

**GENERIC TERMS OF REFERENCE**  
**Civil-Hydro-Technical and**  
**Geotechnical Engineering Services**  
**Standing Offer Agreement**

**For;**  
**Various Agriculture and Agri-**  
**Food Canada Projects**

**Various Locations throughout**  
**Southern Saskatchewan**

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# 1 PROJECT DESCRIPTION

## 1.1 GENERAL

### 1.1.1 SERVICES

- .1 The services of a team of registered civil-hydro-technical and geotechnical engineering professionals are required by Agriculture and Agri-food Canada (AAFC), Corporate Management Branch (CMB). A coordinating registered consulting engineering firm will be required to assemble a team of qualified professionals to respond to civil-hydro-technical and geotechnical engineering and planning support services.
- .2 This document provides the Generic Terms of Reference (TOR) for the common services required for the various projects.
- .3 The Consultant will be engaged through individual project-specific "Call-Ups" which will include a Project-specific TOR.

### 1.1.2 THE PWGSC GENERAL PROCEDURES AND STANDARDS DOCUMENT (GP&S)

- .1 The TOR documents must be used in conjunction with the General Procedures and Standards document (GP&S), as the two documents are complimentary. The GP&S document is a Public Works and Government Services Canada document (PWGSC) which has been adopted by AAFC. Wherever stated in the document as "PWGSC" read "AAFC".
- .2 The Project-specific TOR which will be issued at the time of the Call-Up will describe project-specific requirements, services and deliverables while the GP&S Document outlines minimum standards and procedures common to all projects.
- .3 In the case of a conflict between the two documents, the requirements of the Project-specific TOR override the GP&S Document.

### 1.1.3 PROJECT INFORMATION

Project Information	
Project Title:	Standing Offer Agreement for Civil-hydro-technical and Geotechnical Engineering Services
Project Address:	Various throughout southern Saskatchewan
Solicitation Number:	TBD
AAFC Project Number:	TBD
AAFC Contracting Officer:	TBD

## 1.2 BACKGROUND INFORMATION

### 1.2.1 USER DEPARTMENT

- .1 The User Department referred to throughout the TOR is Agriculture and Agri-Food Canada (AAFC).
- .2 AAFC Mission
  - .1 Agriculture and Agri-Food Canada (AAFC) helps ensure the agriculture, agri-food and agri-based products industries can compete in domestic and international markets, deriving economic returns to the sector and the Canadian economy as a whole. Through its work, the Department strives to help the

sector maximize its long-term profitability and competitiveness, while respecting the environment and the safety and security of Canada's food supply.

### **1.2.2 CONTEXT**

- .1 AAFC owns 33 dams and associated diversion works as well as 5 flood irrigation projects in Saskatchewan. These works, built by the former PFRA between 1935 and 1960 as part of a legislated mandate, contribute to the economic security of the drought prone regions of the western Canadian prairie region. The dams are of earthen construction, generally using controlled and uncontrolled concrete operational spillways and/or earth overflow spillways. Most of the dams have low level outlet works consisting of central wet well containing a control gate and upstream and downstream conduits of concrete or corrugated steel pipe. The dams and the water they store and control support a broad range of dependent uses and carry an array of related public safety implications. The diversion works consist largely of canals and drains of earthen construction containing a variety of stop-log or fabricated gate controlled, concrete, creosote-wood, and corrugated steel pipe structures.
- .2 AAFC, as a result of Canada's ownership of these dams, is responsible for the prudent operation, maintenance and capital life-cycle rehabilitation to ensure that the infrastructure can continue to support the dependent uses and address related public safety issues.
- .3 Arising from AAFC's responsibility, it is incumbent that appropriate operation, maintenance and rehabilitation of the infrastructure be undertaken. Historically federal staff resources have been adequate to provide the required technical, engineering, and administrative capacity to support the responsibilities. Shifting mandate, attrition, and organizational change have, over the recent decades, reduced the capacity to support the infrastructure responsibilities. The mode of operation has gradually shifted to one of a knowledgeable owner, with limited internal capacity to meet all of its technical, engineering, and administrative needs. Consultants have been engaged on an increasingly frequent basis to fulfill the needed project investigation, design and construction requirements for larger and more complex projects. Gradually AAFC's capacity has diminished to the point of no longer being able to support the advanced technical and planning initiatives of the division with respect to civil-hydro-technical and geotechnical engineering.
- .4 The objective of this standing offer agreement is to put into place an "on-call" repertoire of civil-hydro-technical and geotechnical engineering support to provide the capacity to respond to specific water infrastructure planning, operation, maintenance, rehabilitation needs.
- .5 A communicative approach by and with the Consultant, and AAFC representatives and experts using appropriate project management principles and practices is to be applied in the delivery of the project services and outcomes and to enable the consultant familiarity with the assets, operation, and processes associated with the AAFC infrastructure

### **1.2.3 QUALIFICATIONS**

- .1 The services of a coordinating registered professional and a team of registered professionals of record are required. The coordinating registered consulting firm shall have expertise in Engineering including Civil, Hydro-Technical and Geotechnical Engineering

