111

mac

State of New Hampshire

DEPARTMENT OF ADMINISTRATIVE SERVICES
25 Capitol Street – Room 100
Concord, New Hampshire 03301
(603) 271-3201 | Office@das.nh.gov

Charles M. Arlinghaus
Commissioner

Catherine A. Keane
Deputy Commissioner

Sheri L. Rockburn
Assistant Commissioner

January 30, 2024

His Excellency, Governor Christopher T. Sununu
and the Honorable Council
State House
Concord, New Hampshire 03301

Re: Statewide Mechanical Engineering Services Consultant Agreement – CHA Consulting, Inc. for Professional Design and Construction Documents, On-site Observation, and Inspection for Mechanical Engineering Services for Public Works' Projects.

REQUESTED ACTION

Authorize the Department of Administrative Services, Division of Public Works Design and Construction to enter into an agreement with CHA Consulting, Inc. (VC# 221991) 111 Winners Circle, Albany, New York, 12205 for Mechanical Engineering Services required for planning, design and construction of various Public Works' Projects as necessary and required by the Department. The contract is effective from the date of Governor and Council approval through June 30, 2027. The amount expended under this agreement shall not exceed $500,000.

EXPLANATION

The Department proposes to retain the private consulting firm to expedite the current project workload and provide appropriate technical expertise as required for specific projects. This is one (1) of five (5) open-ended agreements for Mechanical Engineering Services that will be presented for approval. The agreement will enable the Department to respond quickly to unscheduled project requests and possible emergencies regarding Mechanical Engineering issues. The decision as to which projects will be assigned will be made on a case-by-case basis depending on the particular expertise required and the firm's current workload.

This type of consulting agreement will be funded from the monies for each project. The majority of projects needing this type of Mechanical Engineering Services consultant work are maintenance and capital funded projects.

This agreement is a proposed contract with the Mechanical Engineering Services firm selected to provide on-call Mechanical Engineering Services. It is anticipated that Mechanical Engineering Services can be handled by five (5) Engineering firms through the contract period.

The consultant selection process employed by the Department for this project is in accordance with RSAs 21-I:22, 21-I:22-c, and 21-I:22-d, all applicable Federal Laws and the Department's procedures for "Selection of Engineers, Architects and Surveyors" dated July 28, 2005. Consensus scoring was used in this selection process in order to assure that the perspective of each committee member received proper consideration during scoring deliberations. The following members of the NH Division of Public Works Design and Construction were on the selection committee: Theodore Kupper, P.E – Director; Michelle Juliano, P.E. – Deputy Director; and David Goulet – Public Works Project Manager III. Each member brings different strengths and knowledge to the table. This allows thorough discussion and weighing of the different perspectives during the scoring process. This process also makes follow-up explanations to the unselected firms easier.

In June 2023, the Division of Public Works Design & Construction solicited Registered Mechanical Engineers, by public announcement in the State, for interest in providing on-call Mechanical Engineering Services. The following eight (8) consultant firms submitted letters of interest.

B2Q
CHA Consulting, Inc.
DuBois & King
Harriman Associates, Inc.
HL Turner Group
McFarland-Johnson, Inc.
Oak Point Associates
SMRT, Inc.

These firms were evaluated based on years of experience, experience on relative projects and past experience with the Division of Public Works, if any. The seven (7) rated firms listed below, were sent a Request for Technical Proposals:

B2Q
CHA Consulting, Inc.
DuBois & King
Harriman Associates, Inc.
McFarland-Johnson, Inc.
Oak Point Associates
SMRT, Inc.

The proposals were rated on the comprehension of the assignment, clarity of the proposal, capacity to perform in a timely manner, quality and experience of the project manager and team, and overall suitability for the assignment.

It is now the Department's intent to enter into Statewide Consultant Service Agreements with the five (5) highest rated firms as their legal documentation and Certificate of Insurance become available.

CHA Consulting, Inc.
DuBois & King
Harriman Associates, Inc.
McFarland-Johnson, Inc.
SMRT, Inc.

A copy of CHA Consulting, Inc.'s Statement of Qualifications is provided, herewith, for your information and convenience.

The subject agreement has been approved by the Attorney General as to form and execution. Copies of the fully executed agreement are on file at the Secretary of State's Office and the Department of Administrative Services, Division of Public Works Design & Construction.

Respectfully submitted,

Charles M. Arlinghaus,
Commissioner

Attachments: CHA Consulting, Inc.'s Statement of Qualifications

cc: Theodore Kupper, P. E.,
Director

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF PUBLIC WORKS DESIGN & CONSTRUCTION

STATEWIDE AGREEMENT
FOR
PERFORMING PROFESSIONAL SERVICES FOR DESIGN AND CONSTRUCTION DOCUMENTS, ON-SITE OBSERVATION, AND INSPECTION SERVICES FOR VARIOUS PROJECTS

CHA CONSULTING, INC.
111 WINNERS CIRCLE
ALBANY, NY 12205

EXHIBIT INDEX

1. Exhibit 'A': Technical Proposal dated October 6, 2023, 27 pages.

2. Exhibit 'B': CHA Consulting, Inc., Wage Rates, 3 page.

3. Exhibit 'C': Quality Assurance/Quality Control Program from CHA Consulting, Inc., 121 pages.

4. Exhibit 'D': Required Contract Terms for Programs Funded by ARPA SFRF, 12 pages

These documents, in the aggregate, constitute the total scope of professional service requirements for this project. If a conflict should occur between any of these documents, the highest or greatest, or most complete scope or standard or task shall take precedence.

DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF PUBLIC WORKS DESIGN & CONSTRUCTION

AGREEMENT FOR PROFESSIONAL SERVICES

THIS AGREEMENT made this 13 day of DECEMBER, in the year 2023 by and between the STATE OF NEW HAMPSHIRE, hereinafter referred to as the STATE acting by and through the COMMISSIONER OF THE DEPARTMENT OF ADMINISTRATIVE SERVICES; hereinafter, referred to as the DEPARTMENT, acting under NH RSA chapter 21-I, as amended and CHA Consulting, Inc., 3 Winners Circle, Albany, NY 12205 (Vendor No. 221991), hereinafter, referred to as the CONSULTANT, witnesses that:

WHEREAS, the DEPARTMENT, requires professional services to provide for design and construction documents, on-site observation, and inspection services for various projects, as they may occur throughout the STATE;

NOW THEREFORE, in consideration of the undertakings of the parties hereinafter set forth, the DEPARTMENT hereby engages the CONSULTANT, as an independent contractor and not as a STATE agency or employee, to perform the professional services required for the planning, design, and construction of projects including but not limited to feasibility studies, programming, site and building assessments and inspections, construction documents, computerized building simulation, life cycle costing, on-site observation and inspection services, as required, for various projects, as they may occur, in accordance with Exhibits 'A', 'B', 'C', and 'D' and the following terms and conditions. Payment for such services on each project shall be at the hourly rates as per the attached schedule (Exhibit 'B'), plus mileage at the prescribed STATE rate in effect at the time of service occurrence, as a not-to-exceed fee, or, shall be a mutual agreed upon lump sum fee. For each project identified by the DEPARTMENT, the CONSULTANT shall first submit a proposal for the professional services required. The proposal shall include a fee for the services required, a detailed, by phase, description of the proposed services, and a date of completion of each phase for the rendering of services required. The CONSULTANT shall not proceed with work until a Notice to Proceed is issued by the DEPARTMENT, and such work shall not exceed the proposed fee unless there is an additional Notice to Proceed issued by the DEPARTMENT for additional services.

TERMS AND CONDITIONS

PART 1 FEE:

1. Payments on the account of the CONSULTANT'S services shall be made on the basis of the statement submitted by the CONSULTANT at the time of the service occurrence on a monthly basis and approved by the DEPARTMENT.

2. Payment will be based upon the

   A. Direct Labor Rate. The maximum Direct Labor Rate allowed for all labor classifications under this AGREEMENT shall be $80 per hour for the life of the AGREEMENT.

   B. Contract Labor Rate. The Contract Labor Rate is the sum of the Direct Labor Rate and the Overhead and Burden.

   C. Fixed Fee. A Fixed Fee for profit and non-reimbursed costs shall be a negotiated amount based upon the estimated risk to be borne by the CONSULTANT. The maximum Fixed Fee shall be 12% of Contract Labor Rate.

3. Payment will be calculated as follows:
   A. Contract Labor Rate ($/hr) + Fixed Fee [12% maximum] ($/hr) = Total Hourly Wage per employee.

4. Payments on the account of the CONSULTANT'S basic services shall be made in proportion to the services performed so that compensation at the completion of each phase shall equal the following percentages of the total basic compensation:

   A. Schematic Design Phase 15%

   B. Design Development Phase 35%

   C. Construction Documents Phase 75%

   D. Bidding and Negotiation Phase 80%

   E. Construction Administration Phase 100%

5. For projects with limited phases, compensation on the account of the CONSULTANT shall be made in proportion to the services performed, and shall apply to a predetermined percentage for each of the limited phases.

