Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Canada

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Serving GOVERNMENT, Serving CANADIANS.

Architectural & Engineering Services

TERMS OF REFERENCE

Saskatchewan Penitentiary Water Pumping Station and Reservoir

For:

Correctional Service Canada (CSC)

Saskatchewan Penitentiary
Prince Albert, Saskatchewan

July 22, 2015

www.pwgsc-tpsgc.gc.ca

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1 PROJECT DESCRIPTION

1.1 GENERAL

1.1.1 PURPOSE OF TERMS OF REFERENCE (TOR)

.1 Public Works & Government Services Canada (PWGSC) requires the services of a mechanical engineering firm, acting as prime consultant with a multi-disciplinary team of sub-consultants for the provision of service required for this project.

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

.1 The TOR describes project-specific requirements, services and deliverables while the GP&S document outlines minimum standards and procedures common to all projects.

.2 The TOR document must be used in conjunction with the GP&S, as the two documents are complementary.

.3 In the case of a conflict between the two documents, the requirements of the TOR override the GP&S Document.

1.1.3 PROJECT INFORMATION

.1 Correctional Service Canada requires a new water pump station, potable/fire water reservoir and distribution infrastructure to replace an existing facility and distribution infrastructure at the Saskatchewan Penitentiary in Prince Albert. Design work will adapt existing construction documents (prepared in 2010 by Genivar) to new requirements.

Project Information	
Project Title:	Saskatchewan Penitentiary Water Pumping Station and Reservoir
Project Address:	CSC – Saskatchewan Penitentiary 2500 15th Street West Prince Albert, Saskatchewan
PWGSC Project Number:	R.077250.001

1.2 BACKGROUND INFORMATION

1.2.1 USER DEPARTMENT NEED

.1 Correctional Service Canada requires a reliable and safe supply of potable water and reliable supply of emergency water for firefighting purposes to serve the Saskatchewan Penitentiary.

1.2.2 USER DEPARTMENT

.1 The User Department referred to throughout the TOR is Correctional Service Canada (CSC).

.2 CSC, as part of the criminal justice system and respecting the rule of law, contributes to public safety by actively encouraging and assisting offenders to become law-abiding citizens, while exercising reasonable, safe, secure and humane control.

1.2.3 EXISTING FACILITY

.1 Saskatchewan Penitentiary (Sask Pen) is a maximum, medium and minimum security facility.

.2 The Institution is serviced with a municipal water supply from the City of Prince Albert, stored in an underground reservoir structure and then supplied to the Institution.

.3 The water supply consists of an underground storage reservoir (split into two chambers), a valve chamber, booster pumping station and distribution system. The booster pumping station consists of a duplex pump system, a high lift well and a fire pump – all located in a building identified as the Pump House. The water storage structure and booster pumping station were constructed in 1960's and since then original equipment has been replaced and other accessories such as instrumentation have been added.

.4 CSC staff in Sask Pen had expressed concerns about the integrity of the system. In 2014, a Building Condition Report was conducted by PWSGC. The overall assessment of the facility's condition is poor – all structures and systems require replacement to ensure a safe and reliable water supply for distribution throughout the Institution.

.5 In addition, CSC staff has reported that the diesel tanks are stored in the Pump House. This is a critical issue as diesel fuel could potentially contaminate the water supply system because the present pump house is located above the reservoir.

.6 Supply:

- .1 Treated water is supplied to the reservoir from the city of Prince Albert distribution system via a 200 mm diameter supply main;
- .2 Treated water is stored in the underground reinforced concrete reservoir and re-pumped to the institution to meet all domestic and fire fighting needs;
- .3 The Pump House is located directly above the storage reservoir occupying a 36 square metre area on the northwest corner;
- .4 There is no provision for re-chlorination or disinfection of any type at the Pump House.

.7 Storage:

- .1 The treated water storage reservoir is approximately 25 metres long and 12.5 metres wide;
- .2 Total nominal storage capacity is 910 cubic metres (200,000 Imp. gals);
- .3 The reservoir is divided into 3 compartments;
  - .1 A full height wall subdivides the reservoir into 2 equal north and south compartments,
  - .2 A third compartment directly below the Pump House structure acts as a pump well for the domestic and fire water pumps.
- .4 Valved piping interconnects the 2 large chambers with the pump well to allow the Pump House operators to empty either chamber for inspection, cleaning and repairs.

.8 Distribution:

- .1 Domestic water is drawn from the reservoir and distributed throughout the institution. There are two Peerless vertical turbine distribution pumps;
  - .1 Pump Number one is a model 4 x 6 x 12 driven by a 15 H.P. electric motor,
  - .2 Pump Number two is a model 6 x 6 x 6 driven by a 25 H.P. electric motor.
- .2 The pumphouse operator runs only one pump at a time and alternates their operation on a regular basis;

.3 The pumps run at full speed and a pressure control valve maintains 480 kPa (70 psi) pressure at the Pump House;

.4 Excess water not consumed is recycled through the control valve back into the storage reservoir;

.5 The operator advised that either pump can meet current demand.

.6 Water for fire fighting purposes is a separate system from domestic supply;

.7 A Peerless vertical turbine pump model 12 MB is dedicated for fire flows

.1 It is driven by a 100 H.P. diesel fueled engine,

.2 The pump is rated to deliver 63.1 L/sec (1000 USGPM) at a pressure of 717kPa (104 psi),

.3 The fire pump is complete with a ULC rated controller and two batteries.

.8 A small ¾ H.P. Goulds booster pump maintains pressure in the fire water loop to prevent false starts of the fire pump. The fire pump starts automatically on low pressure in the system.

.9 Pump House Structure:

.1 The Pump House structure is 6 metres by 6 metres and located over the northwest corner of the storage reservoir;

.2 Walls are constructed of a 1.0 metre high cast-in-place concrete curb and masonry block to a flat built-up roof. It has a single man door and three windows.