- .2 . The consulting firm shall have experience associated with civil-hydrrotechnical engineering, geo-technical engineering and related services in a Canadian prairie setting, including familiarity investigation, design, and construction techniques common to the region,

#### **1.2.4 POTENTIAL SERVICES REQUIRED**

- .1 The needs and goals and the specific Services required will be outlined in the Project-specific TOR.
- .2 Refer to Part 2 of this generic TOR.
- .3 Examples of types of projects which require Engineering Service Call-Ups are;
  - .1 Hydrologic analyses,
  - .2 Moderate complexity hydraulic analyses and designs,
  - .3 Moderate complexity hydraulic structure analyses, designs, and plan preparation,
  - .4 Moderate complexity geotechnical analyses and reports,
  - .5 Small scale on-site geotechnical inspections, opinions and memo reports,
  - .6 Exploratory geotechnical drilling and laboratory testing investigations,
  - .7 Instrumentation design, installation and monitoring surveys,
  - .8 Topographic and Utilities Surveys and plan preparation,
  - .9 Preparation of tender documents, plans and specifications of water structures, earthen embankments, canals, drains, etcetera for construction contracting purposes,
  - .10 Materials testing,
    - .1 Laboratory and field soils performance testing and assessment
    - .2 Laboratory and field concrete performance testing and assessment,
  - .11 Environmental Assessment Services subsidiary to activities above

#### **1.2.5 GEOGRAPHIC AREAS OF WORK**

- .1 The geographic areas of the work are confined to southern Saskatchewan but are otherwise detailed in the Project-Specific TOR.

#### **1.2.6 SAFETY MANAGEMENT PLAN**

- .1 The Consultant will be required to have in place a safety management plan for this Standing Offer Agreement to address required Occupation Safety and Health requirements related to the provision of the contracted services.

#### **1.2.7 EXISTING CONDITIONS**

- .1 Existing conditions will be described in the Project-specific TOR.

#### **1.2.8 CONSTRAINTS AND CHALLENGES**

- .1 The Consultant is expected to be familiar with prairie setting materials and construction techniques and will be required to become familiar with the project site and obtain local information as required.
- .2 On occasion expert advice will be required on an emergency basis.
- .3 The Consultant may be required to obtain security clearances for all his/her firm's personnel as well as any sub-consultants to visit the project site for any reasons, such as: preliminary site inspection, attendance for site design meetings, etcetera.
- .4 All site visits must be arranged through the Departmental Representative.
- .5 Typically, the engineering services and/or subsequent construction on the project sites will be performed during normal working hours with full or partial on-going

operation of the infrastructure. Project phasing must be planned to ensure that disruption to the daily operation of the facilities is kept to a minimum.

- .6 The project scope must be tailored to meet the User Department's budget. Diligent cost estimating and cost control is required.
- .7 Additional project-specific constraints and challenges will be identified in the Project-specific TOR.

#### **1.2.9 HAZARDOUS MATERIALS**

- .1 Encounter of known hazardous materials will be identified in the Project-specific TOR.
- .2 There is always the possibility of the encounter of unknown hazardous materials.
- .3 The consultant shall be responsible for ensuring its staff and subcontractors are provided the appropriate training and response requirements .

#### **1.2.10 PROJECT DELIVERY APPROACH**

- .1 The delivery approach will be identified in the Project-specific TOR.

### **1.3 SUMMARY OF DESIGN WORK**

#### **1.3.1 GENERAL**

- .1 The Consultant shall provide professional service solutions that:
  - .1 Are effective and efficient;
  - .2 Meets current Codes, Standards and guidelines;
  - .3 Optimizes performance of the system;
  - .4 Are designed for ease of operation and maintenance;
  - .5 Minimize long-term maintenance costs.
  - .6 Use industry proven materials and avoidance of experimental materials; and
  - .7 Are cost effective considering both initial cost and operation & maintenance costs over a life cycle ranging from 50 to 100 years (varies by infrastructure component).

#### **1.3.2 ENVIRONMENTAL/SUSTAINABLE DEVELOPMENT**

- .1 Environmental and sustainability targets, if any, will be described in the Project-specific TOR.

### **1.4 SUMMARY OF SERVICES**

#### **1.4.1 GENERAL SERVICES**

- .1 The prime consultant will provide a team of registered, Professional Engineers and Technologists with expertise and experience related to dams and water control structures in a Canadian prairie setting including the following consultant services and specialties:
  - .1 Civil-hydro-technical Engineering Services;
  - .2 Geotechnical Engineering Services;
  - .3 Related Engineering and Technological disciplines
  - .4 Other Engineering Services
  - .5 Subsidiary Environmental Assessment Services

### **1.5 SCHEDULE**

#### **1.5.1 GENERAL**

- .1 The project is to be delivered, ready for acceptance in accordance with the Project-specific TOR.
- .2 Prepare a Project Schedule, in accordance with the milestone list of the Project-specific TOR.

