at a roundabout.
- Section 12.4 Midblock Crosswalks Warrants – the guidelines apply to all mid-block crosswalks with nighttime pedestrian activities.
- Section 13.4 At-Grade Railway Crossings Warrants – the guidelines incorporate recommendations for lighting at railway crossings published by Transport Canada.

The need for lighting at intersections should be determined using the warrant system described in the TAC Guide for Illumination of Isolated Rural Intersections.

- Lighting Design Criteria − Section 9.5 Roadway and Interchange Lighting Requirements
  - Section 9.5 Roadway and Interchange Lighting Requirements Table 9.2 Luminance Criteria for Roadways and Interchanges – all roadway lighting designs should be based on the luminance criteria included in Table 9.2. The roadway design projects should use the luminance method as the primary lighting calculation method and follow the design requirements recommended in Section 9.5.
  - Section 9.5.3 Horizontal and Vertical illuminance for Sidewalks – the guidelines from this section should be used in conjunction with Table 9.3 Recommended Values for Pedestrian Areas.
  - Section 10.5 Intersection Lighting Requirements.
  - Table 10-1 Recommended Illuminance Levels for Full Intersection Lighting.
  - Table 10-2 Recommended Illuminance Levels for Partial Intersection Lighting. The primary lighting calculation method for the intersection lighting design is the illuminance method.
  - Intersection lighting design should be based on the illuminance criteria from Tables 10.1 and 10.2 and follow the design requirements from Section 10.5.
  - Section 10.5.3 Delineation Lighting – the guidelines should be used when designing delineation lighting at an intersection.
  - Chapter 11, Roundabout Lighting – all the design considerations, lighting requirements and design calculations from this chapter should be used when designing a lighting system at a roundabout.
  - Chapter 12, Mid-block Crosswalks – all the design considerations, lighting requirements and calculations apply to mid-block crosswalks.
  - Chapter 13, Railway Crossings - all the design considerations, lighting requirements and calculations apply to railway crossings.
  - Chapter 16 –Off Roadway Facilities Walkways and Bikeways - Lighting levels for walkways should be established based on Table 16.1 Recommended Illuminance Levels for Walkways and Bikeways. Weight Scales - Lighting levels for weight scales should be established based on Table June 2006 (Page 3 of 3) 16.2 Lighting Criteria for Weight Scale Facilities.
  - Rest Areas - Lighting levels for rest areas should be established based on Table 16.3 Recommended Illuminance Levels and Uniformities for Rest Areas.

5.2.5.4 Lighting Fixtures / Luminaire

TEC has adopted energy efficient Light Emitting Diode (LED) luminaires for use on all new lighting systems installation along provincial highways. LED lighting technologies and luminaire options for roadway applications have advanced significantly in recent years. LED luminaires for roadway applications are recognized as having economic and environmental advantages over other types of luminaires through energy and maintenance cost saving, extended life cycle, reduced carbon emissions, reduced light pollution and improved lighting quality.

Alberta's Provincial highway lighting system uses about 2.4 million Canadian dollars on energy consumption per year which is approximately 90% of the department's utility power consumption. To take advantage of the potential savings that LED luminaires may bring and the reduction on carbon emissions, TEC will take this opportunity to start

using LED luminaires on new lighting systems and to retro-fit existing lighting systems as opportunity arises. Following are the key changes:

- LED luminaires shall be used on all new lighting systems installed along provincial highways including lighting systems for Highway Safety Rest Areas, Truck Staging Areas, and private developments along provincial highways warranting access and egress lighting for improving traffic operations and safety.
- All new lighting systems using LED luminaires must be designed to meet lighting level requirements for the roadway class and its application, taking into consideration of light loss factors, grid spacing, average luminance, maximum uniformity ratios, and maximum glare.
- Retro-fitting existing highways systems using LED luminaires should be assessed on an individual case basis. The lighting systems' age, pole conditions, and other factors such as highway geometrics and / or traffic operational changes should be taken into consideration when determining LED luminaire conversion.
- All LED luminaries must meet specification as posted on the following documents.
- TEC LED luminaire Selection/Appraisal Specification.
- TEC Product List.
- All new and retro-fitted lighting system with LED luminaires shall have the installation date, wattage, and make and model recorded. This is to ensure that future replacement of the luminaires is carried out within their appropriate designed life span.

The 'Pedestrian Crossing Control Guide (2018), Third Edition', issued by Transportation Association of Canada (TAC) shall be followed for pedestrian crossing and the 'Traffic Signal and Pedestrian Signal Head Warrant handbook, 2014', issued by (TAC) for traffic signal and pedestrian signal assessment.

5.2.5.5 Warrant Analysis

The following publications are generally used in calculating the warrant for each type of traffic control:

- 'Traffic Signal and Pedestrian Signal Head Warrant Handbook' issued by TAC, available at PTM-TSPSHB-E | tac-atc.ca.
- Traffic signals are considered at a threshold value of 100 points.
- The latest version of 'Pedestrian Crossing Control Manual' issued by TAC, available at Pedestrian Crossing Control Guide (Third Edition) | tac-atc.ca.

The Department generally follows the hierarchy of pedestrian crossings outlined in the TAC guide.

- 'Illumination of Isolated Rural Intersections', and 'Guide for the Design of Roadway Lighting'.
- The guide for 'Illumination of Isolated Rural Intersections' available at PTM-IIRI | tac-atc.ca shall be used to determine the requirement for lighting at rural or semi-urban intersections. The guide outlines three types of highway lighting: full, partial, and delineation lighting, which is recommended based on the warrant calculations. When selecting the type and the extent of the lighting, several factors need to be considered including presence of lighting at adjacent roadway sections, presence of lit roadside development, presence of vulnerable road users during reduced visibility conditions. The Consultant shall also use engineering judgment in recommending the appropriate type of lighting treatment.
- The 'Guide for the Design of Roadway Lighting' available at PTM-LIGHTING06 | tac-atc.ca shall be used to determine the type and extent of roadway lighting along highway segments and their elements (e.g., curves, bridges). Lighting is usually justified when the warrant calculations reach given threshold values.

5.2.6 Traffic Data (Turning Movement Studies, Traffic Speed Data Collection)

The Department frequently requires traffic data for planning, engineering assessment and detailed design purposes. The Department maintains an extensive database of current information and retains the services of a consulting engineering company to collect new information as required. In the event that normal processes cannot be used to obtain or compile the required data, an appropriate traffic study (i.e., speed data collection or turning movement count) may be undertaken either in conjunction with a preliminary Engineering Assessment or as a stand-alone assignment under a separate engineering contract.

5.2.6.1 General

The Department is the authority responsible for setting speed limits on provincial highways. Often to assist with the setting of speed limits on various highway sections, special traffic speed data collection is required at selected sites to

determine speed and turning movements. The following section provides details of turning movement and speed data requirements.

5.2.6.2 Turning Movement Counts

Existing turning movement counts on highway intersections are available online from the 'Traffic Data Map'. The Consultants should refer to 'Section 1.10.5: Traffic Volume Data' under - Data Sources for more information.

5.2.6.3 Speed Data Requirements

The Consultant may choose to collect spot speed data by a reliable method as they see fit. This may be done through manual observation using a radar device, or through the placement of portable equipment to automatically record vehicle speeds.

The Consultant should develop a plan to undertake the speed study that considers the following:

- Duration of study (e.g., 24 hours)
- The date(s) of the study (weekday vs. weekend vs. holidays, during school year, non-winter, etc.)
- The time(s) of the study (e.g., AM peak, PM peak and off-peak)
- The method of data collection (i.e., automated collection allows for a longer study period than manual collection) Note that the method of the data collection may be driven by the other considerations.

Periods of inclement weather, poor driving conditions, and congested periods, which may alter the speed results, should be avoided.

The following information is required for speed data:

1. Highway number, control section, and kilometre
2. Date and day of week
3. Location description
4. Start and end times
5. Sampling scheme (as indicated on the request)
6. General weather and wind conditions
7. Posted speed and limit of speed zone
8. Direction of traffic being monitored
9. Lane observed
10. Vehicle number (number of sampled observations with recorded speed)
11. Road surface type and condition

The Consultant is responsible for performing a statistical analysis of the raw spot speed data, including mean speed, 85th percentile speed, median, mode, and 15 km/h pace (15 km/h interval having the most occurrences). The results must be included in a graphical format.

5.2.7 Reporting Requirements

A written report is required for all Engineering Assessments for each roadway project, unless this is specifically excluded in the Terms of Reference. The report will include a copy of the completed Geometric Assessment or other relevant checklists, supporting documents, such as reproduced existing Department drawings (if available) or new drawings. The drawings shall show the geometric and other pertinent information, and recommendation for improvement.

As a minimum, these drawings shall show horizontal alignment, vertical alignment, cross-section elements, details of all major intersections, and any other pertinent information. The information on geometric improvement needs, shall be provided in an acceptable electronic format as per 'Design Bulletin 108: Implementation of authentication for electronic submission of engineering documents' that can be used for a Terms of Reference for detailed design and construction supervision components of the work.

A relatively detailed construction estimate shall also be provided in the report. This estimate shall be more precise than an “A” Estimate since adjustments would have been made for all of the identified geometric improvements.

Draft reports should be sent to the Project Administrator for review. Comments from the Department should be taken into consideration before finalizing the reports. Departmental acceptance is required for all Engineering Assessment reports due to the cost implications to the construction program.

The Consultant may be required to participate in an Engineering Assessment completion meeting if issues arising from their submission cannot be satisfactorily resolved.

5.3 Surfacing Engineering Assessment

The Department develops a Multi-Year Construction and Rehabilitation program on an ongoing basis. This program identifies the projects which are proposed for construction on the provincial highway network. Construction programming is a continuous process and is subject to revisions due to changing circumstances in terms of projected expenditures, current budget levels, and technical needs.

Since the surfacing strategy has major cost implications for construction projects, it is important that an appropriate Engineering Assessment is undertaken to identify the scope of work prior to detailed engineering. Normally, this is done by the Department’s regional Consultants as an assignment under the Roadway Preliminary Engineering Regional Assignments and included in the Terms of Reference for detailed design.

The current Roadway Preliminary Engineering Regional Assignments include the development of Surfacing Strategies for new construction (base and paving), final paving, rehabilitation, widening, and roundabout projects that are scheduled for detailed design and subsequent construction. The work is completed in general accordance with the Department’s latest version of ‘Pavement Design Manual’ and ‘Guidelines for Assessing Pavement Preservation Treatments and Strategies’. It is worth noting that surfacing strategies have an expiry date after which they are no longer valid for detailed design and construction purposes and must be re-designed.

In the event that the surfacing engineering assessment is included as part of the preliminary engineering tasks for the detailed design project, the work shall be done in accordance with the above-noted manual, guidelines, and design bulletins and consist of the following:

- Obtain design inputs such as project description and limits, traffic, planning report, mosaic plans, soil logs, as-built pavement structures, pavement evaluation data (Falling Weight Deflectometer (FWD), International Roughness Index (IRI), rut measurements, and laser crack measurement system (LCMS) data) from the Department, as applicable.
- The Consultant’s Design Engineer shall conduct and document a detailed field reconnaissance for all final paving, rehabilitation, widening, and roundabout projects.
- For existing grades (base and paving projects) it may be necessary for the Consultant to undertake a field reconnaissance to confirm the existing subgrade width and subgrade condition if this information cannot be obtained from the Department.
- Carry out the analysis and interpretation of FWD testing data in accordance with the ‘Pavement Design Manual’ for the 10- and 20-year design life.
- Carry out design to establish basic pavement thickness, material types, assess potential viable treatment alternatives such as overlay, Cold In-Place Recycling (CIR), Full Depth Reclamation (FDR), cold mill and inlay, etc.
- Conduct a life cycle cost analysis for the viable treatment options to ensure the most cost-effective treatment is selected, keeping practicality and constructability in mind.
- For establishing that a project may be a suitable candidate for CIR, a review of past construction records and pavement condition data shall be carried out. Detailed field coring and laboratory evaluation program for evaluating CIR may be required.
- The Consultant shall include surfacing strategy(ies) for any geometric improvement elements as identified by a geometric assessment provided by the Department. These elements may include widening, intersection improvements, climbing lanes, access roads, and reconstruction.

In cases where a geometric assessment has not been carried out for a rehabilitation project, the Consultant shall confirm that finished widths meet the requirements of the Department’s 3R/4R guidelines in the ‘Highway Geometric

Design Guide'. If widths will not meet the 3R/4R guidelines, direction shall be sought from the Project Administrator. A design exception may be required.

A detailed draft report shall be submitted for acceptance to the Project Administrator and Surfacing Standards Specialist, Technical Standards Branch. That report shall include, as a minimum:

- Site plan showing project limits.
- All pertinent design inputs (i.e., existing structure, traffic, soils characteristics, etc.).
- Detailed field reconnaissance notes, including width measurements, identifying specific distress areas and other observations supporting design recommendations.
- Site photos to illustrate general roadway condition and typical condition of distresses such as cracking, rutting etc.
- Graphical presentation of calculated moduli, overlay needs, rut and roughness data, and existing cross sections.
- Discussion of the inputs used to arrive at the design recommendations and the rationale used in selecting the recommended design strategy.
- Recommended surfacing strategy(ies) and basic structural design including any special requirements such as pre-treatment of existing cracks.
- A "B" estimate based on the recommended surfacing strategy(ies) and current construction costs. Typical cross section drawings for the recommended structural design, including lift thicknesses, and required asphalt mix type and binder grade.

The final report shall also be submitted to the Project Administrator and Technical Standards Branch after any revisions.

5.3.1 Seal Coat Assessments

This Engineering Assessment is normally completed on a regional basis under the Terms of Reference of the Roadway Preliminary Engineering Regional Assignments. The Department provides the regional Consultant a list of potential seal coat projects and standalone bridge decks in a Region. The Consultant assesses and prioritizes the projects on the list in accordance with the latest version of 'Alberta Transportation Guidelines for the Assessment, Rating and Prioritization of Pavements for Seal Coat (Seal Coat Rating Guidelines)'. This involves assessing potential seal coat projects from on-site inspection of the pavement condition, gathering input from the Region (i.e., Construction and/or Operations Managers), and application of a set of criteria to evaluate the needs of particular pavements. The regional Consultant submits to the Project Administrator and Technical Standards Branch a report and all the scoring sheets used in the evaluation of the potential seal coat candidates. The regional Consultant also provides a unit cost estimate for each of the projects including the cost of the seal coat and the cost of pre-seal-coat crack repair. The Regional lists are compiled by Technical Standards Branch for development of the annual seal coat program. This annual program is then sent back to the Regions for detailed design and Tender Package preparation by the Consultant.

5.4 Bridge Assessments

The procedure to be followed for Bridge Assessments is covered in 'Section 11.16: Assessments'.

Section 6: Preliminary Engineering

6.1 General

Before undertaking any preliminary engineering, Consultants are to revisit any pertinent planning and Terms of Reference (TOR) documents to examine basic assumptions, current design practices, concepts, staging plans, cost-effectiveness (based on life cycle costing methods), safety, preservation of design flexibility for the future, and other considerations. The Consultant shall ensure that all decisions related to the above are fully explored, discussed and agreed with the Project Administrator before proceeding with preliminary engineering.

The Consultant shall revise/update and/or undertake any of the following preliminary engineering tasks as stipulated in the Terms of Reference for the project.

In preparation of the Preliminary Engineering work and Report (also referred to as Preliminary Design), refer to 'Section 7: Utilities' for utility requirements.

6.1.1 Bridge Conceptual Design

Bridge Conceptual Design is a distinct and different process compared to roadway preliminary engineering, as further described in 'Section 11: Bridges'. The bridge conceptual design process combines planning, hydrotechnical design, relevant roadway preliminary engineering, and detailed geometric design to provide pre-design parameters for structural design for bridge structures. The timing and complexity of bridge conceptual design is dependent on the type of bridge and crossing under consideration. It is normally undertaken well in advance of detailed structural design of the structure. Early advancement of roadway preliminary engineering components such as survey and finalization of geometric design parameters at the structure and approaches, along with constant coordination between the roadway design engineer and the bridge conceptual design engineer, are generally required for success.

6.1.2 Roadway Work Under Structure

Any pavement work that disturbs the granular base course shall be discussed with the Regional Bridge Manager to ensure that the proposed disturbance of the granular base course does not adversely affect any component of the bridge.

6.1.3 Project Set-Up and Review of Existing Information

The Consultant shall assemble and review all relevant information (i.e., existing design and project data) available from Transportation and Economic Corridors (TEC) and shall plan a Preliminary Engineering Strategy based on this information. Data collected for the Department during the Preliminary Design phase, or provided by the Department prior to or during the preliminary design phase, shall be verified and meet the consultant's satisfaction before being used for the design or otherwise inform design decisions.

6.1.4 Preliminary Survey

6.1.4.1 General Requirements

The Consultant shall complete a preliminary survey that may include:

- Title search
- Horizontal and vertical survey
- Survey control points
- DTM modeling
- Survey transit notes

All surveys shall be referenced to the Alberta Survey System, NAD83, 3 Grid coordinate system. All plan measurements shall be stated in ground distance derived from 3TM Grid coordinates and in accordance with the following:

- The Combined Factor shall be established, at a minimum for each Point of Inflection in the projects;
- Coordinate information along with the Combined Factor information shall be clearly stated on drawings

For general roadway work, the following survey closure accuracy shall apply:

- Vertical level circuit closure accuracy allowable error (mm) = 12 x square root (distant of circuit (km))
- Horizontal linear closure to within 1 in 5000

For sensitive (critical) locations with very high accuracy requirements (e.g., bridge structures, curb & gutter, etc.), survey closure accuracy shall be suitably precise to meet construction tolerances.

6.1.4.2 Chainages

Chainages should be set up in accordance with the Department's Linear Referencing System (LRS). For highways, they begin on the south end of projects running in a general south-north direction and on the west end of projects running in a west-east direction. The chainage at the beginning of a project shall match the control section LRS kilometer (km) value at the same location. For example, if the km value is 10, the initial chainage is 10+000. For interchange ramps, chainages begin and end at the anchor points and increase in the direction of travel.

Note: The 'km' is defined as the length along centre-line from the beginning of the control section, with the south end of each control section being '0' on north-south alignments and the west end being '0' on east-west alignments. TEC Control Section Numbering System and Kilometre Datum Measurement must be used.

Twinning projects may require special chainage e.g. along centre-line or independently along each roadway if they are independent alignments, however the same general convention should be followed where feasible.

If there are questions regarding the use of the Department's LRS, contact the Project Administrator for clarification.

6.1.4.3 Construction Control Points

Control points, as references for future stages of construction, shall (as needed) be established, during the pre-tender phases, at locations that will provide protection from damage or loss. The construction, location, and marking of these control points shall be appropriate to ensure their integrity for the duration of the project. Steel Pins (min 45cm) are considered sufficient as control points. Brass caps shall not be used for construction control points due to possible confusion with legal survey markers.

6.1.4.4 Elevations

Elevations during bench mark levelling are to be recorded to the nearest 0.001m (the third decimal figure is usually estimated).

6.1.4.5 Bridge Surveys

Sufficient survey information shall be collected to support design and reporting requirements as per the 'Bridge Conceptual Design Guidelines'.

6.1.5 Drainage Review

Drainage review includes but is not limited to the following: Side Ditches, Medians Ditches, Non-Bridge Sized Culverts, and Storm Water Management Facilities.

The condition of all existing culverts shall be checked and inventoried. The sizing of the ditches, culverts, and storm-water management facilities, existing and proposed, should be checked to ensure it is appropriate and adequate to allow safe passage of a design rainfall event, along or across the highway with consideration of the direction provided in Chapter C drainage sections (C.4.1 for rural roads and C.5.1 for urban roads) of the 'Highway Geometric Design Guide'.

If any culverts are deteriorated, they shall be checked for excessive deformation to see if the condition is suitable for installation of a liner. If the culvert is deformed too much to install a liner, then the Consultant shall recommend an alternative to rehabilitate/replace existing culverts. Best practice guidelines are available on the Department web-site for the selection of both new culverts and culvert liners.

All drainage patterns along and adjacent to the roadway alignment shall be determined and surveyed (if necessary). The Functional Planning Report and Geometric Assessment Report (when available) will be reviewed, and additional verification of the condition of various drainage structures will be completed as needed.

6.1.6 Right-of-Way Coordination/Permission to Enter & Test

Prior to the commencement of roads, bridges, utility, or soil preliminary surveys on private or crown land, written permission shall be obtained and agreements shall be signed by the Consultant to survey and test from the property owners or renters, land management agency and/or Utility Owner where required. The Consultant shall obtain permission for cutting down of any trees, brushing or clearing outside of the right-of-way and a General Release of All Demands shall be signed by the Department.

Land acquisition has occasionally created problems for the Department and Utility Owners. The Consultant should advise Utility Owners as early as possible; even in the functional planning design stage. Once the right-of-way plans and the detailed design work are done, the Consultant should forward them to the Utility Owners immediately to allow the Utility to begin negotiating with the land owners for utility easements.

6.1.7 Geotechnical Requirements

Geotechnical site investigation, design and reporting requirements are outlined in ‘Section 8: Geotechnical Investigation and Design’.

6.1.8 Review Access Management

The Consultant shall review the access management for the project as outlined in the ‘Highway Geometric Design Guide’. Proper access management on highways enhances safety for all road users.

6.1.9 Sign Inventory

Existing signage on the project and signs adjacent to the project which may be affected by the proposed improvements shall be inventoried. The information collected shall include size, number, location and type of all signs (public and private). The condition of existing sign mounts, structures, and sign faces shall be noted. Faces that are damaged or non-reflective or obsolete shall be identified. See ‘Section 10.7: Signing’ for information on signing.

6.1.10 Geometric and Safety Assessment, and Surfacing Strategy

In the event that these activities have not been done in the Planning or Engineering Assessment stages, these activities may be included as part of the preliminary engineering tasks at the discretion of the Project Administrator.

See ‘Section 5: Engineering Assessment’ for details.

Where this work has been completed previously, the Consultant responsible for preliminary engineering is required to review the previously compiled data, engineering guidelines/warrants used, and the recommendations made.

Repetition of the original analysis and assessment undertaken at the planning or engineering assessment stages is not required unless new information has become available or some design guidelines or technical needs have changed.

Consultants shall strive to achieve highly cost-effective designs while meeting the standards which are appropriate for the highway according to the ‘Highway Geometric Design Guide’.

When pavement rehabilitation and/or geometric improvements are considered on existing paved roadways, the Design Engineer shall use the information contained in Chapter G - 3R/4R Geometric Design Guidelines of the ‘Highway Geometric Design Guide’. Where various options are being considered, for example for horizontal or vertical alignments, the guidelines contained in the “Benefit-Cost Analysis” shall be followed to ensure that total societal cost and benefits are considered in a uniform way.

- Any changes proposed to the original reports will be documented and accepted by the Project Administrator.
- Where a Geometric Assessment, Safety Assessment, Surfacing Strategy or other Engineering Assessment task must be completed at the Preliminary Engineering Stage, the reporting requirements are as shown in ‘Section 5: Engineering Assessment’. In the event that an Engineering Assessment was completed in advance of Preliminary Engineering, the Consultant is required to document any changes that are proposed to the previously accepted

recommendations. These changes should be supported by a suitably detailed rationale / analysis which may include a benefit cost analysis.

6.2 Reporting Requirements

An ASCII geographic coordinate file (xyz values such as latitude, longitude, elevation) is required for roads and bridge site surveys to be submitted to the Project Administrator upon completion of the preliminary survey. In cases where horizontal alignments are being improved or new alignments constructed and there is no planning study, an ASCII file of the alignment shall be submitted by the Consultant to the Project Administrator as soon as the horizontal alignment has been finalized in the field. The purpose of this submission is to facilitate the Project Administrator sending the information to the Highway Geomatics group to keep the inventory up to date. This digital ASCII file shall also include raw and processed data of survey, including geodetic datum, and any other survey specific information.

All titles, survey data, copies of all pertinent correspondence and the original or all permits and approvals (e.g. permission from Landowner to survey and/or enter land, and/or clear vegetation for survey purposes), shall be submitted to the Project Administrator as part of the project documentation at the completion of the project.

See 'Appendix K: Project Records Management' for more information on records management. The Consultant shall keep copies of all permits and approvals for their records. Any information that might affect the cost of the survey or incur liability to the Department shall be included.

Preliminary Engineering Reports for general projects may include but are not limited to the following:

Note: More information on this list is available within the respective sub-sections.

- Project scope description
- Design standards
- Data collection
- Reference documents
- Engineering Assessments (see 'Section 5: Engineering Assessment')
- Geometric design considerations
- Intersection improvement considerations
- Pavement design considerations
- Geotechnical considerations
- Roadside design considerations
- Drainage design considerations
- Bridge design considerations (see 'Section 11: Bridges')
- Functional design considerations and details
- Right-of-way considerations
- Utilities considerations
- Railway considerations
- Illumination design considerations
- Appurtenance considerations
- Environmental considerations
- Access management considerations
- Borrow considerations
- Potential design exceptions
- Plans/Drawings
- "B" Estimates
- Decisions sought

Section 7: Utilities

7.1 General

For the purpose of the Guidelines, “utility” and “utilities” mean all power lines, telecommunications lines, pipelines, and related support structures facilitating a utility system owned by others, and includes Department owned highway appurtenances (e.g., buried power cables of the highway lighting system).

Wherever possible and available, the Consultant shall contact the Department to obtain any necessary as-built drawings that show utilities and Department owned highway buried cables. These utility details shall be incorporated and included as part of the tender document.

The Consultant shall locate all utilities, prepare plans showing the location of utilities within the project area, and shall make arrangements to work with the impacted Utility Owners as soon as possible.

The Consultant shall determine the impact on all utilities affected by the proposed work. These impacts shall be conveyed to and coordinated with the Utility Owners.

The Consultant shall determine, in conjunction with Utility Owners, the most economical and practical method of utility crossing by investigating all possible options such as:

- Revision of alignment
- Highway grade-line adjustment
- Concrete slab pipeline protection
- Light weight fill
- Lowering
- Relocation
- Thermal protection (if required for water pipelines)
- Providing sufficient earth cover (i.e. ditch blocks)
- Removal of abandoned pipeline
- Other recommendations

It is the Department’s desire to have utility adjustments completed prior to commencement of the Contractor’s work whenever possible. In some cases, the utility relocation can be done a year ahead. The Consultant should contact the Utility Owners to ensure the relocation can be undertaken within the project timeline. The approval for such early utility relocation is required from the Department.

Projects involving utility adjustments require as-built drawings from Utility Owners upon completion of the utility work. The Consultant shall incorporate the utility as-built drawings into the Consultant’s drawings and submit to the Department as part of the Final Details.

When utility adjustment/construction work is considered in the vicinity where the road construction will be undertaken at the same time, the Consultant shall contact and liaise with the Utility Owner to avoid potential problems with the road construction work. The Consultant shall obtain information such as detailed plans/drawings, traffic accommodation, and construction schedule from the Utility Owner and coordinate all the information with the highway Contractor. See ‘Traffic Accommodation in Work Zones’ for further details.

- As the Department representative on site, the Consultant will communicate with Contractors and Utility Owners and may have to assist the Department in disputes between them when they are working in the vicinity of each other.

7.2 Utility Survey

7.2.1 Utility Search

The Consultant shall search and collect utility information within the project area for its design purposes. The Consultant shall identify and contact all affected Utility Owners to gather detailed utility information (e.g., type, age,

status, etc.), and to inform them of the proposed design and construction schedules. The utility search shall include, but is not limited to, the following:

- Contact "Utility Safety Partners" (formerly "Alberta One-Call") to locate utilities and respective Utilities Owners. Utility Safety Partners require a minimum of 3 to 5 business days advanced notice for the lines to be located. Response times may be longer during the busy season (May – September);
    - Consultants should be aware that not all Utility Owners subscribe to "Utility Safety Partners" and therefore additional searching may be required. Please note that Transportation and Economic Corridors is not a member of Utility Safety Partners.
- Contact utility regulators (e.g., Alberta Energy Regulator, Canadian Energy Regulator, Alberta Utility Commission, etc.). Search the regulators' website for utility maps and status;
- Review Department's as-built drawings;
- Search Land Title Certificates (ownership, easements, caveats, etc.);
- Review registered utility surveyed plans which are available at the Land Titles Office;
- Conduct site visit (e.g., utility markers, pedestals, casing vents);
- Contact adjacent Landowners (e.g., private water/sewer lines);
- Contact local municipality (e.g., municipal utilities);
- Conduct an on-site utility sweep if necessary (e.g., TECs' buried cables, privately owned lines that are not subscribed to Utility Safety Partners, etc.).

The Consultant shall document the status of the utilities (whether the line is active, discontinued or abandoned), when it was installed, etc. The Consultant shall complete a thorough investigation for all utilities within the project area. Searching all sources available as shown above will demonstrate due diligence on the part of the Consultant.

7.2.2 Utility Notification

The Consultant's first contact with each Utility Owner should be done at the preliminary survey stage as early as possible, in writing, and indicating:

- The Consultant name and contact personnel
- The Consultant is representing the Department for this project
- The project description, scope, and type of work
- The tentative design completion and tender advertising dates

A set of preliminary mosaic plans or township plans should accompany the letter, with each of the applicable utilities highlighted. The letter should request that the Utility Owner provides:

- Utility information (e.g., as-built drawings, type, size, location, depth, age, etc.) of all of its utilities within the project limits;
- The name, e-mail address, and telephone number of their contact personnel for design and field coordination.

The Consultant shall remain in contact with the Utility Owners, on a regular basis to provide updates and communicate requirements to Utility Owners, until the adjustment has been completed.

As soon as the need for utility adjustment has been identified, the Consultant shall communicate the requirement to the Utility Owner reiterating the schedule for the proposed roadwork and obtain a preliminary adjustment schedule from the Utility Owner.

7.2.3 Utility Locating

The Consultant shall be familiar with and follow the requirements of 'Section 447' and 'Section 448' of the 'Occupational Health and Safety Code' under the '*Occupational Health and Safety Act*' as well as Part 5 of the 'Pipeline Rules' under the '*Pipeline Act'* when working within vicinity of a buried utility. Any expected ground disturbance within 30 metres of a buried utility line requires a notification to the Utility Owner. For ground disturbance within the "hand exposure zone" (5 metres from the centre line of a high pressure oil/gas pipeline, or 1 metre from other utility lines), a written approval from the Utility Owner is required.

If ground disturbance is expected within 30 metres of a buried utility line, the Consultant shall make arrangements with the field representative of the affected Utility Owner to locate and flag the horizontal alignment of the utility line for the purpose of obtaining survey data.

Utility Owners are usually responsible for locating their own utilities without charging a fee to the requester. However, for non-commercial Utility Owners that are not registered with Utility Safety Partners and are not capable of paying for locating services, the Department will pay for the locating cost. The Consultant shall arrange for a qualified locator to locate and flag the cable alignments and collect all relevant data.

If ground disturbance is expected within the “hand exposure zone” (as defined above) of a utility line, in addition to obtaining the horizontal alignment, the Consultant shall verify the vertical depth of the utility line (by either hand exposing or hydrovac or air jet) and then recording the elevations (generally at the proposed ditch locations and right-of-way boundaries). This requirement is normally used for major pipelines (e.g., high pressure oil/gas and water/sewer pipelines) and may not be necessary for other utilities. It is the Department’s preference that the Utility Owners complete the exposure, and the Consultant ensures the cost charged by the Utility Owner, is reasonable and recommends the Department reimburse the Utility Owner directly.

Where it has been determined that exposure to sight is required, the exposure of the utility shall be undertaken by either the Utility Owner or a locator hired by the Consultant for the Department.

With the presence of field representatives of the Utility Owner (unless agreed otherwise), the utility line shall be exposed, and elevations taken both left and right in the proposed ditch areas and right-of-way boundaries. These four (4) elevations are critical to the roadway design and assessment of any potential utility alignment shift. The Utility Owner field representative shall be present during backfilling operations unless agreed otherwise. Backfilling with acceptable materials and appropriate compaction shall be done as per the applicable utility agreement. The Consultant shall monitor the backfill operation to ensure that the disturbed area is left in a neat and tidy condition.

The Consultant shall not make allowance for the cost of hand exposing the utilities by hydrovac (or other means of locating utilities) in their engineering proposal, as the cost of utility exposure will be paid directly by the Department. The Consultant shall be responsible for preparing utility crossing plans; scope of work definition for the purposes of retaining a Hydrovac Contractor for line exposure; preparing agreements for execution between the Department and the Hydrovac Contractor; preparing agreements for execution between the Department and the Utility Owners; coordinating field work between the Hydrovac Contractor and Utility Owner; surveying the horizontal and vertical information of the utility; tracking the Hydrovac Contractor's efforts; reviewing Contractor’s invoices; and updating utility crossing plans. The Consultant shall obtain any necessary approvals from Landowners and Utility Owners.

7.2.3.1 Low Pressure Gas Lines

In the case of low pressure gas line (maximum operating pressure of 700 kPa or less) running parallel to the highway, as the gas line is typically buried shallow and therefore adjustment is required in most cases where highway is realigned or right-of-way is widened. In such cases, it may be more cost effective for Consultants to simply arrange for utility adjustments based on the gas line’s horizontal alignment information and assumed minimum depth cover (e.g., 1.4 metre within highway right-of-way; 0.8 metre outside highway right-of-way) rather than undertaking a costly hydrovac survey.

7.2.3.2 Power Lines

It is critical to relocate power poles in a timely manner to facilitate the highway construction work. The Consultant shall contact the Utility Owners as soon as possible so the power poles can be relocated/removed prior to the commencement of the construction work.

During the survey of power lines, the exact location of poles and/or structures shall be noted by chainage and offset from the proposed centerline (it is important at this stage to determine whether the poles and lines are inside or outside the existing right-of-way in order to identify relocation cost responsibilities). The number of wires, height of conductors in the field, voltage, and ownership shall be noted. Information concerning voltage shall be obtained from the local power company representative. Detailed plans are required for any location where power lines cross the highway or other roadways which will be constructed, improved, or obliterated.

For all intersection work that will impact utilities, detailed plans shall be prepared and shall contain information such as power poles, power lines, traffic signals, street lighting, and work limits.

In the case of buried power facilities, the Consultant shall contact the power company to locate and flag their cable alignment and provide all relevant data. The exact location of the buried lines shall be noted by offset from the proposed centerline and crossings by the chainage.

7.2.4 Telecommunication Facilities

The Consultant shall contact Utility Owners to locate and flag the horizontal alignment of buried cables within the project limits. The exact location of telecommunication lines, junction boxes, and pedestals shall be noted. The size and type of cables shall be recorded and any special features shall be noted.

As telecommunication lines are typically buried shallow, it may be more cost effective for the Consultant to simply arrange for utility adjustment based on the line's horizontal alignment information and assumed minimum depth of cover (e.g., 1.4 metre when crossing a highway right-of-way; 1.0 metre (0.6 metre for copper line) when running parallel a highway) rather than undertaking a costly hydrovac survey.

Overhead telecommunication lines within the highway right-of-way are to be noted giving exact locations of poles, chainage and offset from proposed centerline, and number of wires. The exact location of poles and anchors located beyond right-of-way boundaries, which may be affected by construction, shall be noted. Detailed plans are required for any location where the telecommunication lines cross the highway or other roadways which will be constructed, improved, or obliterated.

7.2.5 Other Cables

Other cables such as, pipeline company instrumentation, railway operating cables, traffic counters, traffic light sensors, cathodic protection, etc. shall be referenced in detail in the survey field books. Overhead cables shall be referenced with exact location of poles and number of wires.

Traffic lights (including sensor loops), traffic counters, pedestrian crosswalk lights, and all warning beacons (amber and red) are owned by the Department and shall be coordinated through the Department's Project Administrator.

Cathodic protection cables are usually associated with bridge-sized culverts and shall be coordinated through the Department's Project Administrator.

7.2.6 Reporting Requirements

Upon gathering utility information, the Consultant shall incorporate the utility information into their design drawings. Utility survey information recorded in the Survey Field Books shall be submitted to the Department at the completion of the project. See 'Appendix K: Project Records Management'.

7.3 Coordination

Early engagement with Utility Owners is the key. When utility adjustment is expected, the Consultant shall contact the affected Utility Owners as soon as possible to allow enough time for negotiation and the Utility Owner to conduct their design and procurement work. The Consultant shall work with Utility Owners to develop alternatives and determine the optimum solution to cross the utility line safely and cost effectively. The Consultant shall coordinate with all Utility Owners at the following milestone dates of the design, tender, and construction process:

- Preliminary Design: The Consultant shall conduct a utility search, inform affected Utility Owners of potential highway work within the project limits, and request/verify utility information.
- Detailed Design (mid-design stage): The Consultant shall coordinate with Utility Owners to develop crossing options and a cost estimate for each option, and shall provide updated mosaic plans, and utility crossing plans with the existing utilities shown on them. All plans at this stage should be marked "Preliminary". This shall be completed as early as possible, to provide the Utility Owners enough lead time for preparing adjustments to the design. It is recommended that the Consultant hold interim coordination meetings as required to discuss the on-going design with the Utility Owners.
- Final Design: The Consultant shall submit design drawings, utility crossing plans, and copies of the agreements for final design review to all affected Utility Owners. At this stage, the Consultant shall finalize the utility adjustment costs by requesting the final cost estimate in writing from the Utility Owners. This shall be done a minimum of two (2) weeks prior to the Final Design Review Meeting. See 'Appendix H: Utility Adjustment Agreements (Samples)' for sample letters and agreements.

