

**THE CITY OF EDMONTON
DESIGN-BUILD AGREEMENT
CAPITAL LINE SOUTH LRT EXTENSION**

***Schedule 9
Quality Management***

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SCHEDULE 9

QUALITY MANAGEMENT

1. DESIGN-BUILDER RESPONSIBILITIES

1.1 General Quality Management Responsibilities

Design-Builder:

- (a) acknowledges and agrees that Design-Builder is solely responsible for the quality of the Project Work;
- (b) shall be responsible for all quality activities required to manage its own processes as well as those of the Design-Builder Persons throughout the Term. Design-Builder shall, throughout the Term, ensure that all aspects of the Project Work are subject to its Quality Management System, and shall comply with, and cause each of the Design-Builder Persons to comply with, the requirements of the Quality Management System
- (c) shall plan, execute, and complete the Project Work in such a manner that minimizes the occurrence and recurrence of quality related issues or Nonconformities, both in the process and in the product.

2. QUALITY MANAGEMENT SYSTEM

Design-Builder shall develop and implement a Quality Management System in accordance with the requirements of this Schedule 9 *[Quality Management]*.

2.1 Quality Management System Requirements

- 2.1.1 The QMS shall conform to the requirements and principles of the most recent version of the ISO 9001 Standard and shall cover all activities, products and services related to the Project Work. The QMS shall incorporate the ISO 9001 Standard principles of quality management.
- 2.1.2 Within 180 days after the Effective Date, Design-Builder shall submit to the City an ISO 9001 Standard compliant QMS. Design-Builder shall, and shall ensure that all Design-Builder Persons, comply with the Accepted QMS until the QMS has been certified in accordance with Section 2.2 *[Quality Management System Certification]* after which time Section 2.3 *[Compliance with Certified Quality Management System]* shall apply and the Accepted QMS shall be replaced with the certified QMS.

2.2 Quality Management System Certification

- 2.2.1 Within 90 days after the Effective Date, or at an alternate date accepted by the City in the Submittal Schedule and Register, Design-Builder shall submit to the City details of the accredited ISO 9001 Standard certification agency that Design-Builder proposes to use for certification of the QMS.
- 2.2.2 Within 365 days after the Effective Date, or at an alternate date accepted by the City in the Submittal Schedule and Register, Design-Builder shall obtain certification of the QMS in accordance with the most current version of the ISO 9001 Standard from the Accepted ISO 9001 Standard certification agency.

2.2.3 Within 10 Business Days after:

- (a) initial certification of the QMS; and
- (b) each anniversary of the Effective Date,

Design-Builder shall submit to the City confirmation from the Accepted ISO 9001 Standard certification agency that the then current QMS:

- (c) covers all activities, products and services related to the Project Work, including all aspects of Design and Construction; and
- (d) is in all respects compliant with all applicable requirements and principles of the then most current version of the ISO 9001 Standard.

2.2.4 Design-Builder shall maintain certification of the QMS in accordance with the then most current version of the ISO 9001 Standard throughout the Term.

2.3 Compliance with Certified Quality Management System

Design-Builder shall, and shall ensure that all Design-Builder Persons, comply with the certified QMS, and each of the Accepted Quality Manual and all relevant Accepted Quality Management Plans as each relates to the Project Work, or a portion thereof, and any subsequent amendments to the certified QMS and the relevant Quality Documentation, which have been Accepted by the City.

2.4 Continuous Improvement of the Quality Management System

2.4.1 Design-Builder shall:

- (a) implement a continuous improvement program and shall have processes in place, such as management reviews and Quality Audit programs, to allow all identified opportunities for improvement to be recorded, tracked, implemented and closed out; and
- (b) ensure that all Design-Builder Persons are aware of the importance of continuous improvement and are actively engaged in the implementation of improvements in connection with the performance of the Project Work.

2.4.2 Design-Builder shall use the continuous improvement program to continually improve the effectiveness and efficiency of the QMS. Design-Builder shall conduct management reviews for continuous improvement not less than annually, commencing on the first anniversary of the Effective Date.

3. QUALITY DOCUMENTATION

3.1 Minimum Requirements

The minimum requirements and principles which apply to the Quality Documentation are set out in this Schedule 9 [*Quality Management*] and in Appendix 9A [*Quality Manual*] to Appendix 9C [*Construction Quality Management Plan*], inclusive.

3.2 ISO Reference Documents

Without limiting the requirement of the Quality Management System to comply with the latest version of the ISO 9001 Standard, the Quality Management System shall also incorporate the requirements and principles of the following:

- (a) ISO 9004 Standard;
- (b) ISO 9000 Standard;
- (c) ISO 19011 Standard; and
- (d) ISO 10005 Standard.

3.3 Specific Requirements

All of the Quality Documentation shall:

- (a) be prepared in accordance with Good Industry Practice;
- (b) generally follow the most recent version of the ISO 9001 standard numbering system and nomenclature, and shall include:
 - (i) all requirements therefore specified in this Schedule 9 *[Quality Management]*;
 - (ii) a description of the processes needed for the effective implementation of the QMS, and:
 - (1) a determination of the sequence and interaction of these processes;
 - (2) a determination of the criteria and methods needed to ensure that the operation and control of these processes is effective;
 - (3) a commitment to ensure the availability of resources and information necessary to support the operation and monitoring of these processes;
 - (4) a procedure to monitor, measure and analyze these processes; and
 - (5) a procedure to implement the actions necessary to achieve the process objectives, and to ensure continuous improvement; and
- (c) demonstrate Design-Builder's commitment to the development, effective implementation and continuous improvement of the QMS by providing that Design-Builder will:
 - (i) perform regular scheduled Quality Audits of the QMS;
 - (ii) implement, prior to commencement of the Project Work, a Quality Policy which is appropriate for the Project Work;
 - (iii) implement, prior to commencement of the Project Work, Quality Objectives and monitor their effectiveness;
 - (iv) effectively communicate to Design-Builder's management team the importance of conforming to all quality requirements;

- (v) ensure the adequacy of resources required to meet the Quality Objectives; and
- (vi) conduct an annual management review to assess the effectiveness of the QMS and implement measures required for continuous improvement.

3.4 Submission of Quality Documentation

Design-Builder shall prepare and submit to the City all required Quality Documentation in accordance with this Schedule 9 *[Quality Management]*. All Quality Documentation submitted to the City shall be complete. If the Quality Documentation relies on or incorporates any other quality manual, plan, procedure or like document, then such other quality manual, plan, procedure or like document shall also be submitted to the City. The City may require the amendment of any such other quality manual, plan, procedure or like document to the extent necessary to enable the relevant Quality Documentation to satisfy the requirements of this Schedule 9 *[Quality Management]*.

3.5 Amendments and Updates to Quality Documentation

- 3.5.1 Design-Builder shall be responsible for proactively updating its QMS and all Quality Documentation from time to time, in accordance with the procedures set forth in this Agreement, to ensure that the QMS and all Quality Documentation are, and, at all times remain, in full compliance with the then most current version of the ISO 9001 Standard and the requirements of this Agreement, including this Schedule 9 *[Quality Management]*.
- 3.5.2 Prior to implementing any amendment to the QMS or any Quality Documentation, Design-Builder shall submit to the City the proposed amendments. Design-Builder shall fully implement all such Accepted amendments.
- 3.5.3 If Design-Builder does not propose modifications to the Quality Management System and the Quality Documentation, as and when required or contemplated by this Schedule 9 *[Quality Management]*, then the versions of the QMS and the relevant Quality Documentation then in effect shall be deemed to have been re-submitted to the City. Design-Builder shall address any comments or observations provided by the City and any such comments or observations shall not be treated as a Change.