6. For projects where detailing the phases of services to be performed does not apply, payment on the account of the CONSULTANT shall be made in proportion to the services performed as determined by the DEPARTMENT.

7. Billings shall be in accordance with Exhibit 'B' (Note: All rate changes to the Exhibit 'B' during the life of the agreement shall be subject to the approval of the DEPARTMENT and shall be rates that are implemented on a company wide basis) or, as formerly documented and approved by the DEPARTMENT prior to services being performed.

8. Employees not listed on Exhibit 'B' shall be compensated at a multiple of two and one quarter (2.25) times the employee's Direct Personnel Expense.

9. Additional services of professional sub-consultants shall be computed at a multiple of one and one tenth (1.1) times the amount billed to the CONSULTANT for such services.

10. Direct personnel expense of employees engaged on the project includes architects, engineers, and other technical employees in producing drawings, specifications, and other documents pertaining to the project. Such expenses shall include cost of salaries as well as mandatory and customary benefits.

11. All costs as described in the foregoing paragraphs are to be determined by actual records kept during the term of the AGREEMENT which are subject to audit by the STATE and Federal Governments. The final payment and all partial payments made may be adjusted to conform to this final audit. In no case will any adjustments exceed the total agreed upon not-to-exceed or lump sum fee amount. All sub-consultant costs may also be subject to audit by the STATE and Federal Governments.

PART 2 ASBESTOS:

1. The CONSULTANT shall have no direct responsibility for the investigation, detection, abatement, replacement, or removal of products, materials, or processes containing asbestos. If any asbestos is encountered during the design or construction of the project, it shall be the responsibility of the DEPARTMENT to negotiate a fee with the CONSULTANT to provide for the services, or sub-consultant required for the detection, abatement, replacement, or removal of the products, materials, or processes containing asbestos.

PART 3 DESIGN GUIDELINES:

1. The CONSULTANT agrees to follow the provisions of the current DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION's Design Guidelines, the DEPARTMENT's Interior Space Planning Standards, as well as, the Department's High Performance Design Standard, and amendments thereto, or other professional codes or standards applicable to the services to be performed under this AGREEMENT. When a publication (including interim publications) is specified, it refers to the most recent date of issue in effect at the time of execution of this AGREEMENT.

PART 4 PROJECT DELIVERY METHOD:

1. The CONSULTANT shall provide services for projects in accordance with one of the following delivery methods:

   A. Standard Design – Bid – Build

B. Standard Design – Build

C. Bridged Design – Build

D. Construction Management

2. The DEPARTMENT may remove or add project delivery methods at any time. A detailed scope of services will be defined for each specific project.

PART 5 CONSULTANT'S BASIC SERVICES:

1. The CONSULTANT'S basic services shall consist of the five phases described below or any combination thereof.

   A. SCHEMATIC DESIGN PHASE: The CONSULTANT shall consult with the DEPARTMENT through the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION to ascertain the requirements of the project and shall confirm such requirements through the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION.

      1) The CONSULTANT shall prepare Schematic Design Studies, consisting of drawings and other documents illustrating the scale and relationship of the project components, together with a semi-detailed estimate of construction costs, submitting three (3) sets of these studies to the DEPARTMENT for authorization to proceed to the next phase by the DEPARTMENT through the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION.

      2) The CONSULTANT shall present the Schematic Design Documents at a review meeting with the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION and the Using Agency. The presentation shall contain justification of the concept selected plus a review of options as applicable for the type of project.

   B. DESIGN DEVELOPMENT PHASE: The CONSULTANT shall prepare, from authorized Schematic Design Studies, the Design Development Documents, consisting of drawings and other documents to fix and describe the size and character of the entire project including utilities, materials and methods, as required, together with a more detailed estimate of construction costs, submitting three (3) copies of these studies to the DEPARTMENT for authorization to proceed to the next phase by the DEPARTMENT through the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION.

      1) The CONSULTANT and representatives of each of the consultant engineering disciplines required for the project type shall present the Design Development Documents at a review meeting with the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION and the Using Agency. The presentation shall include justification of selections and impacts of decisions on life cycle costs. The documents shall describe the project sufficiently to allow for thorough evaluation.

2) As a minimum, the Design Development package shall include:

   a. Definitive Drawings

      (1) Site plan

      (2) Floor plans

      (3) Elevations

      (4) Section

      (5) Systems line drawings

   b. Narrative building description including all systems and performance criteria.

   c. Outline specifications including all divisions proposed for final specifications.

   d. Detailed cost estimate itemized by specification heading.

   e. Narrative analysis of any disproportionate budget monies assignments, if any, with justifications.

   f. Documented cost/benefit research of options reviewed by each design team discipline.

C. CONSTRUCTION DOCUMENTS PHASE: The CONSULTANT shall prepare, from authorized Design Development Documents, working drawings and specifications, setting forth in detail the requirements for the construction of the entire project, in cooperation with the requirements of the Project Architect/Engineer of the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION.

   1) Construction documents shall comply with all current applicable Federal, STATE, and local codes, laws, regulations, and requirements applicable to the project in effect as of the date of the advertising of the project.

   2) The CONSULTANT hereby agrees that the construction documents shall be produced in 1/8-inch scale or larger, measuring 24 inches by 36 inches with a 1/2-inch border and a binding border of 1-1/2 inches, unless larger sheets are approved by the DEPARTMENT.

   3) The CONSULTANT with the cooperation of the DEPARTMENT shall prepare the technical specifications in the Construction Specifications Institute's format. Specifications shall be on "bond paper", suitable for reproduction. The Drawings which have been completed by a computer aided drafting system shall be presented to the DEPARTMENT in .DXF or the Department's current release of AutoCAD format. Back of the Plan Sheets shall be labeled with its corresponding electronic file name. The Specifications which have been completed by a computerized word processing system shall be presented to the DEPARTMENT in the Department's current release of Microsoft Word format. The formats and file names shall be clearly identified on the diskettes.

   4) The CONSULTANT shall provide an original wet seal(s) on final construction documents.

5) The CONSULTANT shall advise the DEPARTMENT of any adjustments to previous statements of probable construction costs indicated by changes in program or requirements and shall deliver to the DEPARTMENT a detailed construction cost estimate based on all items of the construction documents.

6) The CONSULTANT shall deliver three (3) sets of prints of the working drawings and specifications to the DEPARTMENT for final review and authorization to proceed to the next phase prior to submitting the original construction documents.

7) The CONSULTANT shall include an affidavit confirming that the construction documents have been reviewed by the CONSULTANT in accordance with the CONSULTANT'S quality assurance/quality control (QA/QC) program (Exhibit "A").

D. BIDDING AND NEGOTIATION PHASE: The CONSULTANT shall assist the DEPARTMENT in preparing the necessary addenda, during the bidding period, and shall assist in negotiations, as required, prior to award of the construction contract.

E. CONSTRUCTION ADMINISTRATION PHASE: The CONSULTANT shall, at all times, have access to the work and shall make weekly visits to the site to familiarize itself generally with the progress and quality of the work and to determine, in general, if the work is proceeding in accordance with the Contract documents, and shall require its sub-consultants to visit the site upon its request to inspect the work in progress. The CONSULTANT shall, to the best of its ability, notify the DEPARTMENT as to defects and deficiencies in the work of the Contractor. The DEPARTMENT reserves the right to require the CONSULTANT to make visits to the site, more frequently or less frequently than weekly, as ordered by Project Architect/Engineer of the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION.

1) After each visit, the CONSULTANT shall promptly submit a written report of its findings (ex. meeting minutes), and/or those of its sub-consultants, to the DEPARTMENT, listing all its observations, decisions and interpretations of the Contract documents and work progress, made during on-site visits.

2) Based upon such observations at the site, and on the Contractor's Requisition for Payment, the CONSULTANT shall determine the appropriateness of line-item costs submitted and shall so advise the DEPARTMENT prior to the processing of the Partial Payment Estimate.

3) The CONSULTANT shall conduct timely review and approval of shop drawings, samples and other submissions of the Contractor only for conformance to the design concept of the project and for compliance with the information given in the Contract documents. These shall be forwarded to the DEPARTMENT for final approval.

4) The CONSULTANT shall cooperate with the DEPARTMENT in the evaluation of the changes in the work.

5) The CONSULTANT shall conduct the inspections to assist the DEPARTMENT in determining the dates of substantial and final completion, and shall receive and review written guarantees and related documents assembled by the Contractor.

6) The CONSULTANT shall assist in the preparation of the Substantial Completion Certificates, compiling punch lists of work in need of correction.

PART 6 THE DEPARTMENT'S RESPONSIBILITIES:

1. The DEPARTMENT will provide the CONSULTANT with all pertinent information, to a reasonable extent, regarding the DEPARTMENT'S and the Using Agency's requirements for the project.