.10 Electrical:

.1 The Pump House is supplied power at 600 volts, 3 phase, 3 wire, 100 amps with an underground feeder from Building D1 – North East Tower;

.2 The underground feeder to the building – connected to the penitentiary emergency power system - was installed within the last few years;

.3 The Pump House electrical service panel is original 1960's equipment and includes a main fused switch, main splitter, starters for each of the two distribution pumps and the compressor, a fused disconnect feeding a 10 KVA transformer and a 16 circuit 120/240 volt panel.

.4 The existing reservoir level controls and pressure controls are old (some components are original equipment) and generally obsolete equipment;

.5 The fire pump engine controller is a Tornatech Model GPD-12-120, Serial number Z122692, 95 HP. It was installed in 2014 and appears to be in good working order, although it is missing a remote signal to indicate that the Fire Pump is running, which necessitates daily checks to verify the integrity of the pump and motor.

1.2.4 CONSTRAINTS AND CHALLENGES

.1 The Consultant will be required to become familiar with the project site and obtain local information as required.

.2 The Consultant is required to obtain security clearances for all his/her firm's personnel as well as any sub-consultants to visit the project site for reasons, such as, site reviews, attendance for site design meetings, etc. Security clearance checks may include credit checks.

.3 All site visits must be arranged through the Departmental Representative.

.4 The Institution must be operational at all times, therefore, the Consultant shall establish a realistic delivery strategy to avoid or limit service interruptions. This strategy shall be developed in cooperation with the Institution.

.5 The work will be carried out during normal working hours, when the Institution is fully occupied and operational.

.6 Plan the new water distribution facility to allow adequate service from the current water distribution facility until the new facility is fully operational.

.7 Access and support distribution infrastructure for the new system shall not require confined space or fall protection response for routine access and or maintenance.

.8 The new Fire Pump system should integrate a soft start technology. The Fire Pump system must be engineered to operate within a piped drinking water infrastructure system. Internal distribution limitations must be considered and addressed.

.9 If a Variable Frequency Drive is used for the Fire Pump; consideration should be placed toward any and all critical resonant speeds within the operating speed range of the pump, which is from zero up to full speed.

.10 Valves should be accessible via a valve room with direct pedestrian access, as opposed to a “Pit” requiring confined space entry.

.11 All maintenance should be able to be performed within this area without any safety restrictions beyond PPE, and lockout tag out.

.12 Retain the direct feed to the institution and the by-pass system similar to what is currently in place.

.13 Regulate flows to a standard 70-80 psi into the Institution.

.14 Variable Frequency Drive pumps should be considered either to meet the requirement of the tank filling or to provide the Institution with a consistent supply of water, or both.

.15 The new system/equipment must be connected to the existing backup generator system.

.16 Environmental conditions must be kept under control during all phases of the work.

.17 The project scope must be tailored to meet the User Department's budget. Diligent cost estimating and cost control is required.

.18 Consultant’s key personnel must be available to respond to emergencies within 1 day.

1.2.5 PROJECT DELIVERY APPROACH

.1 This project will use a traditional design-bid-build approach.

.2 It is anticipated that one tender package will be required for this project.

.3 The Consultant shall prepare the tender package and ensure full co-ordination of the work of all disciplines.

1.3 SUMMARY OF DESIGN WORK

1.3.1 NEW CONSTRUCTION WORK

.1 Adapt the new design requirements using existing construction documents for a new water distribution facility prepared in 2010 by Genivar (now WSP).

.2 Cost analysis to include estimates for the yearly operation and maintenance costs.

.3 Review and upgrade the electrical system as required for the operation of the new facility.

.4 The facility area must be secured via fencing, locked manholes, doors etc.

.5 System design and engineering should also consider distribution pressure sustaining capability.

.6 Design a utilities support building (Pump House) housing the primary valves, meters, electrical, pumps, and ultra violet (UV) systems dedicated to its operation.

.7 Determine the fire protection water supply requirement based on the most stringent standard between NFPA 13, Correction Service Canada Technical Criteria Section M (Water supplies 8.1) and NFPA 1142. An analysis following FUS (Water supply for Public fire protection 1999, Fire Underwriters Survey) should be included as an option.

.8 If the municipal water works system is not adequate to meet the water supply requirements, at least 2 pumps shall be provided in accordance with the Correction Service Canada Technical Criteria 2014 Section M and FC 403.

.9 Every hydrant shall be capable of flowing not less than 30 L/s of water at a residual pressure of not less than 450 kPa (gauge).

.10 The water supply shall be available for a period of not less than 2 hours or in accordance to FUS, whichever is greater.

.11 Water supply network should be analysed to determine if the required water supply can be accommodated in respect to pressure distribution and excessive velocity which could damage the domestic water system.

.12 The pump shall meet NFPA 20, CSC Technical Criteria, Canadian Electrical Code, NBCC and CSA 282. The pump size should be re-determined using FUS or NFPA 13.

.13 Assess the existing emergency generator serving the existing fire pump for conformance to current codes and standards. Reuse should be considered if capacity and condition meets requirements, otherwise replacement may be necessary.

.14 Connect water supply to 2 separate municipal water works system connections – if available.

.15 Update the entire fire protection system including, but not limited to, the new redundant fire pumps and entry pipe infrastructure upgrades. Locate new fuel supply away from the water supply to eliminate the risk of contamination.

.16 Ultra Violet (UV) Water Treatment Requirements:

.1 Provisions for the possibility of Installation of a UV disinfection system. The contractor shall provide a UV system complete with UV reactor, control panel, automatic wiping system (if applicable) and UV intensity monitoring system;

.2 The system shall be fully redundant and designed to allow for a complete system shut down or by-pass;

.3 The system shall be designed such that the UV reactor will not require draining in order to change UV lamps;

.4 Refer to Appendix A for additional UV requirements and design criteria.

Parameter	Design Criteria
Free chlorine residual	0.2 mg/litre
Noise level	40 dB (A)
Regulate flows	60 psi
Fire protection requirement	1,400 m^3 + 20%
Drinking water consumption	38.83 litres/day or 14,173 m^3/month

.17 Alarms:

.1 Comprehensive alarming will be implemented. Alarm conditions from the process, process equipment in integration of tank levels, distribution flows, fault

modes, buildings systems, and backup systems will be monitored by PLC. On an alarm condition, the control system will respond in the Boiler House depending on the severity of the condition.