3.6 Quality Records

- 3.6.1 Design-Builder shall ensure that a complete and accurate set of quality management records (the "**Quality Records**") are maintained in accordance with the Quality Management System and Schedule 19 *[Records and Reports]*. Without limiting the documentation requirements of this Agreement, the applicable standards and the Quality Documentation, all Quality Records and other Quality Control-related documentation shall include the following:
 - (a) identification and traceability to the Project Work or item tested;
 - (b) identification and traceability of the test equipment used, if applicable;
 - (c) results of the applicable Quality Control procedure;
 - (d) remarks regarding conformance with this Agreement;
 - (e) calibration certificates and records for the testing equipment used;
 - (f) the name, position and contact information of the Design-Builder representative or the Design-Builder Person responsible for the Quality Control activity; and

- (g) the name, position, signature and contact details of the person (e.g., Quality Manager, inspector) who verified and approved the measurements.
- 3.6.2 The Quality Records shall provide objective evidence of conformance with all requirements of this Agreement, compliance with the latest version of the ISO 9001 Standard and the effective operation of the Quality Management System.
- 3.6.3 Unless otherwise agreed by the City in writing, all Quality Records and other Quality Control-related documentation shall be provided to the City prior to the Construction Completion Date with a register of all the records included in the Final Design and Construction Report. Any deviations of the register from the requirements of Section 6.2.3(f) and Section 1.4 of Appendix 9C [*Construction Quality Management Plan*] must be noted and subject to review and acceptance by the City.
- 3.6.4 Unless otherwise agreed by the City in writing, all Quality Records and Quality Control-related documentation shall be reasonably legible and provided to the City in English. Where possible, legibility of documents should support the application of Optical Character Recognition (OCR) capabilities in final documents.

3.7 Monthly Quality Management Reports

Design-Builder shall prepare and submit to the City a monthly quality summary report as part of the Monthly Progress Report. As a minimum, each such report shall include the following:

- (a) a summary of all the monthly quality management activities described in a Quality Management Plan which were performed during the applicable reporting period and any outstanding quality issues which arose, including both Design and Construction activities;
- (b) a summary of all Quality Control activities performed during the applicable reporting period complete with a brief summary of any inspections or tests which were not acceptable;
- (c) a three month look-ahead summary of all Quality Control activities planned, including any off-site inspections and activities which are listed in the Testing and Commissioning Plan and each of the Sub-plans (such as factory acceptance testing, qualification testing, and site acceptance tests);
- (d) a summary of all Nonconformities, including a running total of all Nonconformities which are open and closed, and a brief description of any issues with Nonconformities which have exceeded the prescribed rectification periods in the form of an *ad hoc* summary report in accordance with Section 9.4.1(g) or a date-filtered export from the NCR Log which includes information regarding the records to be kept in accordance with Section 9.6 [*Nonconformity Reports*] and should include Potential NCRs, as well as encompass all activities under the Design-Builder's scope relative to this Schedule;
- (e) a summary of all Quality Audits performed during the applicable reporting period, complete with any finding from the audits, including Nonconformities, opportunities for improvement and a brief audit summary;
- (f) a three month look-ahead summary of all Quality Audits planned;
- (g) a summary of all continuous improvement initiatives undertaken;

- (h) any other information required to be included in the QMS reports pursuant to any of the Appendices to this Schedule 9 *[Quality Management]* and the terms of the Quality Management Plans; and
- (i) a summary of any changes or revisions to the Quality Manual and any Quality Management Plan or related quality procedure or plan, which have been Accepted by the City.

3.8 Additional Information

Notwithstanding any other provision of this Schedule 9 *[Quality Management]*, Design-Builder shall provide the City with such information as the City may reasonably request from time to time to demonstrate compliance with the Agreement and this Schedule 9 *[Quality Management]*.

4. QUALITY MANUAL AND PHASE SPECIFIC QUALITY MANAGEMENT PLANS

4.1 Quality Manual and Quality Management Plans

4.1.1 As part of the Quality Management System, Design-Builder shall prepare:

- (a) a comprehensive Quality Manual in accordance with Appendix 9A *[Quality Manual]* of this Schedule 9 *[Quality Management]*; and
- (b) comprehensive phase specific Quality Management Plans in accordance with Appendix 9B *[Design Quality Management Plan]* and Appendix 9C *[Construction Quality Management Plan]* of this Schedule 9 *[Quality Management]*.

4.1.2 Each Quality Management Plan shall:

- (a) at all times meet the requirements of the Quality Manual; and
- (b) describe the processes and procedures to be used by Design-Builder to plan, monitor, assess and track conformance of the Project Work to all of the Project Requirements.

4.1.3 Each of the Quality Manual, Design Quality Management Plan and Construction Quality Management Plan shall be submitted to the City within 90 days after the Effective Date, or at an alternate time accepted by the City in the Submittal Schedule and Register.

4.1.4 Design-Builder shall fully implement the Accepted Quality Manual, each Design Quality Management Plan and each Construction Quality Management Plan prior to submitting any Design and commencing any Construction, as applicable, unless otherwise agreed to by the City.

5. QUALITY PERSONNEL

5.1 Quality Manager

5.1.1 Throughout the Term, Design-Builder shall retain a Quality Manager that meets the requirements for such position as set out in Appendix 26A *[Key Individuals Specific Mandatory Requirements]* of Schedule 26 *[Representatives and Key Individuals]*.

5.1.2 If the City determines that the Quality Manager is no longer able to fulfill the duties and responsibilities as a Quality Manager, the Design-Builder must nominate a designate who shall oversee all day to day project related duties and shall report to the Quality Manager. The nominated individual shall meet all the requirements for the Quality Manager as set out in Appendix 26A *[Key Individuals Specific Mandatory Requirements]* of Schedule 26

[Representatives and Key Individuals], and shall be subject to review and approval by the City prior to being added to the Quality Team and project organizational chart.

- 5.1.3 Design-Builder shall cause each Subcontractor to have a quality representative who shall report directly to the Quality Manager.
- 5.1.4 Within 90 days after the Effective Date, or at an alternate date accepted by the City in the Submittal Schedule and Register, Design-Builder shall:
- (a) submit to the City details of the Quality Manager's accreditation to the required standards as a QMS Lead Auditor; or
 - (b) submit to the City details of how the Quality Manager has obtained certification that meets the requirements for such position as set out in Appendix 26A *[Key Individuals Specific Mandatory Requirements]* of Schedule 26 *[Representatives and Key Individuals]* from an industry standard training provider and recognized certification body.