## **1.6 COST**

### **1.6.1 CONSTRUCTION BUDGET**

- .1 Where the engineering services are anticipated to lead to the construction phase for water infrastructure projects, the order-of-magnitude construction budget will be identified in the Project-specific TOR.

## **1.7 EXISTING DOCUMENTATION**

### **1.7.1 AVAILABLE FOR THE CONSULTANT**

- .1 Copies of all pertinent documentation will be made available to the Consultant.
- .2 Limited as-built drawings and Operation & Maintenance Manuals may be available on the project sites and the Consultant will be responsible for verifying the accuracy of the information incorporated into the design.

### **1.7.2 DISCLAIMER**

- .1 Reference information will be available in the language in which it is written.
- .2 The documentation may be unreliable and is offered, "as is" for the information of the Consultant.

## **1.8 CODES, ACTS, STANDARDS, REGULATIONS**

- .1 A listing of Codes, Acts, Standards and Guidelines potentially applicable to this project are contained in the GP&S Document.
- .2 The Authorities Having Jurisdiction (AHJ) are:
  - .1 The local AHJs, to be identified by the Departmental Representative;
  - .2 Provincial Agencies having legislation impacted by the work undertaken through the Call-up and ensuing construction projects;
  - .3 Federal agencies having legislation impacted by the work undertaken through the Call-up and ensuing construction projects;
  - .4 Treasury Board of Canada.
- .3 The Consultant must identify, analyze and design the project in accordance with the requirements of all AHJs and all applicable Codes, Acts, Standards and Guidelines and Legislation.
  - .1 The applicability of various Codes, Acts, Standards and Guidelines listed in the GP&S document arise out of direct and indirect references in documents which apply to Federal Real Property.
  - .2 The work of the consultant team must comply with the legislation and requirements that are unique to Federal Government Real Property in Canada.
  - .3 The consultant team must be fully versed with the requirements of the Canadian Dam Association Guidelines
  - .4 The work of the consultant team must comply with the legislation and requirements that are unique to Federal Government projects tendered through AAFC.
  - .5 Should future Provincial Dam Safety Legislation come into effect during the term of the SOA, the consultant team will become fully versed with the requirements and shall advise the Departmental Representative thereupon.

- .4 The Departmental Representative, with input from the Consultant, will identify any AHJ's that will require on-going consultation and communication, including the sharing of any reports, designs, tender documents or construction contract documents.

## **2 REQUIRED SERVICES**

### **2.1 GENERAL REQUIREMENTS**

- .1 Following is a list of Services potentially required for an Investigation, Report, Design or Construction Project.
- .2 The Project-specific TOR will identify the project-specific requirements including:
  - .1 Services Required,
  - .2 Project Stages and Deliverables,

#### **2.1.2 SERVICES WHICH MAY BE REQUIRED**

- .1 The prime consultant will provide a team of registered, Professional Engineers and Technologists with expertise and experience related to dams, water control structures, earthen embankments, canals, drains, etc., constructed in a prairie hydrologic setting on soft western Canadian alluvial soils including the following consultant services and specialties:
  - .1 Civil-hydro-technical Engineering Services;
    - .1 Hydrologic analyses,
    - .2 Moderate complexity hydraulic analyses, pre-designs and designs,
    - .3 Moderate complexity hydraulic structure analyses, pre-designs, designs, and plan preparation,
  - .2 Geotechnical Engineering Services;
    - .1 Moderate complexity geotechnical analyses, pre-designs, designs, reports and plan preparation,
    - .2 Small scale on-site geotechnical inspections, opinions and memo reports,
  - .3 Related Engineering and Technological disciplines may be required for project purposes including:
    - .1 Concrete Materials Engineering including prescriptive and/or performance criteria, laboratory and field concrete performance testing and assessment,
    - .2 Construction materials sourcing and quality acceptance testing, including laboratory and field performance testing and assessment
    - .3 Geotechnical drilling and laboratory testing of soils,
    - .4 Test instrumentation systems design, installation and monitoring surveys
    - .5 Topographic and Utilities Survey Services
  - .4 Preparation of preliminary and final designs, tender documents, plans and specifications for construction contracting purposes,
  - .5 Construction Engineering and Site Support Services
  - .6 Other Engineering Services may also be required from time to time for planning or project purposes, which can be engaged as required through Sub-Agreements as described in the General Instructions to Proponents in the Request for Standing Offer Agreement.
  - .7 Environmental Assessment Services subsidiary to provision of the services listed above.

### **2.2 PROJECT REVIEW AND APPROVAL**

#### **2.2.1 GENERAL**

- .1 Comply with all applicable laws and regulatory requirements as required by the General Conditions of the Contract and AHJs

## **2.2.2 REVIEWS, APPROVALS AND PRESENTATIONS**

- .1 Each submission at each stage of the project is subject to reviews by, the Departmental Representative, the User Department site personnel, and AAFC technical experts.
  - .1 Maximum expected turn-around time for reviews is two (2) weeks;
  - .2 For the review at each stage, the consultant shall provide a single coordinated written response to the comments.
  - .3 For review at each stage, the department shall provide a single coordinated written response.