1.4 OBJECTIVES

1.4.1 GENERAL GOALS

.1 Achieve an efficient, enduring, sustainable and economically viable facility, appropriate for its use and place, through leadership and integration of innovation and technical excellence in the course of the life cycle for the new construction. Meet (at minimum) the following design objectives:

- .1 Meet or exceed the requirements of the National Building Code (2010);
- .2 Fully integrate all components and systems including architectural, mechanical, electrical, IT and security design;
- .3 Provide an integrated design and construction process involving;
  - .1 Interdisciplinary collaboration, including all stakeholders as may be identified, design professionals and authorities having jurisdiction,
  - .2 Agreed upon design principles and decision making protocols.
- .4 Ensure good quality design to generate savings in subsequent operation and maintenance costs;
- .5 Provide capacity or ability to expand and accommodate 20 years of population growth. Include spatial provisions for process expansion and upgrades;
- .6 Design for ease of maintenance with systems that can be accessed and easily repaired and/or replaced during the facility's life cycle;
- .7 Use proven technology that is simple to operate using local maintenance and operational support;
  - .1 Must not require highly specialized operator skills or significant operator time;
- .8 Ensure the process is compatible with local climate conditions (-40°C to +40°C);
- .9 Include redundancy for principal/ critical equipment (e.g. parallel pump, so that one pump can be taken off line for maintenance without disrupting operations);
- .10 Minimize both capital and operation/maintenance costs;
- .11 Ensure the noise level of the new installation is no higher than 40 dB(A);
- .12 Access and support distribution infrastructure for the new system should <u>not</u> require confined space or fall protection response for routine access and or maintenance;
- .13 Consider a ground elevated tank reservoir.

1.4.2 FUNCTIONAL REQUIREMENTS

.1 The Consultant will meet with the User Department to confirm the functional requirements based in the information in this TOR and on existing construction documents prepared in 2010 by Genivar(now WSP).

1.4.3 ENVIRONMENTAL/SUSTAINABLE DEVELOPMENT

.1 Design using sustainable design principles.

1.4.4 PROJECT DELIVERY

.1 Deliver the project within the construction budget established during preliminary project approval.

.2 Deliver the project within the key milestones in this TOR.

.3 Ensure that each Consultant team member understands the project requirements for seamless delivery of the required services.

.4 Ensure co-ordination of services with other consultants hired by PWGSC.

.5 Provide a quality management plan that includes rigorous quality reviews performed in-house by the Consultant Team such that submissions are fully complete and coordinated.

.6 Provide a continuous risk management program addressing the risks associated specifically with this project.

1.5 SUMMARY OF SERVICES AND QUALIFICATIONS

1.5.1 GENERAL SERVICES

.1 The prime consultant will provide a full consulting team including the following consultant services and specialties:

- .1 Professional Engineering Services;
  - .1 Mechanical Engineering,
    - .1 Prime Consultant,
    - .2 Project management of the consultant team.
  - .2 Civil Engineering,
  - .3 Structural Engineering,
  - .4 Electrical Engineering,
    - .1 Security System specialist,
  - .5 Fire Protection Engineering;
- .2 Professional Architectural Services;
- .3 Commissioning specialist;
  - .1 Independent from the mechanical and electrical engineers above to conduct the work as described in this TOR.
- .4 Cost Estimating specialist;
  - .1 Independent cost estimator certified by the Canadian Institute of Quantity Surveyors.

1.6 SCHEDULE

1.6.1 GENERAL

.1 Deliver the project to be ready for occupancy in accordance with the project milestone listing identified below.

.2 Completion dates shown are relative to an assumed start date as per below.

.3 Prepare a Project Schedule in accordance with the milestone list.

1.6.2 ANTICIPATED MILESTONE DATES

Project Phase	Milestone Completion Date	Number of Weeks
Consultant Contract Award	January 29th, 2016	
Pre-Design	February 26th, 2016	2 weeks
PWGSC Quality Assurance Review	March 9th, 2016	2 weeks
Schematic Design	March 23rd, 2016	4 weeks
PWGSC Quality Assurance Review	April 21st, 2016	2 weeks

Design Development	May 4th, 2016	4 weeks
PWGSC Quality Assurance Review	June 2, 2016	2 weeks
50% Construction Documents	June 16, 2016	4 weeks
PWGSC Quality Assurance Review	July 16th, 2016	2 weeks
99% Construction Documents	July 31st, 2016	7 weeks
PWGSC Quality Assurance Review	August 18th, 2016	2 weeks
Tender Documents	September 1st, 2016	1 week
Tender Award	September 24th, 2016	
Substantial Completion of Construction	July 31st, 2018	
Decommissioning of Existing Facility	August 15th, 2018	
Final Completion (Commissioning, Final Inspection and Acceptance)	March 31st, 2019	4 weeks
Post Construction Deliverables	1 month past Final Completion date	
Post Construction Warranty Evaluation	9 months past Final Completion date	

1.7 COST

1.7.1 CONSTRUCTION BUDGET

.1 The construction estimate does not include PWGSC project management fees, administration costs, consultant fees, risk allowance, escalation or GST and is in 'Budget-Year (Current)' dollars.

1.7.2 ESTIMATED CONSTRUCTION COST

.1 The estimated construction cost (excluding GST) – including decommissioning of the existing facility - is anticipated at this time to be three-million-four-hundred-fifty-thousand dollars ($3,450,000).

1.8 EXISTING DOCUMENTATION

1.8.1 AVAILABLE FOR THE CONSULTANT

.1 Limited as-built drawings and Operation & Maintenance Manuals will be available at the start of the Pre-Design phase. The Consultant will be responsible for verifying the accuracy of the information incorporated into the design.

.2 Construction documents for a similar project designed by Genivar(now WSP) in 2010 are available to use as a basis for the new design work.

.1 Drawings are in AutoCAD (dwg) format;

.2 NMS specifications are in MS Word (doc) format.