5.2 Quality Team

- 5.2.1 Design-Builder shall retain an appropriate number of suitably experienced and qualified Quality Control personnel to perform and oversee the required inspection and testing processes to support the timely implementation of the Construction Schedule (the "**Quality Team**"). The Quality Team shall retain autonomy from the personnel responsible for Design and Construction, and all Quality Management Plans shall describe how this separation of personnel will be achieved to the City's satisfaction. All final inspections shall be accepted and signed off by Quality Team personnel.
- 5.2.2 At a minimum, the Quality Team shall be composed as follows:
- (a) One experienced and qualified field staff individual for each WBS Discipline (the "**Quality Field Staff**") who are independent of the production process, and who report directly to the Quality Manager. This number may be reduced during extended periods of limited construction activity with the prior written consent of the City, acting reasonably.
 - (b) All major disciplines, including civil foundations, transportation structures, buildings, mechanical, electrical and systems, shall be represented by the Quality Field Staff as required based on the nature of the construction work at any given time.
 - (c) Materials testing personnel, laboratory testing personnel, and quality control staff dedicated to off-site fabrication, are not counted towards the required Quality Field Staff within this minimum number of Quality Field Staff.
 - (d) Each member of the Quality Field Staff shall be certified in Alberta (or other jurisdiction if acceptable to the City) as either a Professional Engineer, or a certified engineering technologist, or any other certification or professional designation related to buildings or building sciences, construction, or architecture, as approved by the City, acting reasonably, and have a minimum of three years of direct construction inspection experience on major infrastructure projects, with a preference for experience in linear civil infrastructure projects, mass transit, rail/LRT or similar projects, and also specific to the work items for which they are responsible. Experience in P3, design-build, or similar contract set up is beneficial to have for Quality Field Staff who are involved with completions and handover.
 - (e) All Quality Field Staff responsible for inspecting cast-in-place concrete shall be certified as a Concrete Field Testing Technician – Grade 1, and shall have a minimum of three

years of direct experience in concrete construction and concrete quality control inspection, including cold weather, materials, placement, and curing experience.

- (f) While bridges are being constructed, a minimum of one member of the Quality Field Staff shall meet the qualifications of Bridge Construction Inspection as defined in Appendix J3 of Volume 1 of the Alberta Transportation's "Engineering Consulting Guidelines for Highway, Bridge, and Water Projects".

5.3 Design Quality Managers

Design-Builder shall require each Design Entity to appoint an Appropriate Person who is responsible to coordinate the engineering aspects of the Project Work for that Design Entity (the "**Design Quality Manager**"). Each Design Quality Manager shall report to the Quality Manager, coordinate directly with the Design Manager and the Integration Manager, and shall ascertain that the interrelationships between the engineering disciplines have been coordinated. Each Design Quality Manager will be responsible for one or more Work Packages pursuant to Section 2 [*Integrated Project Management Team*] of Schedule 4 [*Design and Construction Protocols*] as appropriate, and based on a combination of experience and competence in the respective discipline areas. Each Design Quality Manager shall be an Appropriate Person with at least 10 years of relevant experience. The Design Quality Manager's responsibilities shall include confirming that:

- (a) all Design is performed by or under the direct supervision of an Appropriate Person, including any independent design checks resulting from regulatory requirements or otherwise;
- (b) Final Designs are signed and sealed by the Appropriate Person;
- (c) field reviews for the Design Drawings and Design Data of each of the Appropriate Persons are arranged and carried out by the Appropriate Persons, or if a designate under their direct supervision and control, which may include members of the Quality Team, while confirming that the appropriate documentation is submitted to the Appropriate Person;
- (d) Record Drawings are produced and sealed by the appropriate Registered Professional of Record, and
- (e) interfacing between disciplines and preparing the relevant records for City Quality Audits.

The Design Quality Manager will initiate actions to communicate change impacts to all relevant parties that are detected during the course of Design Reviews, and if required, provide the relevant records to initiate a Design Development Change or alternate procedure, pursuant to Section 5.3 [*Design Development Change Process*] of Schedule 13 [*Changes*].

5.4 Field Reviews of the Design by Appropriate Persons

Design-Builder shall retain Appropriate Persons who shall be responsible for the integrity and completeness of the Design and all subsequent field reviews which must include the requirements of APEGA. Whenever possible, the Appropriate Person shall be a Registered Professional of Record with at least 10 years of relevant experience.

5.5 Field Review Monitors

Design-Builder shall retain a sufficient number of suitably experienced and qualified persons to conduct field reviews for each discipline (each, a "**Field Review Monitor**"). Each Field Review Monitor shall be an Appropriate Person and have at least 5 years of relevant experience in the field. The Field Review

Monitors report to the Quality Manager and applicable Registered Professional of Record, and shall retain independence from the field crews and Construction supervision personnel. Each Field Review Monitor shall ensure that the component of the Project Work that it is responsible for is constructed in accordance with the National Building Code - Alberta Edition, if applicable, the Final Design and the Project Requirements.

5.6 Authority to Stop Work

The Construction Quality Management Plan shall identify at least one qualified person, nominated from the Design-Builder's site crew or Quality Team, who will be on Site at all times during Construction who has the authority to immediately stop any work or activity which is not being performed or carried out in accordance with the Project Requirements, the Final Designs or any applicable Quality Documentation.

6. QUALITY CONTROL – INSPECTIONS AND TESTING

6.1 Quality Control Requirements

6.1.1 Where:

- (a) Design-Builder is required by this Agreement, any of the Project Requirements, or any Quality Documentation; or
- (b) any Submittal, specifies or otherwise indicates the need,

to carry out any check, review, inspection, monitoring, calibration, sample, test or trial, such check, review, inspection, monitoring, calibration, sample, test or trial shall be carried out in accordance with the provisions of Section 6 [*Quality Control – Inspections and Testing*] and the provisions of the relevant Quality Documentation.

6.1.2 Design-Builder shall monitor the performance of all Project Work by performing, or ensuring the performance of, the appropriate checks, reviews, inspections, monitoring, calibrations, samples, tests, trials and any other actions required by the Quality Documentation. Design-Builder shall ensure and record compliance with the Submittals, the Quality Documentation and the requirements of this Agreement, including the Project Requirements and Final Designs.

6.2 Inspection and Test Plans

6.2.1 Design-Builder shall prepare and submit to the City task specific Inspection and Test Plans as part of the Construction Quality Management Plan. Design-Builder shall not commence any task which is to be the subject of an Inspection and Test Plan until the applicable Inspection and Test Plan has been Accepted by the City.

6.2.2 Each Inspection and Test Plan shall set out inspection and monitoring activities and documentation requirements to ensure that the Project Work conforms to the Project Requirements, required standards and codes and Good Industry Practice.

6.2.3 Each Inspection and Test Plan shall define the type and frequency of the inspection and testing activities, and shall include as a minimum:

- (a) the inspection or test activity name and description;
- (b) the frequency of inspections and tests;
- (c) the reference to the appropriate inspection / test procedures, standards or codes;

- (d) the personnel responsible for conducting the inspection and test activities;
- (e) the level of inspection;
- (f) the documentation requirements in the form of an index for each task specific ITP (each a **"Handover Index"**) that includes the following:
 - (i) vendor procurement data;
 - (ii) technical specifications;
 - (iii) third party reports and records;
 - (iv) material test reports or mill test reports;
 - (v) inspection and testing records;
 - (vi) any additional task specific records that may be required by the City; and
- (g) the points where Design-Builder and the City are to witness the work (**"Witness Points"**) (including identification of Design-Builder and proposed City attendance) which includes the Witness Points described in Appendix 9D [*Required Witness Points*].

6.2.4 Design-Builder shall complete all inspections and testing described in the Inspection and Test Plan. In order to corroborate any inspection and testing performed, Quality Assurance inspection and testing shall be performed as required by the Construction Quality Management Plan. Quality Assurance inspection and testing will be done independently from Quality Control inspection and testing. Additional Quality Assurance tests may be performed by the City Person(s) at any time during the Term.