- Final Design Review Meeting: The Consultant may invite all Utility Owners to the Final Design Review Meeting. All design concerns and costs associated with the utilities shall be finalized at this stage. The Consultant shall ensure a letter of confirmation is provided by Utility Owners indicating the final costs, the cost sharing arrangement with the Department, and the starting and completion dates.
- Signing of Crossing Agreements: The Consultant shall ensure all agreements are signed, with agreed costs, prior to tendering. Within the Department's right-of-way, the Department standard crossing agreement shall be used. See 'Appendix H: Utility Adjustment Agreements (Samples)'.
- Tender Document: The Consultant shall incorporate any relevant utility design and information in their "Issued for Construction" drawings and include them in the tender document.
- The Consultant shall provide a table listing all the utilities within the limits of the project. This table will be provided in the Special Provision as part of the tender document. An example is given as below in Table 7.1:

TABLE 7.1 LIST OF ALL THE UTILITIES WITHIN THE LIMITS OF THE PROJECT (EXAMPLE).

Station to Station	Legal Land Location	Angle to Centerline	Offset	Utility Name	Product or Voltage	Comments
10+000		45 degrees LH fwd		ATCO Pipelines	High Pressure Natural Gas	Xing Agreement # APL 31313
5+000 to 15+750		Parallel - Eastside	23.0 Rt	Fortis	500 KV power line	
7+500		30 degrees RH fwd		Star Gas	Sour Gas	
1+000 to 21+000		Parallel - Westside	11.3 Lt	TELUS	400 pair phone line	To be Abandoned

- Tender Advertising: The Consultant shall inform, in writing, all Utility Owners affected by the work about the tender advertising date and the tender opening date.
- Pre-Tender Meeting (Optional): If a pre-tender meeting is held, the Consultant may consider inviting the Utility Owners; depending on the nature of the meeting and the level of impact the utilities are to the project.
- Construction Schedule: Once the successful Contractor's schedule is provided, the Consultant shall promptly provide this schedule along with Contractor's contact information to all Utility Owners affected by the work, and request Utility Owner's written confirmation of the utility work schedule. At this stage, a letter should be sent by the Consultant to the Contractor with a copy to the Utility Owner indicating that the Contractor is responsible for all utility coordination henceforth.
- Pre-Construction Meeting: Although the Contractor is now responsible for utility coordination, the Consultant should invite all Utility Owners to the main Pre-Construction meeting to facilitate the Contractor's coordination with the Utility Owners. Other meeting(s) chaired by the Consultant with the Utility Owners and the Contractor can be held separately from the main Pre-Construction meeting.

For additional information regarding the utility coordination process, refer to the 'Utility Coordination Process Manual'.

7.4 Utility Easements and Clearing

The Consultant shall provide the Utility Owner with the existing and proposed highway right-of-way boundaries to allow the Utility Owner to determine its necessary utility easement.

If utility easement outside of the highway right-of-way is required as a result of the highway construction project, it is recommended that the Utility Owners should negotiate easements with Landowners at the same time as the Department. Note that the Department cannot obtain land or easement on behalf of Utility Owners. The Utility Owners can contact the Landowners separately to obtain their own easements.

The Consultant shall coordinate with the Utility Owners to determine the need and timing for clearing within the right-of-way and easements (existing and/or proposed).

The Consultant shall consider the following options:

- Clearing to be completed as per the Department's construction contract (standard practice). If timing is a concern, the Consultant may, if permitted by the Project Administrator, specify an earlier completion date for the clearing in the tender document;
- The Utility Owner provides their own clearing for their utility relocation unless otherwise specified;
- A separate Department contract is prepared for clearing the right-of-way and easements; or
- The Utility Owner clears the highway right-of-way and their easements under their own contract. The Utility Owner's contract must contain the same level of clearing and timber salvage specifications as in a Department's contract.

When applicable, the Consultant shall discuss these options with the Project Administrator, and the Project Administrator shall make the decision on which option is to be used.

The cost for the highway right-of-way clearing will typically be paid by the Department. The cost for the utility easement clearing will normally be paid by the Utility Owner except as specified below.

When new utility easements from Land Owners are obtained and registered by the Utility Owner before arrival of the Department's clearing Contractor, for convenience, the Department may clear any proposed utility easements by the Utility Owner at the Department's cost. The Utility Owner must request this to the Consultant in writing. Failure to do so will result in the cost of clearing the proposed utility easements remaining with the responsibility of the Utility Owners.

The Department will not pay for clearing any existing utility easements.

7.5 Utility Agreements

The following are the general practices which apply to cost responsibility for utility relocations/adjustments:

- Utilities exist within the highway right-of-way and highway control zone under the authority of a permit from the Department and must accommodate highway work. The Utility Owner is responsible for maintaining and showing proof of a valid permit or agreement for its utility line within the highway right-of-way as well as highway control zone.
- Unless there is an agreement that says otherwise, utilities within the highway right-of-way are adjusted/relocated at the Utility Owner's cost, and those outside the highway right-of-way are adjusted/relocated at the Department's cost.
- In the case of cost sharing, the cost apportionment can be determined based on the ratio of the utility length inside and outside the highway right-of-way, applied to the total project cost (i.e., including tie-ins).

Prior to submitting for the Department's approval, the Consultant shall finalize, and sign utility plans/drawings based on negotiations and crossing agreements with the Utility Owners.

The Consultant shall use standard Department crossing agreements. Examples of typical agreements to be used for adjustments to telecommunications, power, pipeline utilities, and railway crossing material cost are shown in 'Appendix H: Utility Adjustment Agreements (Samples)'. The Utility Owner's schedule of conditions for the protection and safety of the utility are to be part of the crossing agreement. The Consultant shall review the Utility Owner's schedule of conditions to ensure they are acceptable to the Department. The Project Sponsor will be a signatory in all crossing agreements and cost apportionment as per the Department policy.

The Consultant shall ensure all applicable agreements and permits shall be in place prior to tendering.

7.6 Traffic Accommodation for Utility Construction

Utility work within the Department's right-of-way or access from the highway, typically requires a Traffic Accommodation Strategy.

- The Consultant shall review the Utility Owner's Traffic Accommodation for compliance with the latest version of the 'Traffic Accommodation in Work Zones' manual
- The Consultant's role and responsibility to deal with utility construction is outlined in the latest version of the 'Traffic Accommodation in Work Zones' manual.

7.7 Utility Special Provisions

The Consultant shall prepare utility special provisions based on the utility designs, as agreed with the Utility Owners. See ‘Section 12.1.4: Standard Specifications, Special Provisions, Specification Amendments and Supplemental Specifications’ for more information on accessing an up-to-date version of the standard Special Provisions.

Section 8: Geotechnical Investigation and Design

8.1 General

8.1.1 Scope of Geotechnical Engineering Services

This section is concerned with the planning, design, and construction of the Department's geotechnical works, including but not limited to, geotechnical considerations for highways, bridges and bridge-size culverts, embankments, retaining walls, and geohazard mitigation and monitoring projects. Geotechnical considerations are essential to all phases of a transportation project, from concept to completion, as outlined in 'Table 8.1: Typical Scope of Geotechnical Objectives by Project Phase'. The typical scope of services includes desktop study of the regional geology, planning and implementation of the field investigation and laboratory testing, development and refinement of subsurface models, preparation of geotechnical design alternatives and recommendations, detailed drawings, cost estimates and contract Special Provisions, and monitoring of ground conditions for confirmation of design assumptions during the construction stage.

TABLE 8.1 TYPICAL SCOPE OF GEOTECHNICAL OBJECTIVES BY PROJECT PHASE.

Stage	Task	Objectives
Planning	Geotechnical Desktop Study	Review and interpret existing geotechnical information to assess feasibility of project concepts
		Identify geotechnical risks and data gaps
		Scope the geotechnical field investigation
Design	Geotechnical Field Investigation	Conduct site reconnaissance, drilling investigation, and laboratory testing
		Present subsurface conditions, risks, and limitations
	Preliminary Engineering	Prepare preliminary design alternatives
		Recommend an alternative for detailed design based upon supporting rationale (assess pros and cons, construction and operational risks, and life cycle costs)
		Scope the detailed design effort
	Detailed Design	Detail the design of the selected alternative
		Document geotechnical assumptions, risks, and limitations
		Scope the geotechnical construction monitoring effort
		Prepare contract drawings, Special Provisions and cost estimate for geotechnical components
Tender	Contract Tendering	Prepare tender package for submission
		Assist the Department in responding to questions during the tender period
Construction (Refer to ECG Vol. 2)	Construction Monitoring	Monitor ground conditions/behaviour encountered during construction, to ensure conformance with design assumptions
		Inform the owner of unforeseen ground conditions and possible modifications to the design
		Respond to geotechnical construction issues
		Prepare construction monitoring records

8.1.2 Design Standards and Guidelines

All design work shall be undertaken in accordance with relevant codes, current Department design standards and guidelines, and recognized industry practice and standard of care. Department design standards and guidelines can be accessed through the search feature at Transportation policies and technical guidelines | Alberta.ca.

8.1.3 Qualifications and Role of the Geotechnical Engineer

For the purpose of these guidelines, 'Geotechnical Engineer' refers to a professional engineer licensed by APEGA, having sufficient experience in geotechnical engineering with a focus on transportation industry projects. The Geotechnical Engineer is deemed the 'Engineer of Record' for the geotechnical components of a project, which may include: field investigation, geotechnical analysis; geohazard assessment and mitigation; design of geotechnical

components such as foundations, embankments, cut slopes, retaining walls; and preparation of geotechnical portions of tender documents, including drawings and Special Provisions.

This section introduces basic requirements to guide the Geotechnical Engineer in the preparation of proposals, and the completion of investigations, designs and reporting. The guidance outlined in this section is not intended as a substitute for the application of professional judgement and experience.

Geotechnical considerations form an essential component of any transportation project and should be integrated into all phases of the work, from planning through preliminary engineering, detailed design, tendering and construction, and post-construction performance monitoring. This section is organized to highlight the geotechnical requirements that are to be undertaken at each stage of the project, from concept to completion. Depending on the project, the Geotechnical Engineer may act as the Prime Consultant (such as for a stand-alone geohazard mitigation project), or may act as a specialized Sub-Consultant (such as for a major bridge project).

8.1.4 Surveys

Where required by the Terms of Reference to establish a project specific datum for horizontal and vertical control, such a survey shall be tied into the Alberta Survey Control Monument System, as outlined in 'Section 6.1.4: Preliminary Survey'. Alberta Environment benchmarks can be located on the Alberta Environment and Protected Areas website.

8.1.5 Land Acquisition Requirements

Refer to 'Section 3: Right-of-Way' for the Department's general land acquisition guidelines.

8.1.6 Utility Adjustment Requirements

Refer to 'Section 7: Utilities' for utility requirements and coordination.

8.1.7 Regulatory Requirements

Refer to 'Section 4: Environmental Requirements' for regulatory requirements.

8.1.8 Engineering Drawing Standards

Refer to the 'Engineering Drafting Guidelines for Highway and Bridge Projects' for general Department drawing standards and procedures.

8.2 Geotechnical Desktop Study

8.2.1 Overview

A Geotechnical Desktop Study consists of the review and interpretation of existing information, to identify and assess potential geotechnical risks to the proposed project. A geotechnical desktop study is typically undertaken at the project planning or preliminary design stage, to inform the proposed design criteria and identify any information gaps. The geotechnical desktop study provides the basis for scoping the subsequent field investigation and laboratory testing program, in a manner that is appropriate to the project needs and complexity of the geologic setting. In undertaking the desktop study, the Consultant should avail themselves of the Department's GIS (LiDAR) imagery that is available upon request, to aid in the interpretation of geomorphology and identification of geohazards.

The Geotechnical desktop study shall include the following tasks:

- Conduct a site visit if specified in the Terms of Reference (for major bridges, refer to 'Section 11: Bridges')
- Review available surficial and bedrock geology maps, terrain and hydrogeology maps and reports
- Review existing geotechnical investigations, data, drawings, reports, and files
- Review relevant bridge and highway design reports, files, and drawings
- Review and interpret current and historical aerial photographs, and document changes over time
- Review and interpret LiDAR imagery, if available
- Review relevant construction and maintenance records
- Seek and compile local knowledge through contacts such as the Maintenance Contract Inspector
- Determine utility locations and project restrictions due to those utilities (see 'Section 7: Utilities')
- Complete an environmental and historical resources overview if requested

- Determine land ownership and preliminary land assembly requirements if requested
- Prepare conceptual level drawings for the project (or geotechnical components thereof)
- Prepare an “A” Estimate for the project (or geotechnical components thereof)

8.2.2 Geotechnical Desktop Study Report Requirements

For many projects, it is sufficient to document the findings and recommendations arising from the Geotechnical Desktop Study in the Preliminary or Final Geotechnical Report. See ‘Section 8.4: Geotechnical Design and Reporting Requirements’. A stand-alone Geotechnical Desktop Study report or memorandum would typically only be prepared for complex projects, such as for a major bridge conceptual design study, or a highway functional planning study. When required, the Geotechnical Engineer shall prepare a Geotechnical Desktop Study report or memorandum that includes the following components, and any additional information identified in the Terms of Reference.

Executive summary

- Overview of existing information
    - Description of surficial and bedrock geology
    - Findings from existing geotechnical reports and file review
    - Description of overland drainage and hydrogeology
    - Interpretation of aerial imagery (air photos, LiDAR), documenting changes over time
    - Presentation of existing geologic and stratigraphic information, and synthesis into a proposed subsurface model
    - Summary of the past performance of any existing structures and geotechnical issues identified
    - Summary of maintenance history, local knowledge
- Identification of project constraints
    - Identification of potential borrow sources / disposal areas if applicable
    - Identification of geohazard locations and potential impacts to the project. The possible presence of ‘snake pits’, narrow pits excavated to dispose of wet or otherwise deleterious soils along the toe of existing embankments, should be evaluated through the file review and air photo interpretation.
    - Identification of active or historical mining or subsidence issues
    - Identification of utility locations and potential conflicts
    - Overview of permitting and land acquisition requirements
    - Potential environmental, social and historical impacts
- Recommendations
    - Discussion of geotechnical risks and information gaps as they relate to the options identified
    - Presentation of conceptual options, drawings, and “A” Estimates
    - Recommended scope of the geotechnical field investigation and laboratory testing requirements, based on the quality of existing information, the geologic setting, and the project complexity.

8.3 Geotechnical Site Investigation and Laboratory Testing

8.3.1 Overview

This section provides minimum requirements for a geotechnical site investigation and laboratory testing program. The minimum requirements stipulated in Table 8.2 should be supplemented at the discretion of the Geotechnical Engineer, to ensure an adequately informed basis for design. Appropriate planning and coordination is required to ensure relevant subsurface information is acquired for an informed understanding of the vertical and horizontal extents and variability of subsurface materials, their engineering properties, and groundwater conditions. The geotechnical site investigation shall be adequate to inform the design of all potential foundation options, such as shallow foundations, deep drilled or driven foundations, and ground improvement/stabilization requirements. It is not acceptable to design foundation elements extending beyond the investigated borehole depths.

The Geotechnical Engineer shall make at least one (1) site visit prior to the start of the subsurface (drilling) investigation. This visit will allow the Geotechnical Engineer to familiarize themselves with the site conditions, aid in the positioning of boreholes and determine any site access constraints for drill rig mobilization (such as snow clearing, vegetation removal, excavating a level working surface, etc.). Subsequent site visits may be required for

complex projects such as a landslide repair or major bridge construction. The Geotechnical Engineer must have sufficient experience to identify geohazards and other geotechnical conditions of concern, and to bring these field issues forward to the design team at an early stage.

If a Geotechnical Desktop Study has not already been completed as part of the project planning stage, all components of the desktop study described in 'Section 8.2: Geotechnical Desktop Study' should be completed prior to commencing the site investigation. The desktop study findings will serve to inform the scoping of the geotechnical site investigation, including the type of drilling equipment that is appropriate to the expected soil/rock conditions, and advanced geotechnical field and laboratory testing requirements.

8.3.2 Level of Investigative Effort

Various studies and experience have demonstrated the benefits of investing in an adequate geotechnical site investigation to achieve long-term savings in project life cycle costs, including reduced likelihood of delays and construction-related claims.

In order to achieve a tolerable level of geotechnical risk, the investigative effort shall seek to balance the level of understanding of subsurface conditions with the project complexity and consequences of adverse performance. The level of geotechnical risk presented by the project may be affected by a variety of factors, including:

- Quality and extent of existing geotechnical information
- Geologic setting (subsurface complexity, variability and presence of geohazards)
- Importance of the project and consequences of adverse performance (such as major bridge versus a standard culvert, or a major highway versus a secondary route)
- Adjacent structures that could be impacted by the project (such as third-party utilities and railways)
- Potential environmental impacts
- Social and political considerations (such as project visibility and public perception)

8.3.3 Safety, Traffic Accommodation Strategy, Utility Locates

- Refer to 'Section 1.2: Public Safety Requirements (Traffic Accommodation through the Work Zone)' for public safety and traffic accommodation requirements.
- Refer to 'Section 7.2: Utility Survey' for utility search and notification requirements.

8.3.4 Minimum Site Investigation, Field and Laboratory Testing Requirements

Table 8.2 provides the minimum requirements for geotechnical site investigation, field testing, and laboratory testing, based on typical project types. These minimum requirements should be supplemented at the discretion of the Geotechnical Engineer. Test pits may be excavated in lieu of test holes where exposure of a larger stratigraphic section is deemed beneficial. The number of required test holes can potentially be reduced (in consultation with the Project Administrator), if supplemented by Cone Penetration Testing (CPTu) or geophysical methods, where results from these tests would allow for more accurate or economical interpretation of soil behaviour type for design. For the purposes of this section, 'test hole' and 'borehole' are interchangeable terms.

The geotechnical proposal shall clearly describe the geotechnical scope of work and assumptions made in estimating the schedule and resources required.

Special attention should be paid to the minimum borehole depths and drilling equipment required to achieve these depths, particularly for bridge foundation investigations and landslide repair projects. ***Re-drilling of the site may be required at the Consultant's expense if the minimum criteria in Table 8.2 are not met***.

TABLE 8.2 MINIMUM GEOTECHNICAL INVESTIGATION AND TESTING REQUIREMENTS.

Test Holes			Field Sampling and Testing	Laboratory Testing
Maximum Spacing	Minimum Depth	Instrumentation		
MAJOR BRIDGES				
Foundations		Install piezometers, slope inclinometers as appropriate.	Collect disturbed soil samples at 1 m depth intervals and of each major soil type encountered. Conduct Standard Penetration Test (SPT) at 1.5 m depth intervals.[1] Retrieve undisturbed (Shelby tube) or core samples for laboratory testing at appropriate intervals. Conduct Cone Penetration Test (CPTu) if the use of wick drains is contemplated.	Water content tests on all samples. Minimum of two (2) 'suites' of tests per borehole. A 'suite' of tests consists of a water content test, an Atterberg limits test or a grain size analysis (as appropriate). Soluble sulphate testing where concrete will be in contact with soil. Minimum one (1) Unconfined Compressive Strength (UCS) test in each major stratum at each pier location. Advanced testing determined by Geotechnical Engineer[2].
One (1) test hole at each pier location.[3] One (1) test hole at each abutment.	3 m below expected pile foundation or footing depth, OR 3 m penetration into competent bedrock where encountered.			
Embankments				
One (1) test hole per approach fill, about 50 m from abutment seat.	2 m below existing natural grade, or to a depth equal to the fill height, whichever is greater.			

[1] Supplement with field vane test, pressuremeter, dilatometer and/or muskeg probe as appropriate.

[2] These include, but are not limited to, direct shear, triaxial, unconfined compressive strength, permeability, oedometer, point load, slake durability, pinhole dispersion, or other tests as deemed appropriate by the Geotechnical Engineer.

[3] Drilling at all river piers is preferred, however the use of geophysical methods may be an acceptable alternative in some cases, with adequate supporting rationale.

TABLE 8.2 MINIMUM GEOTECHNICAL INVESTIGATION AND TESTING REQUIREMENTS (CONT'D)

Test Holes			Field Sampling and Testing	Laboratory Testing
Maximum Spacing	Minimum Depth	Instrumentation		
STANDARD BRIDGES				
One (1) test hole at each abutment.	3 m below expected pile foundation or footing depth, OR 3 m penetration into competent bedrock where encountered.	Install piezometers, slope inclinometers as appropriate.	Collect disturbed soil samples at 1 m depth intervals and of each major soil type encountered. Conduct Standard Penetration Test (SPT) at 1.5 m depth intervals.[4]	Water content tests on all samples. Minimum of two (2) 'suites' of tests per borehole. A 'suite' of tests consists of a water content test, an Atterberg limits test or a grain size analysis (as appropriate). Soluble sulphate testing where concrete will be in contact with soil.
MAJOR BRIDGE-SIZE CULVERT				
One (1) test hole per 25 m culvert length at new culvert sites. Use judgement at culvert replacement sites.	2 m below existing natural grade, or to a depth equal to the fill height, whichever is greater.	Install piezometers, slope inclinometers as appropriate.	Collect disturbed soil samples at 1 m depth intervals and of each major soil type encountered. Conduct Standard Penetration Test (SPT) at 1.5 m depth intervals in overburden.[5] Retrieve undisturbed (Shelby tube) or core samples for laboratory testing at appropriate intervals. Conduct Cone Penetration Testing (CPTu) if the use of wick drains is contemplated.	Water content tests on all samples. Minimum of two (2) 'suites' of testing per borehole. A 'suite' of tests consists of a water content test, an Atterberg limits test or a grain size analysis (as appropriate). Advanced testing as determined by the Geotechnical Engineer.[6]

[4] Supplement with field vane test, pressuremeter, dilatometer and/or muskeg probe as appropriate.

[5] Supplement with vane shear test, pressuremeter, dilatometer and/or muskeg probe as appropriate.

[6] These include, but are not limited to, hydrometer, direct shear, triaxial, unconfined compressive strength, permeability, oedometer, point load, slake durability, pinhole dispersion, or other tests as deemed appropriate by the Geotechnical Engineer.

TABLE 8.2 MINIMUM GEOTECHNICAL INVESTIGATION AND TESTING REQUIREMENTS (CONT'D)

Test Holes			Field Sampling and Testing	Laboratory Testing
Maximum Spacing	Minimum Depth	Instrumentation		
STANDARD BRIDGE-SIZE CULVERT				
Refer to 'Section 8.4.3.2: Design of Bridge Size Culverts' to determine whether a geotechnical investigation is necessary. If so, the minimum requirements for a Major Bridge Size Culvert (above) shall apply.				
MECHANICALLY STABILIZED EARTH (MSE) / RETAINING WALL				
For retaining walls associated with a bridge abutment, minimum of one (1) test hole at each abutment; otherwise, A minimum of two (2) test holes along each wall, or at 25 m spacing, whichever is greater.	2 m below proposed finished grade, or to a depth equal to the wall height, whichever is greater.	Install piezometers as appropriate.	Collect disturbed soil samples at 1m depth intervals and of each major soil type encountered. Conduct Standard Penetration Test (SPT) at 1.5 m depth intervals.[7]	Water content tests on all samples. Minimum of two (2) 'suites' of tests per borehole. A 'suite' of tests consists of a water content test, an Atterberg limits test or a grain size analysis (as appropriate). Soluble sulphate testing where concrete will be in contact with soil. Advanced testing as determined by the Geotechnical Engineer.[10]
GEOHAZARD MITIGATION PROJECTS				
Requirements are site- and project-specific, subject to the Terms of Reference.			Collect disturbed soil samples at 1m depth intervals and of each major soil type encountered. Conduct Standard Penetration Test (SPT) at 1.5 m depth intervals in overburden.[8] Retrieve undisturbed (Shelby tube) or core samples for laboratory testing at appropriate intervals.	Water content tests on all samples. Minimum of two (2) 'suites' of testing per borehole. A 'suite' of tests consists of a water content test, an Atterberg limits test or a grain size analysis (as appropriate). Advanced testing as determined by the Geotechnical Engineer.[9]

[7] Supplement with field vane test, pressuremeter, dilatometer and/or muskeg probe as appropriate.

[8] Supplement with vane shear test, pressuremeter, dilatometer and/or muskeg probe as appropriate.

[9] These include, but are not limited to, hydrometer, direct shear, triaxial, unconfined compressive strength, permeability, oedometer, point load, slake durability, pinhole dispersion, or other tests as deemed appropriate by the Geotechnical Engineer.

[10] Increase the number and depth of test holes at deep cuts and high fill locations, in order to provide sufficient stratigraphic data for a stability analysis to be undertaken.

TABLE 8.2 MINIMUM GEOTECHNICAL INVESTIGATION AND TESTING REQUIREMENTS (CONT'D)

Test Holes			Field Sampling and Testing	Laboratory Testing
Maximum Spacing	Minimum Depth	Instrumentation		
ROADWAY[10]				
200 m spacing for new construction. **300 m** spacing for grade widening or twinning (provided adequate existing geotechnical information is available). Two (2) test holes at diagonal corners for Type 4 or Type 5 intersection improvements.	Cut Sections: 2 m below ditch level or below bottom of borrow. Fill Sections: 2 m below existing grade, or to a depth equal to the fill height, whichever is greater.	Install piezometers, slope inclinometers in areas of deep cut, or as appropriate.	Collect disturbed soil samples at 1 m depth intervals and of each major soil type encountered. Conduct Standard Penetration Test (SPT) at 1.5 m depth intervals in overburden.[11] Block samples of muskeg may be required.	Water content tests on all samples. Minimum of two (2) 'suites' of testing per borehole. A 'suite' of tests consists of a water content test, an Atterberg limits test or a grain size analysis (as appropriate), and estimates of optimum moisture content and maximum dry density for each tested sample. Advanced testing as determined by the Geotechnical Engineer.[12]
BORROW ASSESSMENT				
Two (2) test holes per borrow. For pre- and post-borrow disturbance assessment requirements refer to 'Section 4: Environmental Requirements.	2 m below ditch level or below bottom of borrow.		Collect disturbed soil samples at 1 m depth intervals and of each major soil type encountered. Collect bulk samples for Standard Proctor testing.	Minimum of two (2) 'suites' of tests per borehole. A 'suite' of tests consists of a water content test, an Atterberg limits test or a grain size analysis (as appropriate), and estimates of optimum moisture content and maximum dry density for each tested sample. Water content tests shall be performed on all samples.
TOPSOIL SURVEY				
Requirements for topsoil survey related to topsoil conservation within the highway right-of-way are provided in 'Section 4: Environmental Requirements'.				
WATER MANAGEMENT STRUCTURES				
Refer to 'Section 13: Water Management Infrastructure Projects – Planning and Design', and 'Water Control Structures: Selected Design Guidelines'.				

[11] Supplement with vane shear test, pressuremeter, dilatometer and/or muskeg probe as appropriate.

[12] These include, but are not limited to, hydrometer, direct shear, triaxial, unconfined compressive strength, permeability, oedometer, point load, slake durability, pinhole dispersion, or other tests as deemed appropriate by the Geotechnical Engineer.

[13] Long term monitoring of groundwater conditions is a requirement of borrow investigations. This typically requires the installation of piezometers, and the Consultant should be prepared to revisit the site several weeks or months after drilling to monitor groundwater levels.

8.3.4.1 Site Restoration, Backfilling Boreholes and Test Pits

Upon completion of the geotechnical field investigation, test holes shall be backfilled in accordance with Transportation and Economic Corridors (TEC)'s 'Geotechnical Borehole Abandonment: Best Practice Guideline'. The cost of borehole abandonment is to be included as part of the Consultant's geotechnical investigation. Where monitoring instruments are installed in the borehole, backfilling shall be completed in accordance with the functional requirements of the instrumentation.

Site restoration costs, if any, shall be included as part of the Consultant's geotechnical investigation. An appropriate allowance shall be included for restoring equipment access routes after completion of the drilling investigation, unless construction works are imminent. In the case of winter drilling investigations, it may be necessary to return in the spring to complete the site restoration.

Any test pit locations must be judiciously selected and properly restored. Excavations along the side slope or ditch may destabilize the highway embankment. If test pits are proposed to be advanced within the highway embankment or along the ditch line, a test pit plan describing the method of excavation and backfilling must be submitted to the Project Administrator for approval.

Drilling spoils and excess materials from the field program shall be removed from the site and disposed of at approved dumpsites. It is unacceptable to dispose of any soil cuttings on-site, unless prior approval has been obtained from the Project Administrator.

8.3.4.2 Instrument Installations

All geotechnical monitoring instrument installations shall be marked or tagged with weather resistant identification numbers that must be easily legible. The location coordinates for each installation shall be obtained by surveying or hand-held GPS.

Geotechnical instrument installations shall be protected from hazards such as wildlife, recreational vehicles, construction traffic, maintenance vehicles, vandalism, etc. Provisions should be made to provide protective housings for instrument cables and associated components. In areas where vandalism is a concern, the used of locked metal protectors is recommended, especially in areas of high visibility. Secure housing is required for batteries associated with solar panel installations. Where instruments are installed within the highway clear zone, flush-mount casing protectors are recommended for the safety of motorists, and to prevent damage by snow clearing/grass mowing equipment (refer to the 'Roadside Design Guide').

The Geotechnical Engineering Best Management Practices website includes the following guidelines: 'Guideline for Installation of Pneumatic Piezometers (PP)', 'Guideline for Installation of Slope Inclinometer (SI)', 'Guideline for Installation of Standpipe Well (SW) and Standpipe Piezometer (SP)'. These cover the installation of select geotechnical instruments (including slope inclinometers, pneumatic piezometers, and standpipes).

8.3.4.3 Soil and Rock Classification and Presentation of Borehole Information

Soils shall be classified in accordance with the Unified Soils Classification System (ASTM D2487-17), as modified by the Prairie Farm Rehabilitation Administration (PFRA) to include clays of medium plasticity; soil property descriptions shall follow the *Canadian Foundation Engineering Manual* (CFEM). Rock is to be classified and described in accordance with the CFEM. Soil and rock classifications, descriptions, and Standard Penetration Test (SPT) 'N' values or Rock Quality Designation ('RQD') and percent recovery shall be shown on the borehole logs as applicable. Muskeg shall be classified according to the *Muskeg Engineering Handbook* (MacFarlane, 1969).

Presentation of test hole logs shall be completed using a geotechnical borehole database system, such as Bentley gINT software, or an acceptable equivalent. TEC's customized borehole log and stick log templates are available through the Bentley website (under "Alberta Transportation").

An electronic copy of the raw data files for the borehole logs shall be included with the electronic report submission.

8.3.4.4 Laboratory Testing Methods

Methods of undertaking laboratory testing and reporting for geotechnical purposes shall conform to the current edition of the applicable ASTM standards.

Field visual description and classification, and laboratory water (moisture) content tests shall be conducted on all soil samples.

For transportation projects, the standard laboratory testing 'suite' (as outlined in Table 8.2) shall include:

- Water (moisture) content (ASTM D2216-19); and
- Atterberg limits (ASTM D4318-17) for cohesive soils, or
- Sieve analysis (ASTM D6913-17) for granular soils.

The following information shall also be included in these tests and form part of the summary of test:

- Estimates of Standard Proctor maximum dry density and optimum moisture content based on the Department's tables (refer to the Department's 'Method to Estimate Standard Proctor Maximum Dry Density and Optimum Moisture Content of Fine-Grained Soils')
- Plasticity Index and Liquidity Index (ASTM D4318-17)

Additional tests may be required as outlined in Table 8.2, or as deemed necessary by the Geotechnical Engineer. These may include, but are not limited to, hydrometer, direct shear, triaxial, unconfined compressive strength, permeability, oedometer, point load, slake durability, pinhole dispersion, and other tests deemed appropriate for design or construction purposes. Advanced geotechnical testing shall follow applicable ASTM standard test methodologies.

8.4 Geotechnical Design and Reporting Requirements

8.4.1 Identification of Geotechnical Risks and Limitations

Whether acting as the prime consultant or a sub-consultant, input from the Geotechnical Engineer is required at all stages of the project design, to ensure that the geotechnical risks, limitations, and assumptions are accurately reflected in the final design.

Concise identification of geotechnical risks and limitations at the project design stage is critical to the management of contractual risk and potential construction-related claims.

The geotechnical design deliverables shall proactively identify and evaluate the site-specific geotechnical risks and recommended mitigation strategies, and clearly articulate the underlying design assumptions, limitations, and expected subsurface conditions, along with constructability considerations and anticipated challenges.

Additional discussion of geotechnical design considerations for typical project types are included in 'Section 8.4.3: Geotechnical Design Considerations for Typical Projects'.

8.4.2 Geotechnical Design Reports

Depending on the project type and their role within the project design stage, the Geotechnical Engineer will prepare a Preliminary Geotechnical Report (if required by the project Terms of Reference) and a Final Geotechnical Report.

The Preliminary Geotechnical Report includes the presentation and evaluation of available alternatives that results in a recommended option for Detailed Design. The level of Geotechnical Engineering completed at the preliminary design stage includes the geotechnical desktop study, field investigation, preliminary engineering analyses and evaluation of preliminary design alternatives. Where required by the project Terms of Reference, a Preliminary Geotechnical Report shall be prepared, including geotechnical design alternatives and "B" Level costing, such that an informed selection can be made for detailed design.

The Final Geotechnical Report presents the geotechnical design recommendations and details for the selected alternative. The Final Geotechnical Report documents the desktop study, field investigation, and engineering analyses, and provides a clear basis of design and performance expectations for geotechnical project components, such as foundations, retaining walls, embankments, subgrade improvement, and geohazard mitigation works. The Final Geotechnical Report shall also provide recommended Special Provisions for incorporation into the contract documents, and the recommended scope of geotechnical construction monitoring, including site inspection, instrumentation, and quality assurance testing for managing the identified risks and confirming the design assumptions.

When acting as the prime consultant for the detailed project design, the Geotechnical Engineer shall also:

- Obtain approvals from Landowner and right-of-way holder
- Refer to 'Section 7: Utilities' for utility requirements and coordination
- Identify right-of-way requirements
- Prepare and obtain environmental permits
- Review the final design with stakeholders of the project (see 'Section 2.4.7: Public Consultation Report')

Minimum requirements for the Preliminary and Final Geotechnical Reports are outlined in the following subsections.

8.4.2.1 Preliminary Geotechnical Report

Where required in the Terms of Reference, the Geotechnical Engineer shall prepare a Preliminary Geotechnical Report that includes the following components, to support the selection of the recommended alternative for detailed design.

Executive Summary

1. Introduction
    - Project overview, design and performance requirements
    - Geotechnical scope of work.
2. Desktop Study Results (refer to 'Section 8.2.2: Geotechnical Desktop Study Report Requirements')
3. Field Investigation
    - Site visit observations: terrain description, vegetative cover, surficial drainage, evidence of groundwater seepage, distressed ground (scarps, cracks, heave, pavement distress, etc.)
    - Description of drilling program, including plan drawing with test hole locations and depths
    - Summary of conditions encountered during drilling, including seepage, sloughing, loss of drill fluid circulation, auger refusal, etc.
    - Groundwater levels encountered during drilling, at completion of drilling, and as measured thereafter (if applicable)
    - Generalized description of the soil and bedrock stratigraphy and characteristics, with exceptions noted as appropriate
    - Description of field tests and results
    - Details of instrumentation installations and readings (including data corrections applied), if applicable.
4. Laboratory Testing
    - Summary table of laboratory testing results including sample location, depth and classification
    - Interpretation of advanced test results, indicating limitations of the sampling and testing methodology
5. Engineering Assessment and Recommendations
    - Discussion of field investigation and laboratory testing results, including stratigraphic cross section drawings and recommended geologic model
    - Discussion of material properties and variability
    - Discussion of engineering analyses undertaken, with assumptions and limitations clearly stated
    - Comparison of viable alternatives that would meet the project needs (may include consideration of future climate scenarios, if required by the project Terms of Reference)

- Preliminary drawings and “B” Estimate for each alternative
- Discussion of life cycle cost associated with each alternative
- Concise presentation of geotechnical challenges and risks to the project, with relevant risk mitigation, avoidance or risk-sharing considerations for each alternative
- Land acquisition and utility relocation requirements for each alternative (see ‘Section 10: Detailed Roadway Design’)
- Environmental impact overview or assessment, and probable mitigation requirements
- Historical resources overview
- Recommended alternative to be carried forward to Detailed Design

Appendix

- List of references
- Stratigraphic cross-section and plan drawings
- Photographs, site sketches
- Test hole logs, including electronic copy of raw data files
- Field testing data sheets
- Instrument installation records and readings
- Laboratory testing data sheets
- Preliminary modeling figures
- Preliminary design drawings

8.4.2.2 Final Geotechnical Report

The Final Geotechnical Report shall include the following components, modified to suit the project-specific requirements.

Executive Summary

Introduction

- Project overview, design and performance requirements
- Summary of options analysis (from preliminary design stage)
- Geotechnical scope of work

Field Investigation

- Site visit observations: terrain description, vegetative cover, surficial drainage, evidence of groundwater seepage, distressed ground (scarps, cracks, heave, pavement distress, etc.)
- Description of drilling program, including plan drawing with test hole locations and depths
- Summary of conditions encountered during drilling, including seepage, sloughing, loss of drill fluid circulation, auger refusal, etc.
- Groundwater levels encountered during drilling, at completion of drilling, and as measured thereafter (if applicable)
- Generalized description of the soil and bedrock stratigraphy and characteristics, with exceptions noted as appropriate
- Description of field tests and results
- Details of instrumentation installations and readings (including data corrections applied), if applicable.