## **2.2.3 COMMUNICATIONS**

- .1 Further to GP&S items 3.5, 3.6, and 3.7 a communicative approach is to be applied by the consultant and AAFC to promote the efficient and informed delivery of the project outcomes
- .2 Email, verbal, telephone, and in-person communications are encouraged during each stage of the project to clarify project objectives and details, and to promote collaborative problem solving.

## **2.3 PRE-DESIGN ENGINEERING**

### **2.3.1 SCOPE AND ACTIVITIES**

- .1 The Pre-design Engineering will deliver all of the Required Services outlined in the Project-Specific TOR to help consolidate the Scope of the subsequent design phase, and will be utilized as the benchmark project control document to monitor progress of the project.
- .2 Through the provision of the Required Services, the Pre-Design shall respond to the operational and functional needs of the user, and may, subject to complexity, require the Consultant to submit a brief work plan, schedule and cost proposal to complete the work. Services potentially required are;
  - .1 Visit the site(s),
  - .2 Analyse the project requirements including any amendments,
  - .3 Investigate and review all other available existing material related to the project including requirements identified in the Project-specific TOR,
  - .4 Identify and analyze all Codes, Acts, Standards and Guidelines that apply to this project,
  - .5 Identify and verify all Authorities Having Jurisdiction (AHJ) over the codes, regulations and standards that apply to the projects,
  - .6 Identify all additional information that will be needed to deliver the project,
  - .7 Provide the range of Required Engineering Services identified in the Project Specific TOR,
  - .8 Establish the sustainability targets,
  - .9 Provide updated cost estimates,
  - .10 Identify and assess the recommended options, and
  - .11 Complete a report documenting the above, complete with an engineering opinion of the recommended option.

### **2.3.2 DELIVERABLES**

- .1 A Draft Predesign Report that will contain at a minimum:

- .1 An Executive Summary;
  - .2 Necessary sections to document and present the items listed in the Scope and Activities section;
  - .3 Class C cost estimate; and
  - .4 An updated schedule.
- .2 Final Pre-design Report with a written response to comments.

## **2.4 CIVIL-HYDRO-TECHNICAL ENGINEERING SERVICES**

### **2.4.1 SCOPE AND ACTIVITIES**

- .1 The services required shall respond to the operational and functional needs of the user, and may, subject to complexity, require the Consultant to submit a brief work plan, schedule and cost proposal to complete the work. Services potentially required are:
  - .1 Visit the site(s) and meet with the departmental representative as required;
  - .2 Provide a wide range of professional civil-hydro-technical engineering services required to support water storage and conveyance infrastructure investigation, analysis and reporting specifically identified in the Project-Specific Terms of Reference which may include but are not limited to:
    - .1 Hydrologic assessments including return period and peak and volume flow determinations
    - .2 Flood level assessments
    - .3 Hydraulic analyses, pre-designs, rating curves, freeboard analysis and capacity assessments of channels, conveyance works or structures
  - .3 Review all other available existing material related to the project including requirements identified in the Project-specific TOR

### **2.4.2 DELIVERABLES**

- .1 Provide draft hydrologic and/or civil-hydro-technical reports for review by the Departmental Representative.
  - .1 Report to include all site assessments, analyses, modelling, opinions conclusions and recommendations
  - .2 Required report outline will be determined in the Project-specific TOR
- .2 Provide final reports incorporating all comments provided by the Departmental Representative,
  - .1 Final report to be stamped and sealed by a professional engineer registered in the Province of Saskatchewan, and
  - .2 Required report outline will be determined in the Project-specific TOR.

## **2.5 GEOTECHNICAL ENGINEERING & MATERIAL SERVICES**

### **2.5.1 SCOPE AND ACTIVITIES**

- .1 The services required shall respond to the operational and functional needs of the user, and may, subject to complexity, require the Consultant to submit a brief work plan, schedule and cost proposal to complete the work. Services potentially required are;
  - .1 Visit the site(s) and meet with the Department Representative as required.
  - .2 Provide a wide range of professional geotechnical engineering services required to support water storage and conveyance infrastructure investigation,

analysis and reporting specifically identified in the Project-Specific Terms of Reference which may include but are not limited to:

- .1 Soil foundation strength assessment;
  - .2 Slope stability and seepage assessment;
  - .3 Soil and granular construction material assessment, quality assurance and related laboratory testing.
- .3 Review all other available existing material related to the project including requirements identified in the Project-specific TOR.

## **2.5.2 DELIVERABLES**

- .1 Provide draft geotechnical report for review by the Departmental Representative.
  - .1 Report to include all test results and site reports.
  - .2 Report and recommendations to meet the project-specific requirements as determined in the Project-specific TOR.
- .2 Provide final report incorporating all comments provided by the Departmental Representative.
  - .1 Final report to be stamped and sealed by a professional engineer registered in the Province of Saskatchewan.
  - .2 Report to include all testing results, site reports conclusions, opinions and recommendations and other applicable documentation.
  - .3 Report and recommendations to meet the project-specific requirements as determined in the Project-specific TOR.