6.3 Accreditation Standards

6.3.1 All Quality Control activities, including checks, reviews, inspections, monitoring, calibrations, samples, tests and trials, shall be carried out by agencies, personnel and laboratories that are duly accredited for the carrying out of such activities.

6.3.2 Laboratories shall be accredited in accordance with the laboratory accreditation requirements specifically identified in this Agreement, including the following:

- (a) concrete and cementitious materials (including activities of sampling, making, storing and transport of test pieces, taking concrete cores and carrying out concrete strength, slump, air content and density tests): CSA A283, "Qualification Code for Concrete Testing Laboratories", to the appropriate category for the tests being done and a minimum of Category II in accordance with Clause 5.3 in CSA A283 and using testing procedures in accordance with the latest edition of CSA A23.1 and A23.2;
- (b) structural steel and welding: CSA W178.1, "Certification of Welding Inspection Organizations", to the level appropriate for the inspection being carried out; and
- (c) protective coatings: "National Association of Corrosion Engineers", as appropriate to the work being carried out.

If there is not an applicable laboratory accreditation requirement identified in this Agreement, then the laboratory shall be accredited in accordance with ISO/IEC 17025, as amended, updated or

replaced from time to time, provided that, for specific activities, the City's Representative may require other industry-recognized accreditation in lieu of ISO/IEC 17025.

6.4 Notice of Inspection and Testing

6.4.1 Design-Builder shall give the City's Representative notice of all Quality Control activities for which there is an associated Witness Point in the relevant Inspection and Test Plan and any changes to those Quality Control activities, shall be given to City's Representative:

- (a) as provided in Appendix 9D [*Required Witness Points*] and occurring in Edmonton, Alberta;
- (b) at least 21 days prior to the start of the check, review, inspection, monitoring, calibration, sample, test or trial, where such activity is being performed in the rest of North America; and
- (c) at least 45 days prior to the start of the check, review, inspection, monitoring, calibration, sample, test or trial, where such activity is being performed outside of North America.

6.5 Remedial work

6.5.1 Design-Builder shall be responsible for any remedial work, including the reperformance of any Quality Control activity, required as a result of any failure to pass any check, review, inspection, monitoring, calibration, sample, test or trial required in accordance with this Agreement, any of the Project Requirements or any Quality Documentation or as a result of any laboratory not being duly accredited as required by Section 6.3 [*Accreditation Standards*]. Any such remedial work shall meet with all the requirements of this Agreement, including the Project Requirements.

6.5.2 When requested by the City, Design-Builder shall retain and preserve all test pieces which represent rejected material for a period of time to be mutually agreed upon between the City and Design-Builder.

6.6 Quality Records

All Quality Control activities shall be recorded and such documentation shall be considered a Quality Record. All Quality Records related to Quality Control activities are to be maintained in accordance with the Quality Management System and Schedule 19 [*Records and Reports*], with all record types and record templates to be listed in each Inspection and Test Plans and Handover Index.

7. QUALITY AUDITING

7.1 Quality Auditing

7.1.1 Not later than 90 days after the Effective Date, or at an alternate time accepted by the City in the Submittal Schedule and Register, Design-Builder shall submit to the City the Quality Audit Plans. Design-Builder shall submit to the City updated Quality Audit Plans at 12 month intervals thereafter.

7.1.2 Each Quality Audit Plan shall:

- (a) contain an auditing process that is capable of identifying Nonconformities, necessary Corrective Actions and Preventive Actions and facilitate continuous improvement; and

- (b) detail the Quality Audits that Design-Builder shall conduct on its own processes and those of the Subcontractors, the planned dates of such Quality Audits, and the conditions or circumstances which could give rise to an unscheduled Quality Audit.

7.1.3 Design-Builder shall provide the following advance notice to the City's Representative prior to the start of any Quality Audit, or any change to the planned date for a Quality Audit:

- (a) at least 5 Business Days for Quality Audits performed in Alberta;
- (b) at least 14 days for Quality Audits performed outside of Alberta but within North America; and
- (c) at least 30 days for Quality Audits performed outside of North America.

The notice shall describe the scope and objectives of the applicable Quality Audit. Quality Audits must be scheduled or rescheduled to meet the notice requirements outlined in this Section 7.13.

7.2 Design-Builder Audits

7.2.1 Design-Builder shall conduct Quality Audits of its own processes and those of the Subcontractors in accordance with the requirements of this Schedule 9 *[Quality Management]*, the Quality Documentation and the Quality Audit Plans, provided that the Design Quality Management Plan shall be subject to an initial Quality Audit within 180 days after the Effective Date.

7.2.2 Within 5 Business Days after the completion of any Quality Audit, Design-Builder shall document, or cause to be documented, the results of such Quality Audit in an audit report and shall provide such report to the City's Representative promptly thereafter.

7.2.3 Design-Builder shall address all findings identified by the Quality Audit and shall implement all Corrective Actions within 30 days of completion of the Quality Audit.

7.2.4 Design-Builder shall conduct Quality Audits in the manner described in Section 6.4 *[Design Management Plan]* of Schedule 4 *[Design and Construction Protocols]* to ensure that internal audits are complete during all phases of each Design on a Work Package basis, including, but not limited to the Interim Design phase as well as the Final Design phase.

7.3 Specific Requirements

Without limiting any other provisions of this Schedule 9 *[Quality Management]*:

- (a) Quality Audits shall be conducted generally in accordance with the most recent version of the ISO 19011 Standard and shall confirm that all activities comprising the Project Work are in compliance with the processes documented in the applicable Quality Management Plan;
- (b) Quality Audits shall be performed by personnel with the combination of education, work experience, auditor training and audit experience required to perform the function and a demonstrated ability to successfully apply these attributes to the role;
- (c) the Quality Manager shall schedule Quality Audits to ensure that all key processes are reviewed at least annually;
- (d) where necessary, follow-up Quality Audits shall be scheduled to ensure that identified Corrective Actions and Preventive Actions are carried out in a timely fashion;

- (e) Quality Audits shall be scheduled taking into account the status and importance of the processes being audited as well as the results of previous Quality Audits; and
- (f) Quality Audits shall be scheduled taking into account the duration of the Project Work to ensure that each Sub-Contractor is subject to at least one Quality Audit.

7.4 Third Party Audits

- 7.4.1 Design-Builder shall cause annual independent third party accreditation Quality Audits to be conducted as required by the ISO 9001 Standard by an accredited certification agency retained by Design-Builder and acceptable to the City, acting reasonably. The resulting audit reports shall be Quality Records and shall be made available to the City's Representative upon request. Design-Builder shall provide written notice to the City within 2 days after receiving any third party Quality Audit report.
- 7.4.2 Design-Builder shall address all findings identified by the independent third party auditor and shall implement all Corrective Actions within 30 days of completion of the independent third party Quality Audit.

8. CITY AUDITS

8.1 General

- 8.1.1 The City's Representative may review the Quality Documentation to identify the activities and processes identified in the Quality Manual and Quality Management Plans on which the City's auditing efforts and resources may be directed.
- 8.1.2 Design-Builder shall provide, and shall ensure the Design-Builder Persons provide, the City's auditors with all documentation, records, access, facilities and assistance required for the safety and convenience of the City's auditors. For clarity, Design-Builder has a duty to provide safe access to the relevant Site for all City Quality Audits, scheduled or unscheduled, without this access impacting the progress of the Project Work.
- 8.1.3 The City may employ independent auditors, and inspection and testing agencies. These agents of the City will be afforded the same facilitation provided to the City.