2. The DEPARTMENT will review project documents for consistency with DEPARTMENT standards. The DEPARTMENT'S review is to ensure project requirements are met, there are no negative impacts to Using Agency operations, and the design is in the STATE'S best interest. The DEPARTMENT'S review shall not be considered part of the CONSULTANT'S QA/QC program.

3. The DEPARTMENT hereby designates the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION as its representative, authorized to act in its behalf with respect to the project. The Project Architect/Engineer of the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION will examine the documents submitted by the CONSULTANT and will render decisions pertaining thereto promptly in order to avoid delay in the progress of the CONSULTANT'S work.

4. The DEPARTMENT will administer all details in connection with obtaining bids or negotiating proposals, awarding and preparing contracts, preparing partial estimates and other contract administrative work required for the project.

5. The DEPARTMENT will provide for field inspection of the work.

6. The DEPARTMENT may extend the completion date stipulated in this AGREEMENT when satisfactory evidence is presented by the CONSULTANT that such extension is warranted.

PART 7 TERMINATION OF AGREEMENT:

1. The DEPARTMENT may at any time, and for any cause, including, but not limited to, the failure of appropriation of funds for these purposes, after the execution of this AGREEMENT, abandon or suspend for an indefinite time the prosecution of the work required by this AGREEMENT or any part thereof. Upon notification in writing of such abandonment or suspension, this AGREEMENT shall be terminated or modified as the case may require. In such event, the CONSULTANT shall, in addition to any installment or fee payable prior to such abandonment or suspension, be entitled to fair compensation for any uncompensated work in progress, satisfactorily performed prior to such abandonment or suspension, and all documents finished or unfinished shall become the property of the STATE as official records and documents of public concern and information.

2. The CONSULTANT, for just cause, may terminate this agreement by notifying the DEPARTMENT in writing thirty (30) days prior to such termination.

3. The CONSULTANT agrees to process the services required by this AGREEMENT expeditiously to the completion of the Construction Documents Phase of the assigned projects and to deliver these documents to the DEPARTMENT without undue delay.

PART 8 EXTENT OF AGREEMENT:

1. This AGREEMENT, including all Exhibits, is the entire AGREEMENT and understanding of the parties and supersedes all prior understandings. This AGREEMENT shall be construed according to the laws of the STATE. This AGREEMENT shall expire on June 30, 2027, unless terminated earlier.

2. No new projects may be entered into after June 30, 2027. The amount of services shall not exceed $500,000 during the life of the AGREEMENT. Projects begun, but not completed, before June 30, 2027 shall be completed under the rates in Exhibit 'B', subject to written mutual agreement of both parties. This AGREEMENT can only be extended or amended in any way with the approval of the Governor and Council.

PART 9 CONTINGENT NATURE OF AGREEMENT:

1. Notwithstanding anything in this AGREEMENT to the contrary, all obligations of the STATE, including, without limitation, the continuance of payments, are contingent upon the availability and continued appropriation of funds, and in no event shall the STATE be liable for any payments in excess of such available appropriated funds. In the event of a reduction or termination of those funds, the STATE shall have the right to terminate this AGREEMENT.

PART 10 CLAIMS AND INDEMNIFICATION:

1. NON-PROFESSIONAL LIABILITY INDEMNIFICATION: The CONSULTANT agrees to defend, indemnify and hold harmless the STATE and all of its officers, agents and employees from and against any and all claims, liabilities or suits arising from (or which may be claimed to arise from) any (i) acts or omissions of the CONSULTANT or its sub-consultants in the performance of this AGREEMENT allegedly resulting in property damage or bodily injury and/or (ii) misconduct or wrongdoing of the CONSULTANT or its sub-consultants in the performance of this AGREEMENT.

2. PROFESSIONAL LIABILITY INDEMNIFICATION: The CONSULTANT agrees to defend, indemnify and hold harmless the STATE and all of its officers, agents and employees from and against any and all claims, liabilities or suits arising from (or which may be claimed to arise from) any negligent acts or omissions of the CONSULTANT or its sub-consultants in the performance of professional services covered by this AGREEMENT.

3. These covenants shall survive the termination of the AGREEMENT. Notwithstanding the foregoing, nothing herein contained shall be deemed to constitute a waiver of the sovereign immunity of the STATE, which immunity is hereby reserved by the STATE.

PART 11 INSURANCE:

1. It is agreed that, in accordance with NH RSA chapter 281, as amended, the CONSULTANT shall purchase and keep in effect, until the date that final payment has been approved on all projects that are subject to this AGREEMENT, workers' compensation insurance and require its sub-consultants to do likewise. The CONSULTANT shall furnish the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION with certificates showing that this insurance has been purchased.

2. Further agreed that, in accordance with NH RSA 21-I:80, II, as amended, the CONSULTANT shall purchase and keep in effect, until the date that final payment has been approved on all projects that are subject to this AGREEMENT, professional liability insurance (errors and omissions) providing protection to the STATE for the CONSULTANT'S acts and omissions committed during the life of all projects that are subject to this AGREEMENT. Such professional liability insurance shall be in the minimum amount of $2,000,000 in the aggregate. No retention (deductible) shall be more than $75,000 per claim. The CONSULTANT shall furnish the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION with certificates showing that this insurance has been purchased.

3. Further agreed the CONSULTANT shall purchase and keep in effect, until the date that final payment has been approved on all projects that are subject to this AGREEMENT, commercial general liability insurance, including contractual coverage, for all claims of bodily injury, death, or property damage, in policy amounts of not less than $250,000 per occurrence and $2,000,000 in the aggregate (STATE, its agencies, and its agents and employees to be named as additional insureds). The CONSULTANT shall furnish the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION with certificates showing that this insurance has been purchased.

4. Further agreed, the CONSULTANT shall purchase and keep in effect, until the date that final payment has been approved on all projects that are subject to this AGREEMENT, commercial and personal automobile liability insurance covering motor vehicles, including owned, hired, borrowed, and non-owned vehicles. Such insurance shall be in the minimum amount of $500,000 combined single limit for bodily injury and property damages. The CONSULTANT shall furnish the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION with certificates showing that this insurance has been purchased.

5. All of the insurance policies required by this AGREEMENT shall require the insurer to provide the DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION with thirty (30) days' prior written notice before an insurance policy is cancelled or modified, or ten (10) days' prior written notice in the event of non-payment of premium.

6. The certificates shall evidence the required coverage, retention (deductible) and cancellation clause. The CONSULTANT shall have a continuing duty to provide DIVISION of PUBLIC WORKS DESIGN & CONSTRUCTION with new certificates of insurance as the policies are amended or renewed. Failure

to comply with the insurance requirements of this AGREEMENT may result in a delay in processing requisitions, stopping work on the project, or other consequences.

PART 12 GENERAL PROVISIONS:

1. Severability Clause: If any provision of this AGREEMENT is declared to be invalid, the remainder of the AGREEMENT will be deemed valid and enforceable.

2. Applicable Law: This AGREEMENT is governed by, and shall be construed in accordance with, New Hampshire law.

3. Ownership of Documents: All Drawings and Specifications and other documents shall become the sole property of the STATE as official records and documents of public concern and information for the project only. Reuse of any of these documents by the STATE, without written permission of the CONSULTANT, shall be at the STATE'S risk.

CONSULTANT: CHA Consulting, Inc.

DATED: December 13, 2023 BY: _____

PRINTED NAME: John A. Achenbach

EMAIL ADDRESS: jachenbach@chasolutions.com

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF ADMINISTRATIVE SERVICES:

DATED: 1/31/24 BY: _____
Charles M. Arlinghaus, Commissioner

ATTORNEY GENERAL: This is to certify that the above Agreement has been reviewed by this office, and is approved as to form and execution.