.3 Survey of the new building site in AutoCAD (dwg) format;

.4 Geotechnical Report;

.1 2008, test holes in close vicinity to the new water pumping station and reservoir site.

1.8.2 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.

1.9 CODES, ACTS, STANDARDS, REGULATIONS

1.9.1 GENERAL

.1 A listing of Codes, Acts, Standards and Guidelines potentially applicable to this project are contained in the GP&S Document. In addition the following standards also apply to this project:

.1 Commissioning (Cx) to comply with CAN/CSA Standards Z320-11;

.2 Meet design standards as expected and required for municipally supplied water, in Saskatchewan and additionally adhere to the requirements of the Federal Drinking Water Guidelines in design of such facilities.

.3 Technical Criteria Correctional Institution CSC, 2014.

.2 The Authorities Having Jurisdiction (AHJ) on this project are:

.1 The local AHJs;

.2 Treasury Board of Canada accessed through the Departmental Representative.

.3 The Consultant must identify, analyse 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 buildings, such as the Canada Labour Code;

.2 The consultant team must be fully versed with the legislation and requirements that are unique to Federal Government buildings in Canada;

.3 The consultant team must be fully versed with the legislation and requirements that are unique to Federal Government projects tendered through Public Works & Government Services Canada.

.4 The Consultant team must fully incorporate the Commissioning Processes and Procedures using the acceptable standard but not limited to CSA Z320-11 and ASHRAE Guideline 0-2005.

2 REQUIRED SERVICES

2.1 GENERAL REQUIREMENTS

2.1.1 SERVICES

.1 Pre-Design Service.
.2 Commissioning Service.
.3 Schematic Design Service.
.4 Design Development Service.
.5 Construction Document Service:
  .1 Provide construction documents for review at 50% and 99% (tender ready) completion stages.
.6 Tender Services - to assist the Departmental Representative.
.7 Construction Support Service.
.8 Post Construction Service.

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.

2.2.2 FEDERAL GOVERNMENT

.1 The federal authorities having jurisdiction over this project are:
  .1 User Department for functional design, IT and security systems.

2.2.3 PWGSC REVIEWS, APPROVALS AND PRESENTATIONS

.1 Project delivery team approval includes both the PWGSC Architectural & Engineering Centre of Expertise (A&ECoE) reviews and User Department approval:
  .1 The purpose of this review is technical quality assurance (including fire protection, health and life safety);
  .2 The purpose of these reviews is to ascertain for PWGSC that the Consultant has reasonably fulfilled the objectives of this project;
  .3 PWGSC will not provide solutions, detailed comments and/or coordination for the Consultant;
  .4 Work that does not meet the objectives of the project will be rejected, rejected work will require further design (including re-design), coordination and documentation at the Consultant's expense;
  .5 Quality assurance for the project design and documentation remains the responsibility of the Consultant;
  .6 Submissions will be reviewed at the pre-design phase, schematic design phase, design development phase and construction documents phases (50%, and 99% complete);
  .7 Expected turnaround time is 2 weeks;
  .8 For each review provide one submission (i.e. electronic copies of documents in pdf format) plus any follow-up submissions.

2.2.4 PROVINCIAL, TERRITORIAL AND MUNICIPAL AUTHORITIES

.1 The federal government generally defers to provincial and municipal authorities for specific regulations, standards and inspections but in areas of conflict the more stringent authority prevails.

.2 Municipal authority review:

.1 The purpose of this review is for a building permit;

.2 Submit documents in formats such as reports, drawings, specifications or other formats as required by the Municipal authority;

.3 Submission will be reviewed for building permit at 99% completion;

.4 For each review provide one submission (i.e. electronic copies of documents in pdf format) plus any follow-up submissions.

2.3 COMMISSIONING SERVICE

2.3.1 GENERAL

.1 The purpose of the Commissioning Service is to ensure that a fully functioning project is delivered to the User Department.

.2 Commissioning (Cx) is an integral part of the Consultants' required services and therefore, required activities and deliverables are listed within each project phase service.

.3 Provide Commissioning Service on the basis of CSA Z320-11, Canadian Standards Association Building Commissioning Standard.

2.4 PRE-DESIGN SERVICE

2.4.1 GENERAL

.1 The Consultant Team will:

.1 Review and analyse all available project information, consult with the Departmental Representative and deliver a comprehensive Pre-Design Report

.2 The Pre-Design Report will consolidate the Scope of the design and will be utilized as the benchmark project control document to monitor progress of the project.

2.4.2 SCOPE AND ACTIVITIES

.1 The Consultant shall:

.1 Confirm and document the Summary of Design Work and project specific Objectives outlined in this TOR with the User Department.

.2 Visit the project site, analyse site conditions, document any conditions that will impact project delivery and design and report the results to the Departmental Representative.

.3 Review all existing reports, documents and material related to the project, including the functional requirements and the requirements identified in this TOR;

.4 Review potential for environmental impacts and application of the Canadian Environmental Assessment (CEA) Act;

.5 Review security documentation;

.6 Review information available on existing facilities;

.7 Develop a preliminary Building Code Analysis based on the applicable codes, regulations and standards;

.1 Applicable Codes, Standards and Regulations,

.2 Compliance and non-compliance concerns,

.3 Strategy for dealing with non-compliant aspects of the work.

.8 Identify all additional information that will be required to deliver the project;

.9 Identify all authorities having jurisdiction (AHJ) over the project and applicable codes, regulations and standards that apply;

.10 Identify any conflicts that will need to be addressed with respect to scope, quality, schedule, cost;

.11 Report on adjustments required to the budget, risk analysis and schedule, including allowances for reviews and approvals for each stage of the project life cycle.

.12 Initiate the Commissioning process;

.1 Define the Commissioning Team (including roles and responsibilities) for all project phases,

.2 Review project objectives and functional requirements to outline a preliminary commissioning scope,

.3 Develop a draft Commissioning (Cx) Plan as per CSA Z320-11 to incorporate who, what, when, where and how and the Owner Project Requirement based upon the Functional Programming document and/or Owner requirements.