Laboratory Testing

- Summary table of laboratory testing results including sample location, depth and classification
- Interpretation of advanced test results, indicating limitations of the sampling and testing methodology

Engineering Analyses

- Interpretation of the subsurface data, and presentation of the geologic model for design
- Methodology and type of analyses undertaken for detailed design, with assumptions and limitations clearly stated
- Discussion of material properties and variability

- Presentation of results
- Discussion of uncertainty and limitations associated with findings

Engineering Assessment and Design Recommendations

- Discussion of geotechnical risks to the project, including assumptions and limitations
- Anticipated construction challenges and proposed mitigation strategies
- Recommended geotechnical Special Provisions
- Estimated quantities and level “C” cost estimate

1. Roadways
    - Topsoil/Muskeg stripping requirements
    - Cut and fill quantities and recommendations
    - Borrow sources
    - Excavation disposal locations
    - Volume modification factors
    - Moisture conditioning
    - Compaction requirements
    - Rippability of rock
    - Subgrade improvement recommendations
        - Geosynthetics
        - Erosion control
        - Swelling soil and frost heave mitigation
        - Soft ground construction
2. Foundations
    - Suitable foundation types and design parameters (bearing and skin friction values, geotechnical resistance factors)
    - Down-drag
    - Settlement
    - Cement type related to soluble sulphate concentrations
    - WEAP analysis results and recommended minimum hammer size
3. Embankments, Head Slopes and Side Slopes
    - Cut and fill slope angles
    - Slope stability analyses, and stabilization measures for natural and cut slopes
    - Staged construction, surcharge or overbuild
    - Embankment consolidation estimates, and rate of fill placement
    - Embankment stabilization or subgrade improvement measures
        - wick drains
        - geosynthetics
        - soft ground construction
4. Retaining Walls
    - Lateral earth pressure
    - Global and internal stability
    - Anchor design
    - Bearing capacity / basal stability
5. Groundwater
    - Site dewatering, groundwater control requirements
    - Drainage installations
6. Landslides and other Geohazards
    - Stabilization measures for natural slopes or cut slopes
    - Soil and rock anchorages and reinforcements

- Rock fall barriers and catchments
- Erosion mitigation and control
- Subsurface voids and subsidence

7. Tunneling/Trenchless Installation Considerations
8. Site Seismic Classification
9. Recommended Quality Assurance Testing
    - Scoping of construction monitoring and ongoing performance monitoring (observational approach)
    - Recommendations for geotechnical instrumentation and monitoring, quality assurance testing, and supervision of construction activities related to geotechnical requirements

Conclusion

Appendix

- List of references
- Definitions of terms and symbols
- Stratigraphic cross-section and plan drawings
- Test hole logs
- Laboratory and in situ test results
- Instrumentation readings
- Modeling figures
- Design drawings
- Geotechnical Special Provisions

8.4.3 Geotechnical Design Considerations for Typical Projects

8.4.3.1 Foundation Design for Bridges and Other Structures

In alignment with TEC's Bridge Structures Design Criteria, bridge substructures, foundations, and embankments shall be designed in accordance with the 'Canadian Highway Bridge Design Code' (CHBDC) and supplemented as required by the Canadian Geotechnical Society's 'Canadian Foundation Engineering Manual' (CFEM).

In accordance with the CHBDC Clause 6.8 (Design liaison, contract documentation, and support during construction), it is expected that the Geotechnical Engineer will be fully involved during the detailed bridge design, including review of the final embankment and foundation design drawings, and during bridge construction.

Geotechnical foundation design shall be undertaken using Limit States Design methodology. Ultimate Limit States are primarily concerned with failure mechanisms of the structure, and determination of the ultimate geotechnical capacity, modified by a prescribed geotechnical resistance factor. Serviceability Limit States represent conditions or mechanisms impacting the intended use or function of the structure under expected service loads. Serviceability criteria, such as tolerable settlements or deformations, should be determined on a project-specific basis through direct communication and interaction between the Geotechnical and Structural Engineers.

Limit States Design does not alter the classical methods for calculating ultimate geotechnical capacity (geotechnical resistance). However, the Geotechnical Resistance Factors applied to the calculated capacity have been derived based on characteristic values defined in a specific manner. It is therefore important that the selection of characteristic material parameters used in the design correspond with "a cautious estimate of the mean" for the affected volume of ground or zone of influence (CFEM 2006). Assumptions and limitations used in determining the soil/rock characteristic parameters shall be clearly identified in the geotechnical report.

The Geotechnical Resistance Factor used in foundation design shall be selected in accordance with the CHBDC. In selecting an appropriate resistance factor, the Design Engineer must consider the type of foundation, the limit state (mode of failure), the level of sophistication employed in the foundation design (semi-empirical analysis compared to field load testing), the degree of understanding of the site parameters and predictive models used in the design (low/typical/high), and the consequence of failure. Adequate supporting rationale shall be provided for the selection of

a low/typical/high degree of understanding category. Further to Clause 6.5.1 (Consequence classification) of the CHBDC, all bridge foundations, embankments and retaining walls shall be classified as having a “typical” consequence level unless otherwise approved by the Department

For driven piles, a WEAP analysis should generally be undertaken at the detailed foundation design stage, to confirm drivability of the proposed foundation elements to the specified depths, and to identify the minimum hammer size required for construction.

Where integral abutments are contemplated for bridge structures, the Geotechnical Engineer shall provide an assessment of headslope stability and settlement, for informing the suitability of integral abutments in accordance with CHBDC Clause 6.13.2. The likelihood and consequences of headslope instability shall factor into the abutment type selection; where headslope failure occurs at an integral abutment bridge, the effort required to repair the instability is considerably more onerous than for a conventional abutment.

Recommendations for quality assurance testing should be provided in the geotechnical report, consistent with the Geotechnical Resistance Factor used in the design, and the requirements of the Standard Specifications for Bridge Construction (SSBC). These may include recommendations for dynamic load testing (e.g., “PDA”), static load testing, bi-directional load testing (e.g., “Osterberg”), rapid load testing (e.g., “Statnamic”), cross-hole sonic logging (CSL), thermal integrity profiling (TIP) and other relevant techniques. Adequate supporting rationale should be provided for any deviations in recommended quality assurance testing compared to the specifications in the SSBC. All quality assurance testing shall follow the relevant ASTM standards.

Foundation design is an iterative process. It is expected that the Structural Engineer will dialog with the Geotechnical Engineer on foundation design and other geotechnical issues. The foundation design drawings should be reviewed by the Geotechnical Engineer to ensure that all geotechnical recommendations are being followed. Any deviations from the geotechnical recommendations should be documented, and rationale provided to support the deviation.

It is not acceptable to design foundation elements to be placed in unknown soil or bedrock conditions, or to present foundation types that cannot readily be constructed within the investigated soil and bedrock conditions. If the depth of the proposed foundations is below the probed depth at borehole locations, a satisfactory rationale is required to support the design. Re-drilling of the site may be required to meet the design criteria.

8.4.3.2 Design of Bridge Size Culverts

Bridge Size Culverts are defined as any structure with an equivalent diameter of 1.5 m or greater. Bridge size culverts can be further classified as “Standard Culverts” or “Major Culverts”, based on the criteria shown in Table 8.3 below.

The design of Bridge Size Culverts shall follow the ‘Design Guidelines for Bridge Size Culverts‘ and shall be drafted in accordance with the ‘Engineering Drafting Guidelines for Highway and Bridge Projects’. Information pertaining to the conceptual design for culvert sites can be located at ‘New Design – Bridge Conceptual Design’ page of the Government of Alberta website.

TABLE 8.3 DEFINITION OF STANDARD AND MAJOR BRIDGE SIZE CULVERTS.

Bridge Size Culverts (Equivalent diameter ≥ 1.5 m)	
Standard Culverts	**Major Culverts**
1.5 m ≤ Equivalent diameter < 4.5 m	**Equivalent diameter ≥ 4.5 m; OR** any structure of lesser diameter having complex site constraints or specialized engineering requirements.

Many older culverts have sagged over the centre sections of their length, often leading to ponding within the barrel section. These situations are most evident at sites with high fill, poor foundations, or yielding ground.

In accordance with the 'Design Guidelines for Bridge Size Culverts', a geotechnical investigation and design recommendations are required for all Major Culverts (4.5 m diameter or greater), and for Standard Culverts where any of the following conditions apply:

- Embankment height above the existing ground is greater than 6 metres and the foundation material has not been previously pre-consolidated.
- Foundation and/or embankment material is known, or suspected to be, poor.
- A life expectancy in excess of 50 years is highly desirable (high AADT, high fills, strategic crossings, long detours, etc.) Define the camber requirements by calculating the required amount for at least five (5) stations along the stream bed.
- A tunneled culvert is recommended for detailed design.

The Final Geotechnical Report should provide an assessment of suitable construction alternatives for bridge size culvert installations. If a deep excavation is required to replace a culvert, stability analyses should be included in the report, along with guidelines as to where the excavated fill can be temporarily stockpiled. The report should also include a discussion of feasible trenchless installation techniques, with associated risks and mitigation measures.

8.4.3.3 Embankment Design and Stability Analysis

Embankments shall include bridge head slopes, approach fills within 5 metres, from the end of the bridge approach slab, transitions between the approach fill side slopes to the head slopes and, any retaining walls within this area. Stockpiling of excavated material on or near the crest of valley walls can lead to slope instability and is to be avoided.

Embankments shall be designed in accordance with the Bridge Structures Design Criteria. The design of the bridge embankments shall account for stability, long term settlements and wall deformations. Stability analyses shall be carried out to determine that the embankments have acceptable short-term and long-term stability and will satisfy ultimate and serviceability limit states design criteria. Unless otherwise agreed to by the Department (through a design exception process), ***the global stability of bridge embankments shall be designed to a minimum Factor of Safety of 1.5 against failure*.**

For many projects, two-dimensional slope stability analyses by Limit Equilibrium Methods (LEM) are sufficient for determining the short-term and long-term Factors of Safety. A data-informed understanding of the geology, representative soil and rock strength parameters, external loading conditions, and short-term versus long-term behavior is of primary importance to ensuring the model results are reasonably representative of the actual site conditions.

Where the stratigraphic conditions are complex, highly variable, or there is a high degree of uncertainty in the soil or groundwater parameters, sensitivity analyses or probabilistic (Monte Carlo) simulations are appropriate for determining the range of expected behaviour, rather than presenting a single deterministic result.

For complex projects where the performance of the asset is governed by soil-structure interactions, three-dimensional LEM analyses, or numerical analyses employing finite element methods (FEM) or finite difference methods (FDM) may be preferable to a two-dimensional LEM analysis, with adequate supporting rationale.

8.4.3.4 Retaining Wall Design

All retaining walls shall be designed in compliance with the requirements of Section 7 of the Bridge Structures Design Criteria (BSDC), supplemented by the guidance provided in the current edition of the 'Canadian Foundation Engineering Manual' (CFEM). The BSDC criteria apply to all retaining wall types including gravity walls, piled walls, cantilever walls, anchored walls and Mechanically Stabilized Earth (MSE) walls. The BSDC applies to all retaining wall locations, whether or not they are located at or in conjunction with a bridge structure. As noted in the BSDC, the height of any retaining wall, or the combined height of multiple retaining walls, shall not exceed 8 metres at any

location adjacent to roadways, or 12 metres adjacent to railway grade separations. The height of retaining wall for this purpose shall be taken as the vertical height from top of coping to top of finished grade in front of the wall.

Retaining structures shall be designed to satisfy the required internal and external loading conditions, stability requirements (basal, internal, and global stability), and serviceability requirements (control of deformations within an acceptable range).

In accordance with the BDSC, the internal and global stability of permanent retaining structures shall satisfy a minimum Factor of Safety of 1.5 against failure.

In accordance with the BSDC, the design of non-MSE walls shall meet the requirements of the Canadian Highway Bridge Design Code (CHBDC). MSE walls are proprietary designs and shall meet design/build requirements in SSBC Section 25: Mechanically Stabilized Earth Walls. There are numerous design considerations specific to MSE walls, depending upon the wall's purpose and location. Where significant settlement may occur below the wall, suitable mitigation techniques such as ground improvement, pre-loading, wick drains, etc., should be proposed. The use of two-stage MSE walls is not a preferred solution for addressing settlement concerns, and would require Department Approval through a Design Exception.

The siting of MSE walls where scour may occur is not permitted. As noted in the CHBDC, there is a high potential for catastrophic failure of an MSE wall if some of the reinforced soil mass is lost during a scour event.

In general, winter construction of MSE walls is not permitted. Fill should not be placed when the receiving surface is frozen or snow covered, when the stockpile is frozen or snow covered, or when winter conditions prevail. If winter construction is contemplated, a Design Exception and additional supporting Special Provisions would be required to address backfill gradation, freeze-thaw impacts, compaction requirements, drainage issues, etc.

The Transportation Association of Canada (TAC) has also published the 'Design, Construction, Maintenance and Inspection Guide for Mechanically Stabilized Earth Walls' for the design and construction of MSE walls, which can be consulted for practical guidance on the selection, design, construction, and inspection of these structures with a focus on public works projects. Additional guidance is also available from Federal Highway Administration's (FHWA) Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes - Volumes I and II.

8.4.3.5 Landslide Stabilization and other Geohazard Mitigation Projects

The design of mitigation measures for landslides and other geohazards may be undertaken as a stand-alone project, or as part of a larger design. Geohazard assessment and remediation projects can be complex and time-sensitive. The Geotechnical Engineer assigned to these projects must be experienced in geohazard identification, assessment, monitoring and mitigation. The scope of work may include geotechnical investigation and instrumentation, preliminary design, detailed design, tender preparation and construction monitoring at existing or emerging geohazard sites. Geohazard issues commonly arise from the adverse performance of both natural and constructed earth works, including unstable soil and rock slopes, embankments, retaining walls, and subgrades. Common subgrade issues may include erosion, frost heave, swelling soil, settlement, and sink holes (typically arising from dispersive soils or abandoned coal mine workings).

TEC's Technical Standards Branch maintains an inventory of information on approximately 500 documented geohazard sites, located throughout the province. "Active" geohazard sites, meaning those that present ongoing risks to the safety and efficiency of the highway system, are inspected on a recurring cycle; geotechnical monitoring instruments have also been installed at many sites, and these instruments are read on an annual or semi-annual basis. Instrument types generally consist of standpipe piezometers, vibrating wire piezometers, slope inclinometers, settlement gauges, load cells and strain gauges, pneumatic piezometers, tiltmeters, shape accel arrays (SAAs) and extensometers. Several locations use data loggers for continuous monitoring. Current and historical inspection reports and instrumentation readings for most of the active geohazard sites are posted on the Department's website at: www.transportation.alberta.ca - /PlanningTools/GMS/Annual Landslides Assessments/.

A multi-staged investigation may be required, spanning several weeks or months, depending on the level of geohazard activity at the site, and the need for instrumentation readings capturing several seasons. A detailed

interpretation of historical aerial photographs or LiDAR imagery, documenting changes over time, shall be included in all geohazard mitigation projects, in addition to a thorough review of historical information available for the subject site, or other sites located in similar geologic settings. The Final Geotechnical Report shall identify the risk factors at the geohazard site, the associated probability of occurrence, and consequences to the highway safety and efficiency. Qualitative assessments of risk, such as low, medium, high, may be used provided the supporting rationale is clearly described. The Department currently uses a semi-quantitative risk level rating system for recurring geohazard site inspections. The risk level is defined as the product of the probability factor (or likelihood of failure on a scale of 1 to 20), multiplied by the consequence factor (on a scale of 1 to 10). The risk level rating scales for earth slides, rock falls, and erosion sites, are posted on the Department's website at: www.transportation.alberta.ca -/PlanningTools/GMS/Annual Landslides Assessments/.

The Consultant should have expertise in geohazard assessment, monitoring and mitigation, either within their team or through sub-consultant arrangements. Typical types of geohazard mitigations include, but are not limited to:

- Toe berm for embankment stabilization
- Minor highway realignment for geohazard avoidance
- Cast-in-place concrete tangent pile wall for landslide stabilization
- Driven steel H-pile reinforcement for embankment stabilization
- Backslope flattening for slope stabilization
- Streambank erosion protection works
- Rockfall barriers and catchment design
- Ditch erosion repairs using a variety of methods

In presenting candidate geohazard mitigation options, the Consultant should consider the practical implications of each intervention, such as:

- Severity and duration of traffic disruption during construction (with consideration of daily traffic volume, highway service classification, high load corridors, etc.)
- Land acquisition requirements
- Utility conflicts
- Environmental permitting requirements, restricted activity periods, historic resources
- Risk of ongoing instability, with plan for monitoring and risk management during construction, and post-construction performance monitoring

Refer to 'Section 8.4.3.3: Embankment Design and Stability Analysis' for a guidance on stability analysis requirements for unstable soil slopes and embankment projects. For rockfall issues, refer to the Department's geotechnical engineering best management practices for Rockfall Hazards Protection and Rockfall Remediation.

8.4.3.6 Roadway Design

Findings of the geotechnical desktop study and field investigation will inform the selection of the most desirable grade-line and alignment for highway grading projects. The location and severity of geohazards identified through terrain analysis or site inspection should also be considered in selection of a suitable alignment.

Geotechnical issues of concern for roadway (grading) projects typically include the estimation of cut and fill quantities, selection of suitable borrow material with moisture-conditioning and compaction requirements, identification of the lateral and vertical extents of soft subgrade, organic soils and muskeg, rippability of rock (where encountered), and subgrade improvement requirements. Geotechnical considerations can have a significant impact on the success of a roadway grading project, impacting both constructability and long-term performance. Guidance is provided in the following subsections for addressing common geotechnical issues of concern.

8.4.3.6.1 Borrow Requirements

It is Department's practice that the Consultant shall secure Department borrow sources to meet project borrow needs, if the borrow requirements exceed 10,000 m^3. Otherwise, the borrow supply shall be specified as to be supplied by the Contractor.

Consultants are directed to avoid the use of frost susceptible (typically silty) materials as a road building material, unless it can be demonstrated that no economically viable alternative exists. Silty soils are also difficult to compact to the Standard Proctor densities typically required for roadway design, and their use is therefore to be avoided.

The use of expansive (high-plastic clay) soils or clay shale as engineered fill is also to be avoided. Roadway embankments built on or with expansive soils are known to exhibit volumetric expansion (heave) or contraction (shrinkage) depending on the water content of the soil and confining stresses acting on the soil. Within embankments, heaves are often expressed at ground surface as wave-like irregularities, longitudinal cracking, localized deformations, and/or generalized (alligator) cracking. Localized heave of a subgrade at transverse crack locations has occurred in Alberta in areas of expansive soil and is a major concern to the Department. Repair or remedial options for these issues are generally expensive and disruptive to traffic. It is preferred to address the presence of these problematic soils during the investigation and design phase rather than during the operation phase of a road life-cycle.

The geotechnical report should document the prevalence of soils with moderate to very high swelling potential within the construction area, including borrow locations. High plastic glaciolacustrine clay soils and clay shale possess significant swelling and shrinkage potential and are common throughout Alberta. Several published correlations are available to predict swell potential; many are based on Atterberg limit parameters or soil activity. If required, the swelling potential of high plastic clays should be quantified through the use of advanced laboratory testing (e.g., one dimensional swell or settlement potential tests).

The use of soils or rock with high swelling potential as a road building material is not permitted, unless it can be demonstrated that no economically viable alternative exists, and the design and construction procedures are optimized to reduce the influence of soil expansion. Inclusion of swelling soils in embankments may be accomplished with the inclusion of capillary breaks or with sufficient overburden confinement. Treatment with chemicals, such as lime, may reduce swelling potential. Strict water content control during compaction (optimum to two percent wet of optimum) is a required minimum construction consideration. Compaction of soils or rock with moderate to high swelling potential at conditions dry of optimum shall not be permitted.

8.4.3.6.2 Soft Ground, Organic Soils and Muskeg

Where soft ground, organic soils or muskeg are present along the highway alignment, delineating the extent and depth of these materials can be accomplished using test pits, track mounted auger drilling, muskeg probes, cone penetration (CPTu) testing or other acceptable methods of investigating the depth and characteristics of soft soils. As noted in ‘Section 8.3.4.3: Soil and Rock Classification and Presentation of Borehole Information’, muskeg shall be classified according to the *Muskeg Engineering Handbook* (MacFarlane, 1969).

Muskeg and organic soils should generally be stripped from the highway subgrade before the road structure is placed. Where adequate rationale exists for potentially leaving these deposits in-place, the Geotechnical Engineer may consider block sampling and laboratory strength or consolidation testing of muskeg. Field vane testing can also be used for shear strength estimation.

The geotechnical report should identify specific construction techniques required to build on muskeg or soft ground, including the use of drains or geotextiles. In addition, the risk factors associated with construction and long-term maintenance of the roadway over muskeg terrain should be identified. An engineering and cost/benefit analysis should justify recommendations for inclusion or removal of the muskeg or soft ground.

8.4.3.6.3 Rippability of Rock

For projects where bedrock or boulders are encountered (e.g., shale, sandstone, rock boulders of size 0.5 cubic metres and greater, or a combination of these materials), a “rock investigation” shall be undertaken as part of the geotechnical investigation. This rock investigation is to be conducted through rock core drilling and/or test pitting. Seismic or GPR techniques may be useful in determine the bedrock horizon and in estimating the shear velocity of the rock. Shear velocity can be correlated to rippability, as noted in various equipment supplier handbooks. At this time the Department recognizes the compressive strength and point load index tests to determine classification of rock materials for pay item purposes.

For grading projects, a rock investigation report is required as a separate document. This report shall contain a detailed description of the investigation, test results, photographs of cores, photographs of test pits, logs of stratigraphy, and quantity and classification of rock materials. In accordance with the Department's 'Standard Specifications for Highway Construction', rock materials are classified and paid for as either "Rippable" or "Solid" rock depending upon whether they can be ripped by a Group 12 Dozer equipped with a ripper (as defined in the ARHCA Equipment Rental Rate Guide), and excavated using conventional earth-moving equipment. For payment purposes, the rock excavation is paid as common excavation (or borrow, etc.) plus an extra amount for "Rippable Rock Excavation – Premium" or "Solid Rock Excavation – Premium" as applicable. The geotechnical investigation report shall provide quantity estimates to support design and tender documents.

8.4.3.6.4 Subgrade Improvement and Geosynthetics

The need for geosynthetics and erosion control materials must be supported by an analysis and design. Specifications for geosynthetic materials shall reference material properties that are appropriate for the design use intended. The use of 'generic' or 'all-purpose' specifications is considered appropriate only when these specifications address the analysis and design requirements of the project. Where judgment is used in selecting materials, reasons must be provided to show the practical, as well as economic, benefits of such material usage. The Consultant is advised to reference the Department's 'Products List' and the 'Erosion and Sediment Control Manual'.

8.4.3.7 Erosion and Sediment Control

The Department has developed an 'Erosion and Sediment Control Manual', complete with Best Management Practices, to assist in the selection and design of erosion control measures. The most effective means of sediment control is erosion prevention; hence the design should be directed towards erosion protection and prevention techniques, where these can be shown to offer practical and economically competitive solutions. Innovative solutions are encouraged. Temporary or construction-related erosion and sediment control measures, including the development of an ECO Plan, are the responsibility of the Contractor.

Erosion Control designs shall be supported by documentation of any design assumptions, soil and hydraulic parameters used in the analysis, method of analysis, and justification for selection of a given erosion control method. Erosion and sediment control related to wetlands and water bodies may require special design treatment stipulated by other agencies. Contact with the appropriate agencies (e.g., Alberta Environment and Protected Areas) shall be established at an early stage of the design.

8.5 Tender Package Preparation

8.5.1 Introduction

Where the Geotechnical Engineer is acting as a sub-consultant, coordination between the prime consultant and Geotechnical Engineer is required when preparing the Tender Package. Where the Geotechnical Engineer is acting as the prime consultant, they are the 'Engineer of Record', responsible for the preparation of the Tender Package deliverables.

Whether acting as the prime or sub consultant, the Geotechnical Engineer shall be engaged in the preparation of the contract Special Provisions, Cost Estimate and Drawings, to ensure that the geotechnical risks, limitations, and design assumptions are clearly stipulated therein. During project tendering, geotechnical investigation reports are generally provided as "Information Only" documents, and do not form part of the construction Contract. Therefore, geotechnical risks and construction requirements identified in the geotechnical report should be explicitly incorporated into the Tender Drawings and/or Special Provisions. Geotechnical load and resistance parameters, and performance criteria (e.g., allowable deflections) shall be clearly stated on the drawings.

It is therefore of primary importance that the Geotechnical Engineer, even when acting as a sub-consultant, be provided with the opportunity to review the Drawings and Special Provisions for accuracy and completeness, prior to issuance.

Unless otherwise noted in the Terms of Reference, the Consultant shall provide electronic copies of the Tender Drawings (in PDF format) for the Department's review at the 50 percent and 95 percent complete stages, with accompanying draft electronic "C" Estimate and Special Provisions.

Refer to 'Section 12: Contract Tendering' for Tender Package preparation requirements.

8.5.2 Soil and Rock Descriptions Presented on Drawings

Soil descriptions presented on the Drawings shall consist of the principal soil types, classified in accordance with the Unified Soils Classification System as modified by the PFRA (in accordance with 'Section 8.3.1: Overview' above). Where rock or rock type materials are encountered, the field visual descriptions should be shown with the corresponding graphic symbol. Rock Quality Designation ('RQD') or Standard Penetration Test (SPT) 'N' values should be shown on the mosaic/stratigraphic sections at the corresponding depths (including SPT 'N' refusal values, where encountered).

While the Final Geotechnical Report will typically be included as an "Information Document" with the Tender package, any geotechnical/subsurface information included on the Drawings or in the Special Provisions becomes contractually binding. ***In the case of discrepancies between the Final Geotechnical Report and the Tender Documents, the Tender Documents (Drawings and Special Provisions) govern.***

https://www.alberta.ca/tender-document-templates-provisions-and-specification-amendments.aspx

8.5.3 Expected Versus Differing Site Conditions

Subsurface conditions are a result of geologic processes modified over time by natural events or human intervention. Geotechnical investigations are undertaken to provide subsurface information to the Design Engineer and to the Contractor bidding the work. However, unanticipated ground conditions can and do occur. Contractors will be paid based on the terms of their contract. This may involve changes in compensation where unforeseen conditions are encountered. Nothing can completely remove the risk of encountering a Differing Site Condition (DSC); however, the potential for costly disputes over what constitutes differing site conditions is greatly reduced through a comprehensive geotechnical investigation, and contract documents which clearly articulate the expected subsurface conditions and associated construction risks. To this end, full disclosure of the geotechnical investigation report will be available to contractors at the tender stage and at the construction stage should the Contractor request it. The Consultant is responsible for ensuring that the contract documents (Drawings, Special Provisions) provide a clear indication of the expected geotechnical conditions along the alignment and at each major subsurface element. While the Final Geotechnical Report will typically be included as an "Information Document" with the Tender package, only the geotechnical/subsurface information included on the Drawings or in the Special Provisions becomes contractually binding. Therefore, In the case of discrepancies between the Geotechnical Report and the Tender Documents, the Tender Documents (Drawings and Special Provisions) govern.

Geotechnical reports are composed of factual, interpreted, and qualified information. Factual information includes test hole logs, field test measurements and laboratory test results. Interpreted information represents the opinions of a qualified Geotechnical Engineer based on the factual information. The interpreted information should clearly describe the analyses, assumptions and limitations that led to the design recommendations. Qualified information is factual information where the source of the data was not under direct control of the Design Engineer. Historical construction records and previous geotechnical reports are examples of qualified information.

There are two principal types of DSC claims. A Type I DSC refers to subsurface or latent physical conditions at the site, including surface conditions that differ materially from those indicated in the contract. Type I DSC is usually related to the factual information presented in the contract. A Type II DSC refers to unknown physical conditions at the site of an unusual nature differing from those ordinarily encountered and generally recognized as to be inherent in work of the character provided for in the contract. Type II DSC is usually related to the interpreted information presented in the contract. Both types of DSC can be greatly reduced through a comprehensive geotechnical investigation, and contract documents which clearly articulate the expected subsurface conditions, and associated construction risks, along the alignment and at each of the major structural elements. To this end, the Consultant

should be neither overly optimistic about site conditions nor overly pessimistic, but should rely on a rational and objective approach to interpretation of the subsurface conditions.

Specific disclaimer clauses can be used as drawing notes, where appropriate. An example of a specific clause might be: “The test hole logs for TH100 to TH110 are representative of the condition at the location where each boring was made but conditions may vary between test holes.” This note indicates that the Consultant has used proper drilling techniques to locate, drill and log the test holes shown on the plans and documents. Soil conditions encountered at the location of the test holes that differ materially from those stated on the logs form the basis of a Type I DSC. Soil conditions between boreholes that differ substantially from those noted at the test hole locations, or that could not have been reasonably interpreted from the drilling logs, or that are unknown in the region would form the basis of a Type II DSC.

Certain complex or high-risk projects may warrant the preparation of a separate Geotechnical Baseline Report for inclusion in the Contract Documents. A Design Exception shall be sought in this case.

Under exceptional circumstances, the minimum geotechnical investigation requirements for the project (Table 8.2) may not be met. In such cases, a Design Exception must be sought for a reduced scope of geotechnical investigation. Under such circumstances, the Consultant shall clearly communicate the geotechnical conditions that were assumed during the design, and ensure the contract documents clearly delineate the expected subsurface conditions along the alignment and at each major structural element.

8.6 Tendering and Construction Monitoring

Refer to ‘Section 12: Contract Tendering’ for contract tendering requirements.

Section 9: Surfacing Design

9.1 General

This section deals with the detailed design, quantity estimates, and related requirements for all projects with a surfacing component. Other items identified under 'Section 5: Engineering Assessment' through 'Section 8: Geotechnical Investigation and Design' must also be addressed, as required, to provide a complete detailed design, cost estimate, and design and Tender Package.

Surfacing includes:

- First course gravel for grading projects;
- Base and paving (either first or full stage placement) using asphalt or concrete pavement;
- Final paving;
- Pavement rehabilitation;
- Surface treatments (seal coats, micro-surfacing, sand seal); and
- In-place recycling (CIR, HIR, FDR).

9.2 Surfacing Design Package

The Consultant shall complete a Surfacing Design package and surfacing design estimate (often included as part of the roadway design package) (using Department forms as per 'Appendix E: Surfacing Criteria' or similar forms as developed by the Consultant. This will include but is not limited to:

- Surfacing strategy review
- Detailed design
- Aggregate requirements
- Mix type and binder grade)
- Special Provisions (if needed)
- Supplemental specifications and specification amendments (if required)
- Bid items description
- Quantity and cost estimates
- Plans
- Pavement markings (see 'Section 10.9: Pavement Markings (Combined Grading/Surfacing Projects and Surfacing Projects)')

The Tender Package (see 'Section 12.1: Tender Package Preparation') shall consist of all information needed for tendering purposes, including the Surfacing component "C" Estimate. Detailed surfacing design information does not have to be submitted with the Design and Tender Package; however, it shall be retained as outlined in 'Appendix K: Project Records Management'.

Note: A surfacing estimate for each project (combined projects) and a surfacing estimate summary are essential requirements for every job submitted to Procurement.

9.2.1 Surfacing Strategy Review

The Department's design practices and philosophies for pavement design are outlined in the following:

- 'Pavement Design Manual'
- 'Guidelines for Assessing Pavement Preservation Treatments and Strategies'
- 'Alberta Transportation Guidelines for the Assessment, Rating and Prioritization of Pavements for Seal Coat (Seal Coat Rating Guidelines)'

The Consultant shall adhere to the Surfacing Strategy as prepared by the Regional Consultant (see 'Section 5.3: Surfacing Engineering Assessment') and included as part of the Information Package in the Terms of Reference for the project. All Surfacing Strategies have an expiry date that shall be checked for validity before implementation.

The Consultant shall perform a site inspection of the roadway at the time detailed design is being undertaken to validate the field reconnaissance observations from the Surfacing Strategy. The Consultant shall pinpoint and finalize the project limits. The roadway condition shall be assessed to identify and rationalize the need for preliminary levelling, repair of failed areas, additional Asphalt Concrete Pavement (ACP) quantities for cross-fall / super-elevation corrections, and special treatment of cracks.

If for any reason it is deemed necessary to revisit the Surfacing Strategy, the Consultant shall contact the Project Administrator and the Surfacing Standards Specialist of the Technical Standards Branch. Examples where the Surfacing Strategy requires revisiting include:

- Expired Surfacing Strategy;
- Changed traffic patterns resulting in increased or decreased traffic volumes or loadings;
- Revised mix, binder or material selection criteria;
- Significant changes (e.g., increase in severity or extent of failed areas) to the surface or general condition of the road from observations contained within the Surfacing Strategy; New elements added that were not included in the original assessment such as climbing lanes, intersection improvements, park/approach roads, etc.

For projects where a Surfacing Strategy is not available and is not to be completed by the Regional Consultant, the Consultant shall undertake the necessary surfacing engineering assessment and complete a Surfacing Strategy as per the requirements of 'Section 5.3: Surfacing Engineering Assessment'.

For projects where the surfacing includes an overlay on a road that goes over a bridge, the Consultant shall discuss the details with the Regional Bridge Manager to determine whether the overlay is permitted on the bridge and what details need to be addressed in developing the Tender Package. This could include: assessing the load capacity of the bridge; addressing reduced barrier height on the bridge and the approaches; modifications to existing bridge barriers and approach barriers; addressing deck drains on the bridge; addressing drain troughs at the ends of bridges; avoiding deck joints; and avoiding control joints at the end of the approach slabs for integral abutments. These issues and details shall be addressed by a Bridge Engineer with experience with Department bridge standards.

9.2.1.1 Pavement and Laboratory Testing

The Consultant shall carry out all necessary laboratory testing and evaluation which may have been identified in the Terms of Reference or which were deemed necessary at the detailed engineering stage. The results of this testing and evaluation shall be documented and appended to the design package.

For projects involving in-place recycling of pavement materials (Hot or Cold-In-Place Recycling or Full Depth Reclamation) the following information is typically collected and included within the tender submission:

- Pavement cross-section diagrams indicating the material types, thicknesses, widths, and year of construction. These are usually contained within the Surfacing Strategy.
- Where available, historical quality assurance test results for the asphalt concrete pavement materials can be obtained from the Pavement Engineering Section within Technical Standards Branch. This information is to be summarized in regards to average lift thickness, asphalt content, aggregate gradation, and percentage of Reclaimed Asphalt Pavement (RAP) additives (where applicable).
- The use of ground penetrating radar (GPR), or other methods, may be required for Full Depth Reclamation projects where the depths of the surfacing materials may be variable or are in doubt.

If historical quality assurance test results and/or layer thickness data are not available, or there is doubt in the type or quality of the granular base materials, additional pavement sampling and laboratory testing may be required. Test data to be collected includes:

- Pavement material types and layer thicknesses

- Aggregate gradation analysis of asphalt and granular layers
- Two face fracture count of aggregate materials
- Atterberg limits for the fines component of granular base or subbase materials
- Asphalt content of asphalt bound layers
- Rheology testing of recovered asphalt cement (hot in-place recycling only)
- GPR (procedure to provide plots on layer thickness)

General sampling frequencies should be in accordance with 'Transportation Laboratory Test procedure TLT 300 Recycling Asphalt Concrete Pavement'.

Test data is to be tabulated and included within the tender documents. Mix designs for in-place recycling are the Contractor's responsibility.

9.2.2 Gravel Surfacing and Seal Coat

Department guidelines for gravel surfacing design and seal coat type are included in 'Appendix E: Surfacing Criteria'.

9.2.3 Geometrics and Clearances

Where the project is primarily a "surfacing/paving" job, the Consultant shall confirm the appropriate roadway geometrics. With respect to clearances, no change in vertical clearance under bridge structures/overpasses is allowed.

The Consultant shall include in the design package all works such as interchanges (including ramps and loops), intersection treatments, side-slope improvements, super-elevation corrections, horizontal and vertical alignment improvements, railway crossings, roadside appurtenances or roadside features, culverts, and treatment on bridge decks and approaches to bridge decks. Where the project involves a significant grading component, the review and analysis of geometric elements is normally undertaken as part of the Geometric Design. Liaison with the Project Administrator is essential.

9.2.4 Aggregate Requirements

The Consultant shall quantify all aggregate requirements and coordinate aggregate supply conditions for the project.

The volume of aggregate required needs only to be an estimate based on the major components of the project. Coordination of the aggregate supply conditions shall be in accordance with 'Section 9.3: Supply of Aggregate'.

9.2.5 Asphalt Mix Type and Binder Selection

Asphalt mix type and binder selection shall be as prescribed in the Surfacing Strategy and associated Design Bulletins. While it is not advisable to change the mix type or binder grade prescribed for a specific highway segment in the Surfacing Strategy, there may be opportunities to reduce the number of mix types and binder grades within a tender, e.g., a few projects with different mix types bundled in the same tender, or with one mix type having very low quantity. In such instances, the Consultant shall seek advice from the Project Administrator and the Pavement Engineering Section of Technical Standards Branch.