## **2.6 RELATED ENGINEERING AND TECHNOLOGICAL DISCIPLINES**

### **2.6.1 CONCRETE MATERIALS ENGINEERING**

- .1 Scope and Activities
  - .1 The services required shall respond to the operational and functional needs of the user with respect to concrete materials technology and concrete materials testing as it applies to the planning, design, construction, monitoring and maintenance of AAFC infrastructure.
  - .2 Subject to complexity, the Consultant may be required to submit a brief work plan, schedule and cost proposal to complete the work.
  - .3 Services potentially required are;
    - .1 Provide specialist advice in the field of concrete materials technology during the planning phase of projects,
    - .2 Ensure concrete specifications reflect the current standards,
    - .3 Assist in the formulation of responses to Construction Contractor inquiries during the tendering phase, and assist in the preparation of addenda to the contract if necessary
    - .4 Review the Contractor's submission, including: mix design parameters for the Contractor's prescriptive or performance submittal alternative; concrete supplier facilities and capabilities; and proposed construction methods (including his sub-contractors),
    - .5 Assure quality of concrete materials and construction during the construction phase.
    - .6 Perform the necessary field concrete tests in accordance with the appropriate CSA standard,

- .7 Performing the necessary concrete laboratory tests in accordance with the appropriate CSA standard,
  - .8 Provide specialist advice on or specification for the provision of Concrete Material Testing Services by a third party (if required),
  - .9 Provide specialist advice with respect to condition assessment of concrete.
- .2 Deliverables
- .1 A written brief outlining the proposed scope and context of the concrete materials specifications to be used on any particular project
  - .2 Specifications for the supply of concrete incorporating:
    - .1 the most recent editions of CSA Standard A23.1, relevant ASTM standards and current industry practices:
    - .2 The requirement for the Contractor to submit a detailed submission within two weeks of the award of the contract, complete with test results on constituent materials, mix design parameters, performance criteria, methods of concrete construction, quality control, etcetera.
  - .3 Mix design review to report on:
    - .1 the suitability of the proposed mix design parameters and constituent materials relative to the specifications,
    - .2 the suitability qualifications of constituent materials and the proposed concrete mix design based on test records
    - .3 the suitability of the concrete mixture based on pre-placement (laboratory and field) trial mixes and test placements.
  - .4 Pre-construction review to report on:
    - .1 the contractor's and his supplier's quality control program,
    - .2 batch plant inspection and proof of certification,
    - .3 proposed construction methods including (but not limited to) delivery, placement, consolidation, curing and protection
  - .5 Materials Testing Report including:
    - .1 all test results and site reports
    - .2 recommended changes (if required) to the specifications or to the Contractor's submission to meet the project-specific requirements.
  - .6 Specifications for the provision of Materials Testing Services incorporating:
    - .1 the most recent editions of CSA Standard A23.2 and current industry practices, including the reporting of test results, accommodating either the prescriptive and performance option that may be selected by the Contractor.
  - .7 Condition Assessment (Survey or Report) to include:
    - .1 Recommendations of timing and methods for rehabilitation or replacement of concrete (if required).
    - .2 Assessment of the current remaining useful life of concrete structures, and urgency of repair and rehabilitation.

## **2.6.2 GEOTECHNICAL DRILLING AND LABORATORY TESTING OF SOILS**

- .1 Scope and Activities
  - .1 The services required shall respond to the operational and functional needs of the user with respect to geotechnical investigation and material testing as it

- applies to the planning, design, construction, monitoring and maintenance of AAFC infrastructure.
- .2 Subject to complexity, the Consultant may be required to submit a brief work plan, schedule and cost proposal to prior to commencement of the work including
    - .1 The proposed scope and context of the drilling investigation and material lab testing protocols to be used on that particular project.
    - .2 Review and discuss safety plan and management strategy prior to proceeding to the field, including all sub-consultants and contractors and sub-contractors.
    - .3 Identify and discuss all applicable environmental and legal regulations and policies that may affect the drilling investigation.
  - .3
  - .4 Services potentially required are;
    - .1 Project reviews which would include the evaluation of AAFC reports and files to provide a professional judgement based on the Project Specific TOR.
    - .2 On-site visit(s) and meet with the Department Representative as required.
    - .3 Provide a wide range of professional geotechnical drilling and certified laboratory testing services in accordance with recognized ASTM standards, required to support water storage and conveyance infrastructure investigation, analysis and reporting specifically identified in the Project-Specific TOR which may include but are not limited to:
      - .1 Soil foundation assessment,
      - .2 Slope stability and seepage assessment,
      - .3 Moderate complexity preliminary geotechnical design and planning, and
      - .4 Soil and granular construction material assessment.
  - .5 On-site investigation designs and plans developed for the Project Specific TOR, whereby the following, but not limited to, would be identified:
    - .1 Possible site surveys and surface exploration to aid in the design and undertaking of a subsurface drilling program
    - .2 Proposed access options, equipment requirements and land disturbance estimates as well as a schedule and timeline to allow the Departmental Representative to communicate with affected individuals and groups prior to the on-site investigation,
    - .3 Bore hole locations, size, depth, ground water depth, and what (if any) the recovery rate of the soil samples to be collected,
    - .4 Soil logging or lithological/stratification recording of materials encountered in the drilling exploration
    - .5 Additional in-situ tests like the SPT, CPT, etc, and
    - .6 Lab testing of the collected materials which may include:
      - .1 Soil type classification based on USCS,
      - .2 Specific gravity,
      - .3 Wet and dry densities,