DATED: 2/23/24 BY: _____

SECRETARY OF STATE: This is to certify that the Governor and Council approved this agreement/amendment on

_____

DATED: _____ BY: _____
Secretary of State

Interview/Selection date: 19-Oct-23

COMMITTEE PROPOSAL RATING FOR
Mechanical Statewide Agreement

Consultant Name	Comprehension of Assignment	Clarity of Proposal	Capacity to Perform in a Timely Manner	Quality and Experience of PM/Team	Overall Suitability for the Assignment	Total Score	Cumulative Score	
B2Q							43.0	
Ted Kupper	3	3	3	2	2	13		
Michelle Juliano	3	4	3	3	3	16		
David Goulet	3	3	3	2	3	14		
CHA							58.0	<===== Highest Rating
Ted Kupper	3	4	3	4	3	17		
Michelle Juliano	4.5	5	4.5	5	5	24		
David Goulet	3	4	3	4	3	17		
DuBois & King							54.5	<===== Highest Rating
Ted Kupper	3	3	3	3	4	16		
Michelle Juliano	4.5	4.5	4.5	4.5	4.5	22.5		
David Goulet	3	3	4	3	3	16		
Harriman							56.5	<===== Highest Rating
Ted Kupper	3	3	4	3	3	16		
Michelle Juliano	4.5	5	5	5	5	24.5		
David Goulet	3	3	4	3	3	16		
McFarland Johnson							66.0	<===== Highest Rating.
Ted Kupper	4	4	4	4	5	21		
Michelle Juliano	5	5	5	5	5	25		
David Goulet	4	4	4	4	4	20		
Oak Point							49.5	
Ted Kupper	3	3	3	3	2	14		
Michelle Juliano	4	4.5	4.5	4.5	4	21.5		
David Goulet	3	3	3	3	2	14		
SMRT							55.0	<===== Highest Rating
Ted Kupper	3	3	3	2	4	15		
Michelle Juliano	5	5	5	5	5	25		
David Goulet	3	3	3	3	3	15		

CHAHOLDING ZRINKUS

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 11/16/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Ames & Gough
859 Willard Street
Suite 320
Quincy, MA 02169

CONTACT NAME:
PHONE (A/C, No, Ext): (617) 328-6555 FAX (A/C, No): (617) 328-6888
E-MAIL ADDRESS: boston@amesgough.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Phoenix Insurance Company A++, XV	25623
INSURER B : Travelers Indemnity Company, A++, XV	25658
INSURER C : Berkshire Hathaway Specialty Insurance Company (A++XV)	22276
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
CHA Consulting, Inc.
3 Winners Circle
Albany, NY 12205

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR	X		630-7E170386	8/1/2023	8/1/2024	DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 500,000
							MED EXP (Any one person)	$ 15,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	X POLICY X PRO-JECT X LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
A	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO	X		810-4S407410	8/1/2023	8/1/2024	BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
B	X UMBRELLA LIAB X OCCUR						EACH OCCURRENCE	$ 15,000,000
	EXCESS LIAB CLAIMS-MADE			CUP-4S539836	8/1/2023	8/1/2024	AGGREGATE	$ 15,000,000
	DED X RETENTION $ 10,000							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						X PER STATUTE / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N N	N/A		UB-4S429322	8/1/2023	8/1/2024	E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
C	Professional Liab			47-EPP-308429-05	8/1/2023	8/1/2024	Per Claim	6,000,000
C				47-EPP-308429-05	8/1/2023	8/1/2024	Aggregate	10,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
If AI box is checked, GL Endorsement Form #CGD604, Auto AI #CAT499 to the extent provided therein applies and all coverages are in accordance with the policy terms and conditions.

State of NH, its agencies, and its agents and employees shall be included as additional insured with respects to General and Auto Liability where required by written contract. A 30 Day Notice of Cancellation is provided in accordance with the policy terms and conditions.

CERTIFICATE HOLDER

State of NH, Department of Administrative Services
Division of Public Works Design & Construction
P.O. Box 483
Concord, NH 03302

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Jared Maxwell

State of New Hampshire

Department of State

CERTIFICATE

I, David M. Scanlan, Secretary of State of the State of New Hampshire, do hereby certify that CHA CONSULTING, INC. is a New York Profit Corporation registered to transact business in New Hampshire on June 09, 2011. I further certify that all fees and documents required by the Secretary of State's office have been received and is in good standing as far as this office is concerned.

Business ID: **651702**

Certificate Number: **0006296070**

IN TESTIMONY WHEREOF,

I hereto set my hand and cause to be affixed the Seal of the State of New Hampshire, this 14th day of August A.D. 2023.

David M. Scanlan

Secretary of State

CORPORATE RESOLUTION

I, Thomas D. Titsworth, Jr., Assistant Secretary of CHA Consulting, Inc., a corporation organized and existing under the laws of the State of New York, hereby certify that a resolution was duly adopted by the Board of Directors of said corporation, at a meeting duly held on the 9th day of February, 2022, pursuant to which John A. Achenbach, Buildings Sector President of the corporation, is authorized to negotiate, make, execute and approve on behalf of this corporation, and to bind the corporation with respect to, contracts, proposals and other business transactions, and amendments, statements, certifications and other documents required in connection with such contracts or transactions or otherwise related thereto.

AND I DO FURTHER CERTIFY that the resolution set forth above has not been in any way altered, amended, revoked, or repealed and is now in full force and effect.

IN WITNESS WHEREOF, I hereunto set my hand this 15th day of November, 2023.

Thomas D. Titsworth, Jr.
Assistant Secretary

CHA CONSULTING, INC. CORPORATE SEAL NEW YORK


CHA
Quality Management
System

CHA Quality Management System

Version Control

Version	Date	Author	Change Description
1	May 2021	CHA Chief Engineers	Initial Version
2	November 2021	CHA Chief Engineers	Version 2
3	March 2022	CHA Chief Engineers	Version 3
4	January 2023	CHA Chief Engineers	Version 4
5			
6			
7			

Version 2 Changes:

1. *GREEN UNDERLINED ITALICIZED TEXT* hyperlinks have been activated.
2. Section 8.4: Differentiated "Experience Gained" from "Lessons Learned".
3. Section 11: Incorporated CHA's 2021 revised Information Security Intranet portal into the QMS with the associated procedures and policies.

Version 3 Changes:

1. Appendix A10: PSQMP Template (fillable form) has been updated to enhance "end user friendliness" with improved field edit capabilities.

Version 4 Changes:

1. Section 6.4: Added Collaborative/ Technology – Adobe Document Cloud for Review of Marketing and Proposal Documents (.pdf Documents).
2. Section 11.5: Included organizational CADD standards.

QMS Document Key: Certain color-coded text within this document is smart or hyperlinks. The Key below identifies the color-coding and functionality.

BLUE UNDERLINED ITALICIZED TEXT are smart links to navigate to sections within this document.
RED UNDERLINED ITALICIZED TEXT are smart links to the Appendix.
GREEN UNDERLINED ITALICIZED TEXT are hyperlinks to documents external to this document.

Table of Contents

Appendices

- **A1:** *Plan – Do – Review – Document Flowchart (.pdf)*
- **A2:** *Project Engineering and Review Responsibility Matrix (.pdf)*
- **A3:** *Sample Technical Review and Quality Control Form (.pdf)*
  - *Technical Review and Quality Control Form (fillable form)*
- **A4:** *Sample Technical Review and Quality Control Comment Summary Form (.pdf)*
  - *Technical Review and Quality Control Comment Summary Form (fillable form)*
- **A5:** *Sample QAQC Project Submission Log (internal template) (.pdf)*
  - *QAQC Project Submission Log (internal fillable template)*
- **A6:** *Checking/ Review Process (.pdf)*
- **A7:** *Sample Quality Assurance Review Certification Form (.pdf)*
  - *Quality Assurance Review Certification Form (fillable template)*
- **A8:** *Sample Continuous Improvement Identification and Action Form (.pdf)*
  - *Continuous Improvement Identification and Action Form (fillable form)*
- **A9:** *Escalation Involvement Ladder (.pdf)*
- **A10:** *Sample PSQMP Template (.pdf)*
  - *PSQMP Template (fillable form)*

Links to CHA Intranet:

- *Certification of Plans and Reports Policy*
- *Authorized List for Certifying Documents*
- *Guide for Digital Signatures and Seals*
- *Digital Signatures, Title Blocks, and Sealing of Documents*
- *Technical Bulletin: Work Product or Deliverable Digital Certification*
- *CHA Project Management Manual*
- *Risk Register*
- *CHA Corporate Organizational Structure*
- *Bluebeam Revu Studio*
- *Adobe Document Cloud (Adobe DC)*
- *Network Folder Structure Guide and File Management Presentation*
- *Information Handling Procedure*
- *Information Handling Policy*
- *Information Security Policy*
- *Information Security Governance Plan*
- *Information Security Risk Assessment Procedure*
- *Information Security Incident Response Plan*
- *Record Retention Policy*
- *Project Email Manager*
- *Data and Information Destruction Procedure*
- *CHA CADD Standards – Organizational CADD Standards Document*

1.0 Introduction

1.0 INTRODUCTION

The purpose of CHA's Quality Management System (QMS) is to establish appropriately consistent, predictable, repeatable, and defensible quality control and quality assurance standards, policies, and procedures for implementation and execution by CHA for the design, development, and delivery of quality services, work products, and results.

This QMS provides guidance on standards of care, policies, procedures, and actions that will contribute to delivering services, products, and results which will comply with requirements defined and detailed in project specific Agreements, or as identified and recognized as relevant, applicable, and appropriate industry-accepted standards, codes, guidelines, policies, or procedures.