9.2.6 Bid Items Quantity and Cost Estimates

The Consultant shall provide detailed bid item descriptions, bid item codes, quantity and cost estimates and summaries for the required surfacing and other roadway work. Examples of this are included in 'Appendix E: Surfacing Criteria'. Note that for estimating purposes, a factor of 2.33 t/m^3 is used for converting compacted granular and asphalt material quantities to tonnes.

If multiple projects are to be included in the contract works, a materials distribution chart must be included in the tender document. A sample of this chart is included in 'Appendix E: Surfacing Criteria'.

The Consultant shall discuss with the Project Administrator if there is a need to include the bid item "Asphalt Mix for Others".

In addition to the bid items from ‘Section 9.2.3: Geometrics and Clearances’, where applicable, the Consultant shall also include bid item descriptions and cost estimates for:

- Crack treatments (e.g. spray patch, crack mill and fill, etc.)
- Subgrade, base repairs, and surface repairs
- Any sidewalk, raised median, or curb and gutter requirements

9.2.7 Plans

The Consultant shall provide a key plan showing the project location and limits, plus the location of all major intersections, bridge structures, vehicle turnouts, and climbing lanes included within the project limits or scope of works. Detailed customized plans of intersections need only be provided where new construction or changes in layout are involved. An example of the necessary key plan is included in ‘Appendix E: Surfacing Criteria’.

In addition, the Consultant shall produce all necessary drawings to provide clear delineation of the work required.

The Consultant shall include aggregate plans as separate files in the design and Tender Package.

9.2.8 Reporting Requirements

The Consultant shall deliver the complete Surfacing Design Package to the Project Administrator for review no later than two (2) weeks before the date scheduled for delivery of the final Tender Package. See ‘Section 12.1.7: Submission Requirements’ for information on timing and details for submission of the finalized Tender Package.

9.3 Supply of Aggregate

9.3.1 Aggregate Sources

9.3.1.1 General

These guidelines cover the Consultant responsibilities related to Specification 5.2 Supply of Aggregate and to a lesser extent, ‘Specification 3.2 Aggregate Production and Stockpiling’ in the ‘Standard Specifications for Highway Construction’. A description of the various categories of aggregate sources is provided in ‘Section 5.2.2: Aggregate Categories’ of the Specification. The two main categories are:

- Aggregate sources controlled by the Department
- Aggregate sources not controlled by the Department

Each category is further sub-divided based upon “legal status” (Department owned or controlled source, crown source, or private source). The Consultant must be familiar with the specifications and tendering/payment practices regarding Supply of Aggregate including the legal status of any sources being offered to, or that has been selected, by the Contractor.

In general, the Contractor is responsible for the supply of aggregate materials. To assure an economical supply of aggregates and to obtain competitive bids, a Department controlled aggregate source will normally be offered as an option. In some cases, the Contractor is required to use a specified source controlled by the Department (Designated Source) for all or a portion of the project.

The Department’s policy regarding aggregate management at the construction and post-construction stage is identified in ‘Engineering Consultant Guidelines for Highway, Bridge and Water Projects – Volume 2 – Construction Contract Administration‘.

9.3.1.2 Aggregate Data Summary Request

The Consultant shall request an aggregate source from the Regional Aggregate Coordinator as soon as a reasonable estimate of the gravel component is available. An electronic copy of the Aggregate Data Summary Request form shall be obtained from the Regional Aggregate Coordinator.

The Aggregate Data Summary Request ('Appendix G: Supply of Aggregate') shall be used to identify the project, project limits, type of work, type of material, and the approximate quantity of aggregate that is required. The request shall be submitted a minimum of six (6) weeks prior to the tender submission date (unless the Department advances the project on short notice). The Department will issue to the Consultant the finalized Aggregate Data Summary Request for all projects, including those with no optional aggregate source. The Consultant shall use this information in the design. The consultant is responsible to review the Special Provisions, Plans, and the Aggregate Data Summary Request, and convert the data for inclusion into the tender documents.

For projects where the tender date is unknown, or the pit is currently unavailable, the Department may advise that the plans and Special Provisions will be provided closer to the tender date.

An amended summary shall be submitted at any time that the aggregate quantity increases because this may necessitate a change to the pit-operating plan or require a change to a different aggregate source.

Additionally, any time the Consultant is required to update the "C" Estimate prior to the tender, the Regional Aggregates Coordinator shall be contacted to ensure the aggregates information is still relevant.

9.3.1.3 Payment for Supply of Aggregate

Payment for the supply of aggregate will be made to the Contractor through a separate Supply of Aggregate bid item which is only paid for aggregate obtained from sources not controlled by the Department. The Supply of Aggregate bid items are:

- Supply of Aggregate – With Option. The Contractor is allowed to use one or more specified sources controlled by the Department, or may use their own source(s). The Supply of Aggregate value is expressed in $/tonne and its unit rate value is determined by the Department and reported to the Consultant on completed Aggregate Data Summary Request.
- Designated Source. No Supply of Aggregate bid item is required.
- Supply of Aggregate – No Option. The Department does not offer a source and the Contractor selects the unit rate value to be used.

9.3.1.4 Pit Reclamation

Progressive reclamation of pits in conjunction with construction or crushing contracts is a normal practice followed by the Department. It is reasonable and desirable to follow this practice to minimize double handling of overburden and reduce the Department's outstanding liability for reclamation.

The Regional Aggregates Coordinator shall assess the need for pit reclamation on each project, as well as whether a Department controlled source is offered as an option. The Special Provisions of the tender shall be revised accordingly.

9.3.1.5 Aggregate Source Controlled by the Department

Where a Department source is made available for a project, the Department will provide the relevant pit information including Aggregate Source Summary Request, Aggregate Testing Plan, Approvals, operating plan and Special Provisions, Summary of Aggregate Sieve Analysis, and the aggregate value (which is to be used for the "Supply of Aggregate" bid item). The Consultant shall use this information to form the Special Provisions to ensure all issues listed on the Aggregate Source Summary Request have been addressed. If the plans or approvals require updating or are not available, the Consultant is responsible for obtaining them and providing them to the Department. This includes surveying the source in an approved manner, and redrafting the plans using the Department standards. The plans and approvals include, but are not limited to:

- Legislated Environmental Approvals
- Water Resource Permits
- Aggregates Testing Plans and Pit Plans
- Detailed Operating plans

The Consultant shall specify in the Tender Special Provisions any special operating conditions that are not included in the ‘Standard Specifications for Highway Construction’. The Code of Practice for pit or Reservation conditions is not included in the tender.

Section 10: Detailed Roadway Design

10.1 General

Before undertaking any geometric design, Design Engineers are to revisit any pertinent planning and Terms of Reference documents to examine basic assumptions, current design practices, concepts, staging plans, cost-effectiveness (based on 'Benefit Cost Model and User Guide', safety, preservation of design flexibility for the future, and other considerations.

The Design Engineer shall ensure that all decisions related to the above are fully explored, discussed and agreed with the Project Administrator before proceeding with geometric design. The Consultant shall use the Department's 'Highway Geometric Design Guide' for all geometric design. The Consultant is responsible for highway design activities including but not limited to:

- Grading and geometric design including horizontal and vertical alignment grade lines, passing lanes, climbing lanes, intersection geometric layout, and interchanges
- Establishment of cross-section elements, drainage design (including culverts, curb and gutter, storm sewers), fencing design, retaining walls, etc.
- Roadside facilities (refer to Chapter F of the 'Highway Geometric Design Guide')
- Access management (refer to Chapter I of the 'Highway Geometric Design Guide')
- Roadside design (refer to the Department's 'Roadside Design Guide')
- Railway crossings (at-grade and grade separated)
- Coordination of utility relocations and preparation of crossing agreements
- Seeding
- Signing (refer to the Department's 'Highway Guide and Information Sign Manual')
- Guide posts (delineators)
- Pavement markings
- Special First Nations Agreements (Special Provisions for contract, etc.) if required (see 'Section 1.3.4: Aboriginal Consultation')
- Optimization of stream and grade separation bridge crossings including geometrics, grading, bridge conceptual design, and structural design considerations
- Pedestrian, cyclist, and pathway accommodation and geometrics in accordance with the 'Roadside Design Guide' and TAC standards

A "Consultant Highway Grading/Surfacing Design Coordination Flow Diagram" is provided for guidance in 'Appendix D'.

The Consultant shall prepare a detailed computer aided design package for contract tendering. The Consultant shall use an appropriate and proven roadway design software package for geometric design, earthwork and quantity calculations, cross sectioning, and mass-haul diagrams. All work shall be done in accordance with applicable guidelines, standards, and specifications. Standard drawings shall be used wherever possible. For relatively simple projects, especially if the grading work will be tendered as a lump sum contract, a design produced manually (without the aid of computers) may be acceptable. Information submitted for tendering purposes must be in electronic format.

10.1.1 Right-of-Way and Borrow

The Consultant shall assess the need for right-of-way or borrow based on design information and basic right-of-way requirements. The Consultant shall, as required, prepare plans for right-of-way purchase, and Borrow Agreements to obtain final agreements between the Department and Landowners. See 'Section 3: Right-of-Way' for more detail.

The Department's intent, where feasible, is that Department supply of borrow is identified for projects/tenders with estimated quantities of 10,000 m^3 or more.

If the quantity of soil is such that additional areas are required for either interim stockpiling or final placement, the Consultant shall make the necessary arrangements for the additional areas. Other alternative Department owned sites (gravel pits) may be considered. In these cases, the Consultant shall consult with the Project Administrator to

determine the availability of such sites and provide a cost estimate for hauling the soil material. The Consultant shall incorporate the soil survey data into the tender documents. Soil quantities shall be calculated and a plan developed for the interim stockpiling of soil during construction.

10.2 Roadside Facilities

The Consultant shall assess the need for roadside facilities such as roadside turnouts, historical turnouts (safety rest areas), vehicle inspection stations, etc. The consultant should review the latest information in Design Bulletins as well as the design content in this regard. The work required may involve upgrading of existing facilities or construction of new facilities. The Consultant should first review the Terms of Reference and any relevant design or planning documents (Geometric Assessments, files, and reports) for direction on this subject. Planning Reports are available which identify the suggested spacing and approximate location of roadside turnouts on all divided highways and some undivided highways in the province. If there is no clear direction contained in these documents, the Consultant shall ask for direction from the Project Administrator on the adequacy of existing facilities as well as the need and feasibility of constructing additional roadside facilities on the project and on adjacent segments of highway. The general guidelines regarding spacing of roadside facilities contained in Chapter F of the 'Highway Geometric Design Guide', together with a review of on-site conditions, may be used to gauge the need for new or improved roadside facilities. Any additional roadside facilities that are considered desirable or necessary should be brought to the attention of the Project Administrator for concurrence before proceeding with right-of-way purchases, survey or detailed design.

10.3 Intersection Design

The Consultant shall prepare intersectional analysis using traffic volumes, turning movement diagrams, and collision history which can be obtained from the Department. The Consultant shall also review with the Department Project Administrator prior to finalizing the intersection design. Guidelines regarding intersection design can be found in Chapter D of the 'Highway Geometric Design Guide'.

The pavement design for intersection upgrades shall be done in accordance with 'Section 5.3: Surfacing Engineering Assessment'.

10.4 Roadside Design (Clear Zone, Mitigation of Hazards, Barrier Protection, Etc.)

On new construction projects the Consultant shall evaluate the traffic volume, traffic speed, highway function, terrain type, and typical hazards and develop an appropriate strategy for clear zone, mitigation of hazards, and barrier protection for the project. The design of barrier at the edge of the finished road surface shall be minimized through the use of flatter side slopes to eliminate the barrier. Recommended fill heights and side-slopes shall be used to reduce the extent of barrier installation. On existing highways, the Consultant shall carry out all necessary survey, inspection, and evaluation of existing traffic barriers. Efforts shall be made to eliminate the need for traffic barriers wherever possible by reducing the severity of hazards, relocating fixed objects outside of the clear zone and side-slope improvement. When assessing the need for traffic barriers, all scenarios shall be examined to achieve the best possible engineering solution to minimize risks and cost to road users, the Department, etc. In some cases, the preferred solution may involve no protection being used. Where it has been decided that existing barrier shall be retained/replaced, the condition of the various components should be assessed for possible replacement. Wood components will generally need replacement when they have rotted, cracked, or become weakened due to age or weathering.

Where necessary, barrier installations shall be designed with locations shown on the roadway design plans. The 'Roadside Design Guide' shall be used as a guide for the choice of barrier system and end treatments type. Bridge rails and approach guardrail transitions shall meet requirements of the 'Bridge Structures Design Criteria'.

10.5 Railway Crossings

The Consultant shall produce design plans for each railway crossing that is created or modified as a result of the highway improvement project.

The design submission package for each crossing shall include, in addition to the crossing design plan, the required Environmental Screening Report, a road and railway traffic estimate, and all other documentation required for an application for approval to carry out the proposed work. In some cases, commitments related to cost sharing and maintenance distribution will be involved. As the approval process may take up to 18 months to complete, the Consultant shall complete this phase of the project as early as possible.

Consultants doing this work shall make themselves familiar with Railway Crossing Cost-Sharing arrangements and historical agreements. Refer to Transport Canada's 'Grade Crossings Regulations' (GCR) and 'Grade Crossings Standards' (GCS).

10.5.1 At-Grade Crossings

The Consultant shall refer to the engineering assessment that is normally completed prior to design. Refer to Transport Canada's 'Grade Crossings Standard' (GCS) for more details on engineering and safety standards. In addition, refer to 'Canadian Transportation Agency' (CTA) website for information on agreement procedure for Road or Railway authorities.

10.5.2 Grade Separated Crossings

In addition to the review of the assessment and recommendation mentioned in 'Section 10.5.1: At-Grade Crossings', the Consultant shall undertake the following tasks:

- Bridge assessment
- Bridge Conceptual Design
- Evaluation of repair options
- Advisement of adjacent Landowners with respect to safety issues
- EARP (Environmental Assessment Review Process) when applicable
- Completion of the structural design, construction drawings, contract documents, and construction inspections in accordance with 'Section 11: Bridges'

10.6 Seeding

The Consultant shall prepare seeding and fertilizer requirements for disturbed areas. See 'Section 12.1.4: Standard Specifications, Special Provisions, Specification Amendments and Supplemental Specifications' for more information on accessing an up-to-date version of the standard Special Provisions.

10.7 Signing

The Consultant is responsible for preparing an inventory of existing permanent signs (which will identify signs, posts, etc. that may be reused) and produce a plan of all permanent signs required for the project. The tender documents for a project will need to show the number of "remove and re-install" as well as the number of "supply and install" signs. Standard signing plans may be used in some cases, for example for standard intersection treatments or for climbing/passing lanes (see the 'Traffic Control Standards' webpage and 'Manual of Uniform Traffic Control Devices for Canada', Sixth Edition 2021). Customized plans shall be prepared whenever the standard plans do not show the necessary detail. The plan shall include any required sign-off for the site, which is a consequence of the project. Approval of the Project Administrator is required for customized signing plans. All guide sign designs should adhere to the Highway Guide and Information Sign Manual.

If identified by the Project Administrator in the Terms of Reference, the above plans may be used for bidding purposes on a lump sum basis (rather than the conventional payment per sign method).

A detailed schedule of all signing requirements must be prepared and made available at the tendering stage if a lump sum bid is used. A Special Provision may be used to modify the payment method.

10.7.1 Signage Design Plans

All signs that are to be placed within the right-of-way of a provincial highway shall be identified in the design package approved by the Department. The Consultant shall submit a Signage Design Plan as part of the design submission package. The Signage Design Plan involves selecting the appropriate signs, determining the locations, and estimating quantities and costs.

To obtain approval on Signage Design Plan from the Department, the Consultant shall include following items in the design package:

- An inventory of the current signs in the highway right-of-way
- A summary of the signs and materials required for the proposed design
- Sign layout drawing(s) and proposed sign details
- Contract quantities
- An estimate of the contract and material costs

In cases where an overhead sign structure will support an overhead sign that is larger than four square metres, it shall be treated as a bridge structure. The structural design shall be approved by the Bridge Engineering Section, Technical Standards Branch.

10.7.2 Third Party Signs

The Consultant shall be aware that the Department has several sign programs available to private facilities and businesses and municipalities along highways. The Department leases or assigns space in the highway right-of-way for placement of these signs, and the third party sign owners are responsible for the installation and maintenance of their own signs. Any adjustment to these third party signs, such as removal and reinstallation during construction, are the third party sign owners' responsibility. Examples of third party owned signs include Tourism Signs, Safety Program Signs, Sponsorship Signs, etc.

The Consultant shall prepare a list of existing third party signs requiring adjustment along the highway, including the sign owners' contact information. The Consultant shall obtain the ownership information and existing lease agreements for the third party owned signs from the appropriate Department Regional Offices. The Consultant shall include Special Provisions in the tender document outlining the Contractor's responsibility for arranging sign adjustments with sign owners prior to construction activities. These third party owned signs are excluded from the bid item schedule, as the Department will not compensate the Contractor for removal and installation of third party signs.

For Tourism Highway Signage Program, refer to 'Design Bulletin 92: Process of Handling Tourism Highway Signage Program (THSP) Signs in Construction Projects'.

10.8 Guideposts (Delineators)

Delineators shall be designed as per the design guidelines contained in Section C7 of the 'Highway Pavement Marking Guide' and 'Traffic Accommodation in Work Zones' manual. These guides provide warrants, recommended spacing, and installation details for delineators.

10.9 Pavement Markings (Combined Grading/Surfacing Projects and Surfacing Projects)

The pavement marking requirements for all intersections, interchanges, passing lanes, rest areas, vehicle inspection stations, auxiliary lanes, and similar highway features shall be shown. This may be done through the use of standard plans where applicable (see the 'Alberta Highway Pavement Marking Guide') or through the use of customized plans for the project.

The Consultant shall identify pavement markings (including pavement messages) required for school zones, railway crossings, R.C.M.P, aircraft patrol zones, stop lines, etc., where these are required on the project.

If identified by the Project Administrator in the project Terms of Reference, the above plans may be used for tendering purposes on a lump sum basis (rather than the conventional payment by quantity method).

10.9.1 Lane Widths (Painting)

Because lane width standards have changed over the years, there is a need to follow a consistent practice to implement the current standards. The current practice for painting lane widths on rural and urban roadways is as follows:

- Normal maintenance involves repainting lines in the same location as the existing lines. This avoids the problem of having two lines visible.
- When projects come up for construction or pavement rehabilitation, lane widths are painted as per the current geometric design standards. This includes all types of construction contracts (e.g. new construction, grade widening, overlay, seal-coat, etc.). After the roadway has been built to the current metric standards, periodic repainting will preserve the standard lane width.

10.10 Rumble Strips

Rumble strips will normally be installed in regular highway projects whenever a new paved surface is constructed.

Refer to 'Highway Geometric Design Guide' for placement (utilization) of rumble strips on shoulders, centerlines, and at stop conditions. These guidelines/practices have been developed based on experience and take into consideration accommodation of cyclists, mitigation of noise near residences, collision experience at intersections and on curves, and other factors.

10.11 Highway Illumination (Lighting)

The Consultant shall prepare plans identifying all existing highway illumination systems which will require modification, expansion, or replacement on the project, and recommend new lighting installations which may be required as a result of the highway construction or improvement.

Consultants shall be aware that:

- Lighting design shall be the Consultant's responsibility (the electrical Utility Owner may provide design input and advice) and shall be included in the Tender Package
- Each lighting installation is the subject of an agreement with the Department
- Where additions or alterations to existing lighting arrangements are proposed, the Consultant shall research the ownership and operating conditions pertaining to the existing installation
- Because of time requirements, it is necessary that lighting needs be identified early in the project design to allow for discussion/concurrence with the Project Administrator, detailed design, review, and co-ordination with electrical Utility Owners
- The Consultant shall prepare a draft agreement to be signed by the electrical Utility Owner and the Department, detailing the capital and operating costs and any proposed cost sharing arrangement

Warrants and Operating Guidelines for Highway Lighting should be referenced from 'Section 5.2.5.3 Highway Lighting'.

10.12 Traffic Control Signals or Roundabout

The Consultant shall produce a plan for each traffic control signal and/or pedestrian crosswalk signal that may be required on the project. The plan shall include all details of the signals, signs, markings, roadway geometrics, and ancillary features.

Transportation Association of Canada, 'Traffic Signal and Pedestrian Signal Head Warrant Handbook' should be referenced for selecting potential location for signalization.

If warrants are met for signals, the Consultant will need to review with the Department whether a roundabout is applicable instead of signals. As roundabouts and signal installations are normally subject to internal Departmental review and approval, the Consultant shall identify potential signal requirements prior to undertaking the actual design.

Further information regarding roundabouts may be found in 'Design Bulletin 68: Roundabout Design Guidelines on Provincial Highways'.

10.13 "C" Estimate Submission

If the "C" Estimate varies from the most recent estimate shown in the Department's construction program by more than 20% (either greater or less than), the Consultant shall provide a rationale for the variance.

The "C" Estimate submission shall include the following:

Two (2) separate cost estimates: one shall be an Average Unit Price Estimate which is based on the Department's most recent Unit Price Averages Report, and the second (the "C" Estimate), which is the estimated cost of the project at the time of final Tender Package submission. For the Average Unit Price Estimate, the consultant shall utilize the regional average unit price for bid items first, and in cases of when regional average unit prices are not available or not accurate, utilize the provincial average unit price for the select bid items. The "C" Estimate shall be the Consultant's best estimate of the project's actual cost if it were to be tendered on the date the "C" Estimate was finalized. The "C" Estimate shall not include any estimate of inflation to account for any potential or expected delay in the actual tendering of the project. For bridge construction and/or rehabilitation work using lump sum bid items, or other projects incorporating specialized types of work where the average unit price information is unavailable, only the "C" Estimate will be required.

When preparing the "C" Estimate the Consultant shall take into consideration factors such as but not limited to:

- Project specific local conditions
- Project location
- Contractor availability
- Current market values for materials based on availability and location, such as:
  - Aggregate availability and/or haul distances
  - Current asphalt binder prices
  - Quality and/or availability of common and/or borrow excavation material
  - Price of raw steel
- Delivery time for materials relative to contract completion date(s)
- Timelines available for construction completion
- Complexity of scope (specialty work)
- Quantities of bid items and;
- Current economic conditions/trends

The Consultant shall include a "C" Estimate Project Sponsor Sign-Off Letter explaining the rationale used to determine the estimated prices. This information shall concentrate on the major bid items only and shall include sufficient information to allow the Project Administrator, Project Sponsor and Procurement Strategy and Planning (PSP) Section staff to assess the validity of assumptions being made. The letter shall include a sign-off area for the Project Sponsor to indicate that they have assessed the validity of the rationale used and have accepted the cost as accurate.

"C" Estimates shall include separate cost breakdown summaries for the project based on major work categories (i.e., grading, base, surfacing, bridge, ancillary etc.), as well as an overall combined summary.

"C" Estimates shall include multi-year cash flow estimates if the succeeding expenditures are expected to take place over multiple fiscal years.

For tenders with multiple projects, identifiable by different construction Work Activity Codes, the "C" Estimate shall also include overall quantity and cost breakdown summaries for each individual project.

Each cost estimate shall include construction bid item costs, engineering costs, right-of-way costs, utility costs, and any other relevant project costs. No contingencies shall be added for the purpose of composing the cost estimates.

All cost estimates shall be provided in electronic form (e.g., MS Excel).

The Consultant shall provide updated “C” Estimates, including breakdowns by project, whenever revisions are made to tender quantities via addendum.

The Consultant is advised that in cases where tendering takes place more than 2 months subsequent to the final tender package submission, the Department may request that the Consultant provide updated Average Unit Price and “C” Estimates to be based on the most recent information available. Re-submission of the letter explaining the rationale used to determine the estimated prices will not be required except in cases where the rationale has changed from that used in developing the original “C” Estimate.

10.14 Detailed Design Package Requirements

A Detailed Design Package for roadway projects may include but is not limited to the following:

- Project scope description
- Design standards
- Decisions made at the Preliminary Engineering stage
- Reference documents
- Geometric design details
- Intersection improvement design details
- Pavement design details
- Geotechnical design details
- Grading design details
- Roadside design details
- Drainage design details
- Bridge design details (may be a separate report)
- Right-of-Way acquisition details
- Utilities adjustment and agreement execution details
- Railway crossing modification details
- Illumination design details
- Appurtenance design details
- Environmental studies, design and mitigation details
- Access management modifications details
- Department supplied borrow acquisition details
- Approved design exceptions
- Plans/Drawings
- Special Provisions
- “C” Estimates

10.15 Independent Design Check

The Consultant shall carry out a complete check of the draft detailed design package using an engineer, other than the individual responsible for the design, prior to submission to the Project Administrator for review.

10.16 Draft Detailed Design Package Submission

The Consultant shall deliver the draft detailed design package to the Project Administrator for review as per established timelines at the Project Initialization Meeting.

10.17 Final Design Review

If required, a final design review meeting will be organized and attended by the Consultant, Project Administrator, and representatives of other concerned branches of the Department, after the submission of the draft detailed design package and allowing sufficient time for department's review. The Consultant will select the time and place for the meeting (after consultation with the Project Administrator), will establish an agenda and shall act as chairperson at the meeting.

Assuming that all significant design decisions have been made at this point, this meeting should concentrate on reviewing the final design, confirming that all necessary changes have been made, finalizing, and packaging the design (including the drawings) for submission. The Consultant may also discuss, in this meeting, tender schedule and Tender Package submission requirements.

10.18 Tender Package Preparation

The Consultant shall submit draft and final Tender Packages in accordance with 'Section 12.1: Tender Package Preparation'.

10.19 Reporting Requirements

The Consultant shall deliver the final roadway design package to the Project Administrator for review and acceptance as per established timelines at the Project Initialization Meeting.

The final roadway design package shall include an electronic copy and set of blueprints of the plans. Documents and plans required for record purposes are listed under Roadway Design in 'Appendix K: Project Records Management'.

Section 11: Bridges

11.1 General

Section 11 presents the project requirements for all new bridges, bridge assessments and bridge rehabilitation projects. It applies to Major Bridges (including Major Bridge-sized Culverts), Standard Bridges and Standard Bridge-size Culverts. Unless otherwise written in the project Terms of Reference, the requirements presented in this section shall apply.

11.2 Engineering Standards

All engineering work shall be done in accordance with the latest Department standards, guidelines, specifications, relevant codes, and recognized engineering practices. The various Department documents referenced throughout Section 11 are available at the Bridge Engineering website. The following are considered the primary Department bridge documents:

- Bridge Conceptual Design Guidelines (BCDG);
- Design Guidelines for Bridge Size Culverts;
- Bridge Structures Design Criteria (BSDC);
- Bridge Management Strategy Guideline;
- Bridge Assessment Guidelines;
- Repair Manual for Concrete Bridge Elements;
- Repair of Bridge Structural Steel Elements Manual;
- Bridge Load Evaluation Manual (BLEM);
- Engineering Drafting Guidelines for Highway and Bridge Projects (Drafting Guidelines); and
- Standard Specifications for Bridge Construction (SSBC).

11.3 Engineering Drawings

Detailed bridge design drawings prepared by Consultants shall be completed in accordance with the Department's Drafting Guidelines.

The Department will assign drawing numbers for all detailed bridge design drawings prepared by Consultants. These numbers and the standard title block template are issued by the Bridge Standards Technologist, Technical Standards Branch.

Final copies of all drawings shall be authenticated and submitted digitally to the Department, in accordance with 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'. Digital drawings shall be submitted such that the drawing scales are correct when plotted at 22" x 34". All drawing packages should include the following note in their general notes: "DRAWING SCALES ARE CORRECT FOR FULL SIZE (22" x 34") SHEET ONLY".

11.3.1 Use of Department Bridge Drawings

The Department has a number of bridge Standard Drawings and Typical Detail Drawings. These drawings are to be used as described in the various Department documents (e.g. BCDG, BSDC, Culvert Design Guidelines, SSBC, etc.).

Standard Drawings have a prefix "S" in front of the drawing number. These are engineered documents. The Consultant shall refer directly to these documents on the project detailed design drawings and shall include them in the tender drawing set. These Standard Drawings often require additional project specific engineering and detailing to be included on the detailed design drawings. Standard Drawings are occasionally updated and Consultants shall ensure they are including the latest version of the drawings in their tender set.

Typical Detail Drawings have a prefix “T” in front of the drawing number. These are not engineered documents, rather are documents provided to demonstrate the Department’s preferred details. Consultants shall utilize the preferred details unless otherwise approved by the Department. Consultants are fully responsible to properly design and draft all details on the project detailed design drawings. Typical Detail Drawings shall not be included in the drawing tender set.

11.4 Independent Design Check

An independent design check shall be completed by the Consultant for the following activities:

- For new bridge designs:
    - Complete review of bridge conceptual planning work and reports, including hydrotechnical design
    - Complete review of preliminary engineering work and reports
    - Complete re-analysis and calculation of all aspects of the structural design, preferably using a methodology or computer program other than that used by the Design Engineer
- For existing bridges:
    - Complete review of bridge assessment work and reports
    - Independent checks for bridge load evaluations shall be in accordance with the BLEM
    - Complete review of bridge rehabilitation work and reports
    - A complete re-analysis and calculation of all aspects of the structural design, preferably using a methodology or computer program other than that used by the Design Engineer

The independent check must be fully independent of the design work. The independent checker may be employed by the same company as the Design Engineer or by another Consultant when the design Consultant does not have adequate in-house capabilities to provide this check. The independent design check shall include a full review of the applicable engineering submission (e.g. reports, drawings, Special Provisions, etc.), ensuring completeness, integrity, and accuracy of all aspects of the submission. The independent checker shall provide design check notes and shall authenticate the engineering submission.

To resolve issues of concern, an additional independent check of a specific component of the structure may be requested by the Department at any time.

11.5 Geotechnical Information

‘Section 8: Geotechnical Investigation and Design’ outlines the requirements for Geotechnical Investigations and Designs. Input from the Geotechnical Consultant is required at all stages of the project design to ensure that the geotechnical risks, limitations, and assumptions are accurately reflected in the final design. Similar to requirements of the Bridge Consultant, the Geotechnical Consultant shall be sufficiently involved throughout the construction phase to provide technical support as needed, and to ensure the work is completed as per their design intent. The Geotechnical Consultant should always be involved in the development of the bridge detailed design drawings and Special Provisions to ensure that the final design is consistent with the geotechnical engineering completed. Where geotechnical issues exist at a site, or when there are important geotechnical items to discuss, it is expected that the Geotechnical Consultant attends submission review meetings.

A Geotechnical Desktop Study consists of the review and interpretation of existing information, to identify and assess potential geotechnical risks to the proposed project. A Geotechnical Desktop Study is used during the bridge planning phase to inform the proposed design criteria, identify any information gaps and provide the basis for scoping the subsequent field investigation and laboratory testing program, in a manner that is appropriate to the project needs and complexity of the geologic setting. Depending on the level of knowledge of the site geotechnical parameters that can be attained during the Geotechnical Desktop Study, the subsequent field investigation (i.e. test holes, etc.) may be completed before or after completion of the Structure Alternatives Report. It is important that the Bridge Consultant and Geotechnical Consultant collaborate during the Geotechnical Desktop Study phase, to identify the pros and cons

of the timing and scope of the field investigation. Foundation types and options should be discussed, and preliminary foundation loads and depths should be determined. A recommendation on the timing of and scope of the field investigation should be included in the Geotechnical Desktop Study. Completing the field investigation before the Structure Alternatives Report may be needed in order to develop realistic foundations options, but this can also result in test holes that are not fully aligned with the location of the substructure foundation locations. For all bridge projects, test holes shall be a minimum of 3 m below the new bridge foundation depth or penetrated 3 m into competent bedrock. A Geotechnical Desktop Study Report is not required for Standard Bridge and Standard Bridge-Sized culvert projects, however, the scope of work typically included in a Geotechnical Desktop Study should still be completed as it will guide the field investigation. For Major Bridge projects over rivers, the Geotechnical Engineer shall complete a site visit as part of the Geotechnical Desktop Study work to inspect the river bank conditions, and identify any geotechnical issues that might affect roadway alignment or the abutment set-back from the top of bank.

Geotechnical investigations are undertaken to provide subsurface information to the Design Engineer and to the Contractor bidding the work. However, unanticipated ground conditions can and do occur. Contractors will be paid based on the terms of their contract. This may involve changes in compensation where unforeseen conditions are encountered. Nothing can completely remove the risk of encountering a differing site condition; however, the potential for costly disputes over what constitutes differing site conditions is greatly reduced through a comprehensive geotechnical investigation, and contract documents which clearly articulate the expected subsurface conditions and associated construction risks. The Consultant is responsible for ensuring that the contract documents (Drawings, Special Provisions) provide a clear indication of the expected subsurface conditions at each major structural element (abutments and piers). While the Final Geotechnical Report will typically be included as an “Information Document” with the Tender package, only the geotechnical/subsurface information included on the Drawings or in the Special Provisions becomes contractually binding.

11.5.1 Geotechnical Submissions for Bridges

‘Section 8: Geotechnical Investigation and Design’ discusses various Geotechnical Reporting submissions. For bridge projects, a Preliminary Geotechnical Report will not be required. Items such as cost estimates, drawings, land acquisition, and utility requirements, may not require discussion in the Geotechnical Reports if they are discussed within another project submission (e.g. Preliminary Engineering Report or Structure Alternatives Report).

When there is a geotechnical scope of work for Standard Bridge and Standard Bridge-Sized culvert projects, the geotechnical scope of work typically begins after preliminary design, once the replacement structure is chosen. A formal Geotechnical Desktop Study report is not required, only a Final Geotechnical Report shall be submitted.

For Major Bridge projects a Geotechnical Desktop Study and a Final Geotechnical Report shall be submitted. Consultants shall refer to the BCDG, the BSDC, and the Structure Alternatives Report Guidelines. The Geotechnical Desktop Study shall be submitted as a standalone report or memorandum, with the pertinent details incorporated into the Conceptual Design Report. The Final Geotechnical Report as described in ‘Section 8.4.2.2: Final Geotechnical Report’ shall be submitted as a standalone report, with pertinent details incorporated into the Structure Alternatives Report.

For Major Bridge projects at large river crossings, the Consultant shall include a deletable item for completing a static pile load test during the design phase as part of their proposal. The use of completing test piles during the design phase to reduce the quantity of river piles is discussed in the BSDC.

11.6 Bridge Surveys

Bridge surveys shall be completed in accordance with ‘Section 6: Preliminary Engineering’.

For new bridges, survey information shall meet the requirements presented in the BCDG. For bridge rehabilitations, if the design options might affect the gradeline, the Consultant conduct a gradeline profile survey in accordance with the Consultant survey requirements in Section 20 of the SSBC.

Additional information on the use of survey data, how to relate it to bridge component geometry and how to present it on the design drawings, can be found in the BSDC and the Drafting Guidelines.

11.6.1 Bench Marks

The Department will assign reference numbers for the bench mark tablets when applicable (major bridge only). These numbers are issued by the Modelling and GIS Section. The final geodetic elevation for the bench marks shall be incorporated into the Record drawings and reported back to the Coordinator.

11.7 Right-of-Way Requests

Refer to ‘Section 3: Right-of-Way'

11.8 Stakeholder Input

The Consultant shall discuss the proposed alternatives with municipalities and regulatory agencies as required to facilitate stakeholder input and feedback. The Consultant shall formulate a public participation strategy where required. Any strategy not detailed in the project Terms of Reference requires prior approval of the Department.

11.9 Regulatory Requirements

The Consultant is responsible for adhering to all applicable regulatory requirements, and shall obtain all applicable approvals, licenses, permits, etc. as required by law, unless otherwise directed in the project Terms of Reference. Specific requirements related to environmental regulatory processes are outlined in ‘Section 4.3: Regulatory Contact/Approvals/Authorizations’.

The Consultant must obtain permission from the Department prior to each contact with the regulatory authorities.

Refer to the Railway Grade Separation Process Flowchart (Figure 11.1) and the BCDG for more information regarding railways projects.

11.10 Submissions of Draft Reports and Detailed Design Packages

Draft reports and draft detailed design packages shall be submitted in accordance with this ‘Section 11: Bridges’ and the project Terms of Reference. The Consultant shall submit these in a timely manner, taking into account the milestone dates, the review periods outlined below and sufficient time to resolve any outstanding issues that arise during the review.

All bridge drawings and reports submitted to the Department must contain a reference to the unique bridge file number (BF#) that has been assigned to the project.

Reports and detailed design packages submitted to the Department for review shall be 95% complete and shall have gone through the Consultant’s quality control process prior to being submitted. Detailed design packages generally include Drawings and Special Provisions related to the construction and design of the work. More detail on these submissions is included later in this ‘Section 11: Bridges’, for the specific bridge work types.

The Department will review reports and detailed design packages and will provide comments back to the Consultant within an agreed to timeframe. As a general guide, the Consultant should expect the following Department review timelines when developing their schedule:

- For reports: 3 weeks
- For standard bridges and culverts detailed design packages: 3 weeks
- For major bridge detailed design packages: 6 weeks

These review timelines do not include the time required to resolve any outstanding review comments from the Department.