.4 Establish and develop a draft commissioning cost estimate for all component(s), system(s) and integrated system(s) within the context of each discipline.

2.4.3 DELIVERABLES

.1 The Consultant shall prepare and submit a Pre-Design Report encompassing the project scope, all related investigations and analyses, along with the specific deliverables noted below, for review and acceptance by the Departmental Representative:

.1 Refer to the GP&S Document for report content;

.2 Include necessary sections to document and present the items listed in the “Scope and Activities” section above;

.3 Preliminary commissioning approach or outline;

.4 A summary of key Owner Project Requirements (OPR), in priority sequence, for evaluation of the project success;

.5 A Basis of Design (BOD) report component which directly responds to the OPR, which records any and all assumptions being used to inform the design and which will form the basis on which to commission the building;

.6 Class D estimate;

.7 Include an updated milestone project schedule.

2.5 SCHEMATIC DESIGN SERVICE

2.5.1 GENERAL

.1 The Consultant Team will review and analyse all available project information, consult with the Departmental Representative and deliver a comprehensive Schematic Design Report.

2.5.2 SCOPE & ACTIVITIES

.1 The Consultant shall:

.1 Prepare two (2) viable options to meet the functional and technical requirements for the project;

.1 Analyse and develop each option with regard to the project goals including cost and schedule for each design option,

.2 Develop each Design Option in sufficient detail to clearly indicate all key elements in the design.

.3 Assess each design option against the Summary of Design Work and the project specific Objectives documented in the Pre-Design report.

.2 Update the budget, schedule and risk analysis and identify any conflicts that will need to be addressed with respect to scope, quality, schedule, cost;

.1 Prepare a Class 'C' Cost Estimate for each option,

.2 Prepare an estimate of the yearly operation and maintenance costs.

.2 Out of this process one option will be selected as the basis to proceed to Design Development:

.1 The Departmental Representative, in concert with others, shall select the preferred option to be further developed;

.2 Although the Consultant is required to identify a preferred option, the Departmental Representative reserves the right to select another option.

.3 Develop a draft Basis of Design document to describe the selected option as per CSA Z320-11including and are not limited to:

.1 Illustrate the general form, scale, and relationship of the major project component(s), system(s) type of construction proposed and the building systems and equipment impacted and/or recommended in support of the design options;

.2 Illustrate a general description of the work indicating the major systems and/or material choices for the design options;

.3 Demonstration that design options satisfy the OPR.

.4 Update all Cx documents.

2.5.3 DELIVERABLES

.1 The Consultant shall prepare and submit the Schematic Design Report for review and acceptance by the Departmental Representative and include:

.1 Report content as per the GP&S document;

.2 Necessary sections to document and present the items listed in the "Scope and Activities" section above;

.3 Recommendations for 'best' option complete with the related Basis of Design and any assumptions contained therein;

.4 Updated Owner Project Requirements (OPR), goals and objectives including updated preliminary Cx Plan and Cx Cost Estimate.

2.6 DESIGN DEVELOPMENT SERVICE

2.6.1 GENERAL

.1 Further develop the option selected for refinement at the completion of Schematic Design.

.2 Prepare the Design Development documents, which consist of drawings and other documents to describe the scope, quality and cost of the project in sufficient detail to facilitate design approval, confirm code compliance and obtain authorization to prepare the construction documents.

2.6.2 SCOPE AND ACTIVITIES

.1 The Consultant shall:

.1 Further develop the selected schematic design option and expand the intent for each design discipline to complete the Design for this project;

.2 Finalize the selected design option in an integrated manner to ensure that all major components have been considered in a collaborative environment and that

the design continues to support the Summary of Design Work and the project specific Objectives documented in the approved Pre-Design report;

.3 Present / submit the design for review and approval to review groups and authorities having jurisdiction as required;

.4 Prepare a class 'B' cost estimate, update the schedule, the risk analysis and identify any conflicts that will need to be addressed with respect to scope, quality, schedule and cost;

.5 Continue to review all applicable statutes, regulations and by-laws in relation to the design of the project and conduct a detailed code analysis to demonstrate compliance;

.1 If there are non-compliance issues, develop alternative solutions to support the design and submit for approval to the CSC Departmental Fire Protection Coordinator (DFPC) and local AHJ.

.6 Analyse the constructability of the project and advise on the construction phasing process and duration;

.7 Develop outline specifications for all systems, principle components and equipment, including manufacturers literature;

.8 Provide a written response to the PWGSC Schematic Design Quality Assurance (QA) review.

.9 Provide a waste diversion assessment of the waste materials from the project site in a spreadsheet format.

.1 This shall be incorporated into the Construction/Demolition Waste Management and Disposal NMS specifications.

.10 Update Basis of Design (BOD) document and Owner Project Requirements (OPR).

.11 Coordinate a multi-disciplinary approach to sustainability, program design, facility design and commissioning;

.12 Commissioning:

.1 Identify and provide a system components list to be commissioned;

.2 Commissioning issues logs and tracking logs specific to the project;

.3 Develop pre-functional and functional verification and test forms specific to each component(s), system(s) and integrated system(s) as per CSA Z320-11including and are not limited to;

.1 Outlining the Cx objective,

.2 Single line flow diagram overlaid with P&ID,

.3 Methodologies,

.4 Line by line procedures,

.5 Sequence of operation and control logic narrative;

.4 Develop draft Commissioning project Risks and Cost Estimate;

.5 Develop detail Verification Event Matrixes to accommodate single, multiple and variance analysis to design set points and system(s) responses specific to normal, power outage and emergency condition;

.6 Prepare outline draft of Commissioning construction documents.