CHA's QMS will meet specific project needs by clearly defining, documenting, and disseminating agreed upon and established project quality planning, implementation, execution, and management requirements. Considerations within CHA's QMS include, but are not limited to, the following:

- The importance of establishing clearly defined roles, responsibilities, and authorities within the project team.
- Identifying qualified and competent professionals to perform tasks within their area of subject matter expertise.
- Establishing and implementing rigorous quality control (QC) protocols which are documented, defensible, and auditable.
- Establishing and implementing comprehensive quality assurance (QA) protocols for process conformance, compliance verification, management escalation, and corrective/ preventive action initiation; all of which contribute to continuous improvement.

This QMS document should be used for procedural and policy guidance. Users of this document should exercise engineering and managerial judgement and/or discretion in conjunction with the provisions contained herein. This document makes use of the terms "shall," "should," "may," and "recommended." The following describes how these terms are to be interpreted:

- The term "shall" denotes a requirement for compliance with the specified consideration.
- The term "should" indicates a strong preference for a given criterion.
- The term "may" indicates a criterion that is usable, but other referenced, prepared and suitably documented, verified, and approved criteria may also be used in a manner consistent with this QMS.
- The term "recommended" is used to give guidance based on past experiences.

Prudent, pragmatic, and rigorous QC and QA involvement and methods will support consistency, predictability, and repeatability in the performance of services and the development and verification of CHA's work products so that the results of technical involvement are of the type and quality appropriate to, and for, its identified purpose, function, and use. The implementation and execution of those practices and actions will yield actions, strategies and solutions that are well founded and defensible in contributing to CHA's responsibility to public safety, health, and well-being.

The individuals responsible and accountable for quality activities are to be identified in the project management planning process as a cornerstone of accomplishing CHA's responsibilities and commitment to protection of the public's safety, health, and well-being.

CHA deliverables will undergo and document the appropriate examination of services and/or products provided, and work done to demonstrate that contractual requirements are met. Technical checks and technical reviews will be performed by individuals with requisite familiarity, knowledge, and experience in the subject matter for which they are reviewing. Appropriate quality documentation shall be completed, signed-

off by the appropriate project team members, and retained in the CHA project files prior to issuance of a deliverable.

CHA is committed to continuous improvement, and as such, the QMS is a version-controlled document and will be reviewed, audited, updated, and distributed on an annual basis, at a minimum, or at such times as warranted at the discretion of CHA's Executive Leadership.

2.0 Quality Policy, Goals, and Objectives

2.0 QUALITY POLICY, GOALS, AND OBJECTIVES

2.1 Quality Policy

CHA's Quality Policy is established so that CHA's clients are provided with quality consulting services, work products, and deliverables that are compliant with appropriate, applicable, and accepted industry and professional standards of care and judgment. The quality management attributes of CHA's Quality Policy have been adopted and distributed as enterprise-wide procedures that will contribute to the delivery of results which are consistent, predictable, and repeatable; and which are defined as meeting the requirements and expectations of a product using an established, defensible, and documented process. CHA's quality procedures will define the roles, responsibilities, and expectations for internal examination of services to provide external confidence in CHA work products and CHA produced deliverables consistent with CHA's Quality Goals.

2.2 Quality Goals

CHA's Quality Goals are the outcomes that CHA intends to achieve through the implementation and execution of this QMS. CHA's Quality Goals are twofold: 1) to produce accurate, valid, consistent, predictable, repeatable, and defensible services and work products; and 2) to complete work in accordance with agreed upon scope, schedule, and budget expectations.

Quality goals are directly related to, and dependent upon, three inter-dependent business parameters: scope, schedule, and budget. Changes to one parameter will have consequential cause and effect on at least one other.

Attributes of CHA's Quality Goals are as follows:

- Compliance with minimum standards of appropriate professional care and conduct.
- Promotion of the health, safety, and well-being of our employees, partners, stakeholders, and the general public.
- Support of business performance transparency and objectives.
- Contribute to CHA's aspiration to *responsibly improve the world we live in.*

2.3 Quality Objectives

CHA's Quality Objectives are the actions that will contribute to achievement of CHA's Quality Goals through a defined and established rigor, while also promoting and advocating for flexibility, individuality, and innovation. Each of CHA's Quality Objectives is based upon the expectation that every employee is responsible and accountable for their actions, contributions, and commitment to quality.

The quality objectives that CHA will adhere to for purposes of achieving our goals include the following:

- All work products and deliverables will be checked and reviewed by a qualified and competent reviewer(s) before external distribution.
- The review effort will be consistent with the criticality of the work product or deliverable.
- The review process and results will be documented and retained by CHA's Project Manager as an integral part of the project files.
- Evidence of independent reviews, constructability reviews, quality control reviews, and quality assurance records will be documented and retained for distribution to the client upon request.

2.0 QUALITY POLICY, GOALS, AND OBJECTIVES

As part of continuous improvement, this QMS will also identify opportunities and implement actions that support and contribute to the consistent achievement or improvement, when necessary, of CHA's Quality Goals.

3.0 Key Quality Management Definitions

3.0 KEY QUALITY MANAGEMENT DEFINITIONS

Agreement: The contractual mechanism between CHA and another party that establishes, infers, and/or defines the quality expectations, and quality standards and programmatic requirements, within an agreed upon technical scope of work.

Best Practices: Quality improvement is a continuous process that produces systematic improvements or enhancements in project execution. Best practices are methods or techniques, developed through experience and/or research, that have been generally accepted as superior to other alternatives because they produce superior results or outcomes that would not otherwise be achieved by other means or because they have become a standard procedure. The recognition, adoption, and incorporation of an improved process, activity, or action into a standard project workflow to increase or optimize performance is a best practice.

Certifying Professional: A licensed and registered Professional in good standing in the State(s) and/or Province(s) where the project exists who is knowledgeable, qualified, competent, and possesses familiarity and understanding in the required discipline(s) by which work products are developed or performed under their direct involvement, responsibility, supervision, or management. CHA's Certifying Professionals are identified, entrusted, and assigned the accountability and authority to certify (a process of stamping, sealing, and/or signing) deliverable work products prior to distribution and upon completion of the appropriate level of project quality management. The following resources for authorization and certifications are available and updated regularly:

- *Certification of Plans and Reports Policy*
- *Authorized List for Certifying Documents*
- *Guide for Digital Signatures and Seals*

Coordinated Review: See *Reviews*.

Corrective Action: Corrective actions are risk-based, and are required when assumptions, services, deliverables, or procedural requirements have not been met. A corrective action involves the appropriate, timely, documented, and well-founded action implemented for the purposes of addressing, resolving, or remediating a non-conformity commensurate with the potential risk, severity, or consequence. A corrective action is an action taken to isolate or eliminate the non-conforming work product to prevent it from negatively impacting the project. When there is objective evidence that a project design requirement has not been met, corrective action is required to eliminate the cause of potential non-conformity and to prevent recurrence. Additional corrective actions may involve the identification of a discrepancy that is not otherwise covered, accommodated, or accounted for by another established process or policy. Both situations are defined as non-conformance. Unforeseen conditions are not a non-conformity, and as such, actions to address, or actions taken in response to, unforeseen conditions are not considered corrective actions.

Corrective Action Reporting: A Continuous Improvement and Action Form (Continuous Improvement Form) will be the controlling and memorializing documentation, when warranted, of identification, handling, and resolution process and the closure of a non-conformance. Any non-conformance will be evaluated to determine whether it is an isolated one-time occurrence not requiring a Continuous Improvement and Action Form, or whether it is of sufficient consideration to warrant the preparation of a Continuous Improvement and Action Form. Corrective action reporting is typically the responsibility of the Project Manager (PM) or the Quality Manager ((QM) if one is designated for the specific project) but can be initiated by an authoritative member of the project team. See Appendix for *Continuous Improvement Identification and Action Form*.

Document Management: Any document or data that is used during a project, up to and including the final deliverable, is considered a project document that is subject to CHA's quality compliance testing and acceptance. Project documents can include input (documents or data) from the client, outside sources,

subconsultants, subcontractors, and others; check prints used in the fulfillment of this procedure; documents or data prepared during the life of the project such as drawings, specifications, calculations, schedules, public involvement hand-outs and displays, reports, cost estimates, and all final project deliverables. Project-related e-mails are also project documents and should be retained in the project files in a logical and recoverable manner.

Engineer-of-Record/ Architect-of-Record: A licensed and registered Professional Engineer (EOR) or Professional Architect (AOR) in good standing in the State(s) and/ or Province(s) where the project exists who is knowledgeable, qualified, competent, and possesses familiarity and understanding in the required discipline(s) by which work products are developed or performed under their direct involvement, responsibility, supervision, or management. CHA's EORs and AORs are identified, entrusted, and assigned the accountability and authority to certify (a process of stamping, sealing, and/or signing) deliverable work products prior to distribution and upon completion of the appropriate level of project quality management. The following resources for authorization and certifications are available and updated regularly:

- *Certification of Plans and Reports Policy*
- *Authorized List for Certifying Documents*
- *Guide for Digital Signatures and Seals*

Escalation: Escalation is the process of communication and involvement protocols for identification of a challenge or situation, and for identification of the appropriate resolution stages/ strategies, beginning at the lowest appropriate level and progressing incrementally higher with more authoritative involvement based upon complexity, risk, magnitude, etc. Escalation is intended as an incremental and sequential action plan based on identifying and resolving challenges at the most appropriate, efficient, and effective levels though collaboration and commitment toward a "win-win" outcome.