- .4 Moisture Contents,
  - .5 Unconfined and confined compressive strength,
  - .6 Grain Size Analyses including hydrometer analysis
  - .7 Atterberg limits,
  - .8 California Bearing Ratio (CBR) tests,
  - .9 Moisture content and moisture density relationship (Standard Proctor),
  - .10 Soil resistivity,
  - .11 Soil pH,
  - .12 Soil Sulphate content,
  - .13 Soil permeability and hydraulic conductivity either by permeaters or triaxial tests,
  - .15 Other geotechnical field investigation and laboratory testing appropriate for the project design
- .2 Deliverables
- .1 Provide draft test result report for review by the Departmental Representative.
    - .1 Report to include all test results, layout plans and site reports.
    - .2 Report and recommendations to meet the project-specific requirements as determined in the Project-specific TOR.
  - .2 Provide final report incorporating all comments provided by the Departmental Representative.
    - .1 Final report to be stamped and sealed by a professional engineer registered in the Province of Saskatchewan.
    - .2 Report to include all testing results, layout plans, site reports conclusions, opinions and recommendations and other applicable documentation.
      - .1 Classification type(s) and thickness(es) of overburden encountered,
      - .2 Type and hardness of bedrock if encountered,
      - .3 Depth to bedrock,
      - .4 Consistency of material encountered,
      - .5 Ground water elevations (static),
      - .6 Geodetic elevation of ground surface at boreholes,
      - .7 Thickness and description of materials just below the ground surface, which have not been sampled, such as topsoil, rocks, etc
      - .8 Soil stratification including thickness of each layer as well as material colour,
      - .9 Soil densities,
      - .10 Moisture condition of the soil,
      - .11 Standard Penetration Test (SPT) and Cone Penetration Test (CPT) results, if performed,
      - .12 Drilling method(s) and date drilled.
    - .3 Report and recommendations to meet the project-specific requirements as determined in the Site Specific TOR.

### **2.6.3 INSTRUMENTATION SYSTEMS DESIGN, INSTALLATION AND MONITORING SURVEYS**

- .1 Scope and Activities

The services required shall respond to the operational and functional needs of the user in support of geotechnical, structural, and hydrotechnical instrumentation systems required for operational and dam safety purposes. Subject to complexity, the Consultant may be required to submit a brief work plan, schedule and cost proposal to complete the work. Services potentially required are;

- .1 Visit the site(s) and meet with the Department Representative as required.
- .2 Provide a wide range of professional engineering services specifically identified in the Project-Specific TOR which may include but are not limited to:
  - .1 Provide data acquisition services on existing instrumentation;
  - .2 Analyse raw data, data plotting and reporting, establish threshold parameters and triggers, and where warranted make recommendations on action based on expert opinion resulting from the analysis;
  - .3 Analyse existing instrumentation infrastructure and monitoring program in order to make recommendations on monitoring frequency, instrumentation maintenance programs, instrumentation modification and upgrades, and instrumentation abandonment;
  - .4 Design and supervise the installation of new instruments including the oversight of any data recording or transmission components.
- .2 Deliverables  
Report on activities including recommendations
  - .1 Reporting of raw data and graphical plotting in accordance with Departmental Standards.
  - .2 Location plans, design details, and engineering drawings for new installations
  - .3 Provide draft Instrumentation System Design, Installation and Monitoring reports for review by the Departmental Representative.
    - .1 Report to include all site assessments, analyses, modelling, opinions conclusions and recommendations
    - .2 Required report outline will be determined in the Project-specific TOR
  - .4 Provide final reports incorporating all comments provided by the Departmental Representative,
    - .1 Final report to be stamped and sealed by a professional engineer registered in the Province of Saskatchewan, and
    - .2 Report to include all testing results, site reports conclusions, opinions and recommendations and other applicable documentation.
    - .3 Report and recommendations to meet the project-specific requirements as determined in the Project-specific TOR.