2.6.3 DELIVERABLES

.1 The Consultant shall prepare and submit the Design Development Report for review and acceptance by the Departmental Representative and include:

.1 Report content as per the GP&S document;
.2 Sections necessary to document and present the items listed in the “Scope and Activities” section above.
.3 Building Code Analysis Report and Alternative Solutions Report (if relevant);
.4 Include a more detailed and updated Basis of Design, with an analysis that confirms the adequacy of the developed design solution for each key project requirement, goal and objective;
.5 An updated milestone project schedule including allowances for reviews and approvals for each stage of the project life cycle;
.6 An updated risk analysis including deviations that may affect cost or schedule;
  .1 Recommend corrective measures.
.7 An updated project log tracking approved major decisions.
.8 Commissioning:
  .1 Approved Owner Project Requirements (OPR) and Basis of Design documentation;
  .2 Commissioning Plan;
  .3 Updated Cx issues log and tracking log for each discipline;
  .4 Include a Cx cost breakout for each discipline in the cost estimate;
  .5 Include commissioning specifications in the outline specifications;
  .6 Include Cx schedule in the milestone project schedule;
  .7 Cx Verification Event Matrix.

2.7 CONSTRUCTION DOCUMENTS SERVICE

2.7.1 GENERAL

.1 The objective of this stage is to translate the Design Development phase into construction drawings and specifications for the purpose of tendering.
.2 The Consultant must obtain written authorization from the Departmental Representative before proceeding with Construction Documents.
.3 Prepare one tender package co-ordinated with all disciplines.

2.7.2 SCOPE AND ACTIVITIES

.1 Create construction documents in accordance with the GP&S document.
.2 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.
.3 Update the project schedule.
.4 Establish a quality control process for the construction and contract administration stage.
.5 The Consultant shall:
  .1 Design according to the budget and schedule;
  .2 Coordinate the work of various disciplines including scope changes required to remain within budget;
  .3 In consultation with the Departmental Representative approve construction materials, processes and specifications considering sustainability and commissioning;
  .4 Apply a process of continuing cost control with increasing level of detail during production of contract/construction documents;

.1 At each review prepare an up-to-date estimate demonstrating compliance with the Construction Cost Plan,

.5 Prepare a Class A cost estimate for the 99% submission, using 100% measured quantities;

.1 Provide a cost breakdown by trade for review of bids and comparison with the successful Contractor's cost breakdown,

.2 Provide a Commissioning cost estimate breakdown by discipline.

.6 Continue to review all applicable statutes, codes, regulations and by-laws in relation to the design of the project and revise the building code analysis accordingly;

.7 Advise Departmental Representative and resolve issues other governmental authority officials raise, and adjust Construction Documents as required;

.8 Provide written responses to PWGSC comments at 50% and 99% completion review stages prior to the next submission and integrate comments into final construction documents;

.9 Participate in the risk management process;

.10 Update project log tracking approved major decisions;

.11 Provide commissioning forms and check lists specific to each component(s), system(s) and integrated system(s) including and are not limited to;

.1 Cx Issues Log, Cx sequence of event, Cx tracking log, Cx system components check list, Cx meeting minutes and Cx verification event matrix and responses,

.2 Installation verification, pre functional and functional performance verification and test,

.3 Name plate data,

.4 First test or retest following correction of an issue,

.5 Identification of the component(s), system(s) and integrated system(s) under test including location and construction document designation,

.6 Expected design performance parameters and responses,

.7 Observed performance including indication of whether or not this performance is acceptable and/or deviation from design set point and qualify,

.8 Design Engineer of Record date and signatures along with those performing and witnessing the test,

.12 Update and incorporate Cx Plan, Cx forms and training requirements into Cx construction documents within the context of Division 01 specifications.

2.7.3 DELIVERABLES

.1 Include items listed in the “Scope and Activities” section above the PWGSC GP&S document and items listed below.

.2 Updated report at each submission noting any deviations from earlier Basis of Design submissions and, as necessary, reconfirming key Owner Project Requirements, goals and objectives, along with:

.1 An updated estimate demonstrating compliance with the Construction Cost Plan;

.2 An updated project log, tracking approved major decisions.

.3 50% complete Construction Documents:

.1 Updated class “B” estimate;

.2 Updated OPR and BOD documents;

.3 Updated project schedule;
.4 Construction Drawings;
.1 Drawings should reflect 50% completeness with all planned and required drawings / sheets shown.
.5 Specifications;
.1 Index to specifications (identifying all sections to be used for the project),
.2 Draft Division 01 including draft commissioning sections,
.3 Updated Commissioning document,
.1 Cx Building Envelope,
.2 Cx cost estimate,
.3 Cx risk and complexity assessment,
.4 Draft Cx Construction Document specification Division 01,

.4 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 and a written response for the PWGSC 50% QA review;
.2 The Consultant shall submit documents to the Departmental Representative, local municipality, or any other Authority having jurisdiction;
.3 Class “A” estimate;
.4 An updated project schedule;
.5 Construction Drawings;
.1 Drawings should reflect 99% completeness as a complete design without any incomplete drawings (as if ready for tendering).
.6 Specifications complete with all sections and thoroughly coordinated with the drawings:
.1 Component, System and assembly requirement(s) including;
.1 Close Loop System Verification,
.2 Close Loop Integration System Verification.
.7 Updated Commissioning Plan;
.1 Updated Cx issues and resolution log.

.5 Final (100%) Construction Documents ready for tendering:
.1 This submission incorporates all revisions required by the review of the previous submission an a written response for the PWGSC 99% QA review;
.2 Advise the Departmental Representative of all issues raised by other officials;
.3 The submittal shall include;
.1 Signed and sealed documents:
.1 3 – hard copies;
.2 1 – electronic copy in PDF format and AutoCAD per client request.
.2 An updated Class ‘A’ cost estimate (include Cx cost breakout),
.3 An updated project schedule,
.4 Construction Drawings & Specifications as per the GP&S document.
.5 An updated Commissioning Plan;
.1 Updated Cx issues and resolution log.
.6 Commissioning;
.1 Updated draft from previous 99% submission to the 100% completion submission.

.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.

2.8 TENDER SERVICES

2.8.1 GENERAL

.1 The object of this phase is to support the Departmental Representative with the tender.

.2 The Contract Authority for this project is the PWGSC Real Property Contracting (RPC) branch.