Independent Peer Review: See *Reviews*.

Innovation: Innovation is the use of new solutions to improve the outcome of a deliverable that benefits CHA, the Client, and/or their end users. Innovation is a strategy or tool that can be used to get to a solution to a problem in a different way from the norm. Innovation can be a refinement, optimization, or change in an existing process. Innovation works to streamline and eliminate unproductive, non-value-added efforts while focusing on high-value efforts and improved client outcomes.

Lessons Learned: A Lesson Learned is a reflective or retrospective assessment of a project aspect(s) for the purposes of continuous improvement. The assessment is intended to identify and capture positive aspects, non-conformances, and challenges that resulted in opportunities within the project development process. Value-added outcomes from these lessons will be used as opportunities for improvement and/or best practices to enhance and improve quality.

Milestone Reviews (Technical): See *Reviews*.

Non-Conformance (Non-Compliance): In quality management, non-conformance (non-conformity), or non-compliance is a deviation from a specification, a standard, or an expectation.

Opportunity for Improvement: An Opportunity for Improvement (OFI) is the appropriate, timely, documented, and well-founded action implemented for the purposes of continuous improvement by addressing, resolving, or remediating a non-conformity, or exercising a proactive action to enhance or optimize performance.

Preventive Action: Preventive actions are proactive measures to address a potential non-conformance or potential discrepancy that is not otherwise covered, accommodated, or accounted for by another established process or policy. A preventive action will be a risk-based specific action, or series of defined risk-based actions, to address the cause of a potential non-conformance and prevent it from happening. The seriousness and impact of the non-conformance will be evaluated so that the actions to be taken are commensurate with the risk.

Preventive Action Reporting: A Continuous Improvement and Action Form will be controlling and memorializing documentation of the identification, handling, resolution, and closure process of the Preventive Action. Preventive action reporting is typically the responsibility of the Project Manager (PM), or the Quality Manager (QM) if one is designated for the specific project, but it can be initiated by an authoritative member of the project team. See Appendix for *Continuous Improvement Identification and Action Form*.

Project Manager: A Project Manager (PM) has the ultimate responsibility for project quality through planning, coordination, and execution as an undertaking with a defined scope, budget, and schedule. The PM is responsible for accomplishing the project performance with responsibilities that include defining and communicating clear project goals and objectives; coordinating and collaborating project requirements (e.g. resource planning, required information, various agreements, and material or technology) that are needed to accomplish the project objectives; and managing the constraints of scope, schedule, budget, and quality. The PM is ultimately responsible for the development, delivery, and performance of the project, including the technical quality and client satisfaction. Depending on the scope, scale, and complexity of a specific project, a PM may, or may not, participate directly in the technical development activities that produce the end result, but rather function to guide and maintain the progress, mutual interaction, and specific tasks of various project contributors in such a way that reduces the risk of overall failure, maximizes benefits, and minimizes costs.

Project Delivery Plan: The Project Delivery Plan (PDP) is the formalized and goal-oriented document that defines how a project is going to be executed and which will contribute to success for CHA and for the client and their end users through the delivery of quality services, work products, and deliverables. See *CHA Project Management Manual*.

The PDP is a living document that is the responsibility of the PM and is used as a documented informational and planning tool for identifying and/or defining the following:

- Scope of services.
- Schedules (meetings, reviews, deliverables).
- Budget development, monitoring, and forecasting.
- Quality management planning and implementation.
- Internal and external project team and resources (including subconsultants, subcontractors, and/or vendors).
- Communication and escalation.
- Risk identification and management.
- Stakeholder registry (include identification, contact, involvement information).
- Health and safety planning.
- Critical factors for success (including risk identification and management).
- Document management.
- Change methodology.
- Project closeout.

3.0 KEY QUALITY MANAGEMENT DEFINITIONS

Quality: The degree to which a process, service, or work product satisfies an agreed upon expectation or requirement, typically identified or set forth within the elements of an executed Agreement or in general conformance with applicable industry standards. Delivering quality results that meet the agreed upon expectations and requirements is contingent upon identification and implementation of established, disseminated, documented, and executed processes that are detailed and definitive to support consistent, predictable, repeatable, and defensible outcomes. Quality is the internal examination of services to provide external confidence.

Quality Manager: When required by Agreement or otherwise determined, the Quality Manager (QM) is a qualified individual specifically identified by the PM who is tasked with the obligation to advocate, upon verification, that a specific work product or deliverable meets the appropriate quality requirements and appropriate standards of care to minimize risk and to satisfy the client's expectations as defined in an Agreement. A QM is expected to provide guidance regarding CHA quality policies, standards, processes, and practices which may include, but are not necessarily limited to the following:

- Developing or contributing to a quality control process to meet the client or project needs.
- Awareness of project-related legal, health, and safety standards for general conformance.
- Checking product development and delivery processes for achievement of quality standards.
- Documenting and analyzing processes to identify improvement opportunities.
- Performing audits of quality actions and making plans or processes for improvements.
- Promoting and advocating quality standards and processes.

Quality Management Plan/ Project-Specific Quality Management Plan: The Quality Management Plan (QMP) or Project-Specific Quality Management Plan (PSQMP) is an integrated part of the PDP or a stand-alone document, respectively, that describes and defines how CHA will implement and execute quality control and quality assurance to the appropriate standard of care for the purpose specified in the Agreement. The QMP or PSQMP is a living document that is an attribute of the PDP and works to align, memorialize, and incorporate requirements and updates of the following three key components necessary to deliver consistent, predictable, repeatable, and defensible work product:

- Document the specific quality-related project requirements including specific key considerations and high-risk potential that will require an extraordinary level of quality management.
- Identify key individuals with defined roles, responsibilities, and expectations of how quality will be instilled, managed, implemented, executed, and continuously improved upon.
- Define scheduled implementation and execution requirements necessary to deliver the expected quality outcomes.
- Additionally, the QMP or the PSQMP identifies the Certifying Professional(s) or Engineer(s)/ Architect(s)-of-Record, Project Quality Manager (when required), key project contributors, review types, review schedule planning, personnel assigned to complete reviews, review processes, and other relevant policies or procedures (at the discretion of the PM and/or QM) deemed necessary to deliver desired project outcomes. See Appendix for *Sample PSQMP template*.

Quality Records: Quality records are objective evidence that specified QC procedures and QA processes were performed. These records are to be retained by the PM in the project files. Additionally, upon request Quality Records can be submitted in accordance with the requirements of CHA operational practices and any additional terms or conditions of the Agreement that is the basis of service, work product, or deliverable. The extent, nature, and detail of quality records is to be determined on a project-specific basis and shall be scalable

to the project and commensurate with the level of project-associated risk. The PM, QM, or Chief Engineer/ Chief Architect/ Chief Planner/ Chief Scientist shall contribute in the establishment of quality records.

Reviews:

Constructability Review: A review process to objectively assess the design development through the lens of construction viability, practicality, and prudency. The review will draw upon the expertise of qualified CHA staff with relevant and applicable construction experience to offer application, interpretation, and expertise into the design development process. Constructability Reviews will generally focus on completeness of information specific to, or related to, achievability of specified tolerances, adequacy of site logistics, access, and sequencing for the work proposed, conventional or innovative means and methods, environmental constraints or considerations, utility conflicts, availability and storage of materials, adequacy of construction estimates, adherence and completeness of technical specifications, adherence to accepted construction standards, etc. CHA's Constructability Reviewers will contribute input that will be prudent, practical, economical, and consistent with the project design objectives in the context of a construction perspective to improve and/or add value to the work product or deliverable. Constructability Reviews are a key component of Milestone Reviews.

Coordinated Review: A comprehensive and collaborative technical review conducted on multi-discipline projects by designated senior reviewers within each discipline to compare and evaluate the design development, coordination, interaction, and conflict resolution of work products produced by other disciplines contributing to the same project. This review may also be known as an Inter-disciplinary Review (IDR). Coordinated Reviews are a key component of Milestone Reviews for multi-disciplinary projects.

Independent Peer Review: A technical review conducted by qualified senior-level professional(s) who provide experience and expertise outside of the design team, but within CHA's organization, to enhance and add value to the quality of the work product or deliverable. Independent peer reviews focus on project content, approach, assumptions, and adherence to procedures, and can be conducted at any time within the project design development lifecycle at the discretion or request of the Project Manager, Business Practice Leader, Business Line Director, Chief Engineer, Sector President, or a designee thereof. Independent peer reviews may also be combined with the Coordinated or Milestone Reviews.