8.2 City Audits

- 8.2.1 The following types of Quality Audits may be conducted by, or on behalf of, the City in its discretion (each, a "**City Quality Audit**"):
 - (a) Work component audits, which may be scheduled or unscheduled, at the City's discretion. A work component audit is a field audit conducted to verify a specific task or component of the Project Work. The objective of these audits is to evaluate Design-Builder's and Design-Builder Person's performance of activities in respect of the Project Requirements.
 - (b) Quality process audits, which may be scheduled or unscheduled, at the City's discretion. A Quality process audit is conducted to determine whether Design-Builder and Design-Builder Persons are in full compliance with the Quality processes outlined in a particular Quality Management Plan, such as the Nonconformity processes, the Corrective Action and Preventive Action processes and the continuous improvement processes.

- (c) Subcontractor audits, which may be scheduled or unscheduled, at the City's discretion. Each subcontractor audit is conducted to determine whether the Subcontractors are in full compliance with the Quality Management System.
 - (d) Verification of independent checking, which may be scheduled or unscheduled, for each Project element noted in accordance with Section 6.9 [*Independent Checking*] of Schedule 4 [*Design and Construction Protocols*]. As part of the verification, a determination of whether the Checking Team remains independent from the Design Team and Design-Builder will be made.
- 8.2.2 Within 15 Business Days after receipt of a notice from the City of any observed Nonconformities or audit recommendations resulting from a City Quality Audit, Design-Builder shall prepare and submit a Proposed Plan and the provisions of Section 9 [*Nonconformities*] shall apply. The City reserves the right to conduct follow up audits or reviews on reasonable notice to Design-Builder, to determine if Design-Builder's Final Plan has been implemented and completed.
- 8.2.3 The City may carry out increased levels of Quality Audits (whether in number, duration or detail) of all or any aspect of the Quality Management System until such time as the City is reasonably satisfied that Design-Builder and the Subcontractors are in full compliance with the Quality Management System.
- 8.2.4 In addition to carrying out any scheduled and unscheduled Quality Audits of the Quality Management System, including auditing compliance with all Quality Documentation, as provided for in Section 8.2 [*City Audits*], the City's Representative may, at its discretion, monitor and verify the operation of the Quality Management System by, *inter alia*, carrying out spot checks and making independent inspections and tests of the Lands, the Infrastructure, Equipment, material, tools, supplies and other items provided in connection with such matters and things, including any areas of the Lands, the Infrastructure or any material which fails any test or is suspected by the City's Representative of not complying with the requirements of this Agreement.

8.3 Cost of City Audits

If the City's Representative carries out any Quality Audit pursuant to Section 8.2 [*City Audits*], and the results of such audit shows any material Nonconformity in respect of the Project Work that was not on the Nonconformity Tracking System before the Quality Audit, then, without limiting any of the City's other rights and remedies, Design-Builder shall compensate the City for all costs reasonably incurred in carrying out such Quality Audit, including all relevant administrative expenses of the City, and including an appropriate sum in respect of general staff costs and overheads.

9. NONCONFORMITIES

9.1 Written Process

Design-Builder shall develop and implement a written process for the handling of Nonconformities, which addresses the matters described in Section 9 [*Nonconformities*], as well as all matters described in Section 10 [*Corrective Action Requests*]. The written process will also address Section 1.2 in Appendix 9B [*Design Quality Management Plan*] and Section 1.2 in Appendix 9C [*Construction Quality Management Plan*].

9.2 Addressing Nonconformities

9.2.1 Design-Builder shall:

- (a) within 2 Business Days of the discovery of a Nonconformity, enter a Nonconformity Report into the Nonconformity Tracking System, which Nonconformity Report shall include at least the information described in Section 9.6 [*Nonconformity Records*];
- (b) assign each Nonconformity Report a reference number with the status 'open' within 2 Business Days of the Nonconformity Report being entered into the Nonconformity Tracking System, and shall indicate the 'open date', the time required for preparing the Proposed Plan and the time required for implementing the Final Plan;
- (c) review any plans or processes that relate to the Nonconformity, including, if applicable, any Quality Management Plans, and, if the Quality Manager identifies any amendments or changes that need to be made to such plans or processes, Design-Builder shall enter a separate Nonconformity Report (or comparable Corrective Action or Preventive Action report) with respect to such amendments or changes in accordance with the requirements of Section 9.2 [*Addressing Nonconformities*];
- (d) develop a proposed disposition plan (the "**Proposed Plan**") for Corrective Action or Preventive Action (if any action is required) to rectify the Nonconformity, including the timing and scope of the Corrective Action or Preventive Action, within 10 Business Days of the 'open date' of the Nonconformity Report, or another date if such other date is: (i) appropriate based on the nature of the Nonconformity; and (ii) acceptable to the City, acting reasonably;
- (e) finalize the Proposed Plan within 30 Business Days or within another time period accepted by the City, and shall obtain the consent or agreement to the Proposed Plan from any individuals that will be responsible for certifying completion of the relevant Project Work, including the Appropriate Person, and, if applicable, the City. The finalized Proposed Plan shall include the scope of the Corrective Action, or the Preventive Action, or both, and the timing for completion of such scope, which shall be no longer than 30 Business Days following finalization of the Proposed Plan, unless otherwise agreed by the City, acting reasonably (such finalized Proposed Plan, the "**Final Plan**");
- (f) submit to the City each Final Plan;
- (g) document and verify the implementation of the Final Plan and final rectification of the Nonconformity; and
- (h) once a particular Nonconformity has been fully rectified and the particular Final Plan has been Accepted by the City, assign the associated Nonconformity Report with the status 'closed' and record the 'closed date' in the Nonconformity Tracking System.

9.2.2 Notwithstanding anything else to the contrary in this Agreement, Design-Builder shall not proceed with that portion of the Project Work that is subject to an 'open' Nonconformity Report until such Nonconformity Report has been assigned 'closed' status in accordance with this Schedule 9 [*Quality Management*], unless the individuals responsible for certifying completion of the relevant portion of the Project Work, including the relevant Appropriate Person, permit Design-Builder to proceed with such portion of the Project Work in writing, and Design-Builder accepts all cost, schedule and other implications and impacts that may arise from proceeding with such portion of the Project Work prior to rectifying the Nonconformity.

9.2.3 For certainty:

- (a) and notwithstanding an Accepted endorsement on a Final Plan, Design-Builder shall be responsible for all cost, schedule and other implications and impacts associated with implementing a Final Plan and rectifying Nonconformities; and

- (b) a Nonconformity cannot be closed until the City has Accepted a Final Plan for that Nonconformity. If ownership of property affected by the Nonconformity is to be handed over by the City or Design-Builder to a third party, the City may require the acceptance of such third party before the City accepts the Final Plan.
- 9.2.4 If a document that is subject to the Review Procedure is to be changed in any way by the implementation of a Final Plan, then Design-Builder shall submit to the City such other changed document.
- 9.2.5 If the City issues a Potential Nonconformity Report under Section 9.3 [*Potential Nonconformity Reports*], and the City, acting reasonably, considers that Design-Builder ought to have identified and reported the occurrence of the Nonconformity before the City did so, the City shall have the right to mandate a shorter time period for developing and finalizing a Proposed Plan than is as set out in Section 9.2.1(d) and Section 9.2.1(e), or a shorter time period for the implementation of the Final Plan and completion of the scope described in the Final Plan than is as set out in Section 9.2.1(e), or both.
- 9.2.6 Nonconformity Reports may be taken into account when assessing progress of the Project Work as it relates to progress payments made pursuant to Schedule 16 [*Payment Mechanism*].