The Department will typically classify comments as follows:

- Red Comment: This indicates that a Department standard or practice or code requirement has not been met. The Consultant must provide a response indicating the changes that have been made to address the non-conformance, otherwise a Design Exception will be required to address the non-conformance;
- Blue Comments: This is a comment that is not related to a standard but is considered important. The Consultant must either make a change to the document or provide a technically supported response to support the issue; or
- Green Comment: This is a general comment or observation and the Consultant can use their discretion as to whether a change is required. The Consultant does not need to provide a response for these comments, but they can provide a response if they wish to get feedback from the Department.

Upon receipt of Department comments, the Consultant shall assemble the comments into a Review Comment Tracking spreadsheet, unless otherwise directed by the Department. The Consultant shall provide responses to the comments as described above and shall return the spreadsheet to the Department. The Department will then review the Consultant's responses and will either close the comments or provide an additional comment. This process shall be repeated until all comments are closed. Therefore, it is important that the initial responses from the Consultant are clear and with sufficient detail to address the Department comments.

A report/detailed design package review meeting with the Department and Consultant may be required to expedite resolution if there are significant comments on the submission or if the initial Consultant responses are inadequate. High quality submissions and appropriate responses can help minimize the need for review meetings.

Final copies of all submissions shall be authenticated and submitted digitally to the Department, in accordance with 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'.

11.11 "C" Estimate Submission

Refer to 'Section 10.13: "C" Estimate Submission'.

11.12 Submissions of Design Notes

As required in Sections 11.15 and 11.17, design and checker notes shall be submitted within three (3) months after final submission of the other components (drawings, Special Provisions, "C" Estimate) of the detailed design package. Final copies of the design and checker notes shall be authenticated and submitted digitally in accordance with 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'.

11.13 Record Keeping

Record keeping for bridge projects shall be in accordance with 'Appendix K: Project Records Management'.

11.14 Standard Bridges and Culverts

11.14.1 General

This section shall apply to bridge projects where the new bridge is classified as a Standard Bridge-sized Culvert or a Standard Bridge, as defined in 'Section 1: General'. If approved by the Department, where minor changes are made to the Standard Bridge designs, the Consultant may still follow the standard bridge processes. However, any modifications to the Department standard drawings must be engineered for the specific situation, including authentication by the design engineer and independent checker.

For these projects, the Conceptual Design and Preliminary Engineering phases are combined, with a single Preliminary Engineering Report produced.

Specific guidance around standard bridges and culverts design can be found in the BCDG, Design Guidelines for Bridge Sized Culverts, and the Standard Bridge Guidelines located on the Bridge Engineering website. Refer to the Standard Bridges and Culverts Process Chart (Figure 11.2).

11.14.2 Bridge Conceptual Design and Preliminary Engineering

Unless otherwise identified in the project Terms of Reference, the Consultant shall:

- Collect and review all relevant data including, but not limited to, historical reports, file history, site survey, site inspection observations, geotechnical investigations (refer to 'Section 8: Geotechnical Investigation and Design'), right-of-way and land ownership information, and environmental information. The Consultant is responsible for obtaining sufficient data for the project.
- Establish hydrotechnical design parameters based on the current version of the BCDG. Review parameters for consistency with site observations, survey data and any knowledge gained during the data collection phase.
- Establish roadway design parameters based on the current version of the 'Highway Geometric Design Guide' and Functional Planning Studies within the project limits.
- Identify conceptual replacement options, including approximate location, alignment, gradeline, and structure type. Consider right-of-way requirements, utilities, geotechnical information, hydrotechnical information, environmental requirements, detour requirements, potential construction challenges, potential construction methodologies, capital costs, and lifecycle costs.
- Recommend a replacement alternative.
- Identify all issues or constraints with the recommended alternative. Outline a plan for Right-of-Way Acquisition, Environmental Approvals, First Nations Consultation, Utility issues, stakeholder issues, and further testing or investigation, as required.
- Prepare and submit a Draft Preliminary Engineering Report including a summary of all constraints and design parameters, a description of all conceptual alternatives identified including cost estimates, sketches (at minimum a site plan, elevation view, roadway profile, and stream profile, if applicable), and description of pros, cons, and risks.
- Coordinate a Preliminary Engineering Report review meeting with the Department, if required.
- Finalize the Preliminary Engineering Report with modifications as discussed with the Department. The final report shall include a description of the selected alternative and justification for its selection, along with level "B" cost estimates.
- All Design Exceptions shall be clearly identified and documented in the Final Preliminary Engineering report.

11.14.3 Detailed Design

The Consultant shall prepare and submit the detailed design package, the draft submission shall include:

- Design Drawings
- Special Provisions related to design and construction (if any are required)

Once all review comments and issues are resolved the Consultant shall submit the final detailed design package which shall include:

- Design Drawings
- Special Provisions related to design and construction (if any are required)
- "C" Estimate

The design drawings and special provisions shall be authenticated and submitted in accordance with 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'. Design and checker notes are not required for standard bridge and culvert projects.

11.14.4 Tender Package Preparation

The Consultant shall submit draft and final Tender Packages in accordance with 'Section 12.1: Tender Package Preparation'.

11.14.5 Summary of Reporting and Submission Requirements

At the conclusion of the design phase of the project, the Consultant shall submit (or by the dates identified in the Terms of Reference) the following documentation:

- Preliminary Engineering Report
- Environmental Reports (Environmental Evaluation, Fisheries Habitat, etc. as required)
- Geotechnical Report (if completed)
- Any other project related reports or agreements
- Detailed design package
- Tender Package

11.15 Major Bridges

11.15.1 General

This section shall apply to bridge projects where the new bridge is classified as a Major Bridge, as defined in 'Section 1: General'.

Major Bridges shall be designed in accordance with the most current version of the documents on the Bridge Engineering website, including the BCDG and the BSDC. Refer to the Major Bridge Process Chart (Figure 11.3).

11.15.2 Value Engineering and Risk Management

Value engineering/analysis and risk management shall be completed for all Major Bridge projects. The results of the value engineering/analysis and risk management shall be woven into the bridge planning and preliminary engineering phases and incorporated into the Bridge Conceptual Design Report and the Structure Alternatives Report.

The Consultant shall create a risk register at the very beginning of the project and update/maintain it throughout all phases of the project.

Large and/or complex bridge projects will require more comprehensive services, such as value engineering sessions, constructability workshops, and risk assessment/management workshops. Further guidance on Value Engineering/Value Analysis is included in 'Appendix J: Value Engineering and Value Analysis Services'. Such services shall be provided when specified in the project Terms of Reference.

11.15.3 Bridge Conceptual Design

The Consultant shall prepare a Bridge Conceptual Design Report in accordance with the BCDG.

The purpose of the bridge conceptual design phase is to determine and document the most suitable solution for a roadway to cross a stream, road, or other facility while considering relevant issues, risks, and constraints, and exploring all potential options. The results should:

- Document data compiled, project constraints, design parameters, alternatives considered, and decisions made
- Provide preliminary design information on the recommended concept to proceed to the Detailed Design phase.

This project phase typically includes:

- Site Survey
- Geotechnical Desktop Study
- Arranging for preliminary environmental data or regulatory inputs
- Identifying and engaging stakeholders
- Value Engineering Session(s), as required

A draft Bridge Conceptual Design Report shall be submitted for review and comments. Following closure and resolutions of all comments, a final Bridge Conceptual Report and Bridge Conceptual Design Summary Sheet shall be submitted prior to proceeding into the Preliminary Engineering Phase.

11.15.4 Preliminary Engineering

The Consultant shall prepare a Structure Alternatives Report in accordance with the 'Structure Alternatives Report Guidelines' on the Bridge Engineering website.

The Structure Alternatives Report serves two purposes:

- Documenting the decision making process used to arrive at a recommendation on what type of structure should be carried forward to the detailed design stage; and
- Assembling all information required for the engineer to complete the detailed design

This project phase typically includes:

- Detailed/Final Geotechnical Investigation
- Arranging for environmental data or regulatory inputs
- Identifying and engaging stakeholders
- Constructability workshop as required

When complete, the Structure Alternatives Report provides a detailed discussion on alternatives considered for all elements of the bridge structure, and will contain, in a summarized format, all of the information necessary for the engineer to complete the detailed design of the bridge.

A draft Structure Alternatives Report shall be submitted for review and comments. Following closure and resolutions of all comments, a final Structure Alternatives Report shall be submitted.

Next, the Consultant shall prepare and submit a draft Project Design Brief for review, in order to confirm the Department's agreement with design features and assumptions. Upon submission of the Project Design Brief, there should not be any unresolved issues pertaining to the bridge design. The Consultant shall have expended sufficient engineering effort on the chosen design alternative to support the information submitted in the Project Design Brief. The Project Design Brief should be considered a standalone document that contains all the information that the Design Engineer(s) would need to complete the design of the bridge. Input and confirmation from the Geotechnical Engineer and other subject matter experts should be incorporated. Sketches and drawings may be required if written text is insufficient. The submission shall also record any major outstanding issues with the project that are yet to be resolved (e.g. environmental, land, utilities, etc.). The submission shall also identify any technical Special Provisions that are being developed to support the design and construction, which will eventually be submitted with the detailed design package for review.

A blank Project Design Brief form is included on the Bridge Engineering website.

Following acceptance of the Project Design Brief, the Consultant can proceed into Detailed Design.

11.15.5 Detailed Design

The Consultant shall prepare and submit the detailed design package, the draft submission shall include:

- Design Drawings
- Special Provisions related to design and construction (if any are required)

Once all review comments and issues are resolved the Consultant shall submit the final detailed design package which shall include:

- Design Drawings
- Special Provisions related to design and construction (if any are required)
- "C" Estimate
- Design and Independent Check Notes. These may be submitted up to three (3) months after submission of Design Drawings, Special Provisions, and "C" Estimate

The design drawings, special provisions, and design and independent check notes shall be authenticated and submitted in accordance with 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'.

11.15.6 Tender Package Preparation

The Consultant shall submit draft and final Tender Packages in accordance with 'Section 12.1: Tender Package Preparation'.

11.15.7 Summary of Reporting and Submission Requirements

At the conclusion of the design phase of the project, the Consultant shall submit (or have already submitted, by the dates identified in the Terms of Reference) the following major documents:

- Final Bridge Conceptual Design Report
- Bridge Conceptual Design Summary Sheet
- Final Structure Alternatives Report
- Project Design Brief
- Detailed Design Package
- Tender Package

The submissions above shall be complimented with the supplementary documents such as geotechnical reports, environmental reports, important correspondence, etc.

11.16 Assessments

11.16.1 General

Assessments of existing bridge structures are completed to determine the optimum strategy for maintenance, rehabilitation, or replacement, in order to maximize the service life of the structure at a minimum life cycle cost. The Department also uses assessments to define the scope of work for the next stage of the bridge (e.g. rehabilitate or replace). Assessments are often completed internally by the Department. However, assessments are also incorporated into various consulting agreements: standing agreements; one-off bridge assessment projects; long-term planning projects; and occasionally they are included in a rehabilitation project, although this can result in challenges when scoping the rehabilitation work.

Assessments shall be done in accordance with the Department's 'Bridge Assessment Guidelines', which discusses the identification of deficiencies, development of management strategies, and the application of life cycle cost analysis.

Guidance on the development of potential bridge management strategies can be found in the Department's 'Bridge Management Strategy Guideline'. Bridge management strategies that include increasing deadload (e.g. when a standard 90 mm waterproofing system is considered for replacing an existing 50 mm system) shall include a bridge load evaluation in accordance with 'Section 11.16.2: Bridge Load Evaluations'. This bridge load evaluation information can be used to evaluate assessment options, but is also used to update the Department's bridge inventory data.

11.16.2 Bridge Load Evaluations

Consistent, thorough and accurate bridge load evaluations are important to ensure the load carrying capacities of the province's bridges are maximized while at the same time maintaining an appropriate level of safety.

When a bridge load evaluation is included in the bridge assessment or bridge rehabilitation scope of work, the load evaluation shall be carried out in accordance with the 'Bridge Load Evaluation Manual' This manual documents the Department's bridge load evaluation guidelines, practices and policies.

When bridge management strategies include strengthening of components, the Consultant shall include a discussion in their report on the appropriate vehicle loads, load factors, and load distribution. This shall include a sensitivity analysis of various vehicle loads so that the Department can determine the impact to the highway network.

11.16.3 Summary of Reporting and Submission Requirements

At the conclusion of the project, the Consultant shall submit (or have already submitted, by the dates identified in the Terms of Reference) the following documentation:

- Bridge Assessment Report
- Bridge Load Evaluation Report, if required

11.17 Rehabilitation

11.17.1 General

This section shall apply to projects where existing bridge structures are to be rehabilitated to extend their service life. The scope of the rehabilitation will be defined in the project Terms of Reference, which will identify the assumed rehabilitation option that should be included the proposal costs, as well as whether any additional rehabilitation options should be considered in the preliminary engineering phase.

11.17.2 Preliminary Engineering

This project phase shall include:

- Review of Department files;
    - Hardcopy files; and
    - Electronic files contained in Livelink;
- Review of all available bridge inspection BIM reports (Level 1, 1.5, & 2);
- Review of functional planning reports, as applicable;
- Review of Geohazard inspection reports, as applicable; and
- Detailed site inspection, including:
    - Damage identification, verification and quantification;
    - Traffic accommodation shall be provided as necessary for the site and inspection scope; and
    - Use of specialized access equipment shall be provided when identified in the project TOR.

This project phase may include:

- Detailed condition inspection with or without specialized access (level 2 inspections; specialized access with man lifts, inspection access vehicles, drones; etc.);
- Material condition assessment (concrete petrography or compressive strength evaluation; steel material evaluation, etc.);
- Geotechnical investigation;
- Profile survey of the existing structure (dependent on the rehabilitation management strategies being evaluated);
- Arranging for environmental data or regulatory inputs; and
- Identifying and engaging stakeholders.

The Consultant shall prepare a Bridge Rehabilitation Report that:

- Summarizes the review of existing documentation as well as the bridge inspection and shall include:
    - Bridge background, maintenance and rehabilitation history;
    - Any special considerations (e.g. load posting, functional deficiencies, roadway issues, geotechnical issues, repeated high load strikes, regular use by farmers or wide loads, traffic control and staging risks, oversize/overweight load corridor, etc.); and
    - Bridge condition;

- Documents the decision making process used to determine a recommended scope of work to be carried forward to the rehabilitation detailed design stage; and
- Assembles all information required to complete the rehabilitation detailed design.

If required in the project Terms of Reference, the Bridge Rehabilitation Report shall include:

- Rehabilitation options including a discussion on the risks, lifecycle costs and recommendations, consistent with the 'Bridge Assessment Guidelines' and 'Bridge Management Strategy Guideline'; and
- Bridge load evaluation for the appropriate rehabilitation options. If a bridge load evaluation was completed for a rehabilitation option in the assessment phase, then it might not need to be repeated. However, if one has not been completed in a recent bridge assessment, or if the bridge condition or options have changed since the assessment, a bridge load evaluation should be completed. When bridge management strategies include strengthening of components, the Consultant shall include a discussion in their report on the appropriate vehicle loads, load factors, and load distribution. This shall include a sensitivity analysis of various vehicle loads so that the Department can determine the impact to the highway network.

When complete, the Bridge Rehabilitation Report provides all of the information necessary for the Department to review recommendations and make informed decisions, and for the Consultant to complete the rehabilitation detailed design.

The Department's 'Repair Manual for Concrete Bridge Elements' and the 'Repair of Bridge Structural Steel Elements Manual' shall be followed as appropriate.

11.17.3 Detailed Design

The Consultant shall prepare and submit the detailed design package, the draft submission shall include:

- Design Drawings
- Special Provisions related to design and construction (if any are required)

Once all review comments and issues are resolved the Consultant shall submit the final detailed design package which shall include:

- Design Drawings
- Special Provisions related to design and construction (if any are required)
- "C" Estimate
- Design and Independent Check Notes. These may be submitted up to three (3) months after submission of Design Drawings, Special Provisions, and "C" Estimate

The design drawings, special provisions, and design and independent check notes shall be authenticated and submitted in accordance with 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'.

11.17.4 Tender Package Preparation

The Consultant shall submit draft and final Tender Packages in accordance with 'Section 12.1: Tender Package Preparation'.

11.17.5 Summary of Reporting and Submission Requirements

At the conclusion of the detailed design phase, the Consultant shall submit (or have already submitted, by the dates identified in the Terms of Reference) the following documentation:

- Bridge Rehabilitation Report
- Detailed Design Package
- Tender Package

The submissions above shall include the following documents as applicable:

- Environmental Reports including Environmental Evaluation, Fisheries Habitat report or any other environmental reports, as required;
- Detailed condition assessment reports;
- Material condition assessment reports;
- Geotechnical investigation reports;
- Final versions of any other project related reports or agreements.

11.18 Construction

11.18.1 General

Consulting services during construction of bridge structures shall be in accordance with this 'Section 11.18: Construction' and the 'Engineering Consultant Guidelines for Highway, Bridge and Water Projects Volume 2 – Construction Contract Administration'(ECG Vol 2). In these documents, construction refers to new bridges and maintenance/repair/rehabilitation of existing bridges.

11.18.2 Design Engineering Support Services

Consultants shall provide design engineering support services throughout the construction of bridge structures. Changes or clarifications during construction that may affect any aspect of the bridge structure's design shall be reviewed and evaluated by an engineering professional. The engineering professional shall be the authenticating Engineer of Record (EOR); however, in unique circumstances the Consultant may propose alternate engineering professionals for this role during construction. Proposed alternate engineering professionals must be acceptable to the Department.

A multi-discipline engineering team makes up the bridge structure design team and therefore the same multi-discipline engineering team must be available as required to provide engineering design support services for changes or clarifications during construction (e.g. structural, hydrotechnical, geotechnical, electrical, etc.).

Design engineering support services shall include review and acceptance of fabrication and construction related contract submissions and contract changes. Design engineering support services shall also be involved with the authentication of as-constructed drawings to address any changes from the tender documents.

11.18.3 Fabrication Inspection Services

The Consultant shall provide bridge component fabrication inspection services in accordance with the requirements of the Department's 'Bridge Fabrication Inspection Manual'(BFIM).

The BFIM specifies personnel qualification requirements, scope of the inspection, testing and reporting responsibilities of the Consultant throughout the fabrication of bridge components and also includes fabrication inspection resources available for use (e.g. checklists and inspection forms, prefabrication meeting agenda templates, sample inspection and test plans, etc.). The BFIM also provides guidance on fabrication inspection and administration levels of effort required.

Unless noted otherwise in the BFIM, personnel required to complete quality assurance testing and/or inspection of miscellaneous steel components shall have the following minimum qualifications:

- Visual welding inspector: Certified by the CWB as a Level 2 or 3 inspector in accordance with CSA W178.2; and
- Non-destructive testing: NDT technicians shall be certified to Level 2 in accordance with CAN/CGSB-48.9712 and employed by an independent testing agency certified to CSA W178.1.

For metal culverts, including CSP (Corrugated Steel Pipe) and SPCSP (Structural Plate Corrugated Steel Pipe) the Consultant quality assurance inspector shall be certified by the CWB as a Level 1 inspector in accordance with CSA W178.2 and must have experience in fabrication inspection of CSP and SPCSP.

11.18.4 Construction Inspection Services

The Consultant shall provide bridge construction inspection services in accordance with the ECG Vol 2 and consistent with the Department's 'Bridge Construction Inspection Manual'(BCIM). The ECG Vol 2 and the BCIM outline inspection, testing and reporting responsibilities of the Consultant throughout the construction of bridge structures and includes inspection resources available for use (e.g. checklists and inspection forms, construction milestone meeting agenda templates, etc.).

The Consultant's bridge construction inspector shall be a designated professional (i.e. P.Eng., E.I.T., C.E.T, or P.Tech (Eng)) in the field of civil engineering and with experience in supervision and inspection of bridge construction/rehabilitation. The inspector shall also possess the skill sets outlined in 'Section A.2 of the BCIM' and maintain an ongoing program of relevant training, including review of the technical standards referenced in the 'Standard Specifications for Bridge Construction'.

Project Terms of Reference may also outline any additional specific qualifications and/or skills required.

For projects containing bridge painting work, the Consultant shall provide a Level 2 coating inspector certified by the National Association of Corrosion Engineers (NACE) or Certified Coatings Inspector with Bridge Specialty certified by the Association for Materials Protection and Performance (AMPP) for all paint work.

Unless noted otherwise in the BFIM, personnel required to complete quality assurance testing and/or inspection of miscellaneous steel components shall have the following minimum qualifications:

- Visual welding inspector: Certified by the CWB as a Level 2 or 3 inspector in accordance with CSA W178.2; and
- Non-destructive testing: NDT technicians shall be certified to Level 2 in accordance with CAN/CGSB-48.9712 and employed by an independent testing agency certified to CSA W178.1.

11.19 Bridge Process Flowcharts

The following flowcharts are general and are intended to be read in conjunction with the requirements presented previously in ‘Section 11: Bridges’.

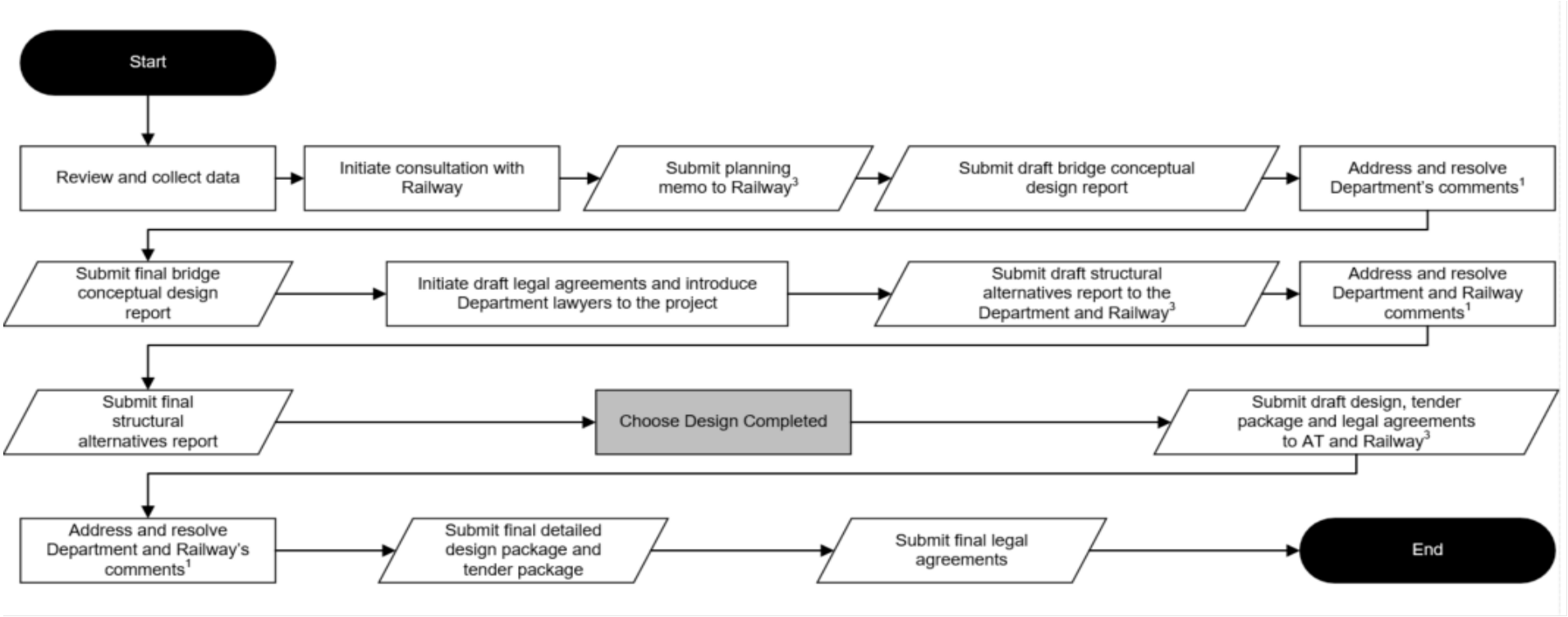


FIGURE 11.1 RAILWAY PROCESS CHART

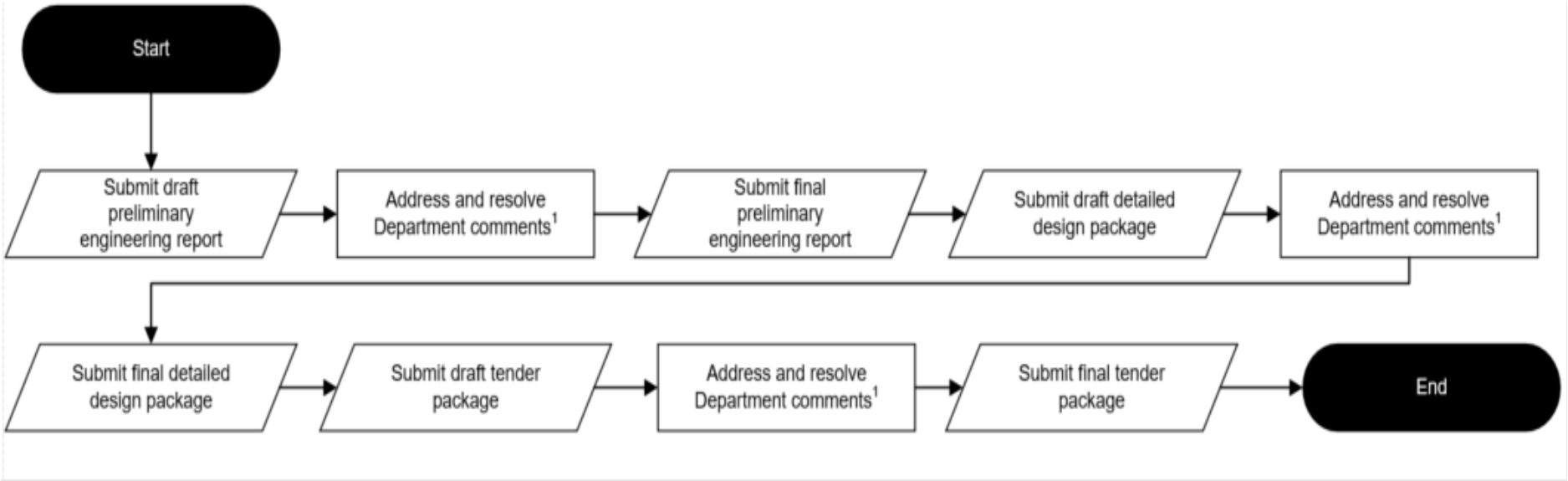


FIGURE 11.2 STANDARD BRIDGE AND CULVERT PROCESS CHART

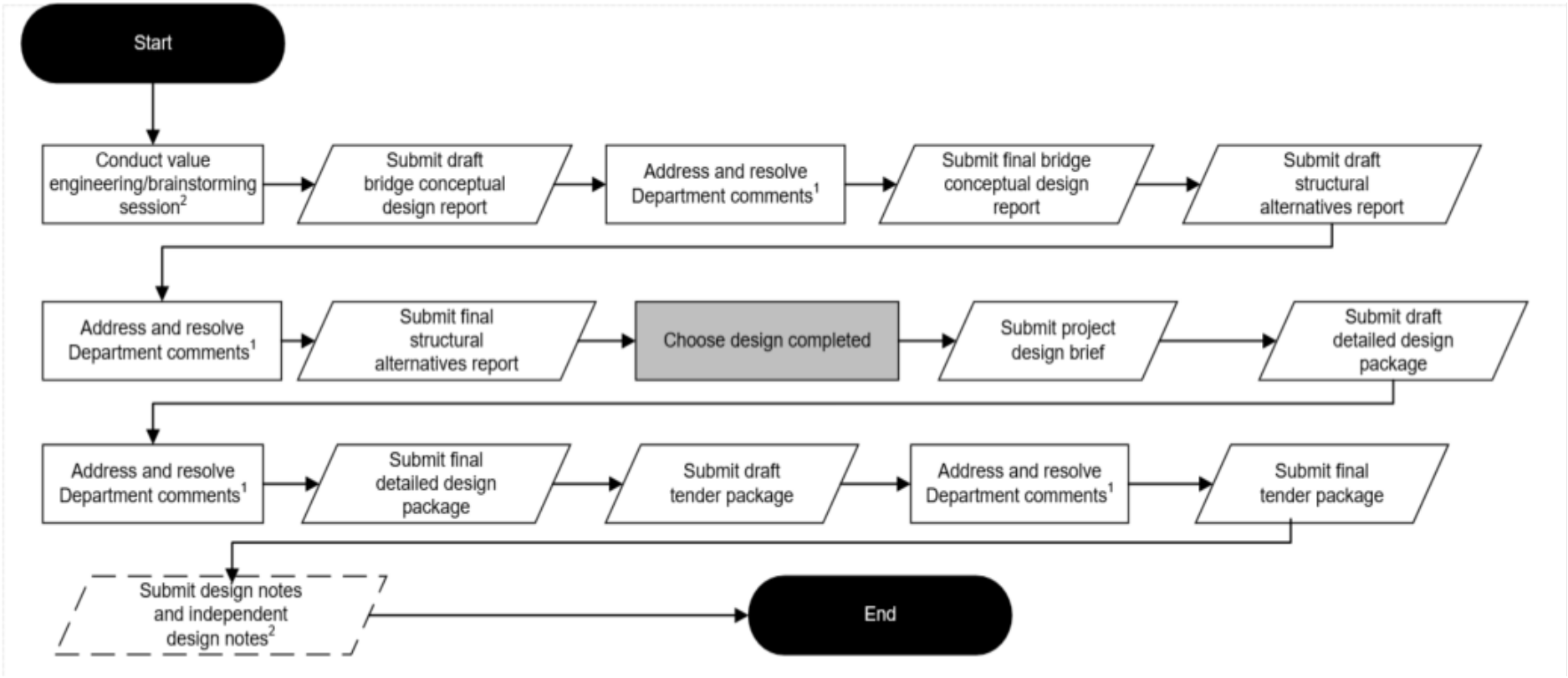


FIGURE 11.3 MAJOR BRIDGE PROCESS CHART

Notes for Figure 11.1 through Figure 11.3:

1 Review process:

i. Receive comments from the Department.

ii. Address comments from the Department.

iii. Continue to resolve comments until Department determines that all comments are resolved.

2 Shall be submitted no later than 3 months after submission of the final detailed design package.

3 Railway means railway owner. Any submissions to the Railway have to be preapproved by the Department.

Section 12: Contract Tendering

12.1 Tender Package Preparation

12.1.1 General

The contract tender submission is the end product of the design phase. The accuracy and relevance of the information provided in the Tender Package is critical to the bidding process and provides the framework for the construction supervision and contract administration phase.

The Consultant shall undertake an independent check of all submissions in accordance with 'Section 1.4.8: Independent Design Check' of these guidelines. A design and Tender Package shall be submitted by the Consultant to the Project Administrator for review. Once the design and Tender Package is finalized, the Consultant shall upload all applicable design and tender documents to the "Documents" tab of the "Maintain Tender" page on the Project Management Application Delivery (PMA-D) website.

Once the complete Tender Package is uploaded to PMA-D, the Project Administrator submits the Tender Submission Memo and Procurement Risk Worksheet by email submission, to the Procurement Strategy and Planning (PSP) Section of Transportation and Economic Corridors (TEC).

12.1.2 Tender Package Submission

Generally, there are five main components to the Tender Package submission: the cover letter, "C" Estimate submission (including "C" Estimate Project Sponsor Sign-Off Letter), tender document, associated separate contract plans and drawings, and Environmental Risk Assessment (ERA).

Depending on the type of work involved, additional documentation may be required. These may include, but are not limited to: reference drawings, design cross-sections, geotechnical and/or environmental reports, etc. These documents will be made available to prospective bidders for information purposes only.

12.1.2.1 Tender Package Cover Letter

The cover letter shall be submitted to the Project Administrator by email submission and upload into PMA-D. The letter shall contain the following information:

- The name, address, telephone number, and signature of the Consultant
- The name, title, telephone number, and email address of the person responsible for the preparation of the tender submission
- The consulting services contract number, tender number, highway/control section number
- The status of all right-of-way/borrow pit negotiations, if applicable
- The status of all utility crossing agreements and status of adjustment, if applicable
- The status of all environmental permits, Fisheries and Navigable Waters Authorizations, if applicable
- The cover letter shall identify the individual/company that performed the independent check
- If the "C" Estimate varies from the most recent estimate shown in the Department's construction program by more than 20% (either greater or less than), the Consultant shall provide a rationale for the variance
- A list of all design exceptions (if required) with the Technical Standards Branch approvals
- Confirmation that the Tender Package has been independently checked and signed off by the Consultant
- A list of enclosures for the Tender Package

12.1.2.2 "C" Estimate Submission

Refer to 'Section 10.13: "C" Estimate Submission'.

12.1.2.3 Tender Documents

The tender document template can be found on the PMA-D main menu page by selecting the option, "Search/Maintain Documents Templates". Whenever practicable, the tender document shall utilize either standard specifications or the Special Provisions posted on the Department's website: 'Tender document templates, provisions and specification amendments'.

The Unit Price Schedule (UPS) shall be incorporated into the tender document.

The Consultant shall update the UPS whenever there are revisions to the UPS via an addendum. Due to Program Management Application Delivery (PMA-D) access restrictions, assistance from the Project Administrator will be required to update the UPS.

Any non-typical Special Provisions, specification amendments, or supplemental specifications shall be created in a format consistent with the Department's standard specifications and shall be in accordance with current Department policies.

Any permits or authorizations, contract drawings, pit plans or other images which are scanned for incorporation in the tender document shall be scanned using the following settings:

- Save image in PDF format
- Resolution: 300 dpi
- Image type: line art or black and white drawing, as applicable. Do not use photo, colour, or grey scale settings
- All scanned images shall be easily legible when printed in the proper size format
- Plans and drawings which are converted directly from MicroStation format shall be in black and white format only. Do not use colour or grey scale settings

As a minimum, all tender documents shall include a Location Plan.

Images that are not easily legible when merged into the tender document can be referenced in tender section *Information Documents Incorporated into Contract Documents* and provided as a separate file.

12.1.2.4 Separate Plans, Standard Drawings, and/or Reference Drawings (if applicable)

Some tenders may require oversize drawings that are intended to form part of the tender documents. Oversize plans are described as plans larger than full size (22"x34"). These plans may be required due to the size or detail of a project and are occasionally needed for interchanges, complex intersections, major utilities, etc. Whenever possible the Consultant shall attempt to use full size plans in lieu of oversized plans.

Generally, separate plans are required on grading projects, bridge projects, and some surfacing projects. These plans are typically considered essential to bidders for the preparation of their bids and include project specific drawings and some reference drawings. Drawings are typically made available in full size (22"x34") format. In addition, some tenders may reference drawings that are provided for information purposes only and are not considered essential for the preparation of bids. These reference drawings may include, but are not limited to, utility plans and as-built/Record drawings.

The Consultant shall upload the separate plans, standard drawings, and/or reference drawings to the project's "Documents" tab in PMA-D.

Submission requirements for plans and drawings include:

- The Consultant shall submit Design Drawings (P-Drawings) according to 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents' at the time of tender submission to the Project Administrator. Each drawing shall be authenticated by both the Design Engineer and the Checker. Each drawing shall be clearly marked with the appropriate date and/or revision number.
- Except for stand-alone bridge projects, the Consultant shall submit two (2) electronic versions of the drawings in PDF format. One version shall include photo mosaics, and the other version shall have photo mosaics turned off.

File sizes shall be limited to a maximum of 2 MB per page. For stand-alone bridge projects, an electronic version of the drawings, including associated reference and standard bridge drawings, shall be submitted in PDF format.

- If the tender includes reference drawings, the Consultant shall supply the reference drawings in PDF format.
- To facilitate printing, all drawings shall be converted to PDF format using black and white settings. Do not use colour or grey scale settings. Notwithstanding the preceding requirement, Consultant logos may be left in colour if desired.

12.1.2.5 Design Cross-Sections (if applicable)

For all Department grading or grade widening projects or projects with a grading component with more than 10,000 m^3 of common and/or borrow excavation, the Tender Package shall include an electronic set of all available design cross-sections for the project, submitted in PDF format.

Electronic design cross-section files shall meet the following requirements:

- Design cross-sections shall be provided for each 20 m distance
- Each cross-section shall show the station, horizontal and vertical scale, and both horizontal and vertical gridlines
- Whenever practicable, the Consultant shall maintain constant horizontal and vertical scales for all cross-sections. Changes to horizontal and vertical scale should be avoided or minimized. In the event that project requirements dictate scale changes, revised scales should be maintained for a length of at least 200 m.
- The recommended horizontal and vertical scales are as follows:
    - Horizontal: 1:250 or 1:500 (Depending on width of cross-section)
    - Vertical: 1:50, 1:75, 0r 1:100 (Dependent on terrain – i.e. flat or rolling)
- Each cross-section shall show all design surfaces (i.e. original ground, design, undercut, finished surface, etc.)
- To facilitate printing, cross-sections shall be created or converted to black and white. Different line types may be used to indicate different surfaces, however, the Consultant shall ensure that the line types used can be reproduced using a standard photocopier
- Each page shall be formatted to fit 8.5”x11” paper size (landscape orientation)
- Design cross-sections shall be printed one (1) cross-section per page
- Each page shall have ½” margins at the left hand, right hand and bottom of the page, and shall have a top margin of 1” to facilitate binding

For projects with 750 or fewer individual cross-section pages, the information shall be submitted in a single electronic file. For projects with more than 750 cross-section pages, the information shall be split into two or more electronic files.