#### **2.6.4 TOPOGRAPHIC AND UTILITIES SURVEYS**

- .1 Scope and Activities
  - .1 The services required shall respond to the operational and functional needs of the user as outlined in the Project-Specific TOR, and subject to complexity, may require the Consultant to submit a brief work plan, schedule and cost proposal to complete the work. Services potentially required are;

- .1 provide topographical surveys including but not limited to contours, tie in detail of existing structures, utilities surface services, details of embankments, conveyance channels and irregular features, borehole locations, permanent or temporary markers used for survey. Legal surveys for the purpose of establishing property boundaries are not included.
- .2 Surveys shall be compatible with available and applicable AAFC survey data and datum
- .2 Elevation tolerance for topographic surveys shall typically be within 50mm +/- . Tolerances for other surveys shall be described in the Project-specific TOR. All elevations shall be to geodetic datum.
- .3 Confirm with the Departmental Representative exact extent of the survey prior to start of Work.
- .2 Deliverables
  - .1 Provide draft topographic survey drawings showing contours, and utilities survey drawings for review by the Departmental Representative.
  - .2 Provide digital and paper copies of all field survey notes;
  - .3 Provide final drawing files in AutoCAD and PDF format, on CD or DVD disk(s) and 5 plotted color hard copies of the AutoCAD file, or as defined in the Project-specific TOR.

## **2.7 DESIGN, CONTRACTING AND CONSTRUCTION ENGINEERING SUPPORT SERVICES**

### **2.7.1 GENERAL**

- .1 The Consultant Team will provide phased planning and design engineering services, as described in the Project-specific TOR and consistent with phasing in the GP&S, and deliver comprehensive Engineering Reports and/or Designs as required.
- .2 Design and construction services shall be in accordance with Categories I to V as outlined in the Association of Professional Engineers & Geoscientists of Saskatchewan, "*Schedule of Recommended Fees to be Charged for General Engineering and Geoscience Projects and Services, January 2013*"
- .3 The work will generally: progress from pre-design to preliminary design and then final design; and include contract tendering, construction and post construction (close-out) support.
- .4 The work assigned may require the consultant to provide services of one, some, or all of the components and will be applicable to projects of moderate complexity.

### **2.7.2 DESIGN SERVICES**

- .1 General
  - .1 The objective of this stage is to further develop the Pre-design Engineering Phase findings into drawings and specifications for the purpose of proceeding to tendering and construction.
  - .2 The Consultant must obtain written authorization from the Departmental Representative before proceeding with Construction Documents.
- .2 Scope and Activities
  - .1 The Consultant shall:
    - .1 Create construction documents in accordance with the GP&S Document;
    - .2 Design according to the budget and schedule;

- .1 The inability to design a solution that is attainable in accordance with the Construction Budget and Schedule will require the Call-up Contract to be revised.
- .3 Update the cost estimates;
  - .1 Provide a cost breakdown by unit rate and/or trade for review of bids and comparison with the successful Contractor's cost breakdown.
- .4 Update the project schedule; and
- .5 Establish a quality control process including necessary environmental compliance monitoring procedures for the construction and contract administration stage.
- .3 Deliverables
  - .1 50% complete Construction Documents. (50% completion at stages as defined in the Project-specific TOR)
    - .1 A Class "B" Estimate.
    - .2 An updated project schedule.
    - .3 Construction Drawings.
      - .1 Drawings should reflect 50% completeness with all Plan, Elevation, Details, and Sections shown.
    - .4 Specifications
      - .1 Index to specifications
      - .2 Draft Division 1.
  - .2 99% complete Construction Documents, fully coordinated as if ready for tender.
    - .1 This submission incorporates all revisions required by the review of the previous submission.
    - .2 The Consultant shall submit documents to the AAFC Departmental Representative.
    - .3 The submittal shall include:
      - .1 A Class "A" Estimate;
      - .2 An updated project schedule;
      - .3 Construction Drawings;
        - .1 Drawings should reflect 99% completeness with a complete design without any unfinished details.
      - .4 Complete Specifications;
        - .1 Specifications should be complete with all sections (including Division 1) and thoroughly coordinated with the Drawings.
      - .5 Response to AAFC written comments of previous submittal.
  - .3 Final (100%) Construction Documents ready for tendering.
    - .1 This submission incorporates all revisions required by the review of the previous submission.
    - .2 The Consultant shall submit documents to the Departmental Representative and any Authority Having Jurisdiction that was previously identified as requiring on-going consultation and communication including the sharing of any tender documents.
    - .3 The submittal shall include:
      - .1 An updated Class 'A' cost estimate;

- .2 An updated project schedule;
- .3 Tender Drawings & Specifications;
  - .1 As per the GP&S Document.
- .4 Response to AAFC written comments of previous submittal;
- .5 Advise the Departmental Representative of all issues raised by other AHJs and officials, and all Consultants' responses.
- .4 The Consultant must confirm in writing that:
  - .1 The documents are ready to be issued for tender;
  - .2 The checklist in the GP&S Document has been reviewed in concert with the requirements of the Consultant Agreement; and
  - .3 A full review and coordination of the Contract Documents are complete and in accordance with professional standard of care.