9.3 Potential Nonconformity Reports

- 9.3.1 If, at any time, the City becomes aware of a Nonconformity, the City may issue a Potential Nonconformity Report by inputting the Potential Nonconformity Report into the Nonconformity Tracking System or other process as agreed to between the City and Design-Builder, without prejudice to any of the City's other rights and remedies.
- 9.3.2 Design-Builder shall provide notice to the City within 2 Business Days after the City enters a Potential Nonconformity Report into the Nonconformity Tracking System whether Design-Builder either:
 - (a) accepts the Potential Nonconformity Report as a Nonconformity Report; or
 - (b) rejects the Potential Nonconformity Report as a Nonconformity Report.
- 9.3.3 If Design-Builder rejects the Potential Nonconformity Report, then Design-Builder shall provide the reason(s) for rejection at the same time as providing the rejection notice to the City.
- 9.3.4 If Design-Builder fails to provide notice to the City pursuant to Section 9.3.2 or fails to provide reasons with its notice, then the Potential Nonconformity Report shall be deemed to be a Nonconformity Report and shall be included in the Nonconformity Tracking System as a Nonconformity Report.
- 9.3.5 If the City accepts Design-Builder's reasons for rejecting a Potential Nonconformity Report, or if the City fails to provide notice to Design-Builder that the City does not accept Design-Builder's reasons for rejecting a Potential Nonconformity Report within 5 Business Days of receiving Design-Builder's reasons for rejection, then the Potential Nonconformity Report shall be assigned the status 'closed'.
- 9.3.6 If the City does not accept Design-Builder's reasons for rejecting a Potential Nonconformity Report, then the City may request Design-Builder to provide such further information to substantiate Design-Builder's rejection of the Potential Nonconformity Report and Design-Builder shall provide such information within 2 Business Days of such request, or the City may require the Potential Nonconformity Report be entered as a Nonconformity Report on the Nonconformity Tracking System, or both. If Design-Builder continues to disagree with the Potential

Nonconformity Report becoming a Nonconformity Report Design-Builder may refer the matter to the Dispute Resolution Procedure.

9.4 Nonconformity Report Tracking System

9.4.1 Within 90 days after the Effective Date, or at an alternate time accepted by the City in the Submittal Schedule and Register, Design-Builder shall fully implement, and shall maintain throughout the Construction Period, a Nonconformity Tracking System to monitor the status of all Nonconformity Reports initiated by Design-Builder and the City. The Nonconformity Tracking System shall be fully operational, and shall:

- (a) comprise a single repository containing both Nonconformity Reports and Potential Nonconformity Reports in the form of a log with functions which allow the end user to filter by individual report criteria or have the ability to be exported into a format similar to that of a log (the “**NCR Log**”);
- (b) have the ability to attach supporting material, such as photos and documents, to a Nonconformity Report and a Potential Nonconformity Report;
- (c) provide remote access to:
 - (i) input and update Nonconformity Reports and Potential Nonconformity Reports; and
 - (ii) update the current status, dates, data and supporting material for all Nonconformity Reports and Potential Nonconformity Reports;
- (d) be available to designated City Persons at all times without payment, using a secure online Internet based system, acceptable to the City acting reasonably;
- (e) include links to Corrective Actions and Preventive Actions related to the Nonconformity Reports and Potential Nonconformity Reports;
- (f) provide automatic, user-configurable, notifications whenever a Nonconformity Report or a Potential Nonconformity Report is inputted or any information regarding a Nonconformity Report or Potential Nonconformity Report is updated or modified;
- (g) have built-in query functionality that can be used to produce *ad hoc* summary reports;
- (h) be able to differentiate between Nonconformity Reports and Potential Nonconformity Reports that relate to the Design and Construction (a “**Product NCR**”) and Nonconformity Reports and Potential Nonconformity Reports that relate to process and procedure (a “**Process NCR**”); and
- (i) be able to differentiate between whether the Corrective Action identified on a report is a Proposed Plan or Final Plan as well as any associated dates and deadlines.

9.4.2 Subject to the City’s consent, Design-Builder may track Process NCR’s through a separate tracking system.

9.5 Unrectified Nonconformities

9.5.1 The City may issue a Potential Nonconformity Report if a Nonconformity identified in a Nonconformity Report continues without rectification beyond the time provided in the Final Plan or as otherwise required pursuant to Section 9.2.5.

- 9.5.2 All Nonconformity Reports must be closed as per Section 9.2.2 in order to achieve Construction Completion.
- 9.5.3 The City may require that the Design-Builder issue a Corrective Action Request if any number of Nonconformities occur which meet the requirements of Section 10 [*Corrective Action Requests*]. The City may issue a Corrective Action Request if there is undue delay on the part of the Design-Builder in rectifying multiple Nonconformities which may have direct impacts (or anticipated direct impacts) on the Quality of the Infrastructure, the scope of the Project Work, the Construction Schedule or which may have financial impacts.
- 9.5.4 If a Final Plan is found not to effectively rectify a Nonconformity, or fails to correct an identified Root Cause, the Nonconformity Report is to be upgraded to a new Corrective Action Request, or added to the list of an existing CAR if the Root Cause is already identified as significantly higher risk or requiring additional action in accordance with Section 10.1.2(c).

9.6 Nonconformity Records

Design-Builder shall maintain records of:

- (a) each Nonconformity, traceable to processes, actual parts, components, locations, drawings and data sheets as appropriate;
- (b) the date of the occurrence of the Nonconformity;
- (c) the reference numbers of all Nonconformity Reports;
- (d) a description of all Nonconformity Reports;
- (e) the proposed disposition of each Nonconformity;
- (f) the date and time at which Nonconformities were identified or discovered;
- (g) the date and time at which Nonconformities were entered into the Nonconformity Tracking System ('opened date');
- (h) the due date for the preparation of the Proposed Plan and the Final Plan, and the due date for rectifying the Nonconformity;
- (i) the date and time at which a Nonconformity specified in a Nonconformity Report was rectified ('closed date');
- (j) identification of the Nonconformity as a Process NCR or Product NCR;
- (k) the date the Final Plan was completed;
- (l) the date the Final Plan was submitted to City;
- (m) the date the Final Plan was Accepted by the City, and
- (n) the priority rating of the NCR, which will be categorized as either:
 - (i) "Important" or
 - (ii) "Requires Immediate Action".

10. CORRECTIVE ACTION REQUESTS

10.1.1 Design-Builder shall develop and implement a written process for the handling of

- (a) repeated instances of Nonconformities, Potential Nonconformities, and Nonconformity types; and
- (b) amalgamations of Nonconformities, Deficiencies, defects or undesirable situations that share a set of common Root Causes

(“**Corrective Action Requests**” or “**CARs**”).

10.1.2 The City may require the Design-Builder to submit a CAR if one or more of the following conditions are met:

- (a) multiple Nonconformities with the same or similar result or outcome;
- (b) multiple Nonconformities with the same or similar Root Cause;
- (c) evidence that previous Corrective Actions were ineffective at addressing a particular root cause or Nonconformity or did not address a particular root cause or Nonconformity;
- (d) submission of a Preventive Action or any other report that should be correctly identified as or re-submitted as a Nonconformity Report; and
- (e) two or more Nonconformities having occurred in the same week.