12.1.2.6 Additional Information Documents (if applicable)

Additional information documents include, but are not limited to geotechnical reports, environmental reports and assessments, and/or other information that may be considered relevant to the work.

The Consultant shall upload the electronic copies of these documents in PDF format to the project’s “Documents” tab in PMA-D.

12.1.2.7 Tender Package Requirements for Aggregates

For any optional source made available for the contract, the Regional Aggregate Coordinator will provide the Consultant with full size plans (approximately 1:2500) in PDF format, for inclusion in the tender.

Along with the full size Testing Plan and Pit Plan, enlarged plans of the areas to be operated may also be provided.

Examples of aggregates plans are shown in ‘Appendix G: Supply of Aggregate’.

12.1.3 Tender Document

The tender document template is located on the PMA-D website. Additionally, the tender document template can be found on the Department's website at 'Tender document templates, provisions and specification amendments' webpage.

The format of the tender document is as follows:

- Title page
- Table of contents
- Instructions to Bidders
- Tender forms
- Unit Price Schedule (created in PMA-D)
- Tender Amendment form
- Special Provisions
- Specification Amendments, where applicable
- Supplemental Specifications, where applicable
- Plans, Drawings and Permits:
    - Tables listing separate drawings, standard drawings, and/or reference drawings, where applicable
    - Pit plan(s), where applicable
    - Aggregates testing plan(s) and data sheets, where applicable
    - Environmental permits, licenses, approvals, and authorizations, where applicable
    - Contract Plan(s) (location plan minimum) and typical sections where applicable
- Addenda

12.1.4 Standard Specifications, Special Provisions, Specification Amendments and Supplemental Specifications

The Department's PMA-D system and the Department's 'Tender document templates, provisions and specification amendments' webpage contains the most up-to-date versions of the tender document templates, bid items, typical Special Provisions, Specification Amendments, and Supplemental Specifications.

The Department maintains several specification manuals including the 'General Specifications and Specification Amendments for Highway and Bridge Construction', the 'Standard Specifications for Highway Construction', and the 'Standard Specifications for Bridge Construction' manuals. Whenever possible, Consultants shall utilize the Standard Specifications rather than creating new Special Provisions.

12.1.4.1 Special Provisions

In the event that a Special Provision is required, the Consultant shall first review the typical Special Provisions posted on the Department's 'Tender document templates, provisions and specification amendments' webpage. If it is necessary for the Consultant to develop a new Special Provision, the Consultant shall ensure the Special Provision is created in a format that is consistent with the Standard Specifications and the existing Special Provisions posted on the website. It is important that any new Special Provision be reviewed and accepted by the Project Administrator to ensure that there are no conflicts with other existing specifications (the Project Administrator may refer this to the Technical Standards Branch or Procurement, Strategy and Planning Section of TEC).

The Consultant shall include a list of Utility Owners' contact names and emergency telephone numbers in the Special Provisions and forward the 'Issued for Tender' drawing(s) to the respective Utility Owners.

Copies of all Environmental Approvals, Permits, Authorizations and other associated documents shall be included in the Plans Section of the tender document. Where the environmental documents indicate specialized work to be performed by the Contractor, the Special Provisions shall describe the work required, and shall describe the method of payment. Where the environmental documents indicate conditions that are beyond the scope of the Contractor's Work, the excluded conditions shall be clearly indicated in the Special Provisions.

12.1.5 Materials

Typically, the supply of materials will be the responsibility of the Contractor as part of the construction contract. In the rare instance where material supply is not included in the construction contract, the Consultant shall be responsible for the preparation of material orders for the Department.

12.1.6 Consultant Services During the Tender Advertising and Tender Acceptance Period

Inquiries during the tender advertising and tender acceptance period are solely directed to the Project Procurement Officer (PPO). During the tender advertising period, the Consultant shall draft any addenda or clarifications as required by the Project Administrator.

For some projects, it may be determined that a pre-tender meeting should be held between the Department and interested bidders. In such cases, the Consultant shall provide this information to Procurement, Strategy, and Planning Section prior to advertising so it may be included in the tender document. An option of holding virtual pre-tender meetings should be made available to bidders.

Following tender closing and validation, bid results are provided to the Project Administrator by the Procurement, Strategy and Planning Section. Upon request, the Consultant shall provide an analysis of bid results and discrepancies on bid items.

When the low bidder is a first-time Contractor with the Department or as may be required by the Department, the PPO will contact the low bidder to arrange a pre-award meeting. The Project Administrator, Project Sponsor, and the Consultant shall attend the meeting to address concerns and any project specific questions the Contractor may have.

At no time shall the Consultant communicate verbally and/or in writing with any bidders in regards to the tender during the tender advertising and tender acceptance period, unless otherwise directed by the Department.

12.1.6.1 Addenda

Addenda are revisions to the tender documents that are issued to all prospective bidders during the tender advertising period. Although any number of sources may identify the need for an addendum, the Project Administrator and Consultant are responsible for providing the addendum information.

The Project Procurement Officer (PPO) from the Procurement, Strategy and Planning Section is the sole point of contact during the tendering process, until the Contract is fully executed. If the Consultant is contacted by a bidder, they shall immediately direct them to the PPO.

When inquiries are received, the PPO will notify the Project Administrator by email. The Project Administrator and the Consultant shall draft an addendum with the changes to the tender document and/or responses to bidder inquiries. The draft addendum is then emailed to the PPO for review and advertisement.

The addendum submission to the PPO shall be in Word format. If the addendum includes revised plans, the plans shall be provided in accordance with ‘Section 12.1.2.4: Separate Plans, Standard Drawings, and/or Reference Drawings’.

If the addendum will result in a substantial change to the estimated cost of the project, the Consultant shall provide the Project Administrator with a revised “C” Estimate for Project Sponsor sign off.

12.1.7 Submission Requirements

The Consultant shall submit the draft Tender Package to the Project Administrator for review and comment.

Following the review of the draft Tender Package by the Project Administrator, the Consultant shall revise the draft Tender Package to address the Department's comments and upload the final Tender Package into PMA-D.

The Consultant must complete the Tender Checklist in PMA-D prior to each submission of a tender packages.

Within two (2) weeks after the Contract has been awarded, the Consultant shall:

- Prepare Issued for Construction (IFC) Design Drawings (P-Drawings) according to 'Design Bulletin 108: Implementation of Authentication for Electronic Submission of Engineering Documents'. Each drawing shall be authenticated by both the Design Engineer and the Checker. Each drawing shall be clearly marked with the appropriate date and/or revision number.
    - At the Department's sole discretion, where no changes or minor changes have been made during the tender advertising period through addenda, the Consultant may use the set previously submitted as part of the Tender Package.
- Print and provide four (4) sets of full sized (22" x 34") project specific drawings marked "Issued for Construction" containing any revisions made during the tender advertising period to the Contractor.
- If requested by the Contractor, the Consultant shall print and provide three (3) sets of reduced size (11" x 17") drawings, printed at half-scale from the full size (22" x 34") drawings. These 11" x 17" drawings shall include a note that states: "Drawing scales are correct for full size (22" x 34") sheet only."
- These drawings shall be accompanied by a letter to the Contractor and Project Administrator indicating the revision number and/or date of the appropriate set of Design Drawings for use at the commencement of construction.

Section 13: Water Management Infrastructure Projects - Planning and Design

13.1 General

This section outlines the responsibilities and authority of the Consultant that is specific to the planning and design of the Department's water management infrastructure projects. The Consultant shall not consider this section in isolation but rather as an integral part of the 'Engineering Consultant Guidelines for Highway, Bridge and Water Projects - Volume 1 Planning, Preliminary Engineering, Design and Tender (ECG Vol 1)'.

This section outlines the differences (including additions, exclusions, and changes) that are specific to the planning and design of water management infrastructure projects. These projects may include:

- Dams and reservoirs
- Diversion weirs and channels
- Irrigation Canals and related structures
- Erosion Protection works
- Flood control and lake stabilization structures and works
- Pump houses
- Water pipelines
- Electrical, mechanical and control systems for water management infrastructure

The Government of Alberta owns and operates water management infrastructure. The Department is responsible for providing the engineering, design, and construction services related to the delivery of water management infrastructure projects.

13.2 Design Standards and Guidelines

Design of water management projects shall be done in accordance with relevant codes, current Department standards, specifications, and recognized engineering practices.

For designs specific to water management infrastructure, see the 'Water Control Structures – Selected Design Guidelines'. The Consultant is advised to use the most recent versions of the standards that are referenced in the above mentioned guidelines.

Any bridges or bridge-sized culverts on the Department's public roadways that are combined or integrated into the Department's water management projects shall be designed to the requirements of 'Section 11: Bridges' or as advised by the Project Administrator.

13.3 Conservation and Reclamation of Topsoil and Subsoil

In addition to the requirements of 'Section 4.7: Assessment, Conservation, and Reclamation of Topsoil and Subsoil', during the final design stage, the Consultant shall employ a soils specialist to perform a pre-disturbance assessment of the topsoils and subsoils within the project site limits that are expected to be disturbed and then returned to agricultural or natural use after the project.

13.4 Geotechnical Considerations

Water Management projects may require geotechnical investigations. In addition to the relevant principles and requirements identified in 'Section 8: Geotechnical Investigation and Design', the Consultant will identify any other geotechnical considerations relevant to the specific water management project. A qualified Geotechnical Engineer, familiar with water management components required for the project shall lead the geotechnical review and investigation.

13.5 Surveys

Where required by the Terms of Reference to establish a project specific datum for horizontal and vertical control, such a survey shall be tied into the Alberta Survey Control Monument System as outlined in 'Section 6.1.4: Preliminary Survey'.

All benchmarks for rehabilitation projects must be tied into the existing survey control system used by the department responsible for the ownership and operation for that water management system. Environment and Protected Areas (EPA) benchmarks are located on the EPA website at 'Benchmark Retrieval System'.

13.6 Land Acquisition Requirements

Refer to 'Section 3: Right-of-Way' for general departmental land acquisition guidelines.

For land assembly requirements around government owned and operated reservoirs refer to 'Reservoir Lands Guideline'.

In addition to the requirements mentioned in the above-mentioned documents, the following applies to the water management projects:

- During preliminary design, the Consultant shall do a detailed search of land ownership, dispositions and Right-of-Way around the project site.
- Land around water management infrastructure should ideally be owned by the department responsible for the ownership and operation of the infrastructure. However, many Water Management sites also have provincial parks or provincial recreation areas attached to them. Some may be under the control of Public Lands.
- A clear understanding of the property boundaries, dispositions, and jurisdiction must be understood at the Preliminary Engineering Stage.
- Consultant must work closely with the Project Sponsor and the Department's regional Property Manager to understand and resolve land issues.
- In most cases, the Consultant will be required to provide Individual Ownership Plans (IOP). The IOP are to be prepared according to 'Appendix C: Planning and Design Requirements', Basic right-of-way request or as directed. All Right-of-Way requirements are to be shown on the IOP highlighted with shading in the appropriate color.
- If any land purchase is required, it will be done through the Transportation and Economic Corridors (TEC) Property group. The Consultant is to support the Department's regional Property Manager with IOPs and technical information for Landowners.
- In some cases, approvals may be required from Public Lands or Alberta Parks to carry out the work of the project. The Consultant may be required to apply for a Temporary Field Authorization (TFA) with Public Lands or support TEC in discussion with the department responsible for the ownership and operation for approval.
- All land purchases and approvals must be complete before the tender is submitted for advertisement.
- Any land purchased for water management infrastructure will be transferred to the department responsible for the ownership and operation of the infrastructure at the end of the project. The Consultant may be required to provide as-built surveys and drawings to support final land registration and transfer.

13.7 Approvals, Licenses and Permits

The Consultant, in consultation with the Department and Regulatory agencies, shall determine which regulatory approvals, licenses, authorizations, and permits are required for the project.

Although TEC is not the owner of the infrastructure. TEC, however, will apply for all regulatory approvals, licenses, authorizations and permits that are required to deliver the project on behalf of the owner.

The Contractor shall be required to apply for any temporary approvals or permits that are required based on the methodology adopted by the Contractor during construction.

The Consultant shall assemble and prepare the information needed for regulatory approvals, licenses, authorizations, and permits. This may include but is not limited to:

- Drawings and specifications
- Environmental Evaluations and other assessment reports
- Impact statements
- Proposed mitigation efforts
- Application forms

The Consultant shall incorporate conditions of any approvals, licenses, authorizations, or permits that affect the construction work into the Contract documents and shall include copies of approvals, licenses, etc. in the Contract document.

13.8 Engineering Drawing Standards

Refer to the 'Engineering Drawing Guidelines for Water Management Projects' guide.

13.9 Stakeholder Input

The Consultant shall submit a written "Communication Plan" to the Project Sponsor and consult with the local authorities, regulatory agencies, First Nations, and general public as required. These discussions may be in the form of general meetings including open houses. All meetings must be documented. Approval of this plan from the Department is required prior to presenting any information to the public. Refer to 'Appendix C: Planning and Design Requirements, 'Table C1: Typical Consultation Notification/Actions', and 'Communications procedures for public open houses and stakeholder consultations'. This process may vary depending on project specifics. The Consultant will be required to prepare a summary of the public input process in the final report. Also, all original questionnaires, sign-in sheets, letters, etc. are to be bound separately and submitted to the Department (this information is to be kept confidential as per FOIP requirements).

13.10 Conceptual Study

The Conceptual Study is a review of available information to determine the proposed design criteria and identify any information gaps. The Consultant shall identify available options to solve problems identified in the Terms of Reference. The Conceptual Study will not generally require the acquisition of field data.

13.10.1 Studies

The Consultant shall:

- Inspect the site and inventory project components
- Review existing surveys, investigations, data, drawings, aerial photographs, and reports
- Review issues and potential options with stakeholders of the project. See 'Section 13.9: Stakeholder Input'
- Undertake studies that are necessary to complete the Conceptual Study
- Determine utility locations and project restrictions due to those utilities. See 'Section 7.2: Utility Survey'
- For a rehabilitation project, evaluate the current design criteria for the existing project and propose design criteria for the project. For a new project, propose design criteria for the project
- Complete an environmental overview and an assessment of the regulatory requirements for the project
- Determine land ownership and preliminary land assembly requirements for the project
- Prepare conceptual level drawings for the project
- Prepare an "A" Estimate for the project and a life-cycle cost analysis for the various options

13.10.2 Reporting Requirements

The Consultant shall prepare a Conceptual Study report that includes the following components:

- A summary of the investigations, surveys, and reviews

- A review of existing design criteria for rehabilitation projects
- Inventory of project components and utilities
- Relevant existing drawings
- Proposed design criteria
- Proposed alternatives that would meet the Terms of Reference
- Conceptual drawings of each alternative
- “A” Estimate (project cost) and life cycle cost for each option
- Land requirements
- Potential environmental, social, and historical impacts and mitigative measures
- Assessment of regulatory requirements
- Conceptual level project schedule(s)
- A ranking of alternatives
- A listing of recommended investigations that would improve the decision making process, refine the design, reduce the life cycle cost of the project, or reduce the risk of the proposed alternatives

13.11 Preliminary Engineering

Preliminary Engineering is a detailed review of available alternatives that results in a recommended alternative that provides the best solution. The Consultant shall undertake required field studies and laboratory testing, consider all external factors, and prepare preliminary design and costing to develop all the viable alternatives to a level that one can be chosen for implementation. If a Conceptual Study is not provided or required by the Terms of Reference, the study requirements of that design phase must be included in the Preliminary Design phase.

13.11.1 Studies

The Consultant shall:

- Inspect the site
- Review surveys, investigations, data, drawings, aerial photographs, and reports. Recommend any additional investigations that are required to assist in the evaluation of options.
- Undertake any required investigations
- Undertake required environmental evaluation, historical reviews and other assessments
- Complete final hydrologic and hydraulic design and preliminary geotechnical and structural design of each alternative
- Review options with stakeholders of the project. See ‘Section 13.9: Stakeholder Input’
- Determine utility relocation requirements
- Determine final land assembly requirements of each alternative for the project
- Prepare preliminary level drawings for the project. These drawings would include detailed site plans; plans and various sections of each structure with enough detail to cost the components; borrow, lay-down and waste disposal areas; and care of water options for each alternative
- Specify materials for major project components: rip rap, concrete, impervious fill, etc.
- Determine material sources for each alternative
- Prepare a “B” Estimate and life cycle cost for each alternative

13.11.2 Reporting Requirements

The Consultant shall prepare a Preliminary Engineering report that includes the following components:

- A summary of the studies and investigations carried out
- Comparison of viable alternatives that would meet the Terms of Reference
- Final design criteria
- Preliminary drawings
- “B” Estimate for each alternative and life cycle cost
- Final land assembly requirements for each alternative
- Utility relocations for each alternative

- Environmental evaluation and other studies required for regulatory applications
- Preliminary project schedule
- The recommended alternative

The Consultant will submit the report for review by the project team which includes TEC and representatives from the department responsible for the ownership and operation of the infrastructure.

In consultation with the project team, make recommendations that are carried forward to the Final Design phase. TEC may ask consultant to consider and evaluate a hybrid option of the provided alternatives.

Larger projects may require separate reports or Design Basis Memorandums (DBMs) for specific topics or issues (such as geotechnical investigations). These reports will be reviewed by the project team and then incorporated into the Preliminary Engineering report. The Project Administrator may require additional review meetings to monitor the progress during the preliminary engineering phase of the project.

13.12 Final Design

The Final Design is the phase where the chosen alternative is advanced to detailed design stage and tender drawings and specifications are produced. The Department will select the one alternative from the Preliminary Engineering report for construction and provide direction to the Consultant. Land Assembly is often undertaken by the TEC property group, but is supported by the Consultant through the preparation of Individual Ownership Plans (IOPs) or other plans, and by providing technical information to Landowners about the project.

All land or Right-of-Way Acquisitions, regulatory approvals and indigenous consultations need to be done before the tender is submitted for advertisement.

13.12.1 Design Activities

The Consultant shall:

- Complete final geotechnical, hydraulic, hydrological and structural design of the selected alternative
- Prepare and obtain utility relocation or crossing agreements
- Identify right-of-way requirements
- Review the final design with stakeholders of the project. See ‘Section 13.9: Stakeholder Input’
- Prepare tender drawings for the project. These drawings would include but may not be limited to: detailed site plans; contractor site limits including environmentally and historically sensitive sites; plans and various sections of each structure with enough detail to cost and build the components and determine material requirements; borrow, lay-down and waste disposal areas; and care of water plans where appropriate
- Prepare Contract Specifications for the Contract
- Prepare a “C” Estimate for the project
- Prepare all regulatory applications and support the regulatory process by responding to information requested until all required approvals are received

13.12.2 Reporting Requirements

During the Final Design phase, unless otherwise noted in the Terms of Reference, the Consultant shall provide electronic copies of the tender drawings in PDF format to the Department at the 75 percent and 95 percent complete stages. Unless otherwise noted in the Terms of Reference, the Consultant shall provide electronic copies of specifications in PDF format for review at the 75 percent and 95 percent complete stage.

The Consultant shall include in the project schedule and budget at least two (2) weeks for the project team to review the drawings and specifications at each stage of the design. Once the review comments have been returned, a review meeting is to be scheduled.

The Consultant shall prepare a Final Design Report that summarizes the design changes that have occurred since the Preliminary Engineering report was issued. Specifically, the report shall summarize the:

- Final studies
- Final drawings (Drawings for water management infrastructure projects shall be prepared in AutoCAD format and in accordance with ‘Section 13.8: Engineering Drawing Standards’)
- Final land requirements
- Utility relocation agreements
- Changes resulting from Regulatory approval process
- Changes resulting from Stakeholder consultation
- “C” Estimate

13.13 Construction Contract Specifications

Unless noted in the Terms of Reference, the Contract Specifications for water management infrastructure projects shall be based upon the latest version of the published Civil Works Master Specification (CWMS), available on the TEC website or provided by the Project Administrator.

The Consultant shall edit the CWMS as necessary to produce the Contract Specifications. The Consultant shall notify the Project Administrator of any significant deviations from the published CWMS.

The form of the contract may change from the standard CWMS format to the Master Construction Contract (MCC) format. Refer to the Terms of Reference or discuss with Project Administrator to ensure correct format is used.

For some water management projects, the ‘Standard Specifications for Bridge Construction’ or the ‘Standard Specifications for Highway Construction’ may be used.

13.14 Contract Tendering

Refer to ‘Section 12: Contracting Tendering’ with the following exception:

- The tender documents shall be prepared in accordance with ‘Section 13.13: Construction Contract Specifications’.

Appendix A: General Engineering Processes for Management of Alberta's Highways and Bridges

General Outline of Engineering Processes

This appendix provides a general outline of the engineering process from long range planning to construction completion for provincial highways.

A. Long Range Planning

1. Transportation and Economic Corridors' Mission is to contribute to Alberta's economic prosperity and quality of life through the provision of a safe and efficient transportation network. The Department's Core Business in this regard is to ensure continuous improvement of the provincial highway infrastructure through efficient planning, design, construction, rehabilitation, operation, and maintenance.
2. To begin, the Department monitors all Provincial Highways for traffic volume, collision experience, operations, pavement/bridge condition, level-of-service, etc. on a regular basis.

An inventory of existing highways including details of features and appurtenances together with various information regarding condition, age, serviceability, etc. is also maintained and stored in the Transportation Infrastructure Management System (TIMS – an important tool in establishing future highway programs).

3. Using this information, the Department develops and refines its priorities and Long-Term Plan which identifies overall transportation needs and priorities for various time horizons (e.g., 5, 10, 20, and 30-50 years) for the entire highway system.
4. At any given time, there is a three (3) year program in place. The three (3) year program is a "rolling program" which is generally approved in the spring session of the legislature each year and is freely available public information. Projects that are included in the program are subjected to planning, engineering assessment, detailed design, etc. as required to deliver the construction work.

The Capital Planning and Programming Section of the Planning and Program Management Branch (PPMB) coordinates input from the Regions, Construction and Maintenance Division, Policy and Safety Division, Planning, Procurement and Technical Standards Division (PPTS), and other stakeholders to identify construction projects and planning studies for inclusion in the construction/rehabilitation and planning programs. Planning studies and construction projects are approved based on demand, needs, and available budgets.

The 'Process of Notification of Provincial Highway Construction Projects to Municipalities' is included below.

An initial "Scope Review" is undertaken by the Department on all projects or highway segments that are under consideration for the 3 to 10 year program. This initial scope review is generally undertaken by the Infrastructure Manager with input from other staff and using the most current technical information. The information available may include planning studies, engineering assessments, pavement management systems information, video log, etc. At this time, the Department will make an initial determination of whether the project requires planning, engineering assessment, or if it can be advanced directly to the preliminary engineering stage.

Every year, the Department develops a multi-year Construction Program for highway and water management projects. This is a continuous process and is subject to revisions due to emerging needs, changing construction schedules or available funding.

B. Consultant Roles

5. Following the assignment of a project to a Consultant, the Project Administrator calls a Project Initialization Meeting with the Department's Project Administrator, Consultant, and the Department Safety Officer to review and clarify project scope, roles, schedule, and requirements.
6. The Consultant performs the detailed engineering work using all relevant manuals, guidelines, and practices that apply to highways in Alberta.

The Consultant submits all deliverables as noted in the Terms of Reference including Right-of-Way plans, Right-of-Way agreements, utility agreements, environmental permits, licenses, and approvals.

The Consultant submits a "B" Estimate to the Project Administrator on completion of preliminary designs.

The Consultant prepares grading, surfacing, and bridge design packages which are used as the basis for preparation of the contract tender.

The Consultant delivers a completed and independently checked design, mosaics, drawings, and electronic copies which include summaries of all estimates including a “C” Estimate for project expenditure.

The Consultant submits the tender package to the Project Administrator as per the schedule specified in the RFP/TOR and as may be adjusted by the Department.

As required, the Consultant calls for a Design Review Meeting(s), a Pre-Tender Meeting, and a Pre-Construction Meeting.

C. Tendering Process

7. The Project Administrator carries out a complete detailed design and tender package review; and updates the Programming Estimate in Program Management Application Delivery (PMA-D) with the Consultant provided “C” Estimate.

Once all revisions requested by the Project Administrator have been incorporated, the Project Administrator forwards the complete accepted tender package and Project Sponsor sign-off letter to Procurement Strategy and Planning (PSP) Section. PSP Section schedules advertising of the project; and carries out final stage review, editing, and tendering of the project.

8. All projects over $100,000 are advertised and tendered centrally by the Department. The Department obtains approval to tender and advertises the tender on the Alberta Purchasing Connection (APC) website.
9. Generally, the Regions advertise and tender contracts where the estimated contract cost is less than $100,000.

D. Construction Administration (Detailed in ECG Volume 2)

10. Throughout the project, the Consultant provides project management and submits weekly reports complete with relevant comments on material testing to the Project Administrator.

The Consultant submits monthly invoices for engineering fees as well as project expenditure reports for construction activities on a timely basis to the Project Administrator. In addition, the Consultant certifies and submits contractor invoices to the Department for payment.

The Project Administrator monitors construction activities and progress of individual construction projects, liaises with Consultants and Contractors, and provides monthly progress reports in the PMA-D.

As required, site visits are conducted by representatives from the Region, Technical Standards Branch (TSB), and PSP Section to monitor various aspects of the project such as construction supervision, adherence to specs/standards, compliance to terms of agreements, and public/worker safety.

11. The Consultant initiates contract changes (i.e., changes in scope of work, estimated cost) within certain defined limits.
12. The Consultant performs segregation inspection and rating of finished pavement surfaces within the time limits required in the contract specifications. A segregation rating sheet is filled out to calculate bonuses and penalties.
13. The Consultant calls for a Final Inspection tour when the Contractor advises the Consultant that the project is complete.
14. Upon completion of the project, the Consultant indicates to the Project Administrator that the work is complete. A conditional Construction Completion Certificate is issued advising the Contractor of all outstanding work (i.e. seasonal deficiencies), the date by which this work is to be completed and the amounts to be retained in holdbacks for the work (at least twice the estimated cost of the remaining work).

Unless otherwise notified, the Consultant Project Manager holds back 10% of progress payments.

In general, the holdback is retained until:

a) Contract has been accepted as complete.

b) Contractor's Statutory Declaration has been received.

c) W.C.B. clearance has been received.

15. When the construction contract has been completed, the Consultant submits the complete "Final Details" and Project Records file to the Projects Administrator. Selected road and bridge information (i.e. As-Constructed Details, Record Drawings, design calculations and checker notes for bridges, etc.) is forwarded by the Project Administrator to the appropriate Section(s) for processing and subsequent record retention. Consultants must follow TSB standards for file identification.

The Department does not pay for any post-construction engineering work until the complete "Final Details" and Project Records file has been received.

Rationale for collection of record information is as follows:

d) Information on bridge structures is needed for load ratings.

e) Pavement width and thickness information is needed for pavement management purposes.

f) Information on geometry/traffic control is needed for future assessment of improvement needs, investigation of need for additional traffic control devices and lighting, for on-going monitoring of safety performance, and to record drainage information.

g) To generate year-end summary reports on construction quality.

All of the above information will be stored as part of TIMS and will be available for future programming, design, and management purposes.

The Consultant retains a complete duplicate copy of the "Project Records Package" which is described in 'Appendix K: Project Records Management' of this document. The "Project Records Package" includes the Final Details as well as design information, correspondence, and other pertinent records.

16. Upon request from the Contractor, the Consultant releases electronic files for earthwork quantities to the Contractor once the files have been edited and verified.

17. The Project Administrator completes an evaluation of the Consultant. The evaluation form is signed by the Consultant and Project Administrator.

E. Warranty Inspection (Detailed in ECG Volume 2)

18. As required, a Warranty Inspection is done 30 to 60 days before the expiration of the warranty period. The warranty period is generally 12 months for roads and 24 months for bridges. The warranty inspection is undertaken by a Regional Warranty Inspection Consultant if required.

If deficiencies are found, the Consultant informs the Contractor in writing prior to the expiry of the warranty period advising him of the defects and specifying a completion date for the repairs. A copy of the letter is sent to the Project Administrator, Procurement, Operations and Grants Branch, and the bonding company.

Process of Notification of Provincial Highway Construction Project to Municipalities

Recommended steps to follow	Responsible party
i. As part of the Terms of Reference development, contact the municipality to advise them of the upcoming work and that the Consultants may be requesting information from the municipality as part of Request for Proposal (RFP) development.	Project Administrator
ii. Include in the RFP a statement to the effect that the successful consultant will contact the municipality after they are awarded the project engineering work and gather input from them.	Project Administrator
iii. Invite municipality representative to the project initialization meeting and conceptual design meeting (as required).	Project Sponsor
iv. Include municipality representative in the value engineering sessions. Invitation is at the discretion of the Project Sponsor.	Consultant
v. Advise the municipality which contractor is awarded the construction contract and anticipated start date.	Consultant
vi. Invite municipality to the Pre-Construction meeting (if warranted). Copy the municipality on the notes of meeting.	Consultant
vii. Involve municipality representative in the interim inspection if there is an anticipated significant impact to their network or local issues identified.	Consultant
viii. Elevate recommended changes to this process to the Divisional Executive Managers.	Construction Process Management Committee (CPMC) Executive Sponsor

Appendix B: Summary of Commonly Used Forms

Forms

The latest versions of the commonly used forms are available on Engineering Consultant Guidelines, Volume 1 website.

- Accident Notification – Involving 3rd Party and/or Contractors' Equipment
- Utility Accident Report
- All-Terrain Vehicles (ATVs) Order Sample
- Request for Corporate Bridge Information Instructions and Form
- Request for Corporate Road Information Instructions and Form
- Design Exception Request Form
- Engineering Cost Tracking Summary Sheet

Appendix C: Planning and Design Requirements

Basic Right-of-Way Request

For the purpose of purchasing the basic highway right-of-way, the Consultant will provide right-of-way information on 1:5000 scale digital photo mosaics. These mosaics are in addition to the mosaics prepared for the functional planning study and are to be prepared in accordance with 'Section 2.4.2: Drawings or Plans'. The mosaics should show clearly and concisely all right-of-way requirements. The Consultant shall submit the Right-of-Way Request package to the Project Administrator for review and approval by the Project Sponsor and the Property Manager along with the Right-of-Way Request form in .PDF format and the Right-of-Way Acquisition Summary in Excel format.

Once the Right-of-Way Request has been approved by the Property Manager and the Project Administrator, the Consultant is to provide an electronic version in PDF format of all required plans listed below:

- Coloured mosaic plan
- Coloured mosaic schematic plan showing an overview of the entire project on one sheet. It may be necessary to use two (2) sheets for larger projects. The size of these overview plans shall not exceed 11"x17" in size per sheet.
- Individual Ownership Plan's (IOP's) showing the proposed right-of-way information for each property affected by the project (including titled and untitled crown land). The IOP shall not exceed 8.5"x14" in size. The contents of the IOP's shall be consistent with the requirements for the mosaic information required except that only the required right-of-way is to be shaded in red.
- Sketch Plans for the submission of a Provisional Road Reservation (RDS) application required by Alberta Environment and Protected Areas, Land Dispositions Branch (process under development) for road upgrades and planned roads on public lands administered by Alberta Environment and Protected Areas (crown lands).

A thorough and current title search is required on all lands affected by the project. All encumbrances must be reviewed. All encumbrances in the name of His Majesty the King (Minister of Transportation) must be reviewed through the Regional Property Manager for clarification of the nature and extent of the encumbrances/caveats. The date of the title search should be clearly labelled on the mosaics under the title block. In addition, the following information is to be shown clearly on the mosaics:

- Land ownership, which is to include the Landowner's name and current address, the amount of right-of-way required from each parcel or land affected in both acres and hectares (right-of-way area calculations to be indicated to the nearest 0.1 acres / 0.01 hectares), land title certificate number, legal description, and/or plan number all labelled within the owner's property. In the case where the parcel of land is too small to record the information within the property boundaries, the information may be shown outside the property with an indicator arrow.
- Show all Certificate of Title boundaries, surveyed rights-of-way, easements, service road dedications, etc.
- Any changes or relocation of existing accesses must be shown including alternate means of access (e.g. service road, local road, private drive).
- Indicate the area of all cut-off parcels or severed land that should be considered for optional purchase by the department or consolidation with adjacent properties.
- Show all dimensions of the proposed and existing right-of-way as well as the additional right-of-way requirements, showing the difference between the two.
- In areas such as subdivisions, towns, etc. where there are properties too numerous to show the required information clearly at the 1:5000 scale, a more detailed plan at a suitable scale may be required. Details on these plans will follow the same requirements as stated within 'Section 2.4.2: Drawings or Plans'.
- In areas through untitled crown lands, the Consultant is to conduct a Land Status Automated System (LSAS) search for all existing land use interests (i.e. Leases, license of occupation, pipelines, etc.) affected by the required right–of-way. The consultant is to obtain any and all plans or sketches that are within the proposed highway right-of-way including ownership of the interests (if available) and record this information on the mosaics to the aforementioned standards.
- In areas through Special Areas Board land, a Special Areas Board search must be conducted to identify occupants.
- Identify potential contaminated sites.
- All mosaic updates and revisions must be consecutively numbered, beginning with right-of-way request #1.

- It is required that all right-of-way requirements are to be shown on the mosaic prints highlighted with shading in the appropriate colour to the following format. A colour legend indicating the following must be shown adjacent to the title block, on each mosaic sheet.
    - Right-of-way required RED
    - Previously requested right-of-way GREEN
    - Cancellation of previously requested right-of-way YELLOW
    - Requested easements ORANGE
    - Optional purchases CROSSHATCHED (RED)
    - Possible borrow locations 10 cm diameter RED CIRCLE
- Each mosaic sheet title block must indicate “Preliminary Design”, the date of mosaic preparation, and “Right-of-Way Request Number”.

Required information	Sample of preferred format
Legal Description C. of T. number Landowner name/s Landowners address	**NE 27-73-4-W6M or Plan /Block/Lot** **962 305 963** **Bob Smith and Cathy Smith** **Box 1234,** **Worsley, AB T0H 3P0**
R/W required (Provide separate areas for highway r/w and Service road r/w) (Red) **Previously requested r/w (Green)** **Cancellation of previously requested r/w (Yellow)** **Requested Easement (Orange)** **Optional purchase (Cross Hatched Red)**	Required Highway R/W - 5.9 ac (2.38 ha) Required Service Road R/W - ac (ha) Previously requested R/W – 5.2 ac (2.10 ha) Cancelled R/W – 2.5 ac (1.01 ha) Easement – 1.3 ac (0.5 ha) Optional purchase / cut-off –29.6ac (11.98 ha) Total R/W required - ac (ha)
Possible borrow locations (Red Circle 10 cm dia.)	Possible borrow location – 10 cm diam. Red circle
• Information to be indicated in the upper right corner (Title Block) • A Right-of-Way request form is required for each revision to the r/w requirements	Note: Use only the headings that are applicable. Right-of-Way Request # 3 - June 21, 2019 Preliminary Design, For Discussion Purposes Only

Forms

The latest versions of Planning and Design Requirements Forms are available on Engineering Consultant Guidelines, Volume 1 website or provided by the Project Administrator.

- Right-of-Way Request Form
- Right-of-Way Process Acquisition Summary
- Sample Correspondence to Stakeholders
- Sample Survey

Location Survey Requirements

Location surveys may be required on zone planning projects, in which case this need will be identified in the project Terms of Reference. The purpose of the Location Survey is to accurately establish the recommended alignment on the ground to ensure that it fits to the surrounding terrain and to confirm that there are no additional impacts that will affect the highway location. The alignment as established on the ground will be used to establish the alignment for a preliminary survey at a later date. Note that a “Location Survey” is not a preliminary survey and may require the horizontal alignment be revised and resurveyed a number of times to achieve optimum placement.

Required Tasks

- The recommended alignment is to be tied to the Alberta Survey Network (3TM, NAD 83 coordinate system) and based on the appropriate base longitude so the alignment can be plotted graphically and accuracy of the survey can be confirmed.
- Obtain written permission of Landowners/leaseholders for access to land where applicable.
- Establish tangents and points of intersection (PI's), points on tangent (POT's), and ends of curves along the recommended alignment. The POT's and ends of curve's are to be referenced with offsets at 90 degrees to the centre line tangents a distance that is outside the proposed right-of-way width so that the alignment can be easily re-established at a later date for a preliminary survey. A metal rod approximately 30 centimetres in length should be used, where appropriate, and countersunk a minimum of 30 centimetres below the ground especially in cultivated areas.
- All centre-line points, offset points and ends of curves are to be clearly marked with 1"x2" marker stakes and a marker lathe bearing the appropriate centre-line chainage. For offsets the offset distance and direction from centre-line should be clearly marked on the reverse side of the marker stakes.
- Where applicable the recommended alignment is to be tied to all legal survey pins in the immediate vicinity.
- All curves and tangents are to be staked at 20 metre intervals.
- A centre-line profile is required using geodetic datum. All natural breaks in the terrain that do not fall within the 20 metre staking are to be recorded.
- Spot cross-sections in critical areas along the alignment are required to ensure the alignment fits to the surrounding terrain.
- Additional profiling to geodetic datum is required along all public access roads to a minimum distance of 300 metres. Some access roads may require longer profiles depending on the terrain.
- Chainages are to increase from south to north and from west to east.
- Transit notes are required detailing all existing features in the vicinity of the recommended alignment. In forested areas the type and general size of the trees are to be recorded.
- All original curve/transit notes, centre-line profile notes and bench mark level notes are to be recorded in appropriate note books and supplied to the Department upon completion of the survey.
- The recommended alignment is to be plotted on the mosaics using the field co-ordinates and chainages obtained from the survey. All PI coordinates are to be recorded on the mosaics in table form on their respective sheets.
- At the request of the Technical Standards Branch, a standard bridge survey may be required for selected water course crossings. If required, this issue will be covered in a separate Schedule included with the Terms of Reference.
- Safety procedures for survey crews are to be adhered to at all times (adequate warning signs and flag people if necessary, etc.).