### **2.7.3 CONTRACT TENDER**

- .1 General
  - .1 The object of this phase is to support the Departmental Representative with the tender.
  - .2 The Contract Authority for this project is AAFC.
- .2 Scope and Activities
  - .1 When requested, the Consultant will be required to to:
    - .1 Provide the Departmental Representative with information required by bidders to interpret tender documents;
    - .2 Prepare addenda, in response to all questions within two (2) business days during the bidding period and submit to Departmental Representative;
    - .3 Attend pre-tender site visits;
    - .4 During Bid Review and Analysis, assist the Departmental Representative, as required, by analyzing and reviewing the submitted bid.

### **2.7.4 CONSTRUCTION SUPPORT SERVICES**

- .1 General
  - .1 The object of this phase is to support the Departmental Representative with the construction phase and ensure the quality, budget and schedule of the project.
- .2 Scope and Activities
  - .1 The Consultant shall:
    - .1 Designate Tender drawing as Construction Drawings including any modifications occurring during the Tender phase;
    - .2 Provide regular field reviews and as required to fulfil the Consultant's professional obligations to monitor the construction activities throughout the construction period and keep Departmental Representative informed of work progress;
      - .1 Reject unsatisfactory work and materials,
      - .2 Provide written reports.
    - .3 Authorize special tests, inspections and minor works that do not impact project cost and schedule;
      - .1 Provide the Departmental Representative with all material specifications, mixes and tests outside the scope of the Contractor.

- .4 Review shop drawings and provide copies to the Departmental Representative
- .5 Review and comment on the Contractor's schedule;
- .6 Interpret contract documents as required and provide any additional drawings or specifications required to clarify, interpret or supplement Construction Documents;
- .7 Review, comment and make recommendations on various documents such as Contractor's Progress Claims and updated schedules;
- .8 Provide timely technical advice;
- .9 Recommend the amounts owing to the Contractor based on work progress;
- .10 Assist the Departmental Representative to prepare Certificate of Substantial Completion and recommend sign-off;
- .11 For Changes to the work;
  - .1 Assist the Departmental Representative to prepare Change Orders, to be issued by the Departmental Representative.
- .12 For Cost Estimating Services;
  - .1 Evaluate change orders; claims, work completed and cash flow.
  - .2 After issue of contract provide details for evaluating the project's cost performance.
- .13 For Scheduling Services;
  - .1 Review contractor's monthly schedule report and report findings and recommendations to AAFC for further discussion with the Contractor.
- .14 For Permits;
  - .1 Assist the Contractor and provide required documentation in order to obtain all necessary permits.

#### **2.7.5 POST CONSTRUCTION SERVICES**

- .1 General
  - .1 The purpose of this phase is to support the Departmental Representative in obtaining all final documents required for project close out.
- .2 Scope and Activities
  - .1 Project Close-out Services:
    - .1 Revise documentation to reflect all changes, revisions and adjustments at completion;
    - .2 Prepare record drawings and specifications based on Contractor's as-builts;
    - .3 Assist the Departmental Representative to prepare the Final Certificate of Completion and recommend sign-off;
    - .4 Prepare a summary of the post construction compliance monitoring results;
    - .5 Prepare and review the Operations and Maintenance Manual; and
    - .6 Participate in Lessons Learned workshops if requested.
  - .2 Warranty Services:
    - .1 Monitor and certify rectification of deficiencies before completion of contract and issuance of final certificate of completion;
    - .2 Sign off on the Final Completion of the construction contract;

- .3 Participate in post-construction warranty inspections with Departmental Representative and Contractor;
  - .4 Provide warranty deficiency list; and
  - .5 Provide Final Warranty Review report.
- .3 Deliverables
- .1 Construction Contract Deficiency List;
  - .2 Final Certificate;
  - .3 As-Built and Record Drawings and As-Built Specifications;
  - .4 Post construction compliance monitoring report;
  - .5 Comments to O&M Manual;
  - .6 Warranty inspection reports and deficiencies list; and
  - .7 Sign-off on Warranty.

### **3 PROJECT ADMINISTRATION**

#### **3.1 GENERAL**

- .1 In addition to adhering to the general project administration requirements contained in section 2 of the GP&S document, the Consultant shall comply with the project-specific requirements in this section.;

#### **3.1.2 LANGUAGE**

- .1 No variation.

#### **3.1.3 MEDIA**

- .1 No variation.

#### **3.1.4 PROJECT MANAGEMENT**

- .1 No variation.

#### **3.1.5 LINES OF COMMUNICATION**

- .1 No variation.

#### **3.1.6 MEETINGS**

- .1 Meeting locations and frequency will be described in the Project-specific TOR.

#### **3.1.7 CONSULTANT RESPONSIBILITIES**

- .1 No variation.

#### **3.1.8 AAFC RESPONSIBILITIES**

- .1 No variation.

#### **3.1.9 USER DEPARTMENT RESPONSIBILITIES**

- .1 No variation.

#### **3.1.10 REVIEW AND APPROVAL BY PROVINCIAL AND MUNICIPAL AUTHORITIES**

- .1 No variation.

#### **3.1.11 BUILDING PERMITS AND OCCUPANCY PERMITS**

- .1 No variation.

#### **3.1.12 TECHNICAL AND FUNCTIONAL REVIEWS**

- .1 No variation.