10.1.3 If a Root Cause is found not to be adequately addressed by a previously-approved Final Plan, or if Corrective Action is unable to address the root cause as intended,

- (a) it will form the basis of a new Potential Nonconformity Report; and
- (b) it could form the basis of a new Corrective Action Request if multiple instances of closed Nonconformities need to be addressed by new Potential Nonconformity Reports.

10.1.4 Design-Builder shall maintain records of CARs as per Section 9.6 [*Nonconformity Records*] and maintain traceability of CAR statuses on the NCR Log as per Section 9.4 [*Nonconformity Report Tracking System*].

10.1.5 Design-Builder shall prioritize the closing of CARs containing NCRs noted as “Requires Immediate Attention” and maintain traceability of CAR statuses on the NCR Log.

10.1.6 The Corrective Action Request can be closed once all the constituent Nonconformities, Deficiencies, defects or undesirable situations are resolved, and the Root Cause or set of common Root Causes are shown to be addressed, and no further Nonconformities, Deficiencies, defects or undesirable situations of the same type have been encountered.

10.1.7 Design-Builder shall address and close all CARs within 30 days from date on which the CAR was submitted.

11. NON-PERFORMANCE EVENTS

Failure by Design-Builder to comply with the obligations set forth in this Schedule 9 [*Quality Management*] may constitute Non-Performance Events and may result in adjustments to the Payments, as more particularly provided in Schedule 16 [*Payment Mechanism*].

APPENDIX 9A QUALITY MANUAL

- 1.1 The Quality Manual shall describe the Quality Management System for all aspects of the Project Work.
- 1.2 The Quality Manual shall establish the Quality Policy and Quality Objectives for all aspects of the Project Work and, in accordance with the requirements of the then most current version of the ISO 9001 Standard, shall describe the processes that shall be established, implemented, controlled, and continually improved to achieve the established Quality Objectives.
- 1.3 The Quality Objectives described in the Quality Manual shall be measurable and consistent with the Quality Policy while meeting the requirements of the then most current version of the ISO 9001 Standard and this Agreement.
- 1.4 The Quality Manual shall detail the quality procedures, including:
 - (a) documented document control procedures;
 - (b) documented records control procedures;
 - (c) documented audit procedures;
 - (d) documented Nonconformity procedures, and
 - (e) documented procedures for Corrective Action Requests.
- 1.5 The Quality Manual shall detail the hierarchy and links between all Quality Documentation.
- 1.6 The Quality Manual shall describe in detail how Design-Builder's key management personnel shall interface to achieve the Quality Objectives. An organizational chart shall be included together with a summary of the responsibilities and authorities of all such key personnel.

**APPENDIX 9B
DESIGN QUALITY MANAGEMENT PLAN**

- 1.1 The Design Quality Management Plan shall describe how Design-Builder will manage the Design activities in accordance with the Quality Manual, the Agreement and all Project Requirements. The requirements listed below for the Design Quality Management Plan shall be incorporated into the Integrated Project Management Plan and the Design Management Plan, in part or in whole, as practical, and as needed, pursuant to Schedule 4 [*Design and Construction Protocols*], if it can be achieved in a practical manner.
- 1.2 The Design Quality Management Plan shall, at a minimum, describe how Design-Builder will perform the following processes:
- (a) design input and output review;
 - (b) design verification to ensure that design input requirements have been met;
 - (c) design validation to ensure that the final product is capable of meeting its intended use;
 - (d) design change management;
 - (e) interdisciplinary coordination;
 - (f) design Sub-Contractor quality assessment and procurement;
 - (g) Quality Audits of Design-Builder and Sub-Contractors;
 - (h) Corrective Actions, Preventive Actions and opportunities for improvement;
 - (i) document management; and
 - (j) control of Quality Records.
- 1.3 The Design Quality Management Plan shall describe in detail how Design-Builder's Design personnel shall interface to achieve the Design requirements. An organizational chart shall be included together with a summary of the responsibilities and authorities of all such personnel.
- 1.4 The Design Quality Management Plan shall describe in detail the organizational interfaces between the Design Quality Manager and his design quality management team and the Quality Manager.
- 1.5 At all times the Design Quality Management Plan shall be in compliance with APEGA Quality Management guidelines.
- 1.6 Design-Builder shall include the following Quality Control processes in respect of Design as part of each Design Quality Management Plan:
- (a) Design Input Identification - Design-Builder shall identify Design inputs prior to the assignment of any Design work. The design criteria shall be identified to clearly define the conditions and standards on which the designs shall be based to ensure compliance with the Project Requirements. All Design inputs shall be recorded as a Quality Record.
 - (b) Design Outputs - All Design outputs shall meet the Design input requirements as confirmed through a systematic checking, reviewing and approval process before release for procurement and/or construction.

- (c) Reviewing – Design-Builder shall review all designs. Design review is a basic and required process and should be performed by the entity producing a design document. At a minimum, all design documents shall be reviewed to ensure general conformance with established procedures, that the appropriate format is achieved, the practicality of numbers, and that there are no missing items. Design-Builder shall retain a permanent record of all Design reviews.
- (d) Internal Checking – Prior to the submission of design documents to the City, all such design documents shall be checked by qualified engineer(s) who were not responsible for the original design. This internal check engineer shall be registered as a professional engineer in their home jurisdiction. Checking is a detailed methodical process to verify the design documents are technically functional and appropriate and in compliance with the Project Requirements, regulatory requirements and current codes. Failure to provide evidence in the form of documented information of successful completion of internal checking requirements prior to the release of the design(s) will be considered a Nonconformity.
- (e) Design Verification - The verification process entails the comparison of all design concepts, design assumptions, inputs and outputs with the Project Requirements to confirm that the design satisfies the functional requirements. Design verifications are formal processes which shall be planned to correspond with major milestones of the design, and, at the City’s discretion, shall include representatives from the City. Design-Builder shall retain a permanent record of all verification reviews.
- (f) Design Validation - Design validation shall be performed upon completion of construction of every major component of the Infrastructure to determine if the final product is capable of meeting the objectives and requirements for the specified application or intended use. Design-Builder shall retain a permanent record of all validation reviews.
- (g) Design Change Management - As design changes are inevitable, any contemplated design change shall be reviewed by Design-Builder using the same processes that were used to review the original design. Design changes and modifications are required to be identified, documented, reviewed and approved to the same level as the original design. Design-Builder shall retain a permanent record of all design change reviews.
- (h) Interdisciplinary Coordination - Interdisciplinary coordination is the process whereby decisions made by one engineering discipline are communicated to all other disciplines to ensure coordination and to help mitigate the possibility of contradictory design outputs. When numerous disciplines contribute to a design output, an interdisciplinary coordination process is required. Design-Builder shall retain a permanent record of all interdisciplinary coordination reviews.
- (i) Software Calibrations - Design-Builder’s designers shall make certain all design software is calibrated or compared with manual calculations or calculations generated by another software package to ensure accuracy.
- (j) Independent Checking - the Checking Team procedure is detailed in Section 6.9 [*Independent Checking*] of Schedule 4 [*Design and Construction Protocols*]. Failure to provide evidence in the form of documented information of successful completion of independent checking requirements prior to the release of the design(s) will be considered a Nonconformity.

- 1.7 The Design-Builder shall include key activities on their Inspection and Test Plans however they will be subject to review in accordance with Section 6.2 [*Inspection and Test Plans*] and Appendix 9D [*Required Witness Points*] with noted deviations requiring communication with and Acceptance by the City.