2.8.2 SCOPE AND ACTIVITIES

.1 When requested, the Consultant will be required to:
  .1 Provide the Departmental Representative with information required by bidders to interpret construction documents;
  .2 Prepare addenda in response to all questions within two (2) business days during the bidding period and submit to the Departmental Representative;
  .3 Attend pre-tender site visits;
  .4 If PWGSC decides to re-tender the project, or any specific tender package, provide full services to the Departmental Representative;
  .5 During Bid Review and Analysis assist the Departmental Representative as required by analyzing and reconciling any differences between pre-tender estimates and submitted bids.

2.9 CONSTRUCTION SUPPORT SERVICE

2.9.1 GENERAL

.1 The object of this phase is to support the Departmental Representative with the construction phase and ensure the quality, budget and schedule meet the project requirements.

2.9.2 SCOPE AND ACTIVITIES

.1 The Consultant shall share all project information with PWGSC:
  .1 All material specifications, mixes and test results shall be turned over to the Departmental Representative for future maintenance by PWGSC and others.

.2 General Services:
  .1 Review shop drawings, test reports and other submissions;
  .2 Prepare record drawings and specifications based on Contractor’s as-builts;
  .3 Update the project log tracking approved major decisions, including those impacting project scope, budget and schedule;
  .4 Prepare and issue a communications protocol and a shop drawing review protocol in consultation with the Departmental Representative;
  .5 Review and comment on Contractor’s commissioning submittals including:
    .1 Contractor's Commissioning Plan;
    .2 Project and Project Commissioning Issues Logs;
    .3 Cx Report;

.4 Cx Schedule reflecting the Performance Verification Tests;
.5 Outstanding activities.

.3 Construction & Contract Administration:
.1 Provide field reviews and as required to fulfill the Consultant's professional obligations to monitor the construction activities throughout the construction period and keep the Departmental Representative informed of work progress;
.1 Anticipate a minimum of five (5) site meetings,
.2 Reject unsatisfactory work,
.3 Provide written reports.
.2 Provide construction progress reports based on Contractor's submissions and on-site performance;
.3 Furnish supplemental instructions to the Contractor with reasonable promptness or in accordance with a schedule for such instructions agreed to by PWGSC and the Contractor;
.4 Provide additional drawings to clarify, interpret or supplement the contract documents;
.5 Review and comment on various documents such as the Contractor's Progress Claims and updated schedules;
.6 Offer timely technical advice on all disputes and claims between PWGSC and the Contractor;
.7 Authorize special tests, inspections and minor works that do not impact project cost and schedule;
.8 Determine the amounts owing to the Contractor based on work progress and certify payments to the Contractor;
.9 Assist the Departmental Representative to prepare the Certificate of Substantial Completion and provide sign-off;
.10 Provide a Post-Construction Evaluation report.

.4 Cost Services:
.1 After issue of contract provide details for evaluating the project's cost performance;
.2 Assist the construction team with cost management advice, if requested;
.3 Evaluate change orders, claims, work completed and cash flow.

.5 Changes to the Work:
.1 Assist the Departmental Representative to prepare Contemplated Change Notices (CCNs) and Change Orders (COs) to be issued by the Departmental Representative.

.6 Draft of Final Commissioning Report documenting all commissioning work, testing, verification and results achieved during the project construction specific to component(s), system(s), different levels of integration between system(s) and assemblies. Include at a minimum the following:
.1 Engineer of Record to review, approve and sign off all submittals for performance parameters before and after execution of test and for adherence to OPR and BOD;
.2 Conduct field reviews, witness and complete reports with Cx forms verifying tests for compliance with the OPR and the BOD including but not limited to;
.1 All factory test reports and data,
.2 Installation, pre-functional, functional performance testing and TAB,

.1 Component(s) based checks,
.2 System(s) based checks,
.3 Integrated system(s) based checks,
.4 Seasonal/deferred commissioning for those systems that have been functionally tested and/or handed over in seasons where retesting and commissioning will be required during the opposite season.

.3 Prepare and update Cx Tracking Log and Cx issue log specific to component(s), system(s) and integrated system(s) that failed the tests and documents how the failed test impacted other component(s) either upstream to or downstream of the component in question;

.4 Provide bi-weekly Cx issues report and meeting minutes for distribution;

.5 Provide Trending Report to confirm the design performance parameters;

.6 Review and comments to Operation and Maintenance Manual (O&M) and Training Manual for completeness and accuracy in advance to ensure;

.1 Complete system, assembly, maintenance and inspection procedures,
.2 Complete repair procedures including disassembly, component(s) removal replacement and reassembly,
.3 Complete emergency instructions for operating the facility during various standard and/or nonstandard and emergency conditions,
.4 Key Warranty requirements.

.7 Certify Substantial Completion for Interim Acceptance Report sign off and ensuring:

.1 All component(s), system(s), integrated system(s) are fully commissioned, completed and functional as per Construction Specification Document, OPR and BOD;

.2 All test certificates, final project commissioning reports, training and project O&M manual complete;

.3 Successful completion of life safety systems and their components (i.e. fire alarm systems, sprinklers, standpipes, smoke control, ventilation, pressurization, hold open devices, elevators recalls, smoke fire shatters and dampers, emergency power, emergency lights, etc.);

.4 Engineer(s) of Record shall provide a Letter of Acceptance or Rejection more specifically that the OPR and the BOD has and/or has not been met and by extension system functionality has and/or has not been materialized;

.5 Recommendation of acceptance of the project to the Departmental Representative.

2.9.3 DELIVERABLES

.1 Approved shop drawings, test reports/certificates and other submissions.

.2 Clarifications, Supplemental Instructions, Contemplated Change Notices and Change Order Recommendations.

.3 Site Visit/Field Review Reports.

.4 Reviewed Contractor Progress Claims.

.5 Comments to Contractor Schedule, Change Orders.

.6 Completed Certificate of Substantial Completion.

.7 Cx Deliverables:

.1 Final Commissioning Report;
.2 Final OPR and BOD;

.3 Certified Substantial Completion.

2.10 POST CONSTRUCTION SERVICE

2.10.1 GENERAL

.1 The purpose of this phase is to support the Departmental Representative in obtaining all final documents required for project close out.