Milestone Reviews (Technical): A comprehensive technical project review performed prior to issuance of a significant deliverable outside of CHA. The primary objective of the Milestone Review is to verify consistency with design standards, project scope, constructability, coordination between technical disciplines, compatibility, biddability, and client expectations at critical points along the project design development lifecycle, typically defined in the Project Delivery Plan (PDP), Quality Management Plan (QMP), and/or Project-Specific Quality Management Plan (PSQMP). All aspects of Milestone Reviews contribute to accomplishing CHA's quality goals and objectives.

Risk: Risk is any situation involving exposure to uncertainty and the uncertainty about the effects or implications from that exposure. A hazard is anything that can cause harm, including accidents and emergency situations. Risks differ from hazards. A risk is the chance that a hazard will cause harm. Risk can be associated with health, safety, and well-being, as well as scope, schedule, and/or financial considerations. Risks can be applicable to the project design and execution, CHA staff and Project Team members, the client and affiliates, and/or the end users.

3.0 KEY QUALITY MANAGEMENT DEFINITIONS

Risk Management: Risk Management is the process in which project risk, both internal and external, is identified, characterized, assessed, and ultimately mitigated, minimized, or accepted. As an activity or project evolves, risk profiles will change, and the focus of risk management practice will narrow. Lessons learned from previous risk assessments can be applied to upcoming project work allowing more effective risk management efforts. Risk management is a continual process and it is expected to be evaluated as necessary to reflect changes in managerial methodology, project structure, or other evolutionary project conditions.

Risk Register: A risk register is a document or spreadsheet that serves as a central repository for the documentation of identified risks in a project. Information contained in the risk register may include, but is not limited to the nature of the risk, level of the risk, probability of occurrence, consequences from occurrence, ownership of the risk, mitigation or management measures to address the risk, etc. A project risk register allows the PM and the project team to see all potential risks documented in one central format and location.

Root Cause: Root Cause is the real or primary underlying cause of a non-conformance or quality problem.

Root Cause Analysis: Root Cause Analysis (RCA) is a process of defining, understanding, and problem-solving methods used to identify the Root Cause of a non-conformance or quality deficiency or problem. A systematic RCA will identify a fundamental cause or primary source of a non-conformance/ non-compliance that will be used as the basis for Corrective Action. Root Cause Analysis is typically initiated by the PM or the QM (if one is designated for the specific project) but can be initiated by any authoritative member of the project team. The extent, nature, and detail of an RCA is to be determined on a project-specific basis and shall be scalable to the non-conformance and commensurate with the level of project-associated risk. The PM, QM, or Chief Engineer shall contribute to the RCA strategy.

4.0 Organizational Structure, Roles, and Responsibilities

4.0 ORGANIZATIONAL STRUCTURE, ROLES, AND RESPONSIBILITIES

CHA is a highly diversified, full-service engineering, architecture, interior design, and construction management firm providing a wide range of planning, design, and construction-related services to public, private, and institutional clients. CHA is organized in a hierarchal structure to optimize efficiency, communication, and business performance. The core of CHA's organizational structure is the purposeful alignment of three (3) primary technical Business Sectors (Infrastructure, Buildings, and Power) and five (5) functional corporate support groups (Business Development, Operations & Innovation, Finance, Human Resources, and Legal). Under each Business Sector, various Business Lines are defined which provide further clarity, focus, and attention to specific industry markets that comprise the Sector. Subordinate to the Business Lines are the Business Practices which provide the most granular and definitive identification of discipline and client alignment (see current *CHA Corporate Organizational Structure*). Although the ultimate accountability and responsibility for delivery of CHA's Project Quality resides with CHA's CEO, the subordinate authoritative responsibility and accountability for CHA Project Quality is appropriately assigned and delegated down through the entire organizational structure. The CHA PM is supported by qualified and competent professionals and entrusted with the actions and decisions that will support and contribute to delivering quality services, work products, and deliverables. The PM is responsible to implement and execute a work plan that involves appropriate and highly qualified Project Team members. Every CHA employee is accountable and responsible for their individual commitment and contribution to upholding the highest standards of quality within their purview and job title/ description.

Quality management must be rigorous, advocated, and embraced at every level throughout CHA. Effective and successful quality is founded at the lowest levels of every project and shall be reinforced back up through the entire CHA organizational structure. CHA espouses a culture where every team member plays a critical role in the quality delivery of every project, at every stage of development. ***Quality is every employee's responsibility.***

At a minimum, the responsibilities for quality within the CHA organizational structure can be identified as follows and as depicted in *Figure 1* at the end of this Section:

- **Project Team:** Typically, the Project Team is an assemblage of technical and support staff internal to CHA, as well as external to CHA (e.g., subconsultants, subcontractors, vendors, etc.) when engaged through appropriate contractual arrangements, who will contribute to the project development and delivery process. The Project Team is a diverse and comprehensive composition of internal and external contributors providing varying degrees and levels of knowledge and experience to most effectively serve the needs of the project. The Project Team members are responsible and accountable for day-to-day execution, decision-making, self-checking, and verification that a work product conforms to appropriate and applicable standards of care, client standards, and accepted design criteria. Project Team members are responsible for the documentation and preparation of all work products for technical reviews, including, but not limited to, the following:
  - Advancing the project towards designated milestones.
  - Conducting technical quality checks and reviews in accordance with the QMP.
  - Communicating design issues to the PM and/or Technical Task Manager (TTM) that could impact schedule or budget. This expectation includes internal and external contributors.

- **Project Team Leader:** The Project Team Leader (PTL) is responsible and accountable for specific scope, schedule, and budget performance parameters within his/ her designated area or role within a Business Practice. The PTL is the liaison between CHA's Business Practice Leader, designated PMs, and TTMs for the purposes of operational performance, which includes but is not necessarily limited to scope,

schedule, resource, and budget planning, monitoring, communication, and compliance. The PTL's success is highly dependent upon collaboration, cooperation, and communication with the Project Team. The PTL plays a critical role in the execution of high-quality projects and is responsible for overseeing both technical staff and project management teams for quality delivery of projects.

- **Technical Task Manager:** The Technical Task Manager (TTM) is responsible and accountable for the management of specific scope, schedule, and budget performance parameters within his/ her discipline, and for the oversight of his/ her discipline project team members. The TTM is the liaison between designated PM and project team within the TTM's discipline, for the purposes of operational performance. The TTM's success is highly dependent upon collaboration, cooperation, and communication with the Project Team. Key roles and responsibilities of the TTM include, but are not necessarily limited to the following:
  - Monitoring discipline project scope, schedule, and budget under the direction of the PM.
  - Directing discipline specific technical elements of the project.
  - Initiating problem resolution sub-processes as directed by the PM.
  - Monitoring their discipline Project Team members' adherence to the PMP and QMP.
  - Regularly communicating with the PM on project status.
  - Identifying professional approvals or certifications required for project delivery of their discipline specific work product.
  - Contributing to client communication support to the PM.

- **Project Technical Task Manager:** The Project Technical Task Manager (PTTM) has the same roles and responsibilities as identified for the Technical Task Manager position above, however, on multi-discipline projects, the PTTM (from the project's lead discipline) has the added responsibility for overall coordination with the discipline specific TTMs to ensure all the parts and pieces coming from other disciplines are combined seamlessly into a cohesive deliverable.

- **Project Manager**: The Project Manager (PM) is identified and assigned by the PTL and/or Business Practice Leader. The PM has the primary responsibility and accountability for scope, schedule, and budget performance that are the result of project planning, project plan implementation, project execution, and project delivery. The PM is generally the primary liaison between CHA, the client, and the Project Team. The PM's success is highly dependent upon collaboration, cooperation, and communication with the Project Team. The PM is responsible for the management and oversight of projects (process and product), working effectively and efficiently to deliver tangible quality work products on time and within budget. The PM has responsibility and authority for project execution and delivery, including the following:
  - Documentation and contractual obligation of project deliverables as agreed to with the Client.
  - Establishment and implementation of QC and QA protocols appropriate for the Project, as identified in the QMP (or PSQMP), and within the guidelines of this QMS.
  - Definition and identification of resources needed for work product development and/or project execution, including CHA staff, subconsultants, subcontractors, and vendors.
  - Definition and identification of resources needed for project reviews.
  - Coordination and collaboration with technical teams regarding staff resources, budgets, schedule, technology, and deliverables.

- Documentation of a plan for collecting, assessing, and reporting client feedback.