TABLE C1: TYPICAL CONSULTATION NOTIFICATION/ACTIONS

Notifications/Actions	When (approx. time-frames)	Action By
i. Study Initiation		
• Study Initiation meeting.	After the Consultant has begun preliminary work on study tasks.	Consultant
• Study Initiation notification letter to MLA.	Prior to study initiation meeting	Regional Director
• Letter to Local Authority informing study initiation.	1 to 2 weeks after MLA notification.	Regional Director
• First Technical Review Committee meeting.	2 to 4 weeks after informing Local Authority.	Consultant
• Letter to all adjacent Landowners, informing study initiation.	As needed	Consultant
• Meet local authorities and/or major stakeholders to identify issues.	As needed	Consultant and Project Administrator, may include Project Sponsor or Regional Director
i. Development of Plan Alternatives		
• Undertake analysis, screen and confirm range of alternatives.		Consultant
• Develop broad concepts for discussion purposes, reviewed by project team and TRC.		Consultant
• Prepare refined planning alternatives as per inputs from TRC and department subject matter experts.		Consultant
ii. Public/Stakeholder Engagement		
• Prepare communications plan, Public Open House (POH) materials and Deliverables (described in communication procedures in 'Appendix C: Planning and Design Requirements').	6 weeks prior to public open house	Consultant and reviewed by Project Administrator and Communications
○ Arrange In person and/or Virtual Public Information Sessions and repeat all tasks for all remaining open houses.	4 weeks prior to public open house	Consultant and reviewed by Project Administrator
○ Notify by letter the MLA's, local authorities, adjacent Landowners and stakeholders.	4 weeks prior to public open house	Consultant prepares letter for signature of Regional Director
○ Advertise in local media of upcoming open house events (Use sample added in 'Appendix C: Planning and Design Requirements').	Minimum 5 weeks prior to the date of publishing	Consultant and reviewed by Project Administrator and Communications

○ Hold first open house to present broad concepts for discussion purposes and inform about next steps. ○ Hold individual discussions with concerned Landowners and maintain a list of issues.	On the day of open house	Consultant and Department e.g. Right-of-Way Agent and other department representatives
iii. Develop Detailed Plans		
• Develop more detailed plans considering input from open house.		Consultant and Department
• Hold second open house and repeat all tasks in open house procedures to present plans and findings from first open house. ○ Hold individual discussions with concerned Landowners and maintain a list of issues.	As needed	Consultant, Right-of-way agent or other department representative
iv. **Finalize Preferred Plan and Recommendations**		
• Prepare draft report and plans.		Consultant -Reviewed by TRC
• Present recommendations and obtain acceptance from the department Divisional Executive Committee (DEC).		Consultant-Accepted by DEC
• Prepare necessary documentation briefing Deputy Minister and Minister outlining recommendations.		Consultant, Study Sponsor
• Send a letter from the Minister to the MLA's advising the results of the study and the date of third open house.	4 weeks prior to the open house	Consultant
• Hold third (final) open house to present final recommended plan and repeat all tasks required in open house.		Consultant, Right-of-way agent or other department representative
• Send a letter to MLA(s) informing of completion of the study and future actions.		Consultant prepares letter for signature of Regional Director
• Prepare a letter for the signature of the Regional Director. Send this letter and plan to Landowners indicating ○ Status of recommended plan ○ Anticipated timing of construction ○ Right-of-way requirements (department right-of-way contact person) ○ Timing of right-of-way purchase ○ Department's contact person and telephone number (Regional Director)	2 weeks from the letter to MLA	Consultant prepares letter for signature of Regional Director
• Prepare a letter to the Regional Director to indicate enhancements to the public participation/stakeholder engagement process for future studies.		Consultant

Communications Procedures for Public Open Houses and Stakeholder Consultations

Prior to undertaking any public or stakeholder consultation, the Consultant shall develop a “Communication Plan” for the Project Administrator. This plan shall identify potential issues and include communication steps or suggested action that will be needed to consult with local authorities, regulatory agencies, First Nations and public as required for a study. The Project Administrator will work with the Consultant and the Communications Specialist to review and refine this communication plan and provide guidance to the Consultant with respect to deliverables and materials required, for a successful stakeholder and public engagement.

Before developing open house materials, the Consultant shall obtain templates for open house materials listed below as well as the power point presentation template, from the Project Administrator. These templates are available through the Government of Alberta Visual Identity website.

To seek approval from Communications by the Project Administrator, the Consultant must submit the following deliverables at least four (4) weeks in advance of the scheduled event date to the Project Administrator.

1. Advertising

   It is the Consultant’s responsibility to ensure that all stakeholders are aware of any open house or public meeting(s). The Consultant will work within newspaper(s) deadlines to ensure advertisements are placed in the appropriate newspaper(s) and in other media platforms as appropriate and to ensure maximum attendance.

   The Consultant will:

   - Develop ad copy using the sample ad provided on the next page. The ad should contain Government of Alberta and Consultant logos on the bottom of the ad as shown.
   - Submit draft copy to the Project Administrator for approval from Communications at least four (4) weeks in advance.
   - Provide a list of newspapers where the ad will be inserted and list insertion dates, and reserve space in newspaper(s) for insertion at least one week before the event.
   - Provide Transportation’s approved ad copy to newspaper(s).
   - Provide the Project Administrator with a tear sheet (or photocopy of ad) from newspaper(s) to submit to Communications for record.

2. Correspondence to Landowners

   Using the template provided for a sample letter, the Consultant will draft correspondence to the Landowners and stakeholders in plain language. This letter should provide the following information:

   - an explanation that the Consultant was hired by the Department to manage the study.
   - a plain language description of the study.
   - mention where open house(s) will take place and list the location, date, and time.
   - mention that their participation is important and valued.
   - a request to Landowners to forward the open house notice to anyone else who has an interest in this study.
   - a contact name and telephone number.

3. Fact Sheet

   The Consultant will develop a fact sheet for the study, which will be distributed at the open house. The Fact Sheet shall provide the following information in plain language:

   - provide background details
   - provide current status
   - state proposed plans
   - provide a contact name for further information
   - include both the Consultant’s logo (bottom left) and the Alberta Government logo (bottom right)

4. Display Boards

   For the open house, the Consultant will develop display boards, as needed, that include maps and proposed plan alternatives as per the official presentation prepared by the Consultant. The display information should:

   - be in plain language
   - be easy to read and in plain language
   - be in point form or use short bullets
   - use in large type font type
   - maximize white space
   - include maps
   - include proposed plan alternatives
   - include charts if applicable
   - include a link to website (or URL) to view display boards, maps and proposed alternatives online
   - include the Consultant's logo (bottom left) and the Alberta Government logo (bottom right) on display boards

5. Survey

   In order to seek public input regarding the study options and plan alternatives, the Consultant will develop a survey questionnaire on paper, as well as electronically, that will be used during the public open house or during a public meeting. The survey questionnaire shall be in plain language, and prior to finalization, the Consultant shall submit a draft questionnaire for review by the Communications. In general, the survey questionnaire shall:

   - encourage participation in survey and include a statement which advises that stakeholders' comments are important to the Department.
   - on a table near the exit, provide a cardboard box or other container so that participants can return their completed surveys easily and anonymously.
   - provide e-mail and mail address where questionnaires can be returned at a later date.
   - include a link to a website (or URL) and instructions to complete this survey online.
   - provide a deadline for receipt of the questionnaires.
   - follow up with Communications on survey results/analysis.

   If the stakeholder can be identified by any information on the completed questionnaire, the following statement also must be added to the survey:

   Any personal information that you provide on this form is protected under the Freedom of Information and Protection of Privacy Act of Alberta. The personal information that is collected on this form relates directly to programs being undertaken by Transportation and Economic Corridors and will be used to reply to your questions and concerns supplied on this form. No other use will be made of this information and it will not be released without your written consent.

Other Considerations

Communications for those with Special Needs

Consultants should be aware of any special needs of their stakeholders and anticipate the need for alternative formats of communication such as larger print handouts and interpreters. Where practical, meeting venues should be accessible to persons with disabilities. This would include wheelchair access, washroom access, and adequate lighting.

Issues Management

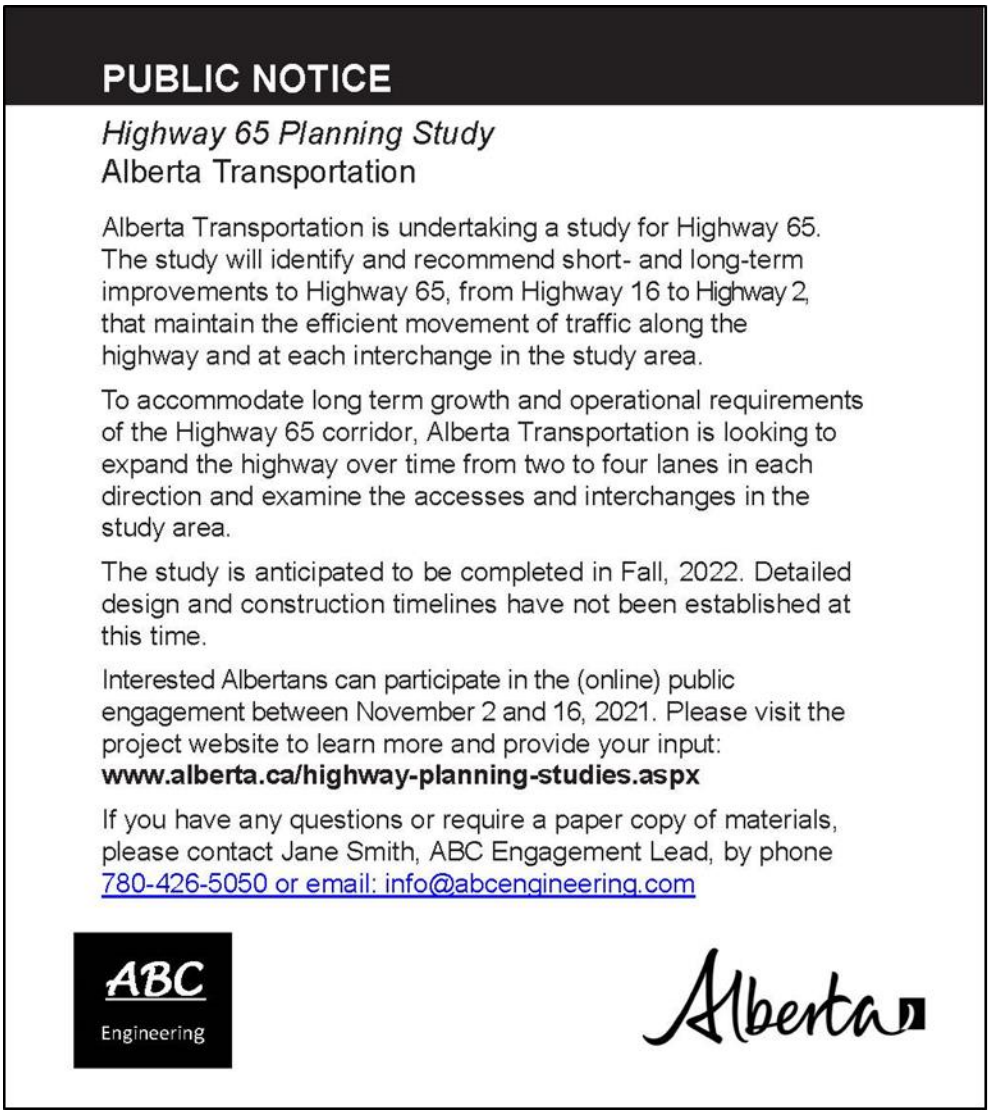
The Consultant shall identify any potential issues and must advise and provide this information to the Project Administrator and Communications. The Consultant will maintain an "Issues log" that includes details about the issues and their resolution during the life of the planning study. The Consultant and Communications will work together to manage all issues.

Media Relations

The Consultant will deal with the media on general project questions and will:

- always respond in a timely manner
- focus on and adhere to the facts
- not comment on matters of opinion
- not comment on policy decisions
- speak about the project only
- not speculate if they do not have the answer to a question and will advise the reporter that they will get the information and call them back
- inform and discuss media questions and responses with Communications if known ahead of time
- send information immediately by email to Communications

Sample Advertisement



PUBLIC NOTICE

Highway 65 Planning Study
Alberta Transportation

Alberta Transportation is undertaking a study for Highway 65. The study will identify and recommend short- and long-term improvements to Highway 65, from Highway 16 to Highway 2, that maintain the efficient movement of traffic along the highway and at each interchange in the study area.

To accommodate long term growth and operational requirements of the Highway 65 corridor, Alberta Transportation is looking to expand the highway over time from two to four lanes in each direction and examine the accesses and interchanges in the study area.

The study is anticipated to be completed in Fall, 2022. Detailed design and construction timelines have not been established at this time.

Interested Albertans can participate in the (online) public engagement between November 2 and 16, 2021. Please visit the project website to learn more and provide your input:
www.alberta.ca/highway-planning-studies.aspx

If you have any questions or require a paper copy of materials, please contact Jane Smith, ABC Engagement Lead, by phone 780-426-5050 or email: info@abcengineering.com

ABC Engineering

Alberta

Guidelines for Planning Study Signoff

Purpose:

Signing off a study demonstrates that the Department has accepted the study conclusions and recommendations and they are the official Department direction, within the scope of the study and can be shared externally.

Guidelines:

- All planning studies will be assigned a report and plan number by Network and Highway Planning.
- For all finalized planning studies, electronic copies of the report, MicroStation drawings, and all of the files, will be submitted to Network and Highway Planning for retention in a central repository. Additional bound hard copies e.g., for district and regional offices, and for municipalities will also be required.
    - Spatial data for all proposed roadway alignments shall be provided in a single file suitable for conversion into the Department's Geographic Information System (GIS).
- Representatives of the Technical Standards Branch, and Planning and Program Management Branch may participate on any study committees, as required.
- For strategic, network, or corridor studies, signoff will include the Department Senior Executive overseeing the provincial highway network, and may include signatures from impacted Regional Director(s).
- For all functional and operational planning studies, only the Regional Director's signature is required.
    - Planning or Design exceptions are to be identified early in the planning process and approval obtained from the Planning and Program Management Branch and/or the Technical Standards Branch.
- Reports that contain select contentious or unsupported recommendations can still be signed off, but the Department signoff needs to clearly define which recommendations are being accepted and which are not.
- Any proposed changes or deviations from the future functional classification shown on the Roadside Management Classification Map require approval by the Director - Network and Highway Planning.
- Disagreements between parties should be identified as early as possible and follow the Department's standard issue resolution process by escalating the issue through necessary levels for the quickest decision. Each stage of escalation will require a written summary from both perspectives and every attempt should be made to resolve the disagreement at the working level.

Alberta Spatial Economic and Travel Model

Alberta Spatial Economic and Travel (ASET) model is an analysis tool used by the Department for determining socioeconomic impacts of transportation infrastructure. ASET uses economic data, land use data and transportation policies to model travel on the transportation system by various modes including Single Occupancy Vehicles (SOV), High Occupancy Vehicles (HOV), air, coach demand matrices, peak hour traffic volumes, and commercial vehicles (light, medium, intermediate, and heavy trucks). The horizons currently used by the Department are a base case scenario (2016) and future scenarios 2029, 2039 and 2049. The model is kept up to date with current provincial highway network and land use information. The scenarios will change as needed according to Department need and requirements.

ASET can be used to analyse the demand for travel by estimating future traffic volumes on highways. Typically, traffic volume outputs are available for AM/PM peak hours and average number of vehicles per day. Other model outputs such as Volume to Capacity (V/C), Vehicle Hours Travelled (VHT), Vehicle Kilometers Traveled (VKT) and select link and traversal analysis, can be provided if required. Consultants will need to create a request for data specific to a study through the Project Administrator. Since modelling resources are limited in the Department, the Consultant should create these requests well in advance. The Department will provide travel model data to support the planning study upon the Consultant's request.

Noise Attenuation Guidelines for Provincial Highways Under Provincial Jurisdiction within Cities and Urban Areas

Definition:

Noise is defined as the sounds generated by vehicles operating on the highway. It includes but is not limited to engine or exhaust sounds and road contact sounds.

Guidelines:

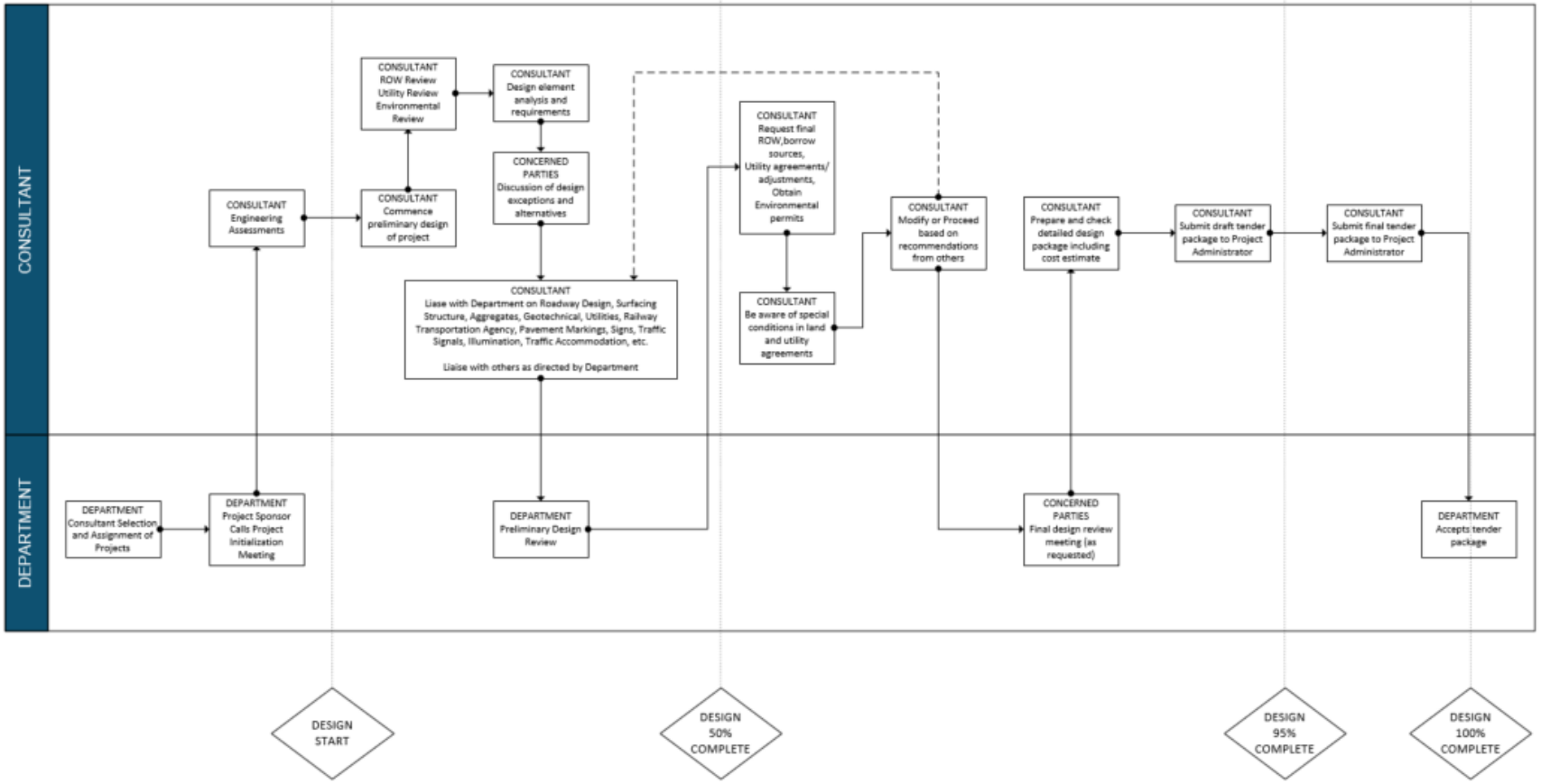
- For construction or improvements of highways through cities and other urban areas, the Department will adopt a noise level of 65 dBA Leq24 * measured 1.2 metres above ground level and 2 metres inside the property line (outside the highway right-of-way). The measurements should be adjusted to the 10 year planning horizon value, as a threshold to consider noise mitigation measures.
- The mitigation of noise issues could include constructing noise walls and/or berms. The decision to implement noise mitigation must consider whether mitigation is cost-effective, technically practical, broadly supported by the affected residents, and fits into overall provincial priorities.
- Any accepted noise mitigation measures consistent with this guideline will be the responsibility of the Department. Where established local noise mitigation policies are more stringent than this guideline, the local policy may be considered on a shared responsibility basis.
- The Department will be responsible for noise attenuation, in accordance with this guideline, in areas where the Department is undertaking: widening (by at least one lane width), or major realignment of an existing road, or constructing a new road adjacent to an existing residential development.
- In areas where a residential subdivision is constructed adjacent to an existing roadway, the development proponent will be responsible for noise attenuation consistent with these guidelines.
- In areas where a residential subdivision is constructed adjacent to a designated highway that has not been constructed, the development proponent will be responsible to address future noise concerns consistent with these guidelines.

** Noise level expressed in decibels (dB) is taken to mean the A-weighted 24-hour equivalent sound level.*

Appendix D: Highway Grading/Surfacing Design Coordination Flow Chart

Alberta

Consultant Highway Project Process Flow Diagram



This chart is only a general guide as projects will have unique circumstances that the Consultant should adjust for.

Appendix E: Surfacing Criteria

Spread Rate Guidelines for First Course Gravel Surfacing Design

The following chart has been developed to assist in the design of first course gravel surfacing quantities:

Subgrade width	Spread rate
(m)	(m^3/km)
7.0	300
8.0	350
9.0	400
10.0	450
11.0	500
12.0	550
13.0	600
14.0	650
15.0	700
16.0	750
17.0	800
18.0	850

The spread rates provided apply to general application only. The condition of the subgrade may affect the actual gravel requirements.

Guidelines for Selecting Type of Seal Coat on a Paved Surface

Once a project has been selected and approved for seal coat application on a paved surface, the type of seal coat application is based upon traffic volumes and cost effectiveness as shown in 'Table 1: Seal Coat Selection Based Upon Traffic Volume'.

Table 1: Seal Coat Selection Based Upon Traffic Volume

Traffic Volume A.A.D.T	Seal Coat Type	Specification for Aggregate (see Specification 3.2 Table 3.2.3.1)	
		Designation	**Class**
All paved roads[1,2]	Micro-Surfacing[2]	Specification 3.26 ISSA Type III	
> 10,000 – 20,000	Chip Seal	3	12.5 AW[3]
1,000 – 10,000	Chip Seal	3	12.5 BW[3]
< 1,000	Graded Aggregate Seal	3	12.5 C[3]
< 500	Double Seal Coat[4]	3	16[3] (both applications)
< 300	Restorative Sand Seal[5]	Contact TSB for Special Provision	

Notes:

Micro-surfacing may be considered for any paved road. Micro-surfacing is the preferred treatment for paved roads with AADT >20,000 that require work to be completed during off-hours (i.e. night time work); or in urban and semi-urban applications; or locations with significant turning movements.

Micro-surfacing may not be used in place of Double Seal Coat. Additional micro-surfacing applications are identified in 'Section 5: Engineering Assessment'.

Indicate aggregate class in the contract documents and Unit Price Schedule.

Double Seal coat is occasionally applied to a base structure (Granular or Full Depth Reclamation) in lieu of an asphalt pavement.

A lower cost treatment that is occasionally used on very low volume highways where a rejuvenating type binder is used to protect and restore an aged oxidized pavement. Has also been used to treat the existing paved shoulders on mill and inlay paving projects.

Other Considerations

1. Chip Seal using a Polymer Modified Binder

Specification 3.24 Chip Seal Coat specifies that the Contractor is to supply a cationic, rapid set asphalt binder. On multi-lane divided highways the Consultant is to specify a CRS-2P (polymer modified grade). The polymer modification is to increase early stage chip retention and reduce potential problems associated with loose chips. For estimating purposes, the polymer modified asphalt has a premium cost of $0.20/m^2.

2. Fog Coat Application

Fog coating a chip seal coat after sweeping has been trialed by the Department as a means to reduce loose chips.

3. Racked-In Chip Seal

A racked-in chip seal is similar to a regular washed chip seal except the aggregate is spread through two applications. In this process, the binder type and application rate is the same as a regular seal coat. The first

aggregate distribution consists of a Des 3 Cl 12.5 AW/BW product and is applied at roughly 75% of the total application rate. The second aggregate distributor follows closely and spreads smaller size washed chips (8 mm top size). The smaller surface chips are intended to reduce risks associated with loose chips. The premium cost in using the racked-in system is estimated to be $0.50/m^2. The longer term in-service performance of the racked-in system is considered to be equivalent to regular chip seals.

This type of chip seal application may be selected for use in situations where local traffic conditions could be sensitive to chip sealing operations and associated loose aggregate issues. The choice of Class 12.5 AW or BW aggregate is as per Table 1 (above). The North Central region has the most experience in using this type of seal coat.

4. Asphalt Binder Pre-Spray

In this process, a regular chip seal application is used except that two (2) asphalt distributors, working in close tandem, are used to spray the binder. The first distributor applies a light application across the mat except within the wheel paths. The second distributor applies the binder across the full travel lane. In this process, the more heavily travelled wheel paths have a slightly lower binder application in order to be less prone to asphalt “flushing” problems. The chip seal outside of the wheel paths have a slightly higher binder application rate in order to better increase aggregate retention. This system is not normally used by the Department, and Technical Standards Branch should be consulted prior to using.

5. Micro-Surfacing

Specification 3.26 Micro-Surfacing describes a slurry type application to be chosen as outlined in Table 1. The micro-surfacing material may also be used for rut-filling applications either with or without a subsequent pass across the entire travel lane.

Surfacing Design Estimate

A. Work sheet

The work sheet shall contain complete project descriptions and limits for all of the work proposed, and a work-up of the spread rates and application rates per km, for each typical section, type, and layer of material. Extra material required for levelling and minor intersections or approaches, are indicated here. These rates are used in the calculation of quantities in the project estimates. This is also a valuable aid to the Consultant's Representative in terms of material distribution management. Major intersection and roadside turnout quantities shall be calculated separately.

B. Schematic diagram

Prepare a graphic logistic layout of all of the major contract work components. It shows the limits of work segments and project limits for each project, expressed in kilometres. Show locations of all of the typical sections and respective limits where they occur. Special notes and details or conditions regarding bridges, curb and gutter, railway crossings, intersections, climbing lanes, and other special peculiarities are also shown here.

C. Typical sections and details

Show all of the typical sections. Each typical section shows the layers and thicknesses expressed in mm, widths expressed in m, as well as the ACP mix type, and asphalt binder grade to be used in the construction of each material layer. It also indicates the requirements of tack coat and/or spray coats where required. Cross-fall and side-slope gradients should be shown when necessary.

D. Project estimates

Each project in the contract requires a separate complete comprehensive estimate of quantities and costs. Each estimate shall include the contract costs, contingency, and engineering.

E. Bid item summary

Prepare a summary of the total quantities from all of the project estimates for all of the bid items in the contract.

F. Cost summary

Prepare a summary of all of the total costs from all of the projects, for all of the bid items, as well as, the total estimated costs, including contract costs, contingencies, and engineering.

G. Surfacing estimate summary

Compile a combined summary of quantities and costs used in the preparation of the "Unit Price Schedule" for the final tender documents.

H. Contract location map (key plan)

Prepare a map showing the geographic location, limits, townships, and ranges, plus the locations of all major intersections, bridge structures, vehicle turnouts, and passing/climbing lanes within the contract.

I. Materials distribution summary

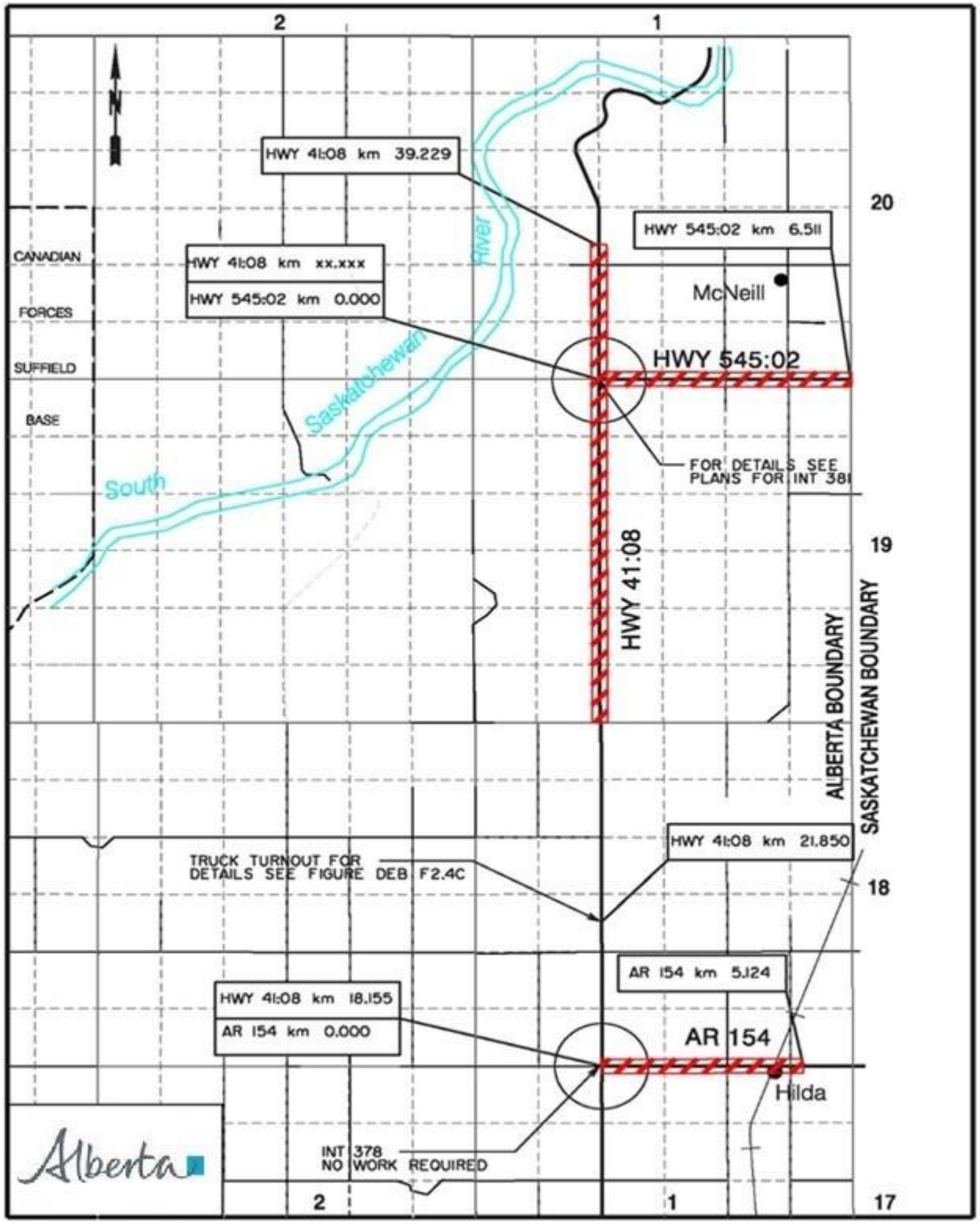
Prepare a distribution chart for the major haul related materials.

Forms

The latest versions of Surfacing Estimate Worksheets and other related forms are available on Engineering Consultant Guidelines, Volume 1 website or provided by the Project Administrator.