**APPENDIX 9C
CONSTRUCTION QUALITY MANAGEMENT PLAN**

- 1.1 The Construction Quality Management Plan shall describe how Design-Builder will manage the Construction activities in accordance with the Quality Manual, this Agreement and all Project Requirements.
- (a) The Construction Quality Management Plan shall include details on the scheduling and timing of Pre-Construction meetings for each major phase of construction. These details take into consideration that:
 - (i) The registered Professional of Record and/or Field Review Monitor shall attend a Pre- Construction Meeting;
 - (ii) The Design-Builder shall submit work procedures related to Quality Assurance and Quality Control to the Appropriate Person for review and approval prior to submitting to the City for review in advance of the PreConstruction Meeting; and;
 - (iii) The Design-Builder shall submit equipment data sheets and equipment NDTs for Appropriate Person review and approval and City review prior to PreConstruction Meeting (example, piling hammer, crane pre-operational checks, etc.)
 - (b) If the Appropriate Person and/or Field Review Monitor cannot attend the Pre-Construction meeting, it shall be rescheduled until which time that attendance is guaranteed.
- 1.2 The Construction Quality Management Plan shall, at a minimum, describe how Design-Builder will perform the following processes:
- (a) inspection, calibration, sampling, testing, trials and monitoring in accordance with Appendix 9D *[Required Witness Points]*;
 - (b) materials identification and traceability;
 - (c) Sub-Contractors' quality assessment and procurement;
 - (d) Quality Audits, including of Sub-Contractors engaged in Construction activities;
 - (e) control of nonconforming product;
 - (f) Corrective Actions, Preventive Actions and opportunities for improvement;
 - (g) document management; and
 - (h) control of Quality Records.
- 1.3 In addition to any other requirements of this Agreement, the Construction Quality Management Plan shall include:
- (a) an organizational chart identifying key Construction quality management personnel and the linkage with the Quality Manager for Design-Builder's overall Quality Management System as documented in the Quality Manual;
 - (b) a description of the responsibilities, qualifications, and authority of the above personnel;

- (c) a description of the organizational interfaces between the above personnel and the design and other disciplines;
 - (d) identification of all Sub-Contractors engaged in Construction activities; and
 - (e) identification of all laboratories, inspection agencies and inspectors used by Design-Builder in connection with the Construction activities, including evidence of their accreditations and contact information.
- 1.4 Final submissions of construction Quality Records must at minimum be structured around the Accepted Handover Index and in accordance with Section 6.2 [*Inspection and Test Plans*] with noted deviations requiring communication with and Acceptance by the City.

**APPENDIX 9D
REQUIRED WITNESS POINTS**

- 1.1 This Appendix is applicable to the following project phases:
- (a) Design;
 - (b) Construction; and
 - (c) Commissioning and start-up.
- 1.2 For the activities noted in Table 9D [*Required Witness Points*], the Design-Builder will provide the City with written notification in accordance with the notice period associated with the activities. During the notice period, the Design-Builder will provide the City with all documentation associated with the activity. Written notification in the form of e-mail is acceptable.
- 1.3 The notice periods noted in Table 9D [*Required Witness Points*] are considered to be minimum for the activities noted. The Design-Builder is responsible to ensure that additional activities and longer notice periods that may be required in compliance with Good Industry Practice are included.
- 1.4 The Design- Builder will provide written notice to the City in accordance with the following:
- (a) 24 hour notifications are equal to 1 Business Day;
 - (b) 48 hour notifications are equal to 2 Business Days; and
 - (c) notifications sent after 4 PM will be considered to have been sent the next Business Day at 8 AM.
- 1.5 Inspection and Test Plans submitted by the Design-Builder will distinguish between 24 hour notifications and 48 hour notifications in a manner acceptable to City and detailed in the Quality Management Plans.
- 1.6 If the City identifies gaps in the Inspection and Test program, the City may require that additional Witness Points be included.
- 1.7 If the Appropriate Person identifies gaps in the Inspection and Test program, the Appropriate Person may require that additional Witness Points be included.

Table 9D - Required Witness Points

PHASE	ACTIVITY - CATEGORY	NOTICE PERIOD (Hours)
DESIGN	Building Permit	24
DESIGN	IFC Drawings Complete	48
DESIGN	Issued for Building Permit Documents	48
DESIGN	Masonry Materials (Approval)	48
DESIGN	Trial Batching and Testing	48
CONSTRUCTION	Asphalt Placement	24

PHASE	ACTIVITY - CATEGORY	NOTICE PERIOD (Hours)
CONSTRUCTION	Base Preparation	48
CONSTRUCTION	Bearing Installation	48
CONSTRUCTION	Concrete (Precast) Erection	24
CONSTRUCTION	Concrete Post-Pour Inspection (Finishes, Repairs, Patching, etc.)	48
CONSTRUCTION	Concrete Post-Pour Inspection (Precast)	48
CONSTRUCTION	Concrete Pour (Deck)	48
CONSTRUCTION	Concrete Pour (General)	24
CONSTRUCTION	Concrete Pour (Mass)	48
CONSTRUCTION	Concrete Pour (Precast)	48
CONSTRUCTION	Concrete Pre-Pour Inspection (Reinforcement, Formwork, etc.)	48
CONSTRUCTION	Concrete Repair Demonstration	48
CONSTRUCTION	Concrete Repair Surface Preparation	24
CONSTRUCTION	Connection LRT Sanitary Servicing to COE Sanitary System	24
CONSTRUCTION	Connection of LRT Service to Any Other Utility	24
CONSTRUCTION	Connections - Sanitary System	48
CONSTRUCTION	Deck Joint Flood Test	24
CONSTRUCTION	Deck Joint Installation	48
CONSTRUCTION	Deck Overlay Test Slabs	48
CONSTRUCTION	Deck Pour Machine Set-up	48
CONSTRUCTION	Deck Waterproofing Installation	24
CONSTRUCTION	Disinfection and Sampling/Testing of Water Mains	48
CONSTRUCTION	Domestic Water Systems Installation and Testing	48
CONSTRUCTION	Dowel Pull Testing	48
CONSTRUCTION	Drainage - Retesting for Failed Test Results	24
CONSTRUCTION	Excavation - Foundation Final Leveling and Bearing	48
CONSTRUCTION	Excavation - Material Removal	24
CONSTRUCTION	Field Post-Tensioning	24
CONSTRUCTION	Geotechnical Certificate	48
CONSTRUCTION	HVAC Equipment Installation and Testing (AHUs, Boilers, Heaters, AC Units, etc.)	48
CONSTRUCTION	Leakage Testing – Sewers & Sewers Forcemains	24
CONSTRUCTION	Mandril Test	24
CONSTRUCTION	Masonry Installation	24
CONSTRUCTION	Mock-up Site Reviews and Inspections	48
CONSTRUCTION	Non-Destructive Testing and Inspections (On-Site)	48
CONSTRUCTION	PDA Testing	24
CONSTRUCTION	Piling Final Bearing	48

PHASE	ACTIVITY - CATEGORY	NOTICE PERIOD (Hours)
CONSTRUCTION	Piling Final Set	24
CONSTRUCTION	Placing of Water Mains	24
CONSTRUCTION	Plumbing Drainage System Installation and Testing	48
CONSTRUCTION	Post Asphalt Inspection	48
CONSTRUCTION	Pressure Testing (all kinds)	48
CONSTRUCTION	Proof Roll	48
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