2.10.2 SCOPE AND ACTIVITIES

.1 Project Close-out Services:

- .1 Revise documentation to reflect all changes, revisions and adjustments after completion of commissioning;
- .2 Prepare record drawings (AutoCAD format as per GP&S requirements) and specifications based on Contractor's as-builts;
- .3 Prepare and submit final Certificate of Completion and final records;
- .4 Review the Operations and Maintenance manual;
- .5 Review the integrated commissioning manual;
- .6 Sign-off Final Commissioning Report;

.2 Warranty Services:

- .1 Monitor and certify rectification of deficiencies before expiry of warranties;
- .2 Monitor environmental and life safety system checks to be carried out by Contractor / O&M staff before expiration of warranties;
- .3 Sign-off on the Final Completion of the construction contract;
- .4 Participate in warranty inspections with the Departmental Representative and Contractor;
- .5 Provide warranty deficiency list;
- .6 Assist with the final PWGSC Cx evaluation.

.3 Commissioning:

- .1 Coordinate deferred commissioning for those systems that have been functionally tested and/or turned over where retesting and commissioning is required;
- .2 Resolution of any warranty issues on commissioned systems during the warranty period;
- .3 Ensure that all completed operating and maintenance manuals, warranties, guarantees and other required submittals are turned over to the User Department (Owner);
- .4 Provide ongoing consultation with the construction teams in support of their project closeout activities and submittals related to systems and assemblies commissioning specific deliverables in compliance to the Commissioning Plan, Construction Specifications document, Owner's Project Requirements (OPR) and BOD;
- .5 Finalize the Commissioning Report;
- .6 Prepare final Commissioning Manual as per CSA Z320-11 including and are not limited to;
  - .1 Final O&M Manual,
  - .2 Post occupancy changes.

2.10.3 DELIVERABLES

.1 Warranty Deficiency List.
.2 Final Certificate.
.3 As-Built and Record Drawings and As-Built Specifications.
.4 Comments to O&M Manual.
.5 Final Certification of installation and warranty from manufacturers.
.6 Final Commissioning Manual.
.7 Sign-off on Warranty.

3 PROJECT ADMINISTRATION

3.1 GENERAL REQUIREMENTS

3.1.1 PWGSC PROCEDURES AND STANDARDS

.1 The consultant shall comply with the amendments and/or additions in this section in addition to adhering to the requirements contained in the GP&S section 3 (Project Administration).

3.1.2 MEETINGS

.1 Design Phase:

- .1 Bi-weekly meetings with PWGSC, CSC and the Consultant team will normally be held via teleconference.
- .2 Seven (7) meetings with PWGSC, CSC and the Consultant team will be held at the PWGSC offices in the Saskatchewan Penitentiary, Prince Albert:
  - .1 Project start-up;
  - .2 Pre-design review;
  - .3 Schematic Design review;
  - .4 Design Development review;
  - .5 50% Construction Documents review;
  - .6 99% Construction Documents review;
  - .7 Tendering phase.

.2 Construction Phase:

- .1 Bi-weekly meetings with PWGSC, the Consultant team and the Contractor will normally be held at the construction site for the duration of the project and as required.

3.1.3 BUILDING PERMITS AND OCCUPANCY PERMITS

.1 The Consultant shall apply for a Building Permit from the city of Prince Albert (local AHJ) on behalf of PWGSC at the completion of the 99% construction document phase.

3.1.4 TECHNICAL AND FUNCTIONAL REVIEWS

.1 The role of the federal HRSDC fire commissioner no longer exists and has been replaced by the CSC Department Fire Protection Coordinator (DFPC). Fire protection, health and life safety reviews will be undertaken by the PWGSC Fire Protection Coordinator who is now part of the PWGSC Quality Assurance review team.

4 APPENDIX A

4.1 UV REQUIREMENTS

4.1.1 STANDARD OF ACCEPTANCE

.1 Trojan UV Swift SC-808 complete with H2FLOW Equipment Inc. H2 Clean System or approved equal.

.2 Approved Manufacturers:

.1 Siemens;

.2 Tojan;

.3 Calgon;

.4 Degremont Technologies;

.5 ITT/Wedeco.

.3 Alternate UV manufacturer that is not listed as approved equal must submit the following 15 days prior to close of tender to be considered for approval:

.1 Evidence of previous successful performance utilizing low-pressure amalgam lamp systems in similar applications;

.2 The proposed manufacturer must be able to demonstrate at least ten (10) permanent installations of this equipment type;

.3 Submittal including Reactor Details, Control Panel, lamp and ballast descriptions, and engineering reports stating head loss;

.4 A Validation Certificate for the proposed certifying compliance with the USEPA "Ultraviolet Disinfection Guidance Manual for The Final Long Term 2 Enhanced Surface Water Treatment Rule";

.5 A statement by the equipment manufacturer listing any deviations or exceptions taken to these specifications shall be submitted. State specification reference and proposed alternative with reason for exception;

.6 Description of manufacturer's service capabilities including local support offered for technical service;

4.2 UV DESIGN CRITERIA

.1 Provide UV equipment to disinfect municipal water with the following characteristics:

Parameter	Design Criteria
Peak Flow	26 litres/sec
Reduction Equivalent Dose (RED)	40 MJ/cm^2
Water Temperature Range	0 to 40°C (32 to 104°F)
Ultraviolet Transmittance @ 253.7nm	95%
Iron Content	<0.5 mg/litre
Equipment Redundancy	100%

.2 Each UV reactor will be configured as follows:

.1 The UV reactor will be supplied pre-assembled and ready for installation;

.2 The UV system will consist of 2 UV reactor(s) with an automatic cleaning system (if applicable). Each UV reactor will consist of a minimum of 1 UV intensity monitor and one Control Panel per reactor;

.3 The UV system must fit within the piping footprint as stated without modification;

.4 The maximum operating pressure of the UV System shall be 1 034 kPa (150 PSI);

.5 Reactor will be tested to 1551 kPa (225 PSI) for a minimum of 10 minutes;

.3 Performance Requirements:

.1 RED at end of lamp life: 40 mj/cm^2 (minimum).