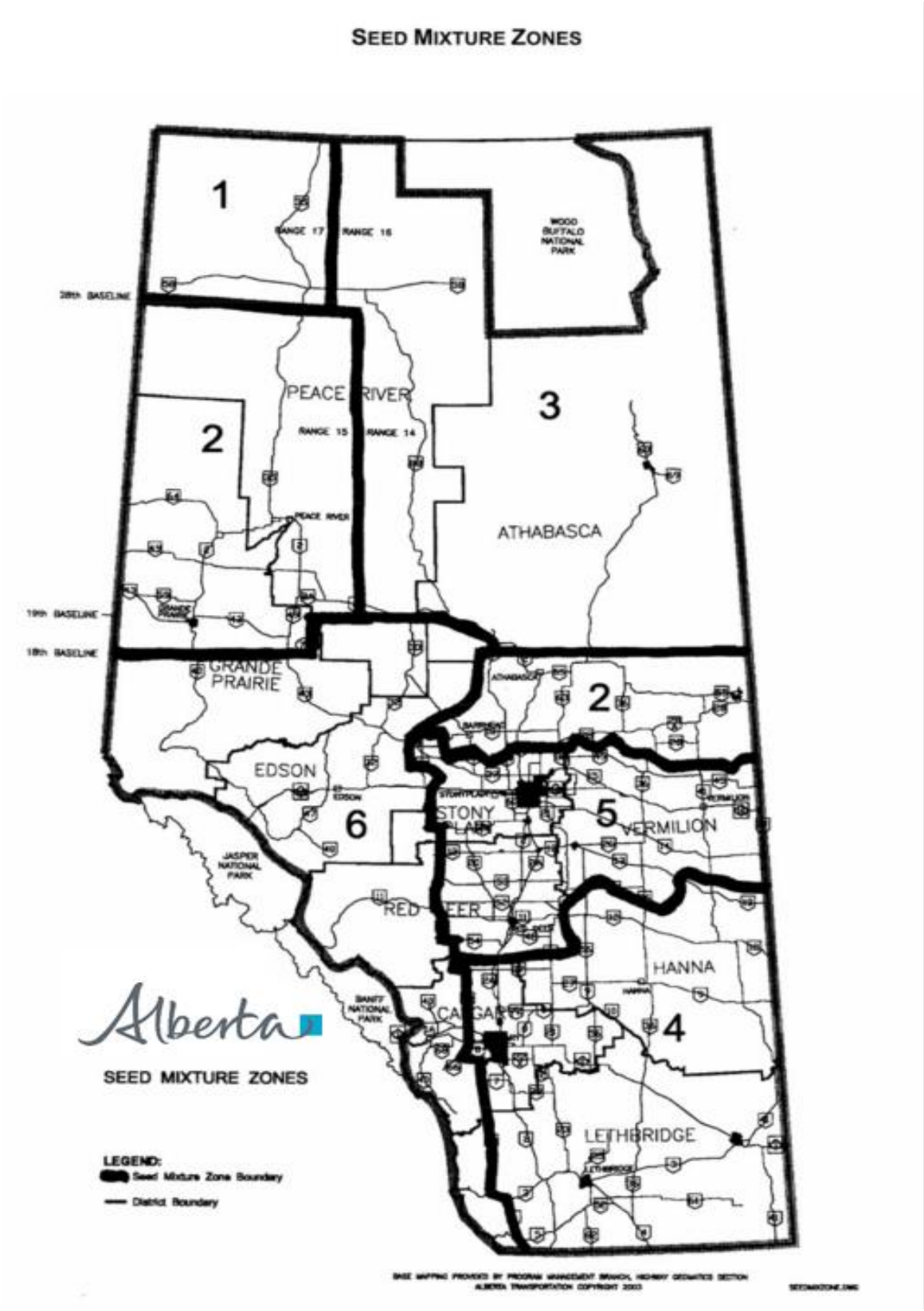
- Surfacing Estimate Worksheet
- Surfacing Estimate Schematics
- Surfacing Estimates Typical
- Surfacing Estimates
- Surfacing Estimate Summary
- Materials Distribution Summary

Sample Site Plan



Appendix F: Vegetation Assessment

Seed Mixtures Zones



Recommended Native Seed Mixes

Seed Mix Zone	Recommended Seed Mix		Percentage by Dry Weight
	Common Name	Latin Name	
1 Wetland Mixedwood	Slender Wheat Grass	Agropyron trachycaulum	40%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	15%
	Tufted Hairgrass	Deschampsia cespitosa	15%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Rocky Mountain Fescue	Festuca saximontana	10%
	Fowl Bluegrass	Poa palustris	10%
2 Dry Mixedwood	Slender Wheat Grass	Agropyron trachycaulum	35%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	20%
	Northern Wheat Grass	Agropyron dasystachyum	15%
	Tufted Hairgrass	Deschampsia cespitosa	10%
	Rocky Mountain Fescue	Festuca saximontana	10%
	Fowl Bluegrass	Poa palustris	10%
3 Central Mixedwood	Slender Wheat Grass	Agropyron trachycaulum	35%
	Rocky Mountain Fescue	Festuca saximontana	20%
	Tickle Grass	Agrostis scabra	10%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	10%
	Canada Wildrye	Elymus canadensis	10%
	Tufted Hairgrass	Deschampsia cespitosa	10%
	Fowl Bluegrass	Poa palustris	5%
4	Slender Wheat Grass	Agropyron trachycaulum	30%
	Canada Wildrye	Elymus canadensis	15%

Mixedgrass and Dry Mixedgrass	Mountain Brome	Bromus carinatus	15%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Western Wheat Grass	Agropyron smithii	5%
	Indian Rice Grass	Orzyopsis hymenoides	5%
	Alkali Grass	Puccinellia distans	10%
	Needle and Thread Grass	Stipa comata	10%
5 Central Parkland	Slender Wheat Grass	Agropyron trachycaulum	25%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	15%
	Green Needle Grass	Stipa viridula	15%
	Canada Wildrye	Elymus canadensis	10%
	Indian Rice Grass	Orzyopsis hymenoides	10%
	Nuttall's Alkali Grass	Puccinellia nuttalliana	10%
	Western Wheat Grass	Agropyron smithii	5%
6 Lower Foothills	Slender Wheat Grass	Agropyron trachycaulum	30%
	Smooth Wildrye	Elymus glaucus	20%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Tickle Grass	Agrostis scabra	10%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	10%
	Tufted Hairgrass	Deschampsia cespitosa	10%
	Foothills Rough Fescue	Festuca campestris	10%

Recommended Agronomic Seed Mixes

Common Name	Latin Name	Seed Mix – Percentage by Dry Weight	
		Zone 1, 2, 3, 6	Zone 4, 5
Pubescent Wheat Grass	Agropyron trichophorum	40%	32%
Dahurian Wildrye	Elymus dahuricus	22%	30%
Sheep Fescue	Festuca ovina	30%	30%
Perennial Ryegrass	Lolium perenne	8%	-
Cereal Rye	Secale cereale	-	8%

Special Provisions

0.1 Seeding

Unless otherwise directed by the Consultant, seeding shall be in accordance with the following:

From/To	Side	Grass Seed Mix (Native or Agronomic)	Fertilizer Composition	Fertilizer Application Rate

INSERTS: see zone map for locations

Zone 1 - Peace River District - north and west of High Level

Seed Mix Zone	Native Seed Mix		Percentage by Dry Weight
	Common Name	**Latin Name**	
1 Wetland Mixedwood	Slender Wheat Grass	Agropyron trachycaulum	40%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	15%
	Tufted Hairgrass	Deschampsia cespitosa	15%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Rocky Mountain Fescue	Festuca saximontana	10%
	Fowl Bluegrass	Poa palustris	10%

Agronomic Seed Mix		
Common Name	**Latin Name**	**Seed Mix % by Dry Weight**
		Zone 1
Pubescent Wheat Grass	Agropyron trichophorum	40%
Dahurian Wildrye	Elymus dahuricus	22%
Sheep Fescue	Festuca ovina	30%
Perennial Ryegrass	Lolium perenne	8%

Zone 2 - Athabasca District (south of Athabasca) and Grande Prairie District

Seed Mix Zone	Recommended Seed Mix		Percentage by Dry Weight
	Common Name	**Latin Name**	
2 Dry Mixedwood	Slender Wheat Grass	Agropyron trachycaulum	35%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	20%
	Northern Wheat Grass	Agropyron dasystachyum	15%
	Tufted Hairgrass	Deschampsia cespitosa	10%
	Rocky Mountain Fescue	Festuca saximontana	10%
	Fowl Bluegrass	Poa palustris	10%

Agronomic Seed Mix		
Common Name	**Latin Name**	**Seed Mix % by Dry Weight**
		Zone 2
Pubescent Wheat Grass	Agropyron trichophorum	40%
Dahurian Wildrye	Elymus dahuricus	22%
Sheep Fescue	Festuca ovina	30%
Perennial Ryegrass	Lolium perenne	8%

Zone 3 - Athabasca District (north of Athabasca) and Hwy. Nos. 88, 750, 986

Seed Mix Zone	Recommended Seed Mix		Percentage by Dry Weight
	Common Name	Latin Name	
3 Central Mixedwood	Slender Wheat Grass	Agropyron trachycaulum	35%
	Rocky Mountain Fescue	Festuca saximontana	20%
	Tickle Grass	Agrostis scabra	10%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	10%
	Canada Wildrye	Elymus canadensis	10%
	Tufted Hairgrass	Deschampsia cespitosa	10%
	Fowl Bluegrass	Poa palustris	5%

Agronomic Seed Mix		
Common Name	Latin Name	Seed Mix % by Dry Weight
		Zone 3
Pubescent Wheat Grass	Agropyron trichophorum	40%
Dahurian Wildrye	Elymus dahuricus	22%
Sheep Fescue	Festuca ovina	30%
Perennial Ryegrass	Lolium perenne	8%

Zone 4 - Lethbridge District (east of Hwy 22), Calgary District (east of Hwy 22), and Hanna District

Seed Mix Zone	Recommended Seed Mix		Percentage by Dry Weight
	Common Name	**Latin Name**	
4 Mixedgrass and Dry Mixedgrass	Slender Wheat Grass	Agropyron trachycaulum	30%
	Canada Wildrye	Elymus canadensis	15%
	Mountain Brome	Bromus carinatus	15%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Western Wheat Grass	Agropyron smithii	5%
	Indian Rice Grass	Orzyopsis hymenoides	5%
	Alkali Grass	Puccinellia distans	10%
	Needle and Thread Grass	Stipa comata	10%

Agronomic Seed Mix		
Common Name	**Latin Name**	**Seed Mix % by Dry Weight**
		Zone 4
Pubescent Wheat Grass	Agropyron trichophorum	32%
Dahurian Wildrye	Elymus dahuricus	30%
Sheep Fescue	Festuca ovina	30%
Cereal Rye	Secale cereale	8%

Zone 5 - Stony Plain, Vermillion, and Red Deer (east of Hwy 22) Districts

Seed Mix Zone	Recommended Seed Mix		Percentage by Dry Weight
	Common Name	Latin Name	
5 Central Parkland	Slender Wheat Grass	Agropyron trachycaulum	25%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	15%
	Green Needle Grass	Stipa viridula	15%
	Canada Wildrye	Elymus canadensis	10%
	Indian Rice Grass	Orzyopsis hymenoides	10%
	Nuttall's Alkali Grass	Puccinellia nuttalliana	10%
	Western Wheat Grass	Agropyron smithii	5%

Agronomic Seed Mix		
Common Name	Latin Name	Seed Mix % by Dry Weight
		Zone 5
Pubescent Wheat Grass	Agropyron trichophorum	32%
Dahurian Wildrye	Elymus dahuricus	30%
Sheep Fescue	Festuca ovina	30%
Cereal Rye	Secale cereale	8%

Zone 6 - Lethbridge, Calgary, and Red Deer Districts all located west of Hwy 22)

Seed Mix Zone	Recommended Seed Mix		Percentage by Dry Weight
	Common Name	Latin Name	
6 Lower Foothills	Slender Wheat Grass	Agropyron trachycaulum	30%
	Smooth Wildrye	Elymus glaucus	20%
	Northern Wheat Grass	Agropyron dasystachyum	10%
	Tickle Grass	Agrostis scabra	10%
	Fringed Brome (Fringed Brome shall be coated)	Bromus ciliatus	10%
	Tufted Hairgrass	Deschampsia cespitosa	10%
	Foothills Rough Fescue	Festuca campestris	10%

Agronomic Seed Mix		
Common Name	Latin Name	Seed Mix % by Dry Weight
		Zone 6
Pubescent Wheat Grass	Agropyron trichophorum	40%
Dahurian Wildrye	Elymus dahuricus	22%
Sheep Fescue	Festuca ovina	30%
Perennial Ryegrass	Lolium perenne	8%

Appendix G: Supply of Aggregate

Forms

The following is a brief description of the forms and their purpose. Examples follow in the same order as listed.

Aggregate data summary request

Use the Microsoft® Excel® form available on Engineering Consultant Guidelines, Volume 1 website, to formally request an aggregate source for all projects. It will be returned with the information necessary to insert into the special provisions for the contract. This new form replaces all previous versions.

Pit Plan

This plan shows the proposed pit operations such as areas to be cleared and mined, stockpile and plant sites, and areas to be backfilled or reclaimed. It may not be necessary to repeat in the special provisions what is clearly shown on the plan. A separate reclamation plan may be provided for complex operations. The plans may require an update prior to including it in the tender document if significant time has elapsed between the time the information was received and the tender date. To ensure legibility 1-2500 scale is recommended (ansi-C).

Aggregate Testing Plan

This plan shows the test holes, open pit and other surface features. The proposed pit operations should not be shown here. An additional plan, sufficiently enlarged to ensure the text is legible, shall be included for the portion of the plan where mining is to occur.

The plan may require updating before it can be included in the tender document. To ensure legibility 1-2500 scale is recommended (ansi-C).

Sieve Analysis

These correspond to the test holes on the Aggregate Testing Plan. These sheets will be included in the tender documents.

Sample Pit Plan

Alberta

PIT PLAN

NAD1983 IOTM AEP RESOURCE

LEGEND:

OP	OPEN PIT	SP	STOCKPILE
A	AGGREGATE AREA	CSP	CRUSH STOCKPILE
D	DEPLETED AREA	A.T. RES. BDY.	BOUNDARY OF RESERVATION AREA
STR.	STRIPPING	A.T. AGR. BDY.	BOUNDARY OF AGREEMENT AREA
T	TOPSOIL	HWY R/W	HIGHWAY RIGHT OF WAY
GF	GRAVEL FACE	-X-	FENCE LINE
SF	SAND FACE		MUSKEG
B	BOULDER PILE	R	REJECT FINES
O	OVERBURDEN PILE	N or NF	NATURAL FINES PILE

SW ¼ SEC. 19 TP. 70 RGE. 5 W. 6 M.

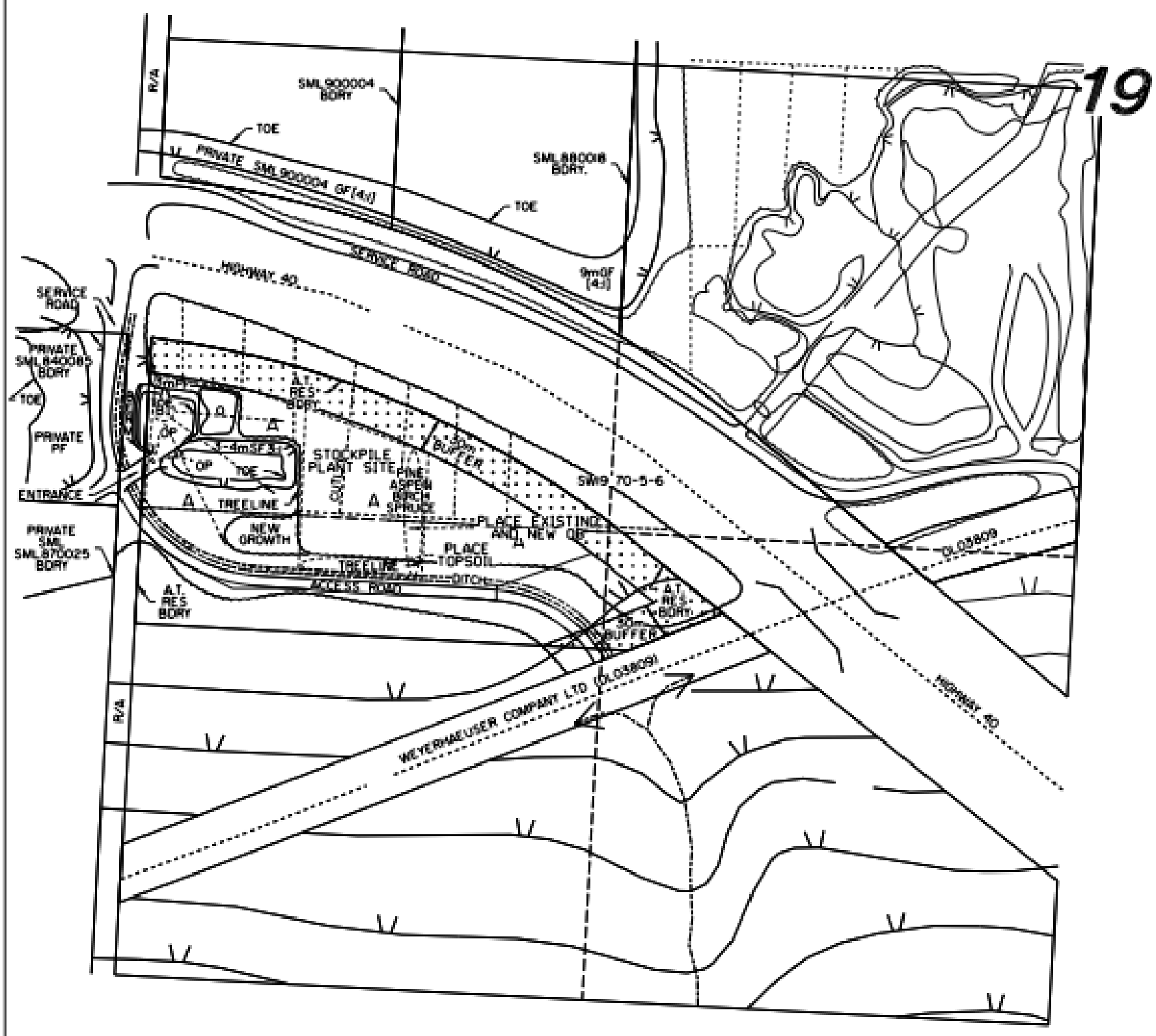
BIG MOUNTAIN SOUTH PIT.

AMENDMENTS:

DATE (MM/DD/YY)	NAME	AMENDMENTS
JAN 13/13	GEMSAR	CONSERVATION RECLAMATION BUSINESS PLAN
DEC / 16 / 20	HOLSTEIN ASG	RECLAMATION TO STANDARD

N

SCALE: 0 m 50 m 100 m 150 m 200 m 250 m 300 m



Sample Aggregates Testing Plan

Alberta

AGGREGATES TESTING PLAN

NAD1983 10TM AEP RESOURCE

LEGEND:

F	FINE	Ss	SANDSTONE		FENCE	AT RES BDY	BOUNDARY OF RESERVATION AREA
Co	COARSE	Sh	SHALE		MUSKEG		
D	DIRTY	BR	BEDROCK	SP	STOCKPILE	AT AGR BDY	BOUNDARY OF AGREEMENT AREA
T	ORGANIC TOPSOIL	B	BOULDERS	CSP	CRUSHED STOCKPILE	HWY R/W	HIGHWAY RIGHT OF WAY
C	CLAY	L	LAYER				
Si	SILT	⊻	WATER LEVEL AT TIME OF TESTING	STR	STRIPPING	CULT	CULTIVATED AREA
S	SAND			DH	DEAD HAUL	GF	GRAVEL FACE
G	GRAVEL	•	TEST HOLE	OP	OPEN PIT	SF	SAND FACE
Pg	PEA GRAVEL	+	2.5 x 2 or TREE TAG	DEP	DEPLETED	NF	NATURAL FINES PILE
V	VERY (i.e.,VSG= VERY SANDY GRAVEL)			R	REJECT FINES	R or NF	

TOPOGRAPHICAL FEATURES INDICATED IN WORDS

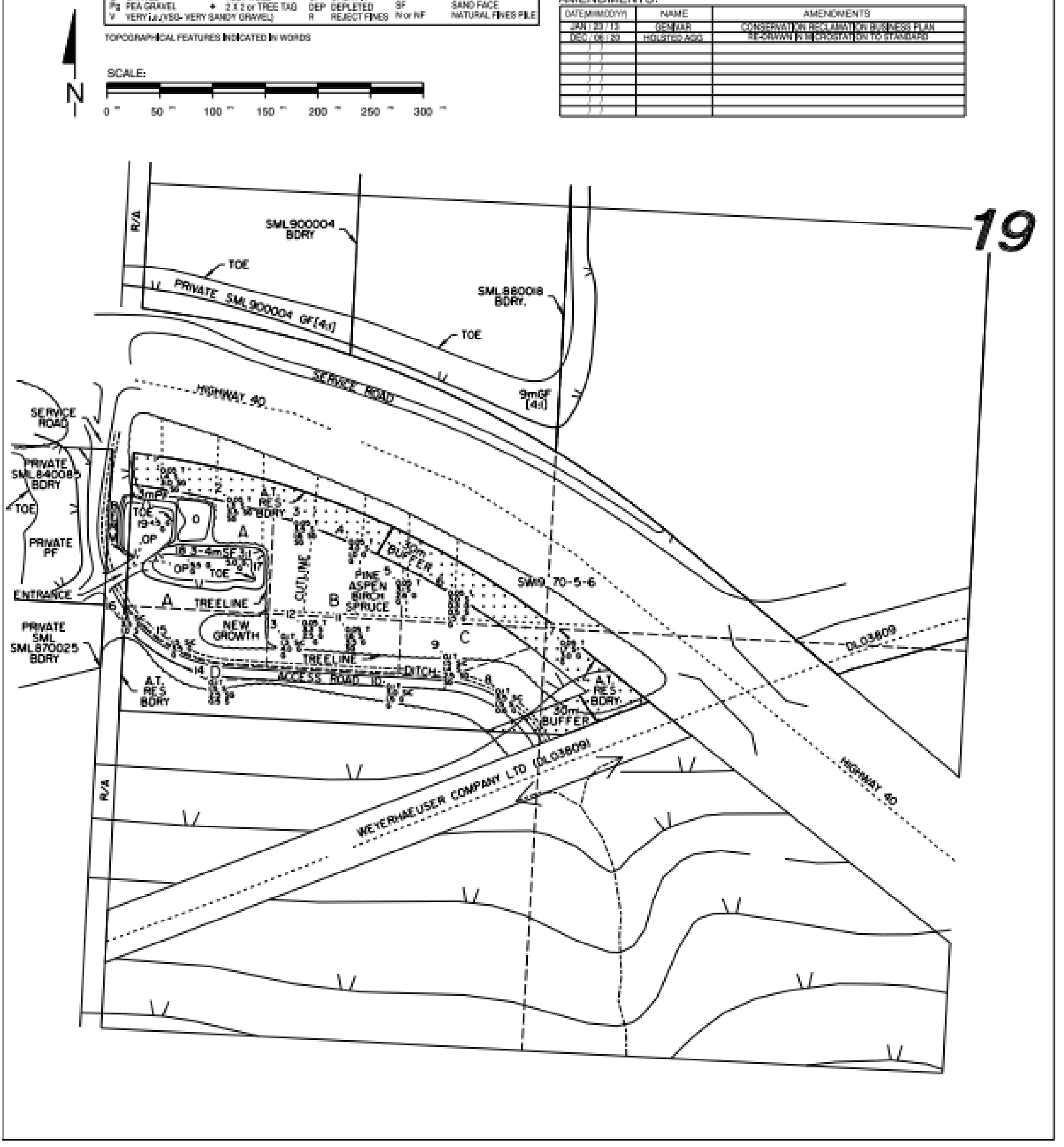
SW ¼ SEC. 19 TP. 70 RGE. 5 W. 6 M.

BIG MOUNTAIN SOUTH PIT.

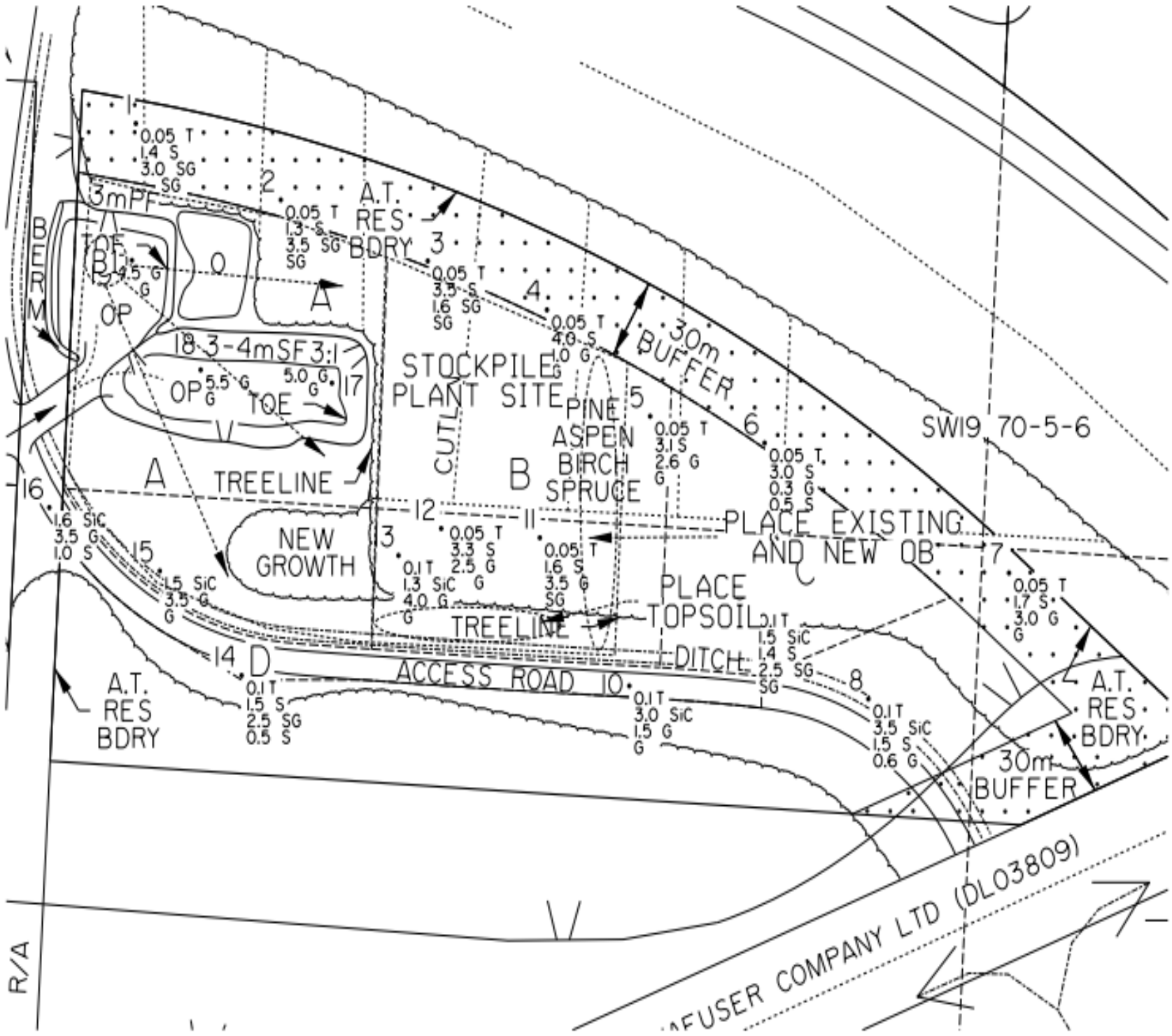
TESTED BY GENIVAR DATE: , 20

AMENDMENTS:

DATE(MM/DD/YY)	NAME	AMENDMENTS
JAN / 23 / 13	GENIVAR	CONSERVATION RECLAMATION BUSINESS PLAN
DEC / 06 / 23	HOLSTED AGG	RE-DRAWN IN MICROSTATION TO STANDARD



Enlarged Aggregate Testing Plan (Area to be mined)



Appendix H: Utility Adjustment Agreements (Samples)

Appendix H contains sample letters and agreements that have been used by the Department to arrange for adjustments to utilities, which are generally required due to highway upgrading or new construction.

The latest versions of these samples are available on Engineering Consultant Guidelines, Volume 1 website.

All agreements should be sent under the Government of Alberta letterhead/logo except the Letters of: Notification, Requesting for Cost Estimate, and Confirmation of Commencement of Construction, which can be sent out under the Consultant's company letterhead.

Generally, there are three utility crossing scenarios (mainly for pipelines); each has a sample standard crossing agreement:

- Highway upgrading within highway right-of-way – adjustment is required;
- Highway upgrading within highway right-of-way – adjustment is not required;
- New highway construction over utility right-of-way.

There may be instances where the sample standard agreement requires modifications (e.g., changes in legislation, different utility types). The modifications should not change the intent and purpose of the standard crossing agreement. Consult the Department's Utilities Lead and Justice as necessary.

List of Sample Letters and Crossing Agreements

Purpose	Oil/Gas	Water/ Sewer	Power	Telecom	Railway
Letter of notification	Sample 1	Sample 1	Sample 1	Sample 1	Sample 1
Letter requesting utility design options and cost estimates	Sample 2	Sample 2	Sample 2	Sample 2	Sample 2
Letter confirmation of cost responsibility and signing of crossing agreement	Sample 4	Sample 3	Sample 3 (Sample 11 for ATCO Electric) (Sample 15 for Fortis)	Sample 3	Sample 3
Letter confirmation of utility construction schedule	Sample 10	Sample 10	Sample 10	Sample 10	Sample 10
Hydrovac agreement within highway right-of-way	Sample 13	Sample 13	Sample 13	Sample 13	n/a
Crossing agreement for roadway upgrading - utility adjustment not required	Sample 6	Sample 6w	n/a	n/a	n/a
Crossing agreement for roadway upgrading - Utility adjustment required	Sample 5	Sample 5w	Sample 3 (Sample 11 for ATCO Electric) (Sample 15 for Fortis)	Sample 3	n/a
New roadway over existing utility crossing agreement	Sample 7 (Sample 12 for ATCO Gas and Pipelines) (Sample 14 for TC Energy)				
New railway crossing agreement	n/a	n/a	n/a	n/a	Sample 8
Roadway upgrading at existing railway crossing agreement	n/a	n/a	n/a	n/a	Sample 9

Note:

Sample 3, 11 and 15 are not to be used to accept proposal for the installation of power supply services. Such services must be quoted by the service provider of the franchise area as fixed price contributions.

Agreements for payment of utility adjustment costs are documented separately from the "Utility Crossing Agreement".

In the case where utility adjustment is required, the letter confirmation of cost responsibility as well as the letter confirmation of utility construction schedule should be used and included to form part of the crossing agreement.

Specifically for ATCO Gas and Pipelines Ltd., in addition to the above requirements, a copy of the applicable Master Agreement regarding prime contractor obligations (signed by ATCO Pipeline Ltd. on June 8, 2006 regarding high pressure pipelines, and by ATCO Gas Ltd. on May 23, 2006 for low pressure gas distribution pipelines) should be appended to form part of the agreement.

In the case where sample 11 is used, a copy of the letter for the Master Agreement, regarding prime contractor obligations, signed by ATCO Electric and Alberta Transportation (now Transportation and Economic Corridors) on May 11, 2006, should be appended to form part of the agreement document.

For the protection of the utility line during highway construction, Utility Owner typically provides their schedule(s) of conditions to be attached to the crossing agreement. Such schedule(s) should be strictly for safety and protection of the utility line, and nothing else.

The Operations Manager needs to be informed in writing when there are implications on highway operating/maintenance costs.

For additional information on utility coordination process, refer to the 'Utility Coordination Process Manual'.

Appendix I: Sample Cost Estimates and Summary

Forms

The latest versions of templates and examples are available on Engineering Consultant Guidelines, Volume 1 website.

- “A” Estimate Template
    - “A” Estimate Example
- “B” Estimate Template
    - “B” Estimate Example
- “C” Estimate Template
    - “C” Estimate Example
- “D” Estimate Template

Appendix J: Value Engineering and Value Analysis Services

General

Value Engineering and value analysis services are to be delivered by a certified facilitator with experience and training in delivering Value Engineering, Risk Management, and Constructability Review services. The facilitator shall fulfil the following criteria:

- Certified Value Specialist (CVS®) accredited by SAVE International
- Licensed as a P.Eng. or P.E.
- Have experience in five similar projects in the past five years

The services shall include the following scope of work:

- Value Engineering: utilizing SAVE International standards and a workshop delivered by a CVS® certified facilitator
- Risk Management: utilizing PMI Standards and the structured approach preferred by the Project Management Institute (PMI)
- Constructability Review: utilizing the Construction Industry Institute's (CII) standards and process

Value Engineering

Value Engineering is defined by SAVE International (the governing body for Value Engineering) as a systematic process used by a multidisciplinary team to improve the value of a project through the analysis of its functions. SAVE defines Value as a fair return or equivalent in goods, services, or money for something exchanged.

The Department's goal is to improve the value of its projects through the examination of function, where value is the ratio of function to cost. Value provided through the implementation and completion of Department projects can be increased by either improving the function or by reducing the cost of projects. Through Value Engineering, the Department will evaluate options on projects through gathering of information, measurement and analysis of alternatives, generation of innovative alternatives for the projects, evaluation of the ideas, detailed idea development including looking at impacts, costs and performance of alternatives, and finally presentation of ideas.

Value Engineering may include but is not limited to the following:

- Facilitate Value Engineering Workshops
- Complete Value Engineering Reports

Risk Assessment and Management

The PMI defines a project risk as "an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives." Risk Management includes the process of conducting Risk Management planning, identification, response, and control on a project, as per the PMI's defined process.

Managing project risk is a priority for the Department. The goal is to identify, assess, and prioritize risks followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of events or to maximize the realization of opportunities. Specifically, the Department is interested in all risks that could have impacts on quality, schedule, and/or costs.

Risk Assessment and Management may include the following:

- Create, provide, monitor, and control Risk Registers including meeting with all stakeholders and creating a list of all risks associated with the project that could have impacts on quality, schedule, and/or costs. The Risk Register will be used as a basis to assign costs to the risks which will subsequently be used in establishing contingency values. The Risk Register will be maintained throughout the design and construction phases and updated at design and construction meetings.
- Develop Risk Management plans including strategies for each identified risk and assure that all mitigations strategies are in place throughout all phases of the project. The Consultant will communicate and monitor all risk mitigation strategies that are to be adhered to by all parties involved with the project. The Consultant will provide

a compliance monitoring program to ensure that the recommended mitigation measures are undertaken as specified.
- Organize and facilitate Risk Management workshops with subject matter experts present near the conclusion of each major design phase including concept, preliminary, and detailed design.

Constructability Review

The CII defines Constructability Review as, “the optimal use of construction knowledge and experience in planning, design, procurement, and field operations to achieve overall project objectives.”

The facilitator shall develop and implement a strategy for completing a Constructability Review of the design aligned with the project schedule and work plan. The workshop objective would focus on incorporating construction knowledge into the design by exploring the current design components, staging, schedule, access, site layout, utilities, and other potential constructability issues.

Deliverables

The facilitator will work with the Department and consulting team to create a work plan, including the following:

- Identify external experts
- Prepare for workshops (e.g. logistics, project background information)
- Plan for workshop delivery (in person or virtual depending on the health restrictions)
- Workshop facilitation
- Draft and finalize reports
- Develop and manage recommendations and an implementation plan alongside the consulting team

Appendix K: Project Records Management

Scope of Records Management in Volume 1

This appendix documents the Department's expectations regarding records management up to and including tender package completion.

Project Records File Submission

The Project Records file shall be submitted prior to final invoice submission for engineering services on a project. Electronic files for all text and graphics shall be included.

In the circumstance where the Consultant is contracted to perform a planning project or roadway project, the Consultant is required to submit one Project Records file with the following identifiers: Highway Number, Control Section Number, Kilometre "from and to" information (project limits), Contract Number, Contract Execution Date, and Project Description. The information within the Project Records file shall be categorized according to the headings shown below.

For bridge projects, in addition to the identifiers listed above, the Project Records file shall include the Bridge File Number. The information within the Project Records file shall be categorized according to items 3a and 3b below.

Final Tender Packages shall be stored in the Departments' program management application (e.g. PMA Delivery, Maintain Tender)

Consultants are required to prepare a complete duplicate copy of the Project Records files, including the Tender Package, and retain the information for ten (10) years. After this time, the documents should be returned to the Department for destruction.

Note: All final version drawings and engineering documents need to be authenticated in accordance with APEGA's Professional Practice Standard and with the Department's 'Design Bulletin #108: Implementation of Authentication for Electronic Submission of Engineering Documents'.

Project Records File Categorization

In order to maintain an effective records system according to standards acceptable to the public body (refer to 'Section 1.3.5: Records, Freedom of Information, and Protection of Privacy Act') and to serve the future needs of the Department, the following records must be prepared, submitted, and a copy retained by the Consultant. The records are listed in categories as follows:

1. Planning Project
2. Roadway Project
    a) Preliminary Survey
    b) Grading Design
    c) Environment
    d) Utilities
    e) Lands and Aggregates
    f) Geotechnical
    g) Surfacing
    h) Traffic
3. Bridge Project
    a) Bridge Preliminary Engineering
    b) Bridge Design
4. Tender Package

1. Planning Project

Two bound hard copies of the complete final report are required. All electronic data, for example survey data, digital files for photo image, digital file for interchange or intersection plans, etc. shall also be submitted for department use.

Public participation documents (i.e. questionnaires) shall be bound separately to enable the Department to protect the privacy of the individual as per FOIP.

2. Roadway Project

All electronic files of the design categories below (from 2a to 2h), shall be clearly labelled, and submitted to the Project Administrator prior to final invoice submission for engineering services on a project.

a) Preliminary Survey

- An ASCII geographic coordinate file (xyz values such as latitude, longitude, elevation) for roads and bridges site surveys including raw and processed data of survey, geodetic datum and other survey specifics.
- Utilities Survey
- Surveyed location and depth of installation of telephone cable (size and type) and pedestals, overhead telephone lines, power lines, television, telecommunication, pipeline company instrumentation, pipelines, telegraph, railway operating cables, etc. shall be noted in the survey field book.
- Railway Crossings
  - The complete details of survey and all plans prepared for railway crossings

b) Grading Design

- Geometric, Safety, and Surfacing Assessment Reports (when prepared by the Roadway Design Consultant)
- Final Grading Design Package including Design Drawing mosaic profile plans, intersection plans, utility plans, overhaul diagram, and other special drawings
- A zipped file of Computer Aided Detailed Design of the entire project including road allowances, roadside turnouts, accesses, and service roads

Note: The database should be ready for loading in the program software to print design information as well as to view the Design Cross Sections, Earthwork Quantities, and Overhaul Diagrams.

- Design Element Files
  - horizontal and vertical alignments
  - typical cross-sections
  - super-elevation
  - climbing/passing lanes
  - soil survey information (i.e. borings file)
  - area/surface parameters
  - borrow files
  - volume files
- Record Drawing mosaic profile plans
- Record Drawing plans for intersection geometric layout, passing lanes, climbing lanes, interchange, roadside turnouts, etc.

c) Environment

- Approvals issued by Alberta Environment and Protected Areas (AEP) need to be retained until a reclamation certificate is obtained for borrow pits and gravel pits
- Permits and licenses issued by AEP may need periodic re-authorization
- Letters of clearance issued by Alberta Culture for archaeological sites, etc.
- Terms and conditions from referrals

d) Utilities

- Utility crossing plans and associated crossing agreements (plan to be retained with Finals Details)
- Utility alteration estimates, where applicable
- Correspondence with utilities companies
- Utility Accident Reports (form in ‘Appendix B: Summary of Commonly Used Forms’)

e) Land and Aggregates

- Aggregate data summary requests
- Spec. shell (supply and payment for aggregate - contractor's supply with option)
- Pit operations
- Pit plan
- Aggregates testing plan
- Area map showing project and aggregate site
- Mosaic of right-of-way request

f) Geotechnical

- Authenticated geotechnical engineering report (complete with field investigation details, borehole logs and in situ testing, instrumentation installation details and monitoring results, laboratory testing results and supporting data sheets, engineering analyses, assumptions and modeling figures, plans, drawings, recommendations and geotechnical special provisions)
- Electronic data files for instrumentation readings (e.g. Excel, GTILT, etc.) and borehole logs (gINT or equivalent)

g) Surfacing Design

- Final Surfacing Strategy if completed by the Consultant
- Detailed Design, including documentation of any changes from the Surfacing Strategy
- Design notes and correspondence
- Summary of Pavement Testing Program Materials (where required)

h) Traffic

- Traffic and Pedestrian Control Signals
  - Traffic data (if these are provided by the consultant)
  - Signal design (phasing, timing, etc.)
  - Intersection layout (signal design)
  - Signal equipment (electrical prints, operation manuals, brochures, etc.)
- Railway Crossing Signals
  - Crossing plan
  - Application documents with Transport Canada, etc.
  - Board Orders and cost sharing agreements
- Traffic Studies
  - Proposals
  - Study Report
- Signing, Pavement Markings, and Guardrail Design
  - Project plans where necessary
- Illumination
  - Lighting design (plans, etc.)
  - Agreements with power company (operation and maintenance responsibility)

3. Bridge Project

   a) Bridge Preliminary Engineering

   - Bridge assessment report
   - Plans and cost estimate for alternatives considered
   - Navigable Water Protection Act (NWPA) drawings and permit applications/approvals
   - Railway grade separation design plan including Canada Transportation Act (CTA) submission
   - Drawings
   - Environmental Impact Assessment and all documentation required for CTA approval
   - Environmental permit documents
   - Estimated life expectancy of culvert and corrosion survey results
   - Design notes
   - Stamped, signed and sealed original drawings (electronic)
   - CTA order, and approval drawing(s)

   b) Bridge Design

   - Original drawing (with stamps and signatures) (electronic)
   - Design notes
   - Shop drawings
   - Project summary report

Note: An electronic form (MS Word or PDF) of all records, notes, etc.

4. Tender Package

   - Cover letter
   - “C” Estimate submission
   - Tender Document
   - Contract Plans and Standard Drawings
   - Environmental Risk Assessment

Note: Depending on the type of work involved, additional documentation may be required. These may include, but are not limited to: reference drawings, design cross-sections, geotechnical and/or environmental reports, etc.