The PM is responsible for the development, monitoring, and maintenance of the PMP and QMP (or PSQMP) which establishes the quality expectations and activities for the life of the Project. Coordination of all quality efforts is the responsibility of the PM, including, but not necessarily limited to the following:

- Reviewing plans or supporting documentation provided with the project proposal.
- Developing the PDP and QMP (or PSQMP) with input from technical, operational, and market resources.
- Verifying that the requirements of the PDP and QMP (or PSQMP) are adhered to.
- Updating the PDP and QMP (or PSQMP) as needed to meet project change requirements or directives.
- Monitoring scope, schedule, budget, and financial controls for the Project.
- Initiating and monitoring problem resolution sub-processes when necessary.
- Assuring that progress and milestone reviews are completed.
- Assuring that professional approvals/ certifications of the finished work product or deliverable are applied.
- Being the primary point-of-contact for client and Project Team communication, interaction, coordination, and collaboration.

- **Quality Manager:** Large or complex projects may require a dedicated Quality Manager (QM) for the purposes of supporting the PM in the development, implementation, execution, and monitoring of quality activities established in a QMP for the Project. In those situations, the QM generally is the author (or co-author with the PM) of the PSQMP. When a QM is not required on a Project, the responsibilities of that position remain with the PM. The QM establishes the minimum standards for project reviews, verifies that the appropriate checks and reviews have been completed, audits the quality documents for compliance with the established processes, supports the training of the Project Team on QC and QA procedures, and when required, issues Non-conformance and Continuous Improvement Reports to the PM and project files. The release of documents will not occur without QM (or PM, when a QM is not required) sign-off.

- **Section Manager:** The Section Manager is responsible for management and professional development of staff within their discipline specific technical team, focusing on technical excellence and technical quality. The Section Manager reports up to the PTL and has TTMs as direct reports.

- **Chief Professionals (Chief Engineer/ Chief Architect/ Chief Planner/ Chief Scientist):** The Chief Professionals are highly qualified and tenured senior-level technical resources available to the entire CHA enterprise. Chief Professionals support CHA project teams and may function as a quality resource to the PM and/or QM to provide reviews and technical guidance on projects within their discipline, perform QC and QA reviews, and designate experienced personnel to complete required reviews. Chief Professionals may contribute to the development of the QMP (or PSQMP), perform technical reviews and quality audits, and provide mentoring to project staff. When necessary or appropriate, a Chief Professional may fulfill the role of QM on a specific Project. The Chief Professionals support and advocate for professional technical development and mentoring and are responsible for CHA's Technical Excellence and quality initiatives.

- **BIM Manager:** The Project BIM Manager (PBM) acts as the intermediary between designers, clients, and architects, leading and supporting the use of digital technology to create Building Information Models

(BIM) throughout the project lifecycle. During the design, construction, and handover of the project, the PBM will assist in implementing all procedures regarding BIM and Digital Construction including, but not limited to the following:

- Reviewing, evaluating, and commenting on BIM Execution Plans.
- Assisting in BIM guideline development and implementation.
- Providing BIM coordination scheduling.
- Coordinating BIM kickoff meetings and model reviews with the project team.
- Providing timely reporting on BIM progress.
- Organizing models and related documents within the Owner's desired Common Data Environment.
- Interfacing with stakeholders to develop model content conforming to data requirements.
- Facilitating BIM hand-over at critical phases of the project.

- **CADD Coordinator:** The Project CADD Coordinator (PCC) is responsible to the PM and TTM for developing, implementing, and maintaining the CADD strategy and processes throughout the project lifecycle. The PCC is responsible for project set-up and customizations, extraction of drawings and reports, strategizing 3D model development, and ensuring the design team and CADD operators work in compliance with the CADD standard operating procedures. The PCC will be key in the following:
  - Planning, organizing, and managing the production of CADD models and drawings.
  - Providing guidance and direction to ensure operational and technical excellence.
  - Developing, implementing and monitoring CADD design standards and procedures.
  - Assisting with technical support, training, and other CADD system issues.
  - Identifying opportunities and recommendations for increased workflow efficiencies.
  - Evaluating team members for their technical skill, performance, and productivity.

- **Business Practice Leader:** The Business Practice Leader (BPL) is responsible for overall business management, strategic direction, workforce inspiration, and elation of clients through delivery of quality projects within his/ her specific business practice.

- **Business Line Director:** The Business Line Director (BLD) is responsible for overall business management and strategic direction, including staffing, project management, technical excellence, quality assurance, and operational activities within his/ her business line.

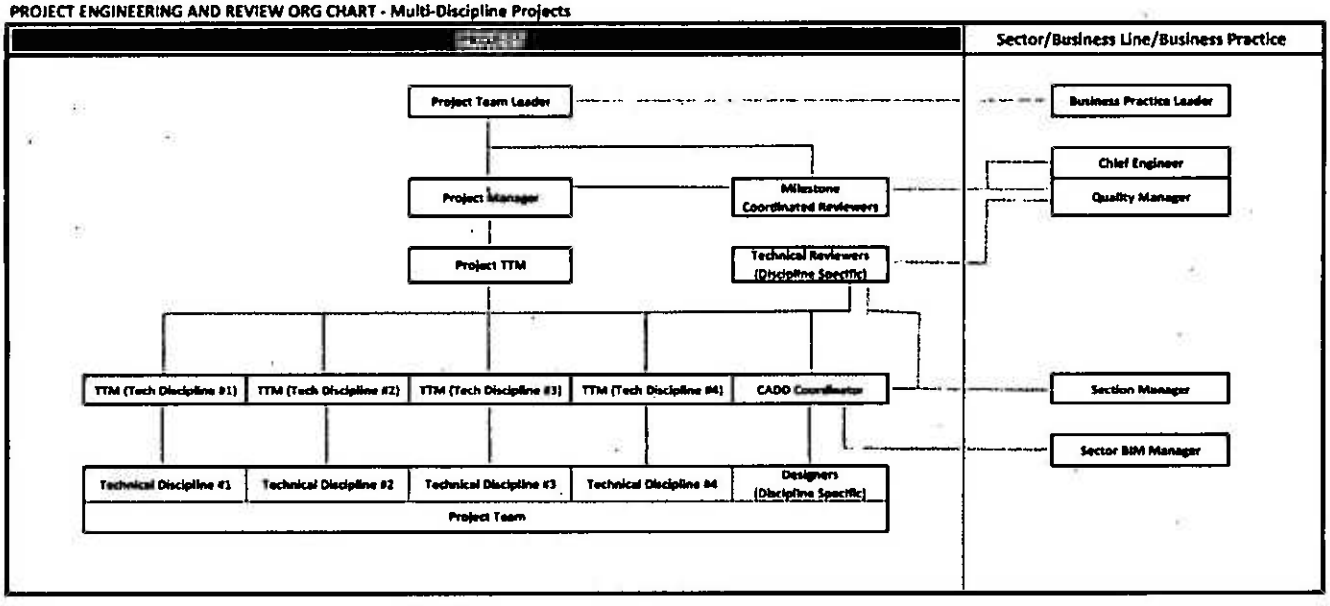
- **Business Sector President:** The Business Sector President (BSP) is responsible for the overall business management and strategic direction of the Business Sector.

- **Chief Executive Officer:** The Chief Executive Officer (CEO) has ultimate responsibility for all actions of the firm.

See Appendix for the established *Project Engineering and Review Responsibility Matrix*.

4.0 ORGANIZATIONAL STRUCTURE, ROLES, AND RESPONSIBILITIES

Figure 1 – Project Engineering and Review Org Chart – Multi-Discipline Projects



5.0 Quality Management

5.0 QUALITY MANAGEMENT

5.1 Achieving Consistent, Predictable, Repeatable, and Defensible Outcomes

Within the purview of CHA's Director of Innovation and Operations, CHA's Chief Professionals are responsible for developing, contributing, communicating, advocating, educating, facilitating, and auditing the implementation of the CHA's Quality Management System (QMS). The QMS is reviewed and updated by the Chief Engineers on an annual basis, at a minimum, and more frequently should the need arise. Quality audits, employee feedback, and client feedback are considerations that may be reflected in the continuous improvement and updating of the QMS. Records of updates, modifications, or supplements to the QMS are maintained and version-controlled for future reference and objective evidence.

CHA's QMS is readily available and accessible on CHA's Intranet for use and reference by all CHA employees.

CHA is committed to providing quality services, work products, and deliverables. The principles outlined below are essential to ensuring that CHA's standard for quality services and work products are achieved in a manner that is consistent, predictable, and repeatable:

- Quality is an ongoing process, not a milestone event.
- Quality is everyone's responsibility.
- Quality requires focus on the Client's needs.

To accomplish the standards of CHA's Quality Goals, the following principles and actions are promoted:

- Involve senior staff early and often as key contributors to quality success.
- Document all design elements for defensible quality and risk management.
- Continuously improve quality management through lessons learned and/or best practices observed from other projects.
- Identify and manage risk during all phases of a project.
- Scheduling and performing regular and consistent quality reviews, including post-review conferences/ debriefs, is essential.
- Communicate all changes in scope, schedule, and deliverables in an accurate, unambiguous, and timely manner.
- Take ownership of the completeness and accuracy of work, no matter how small the task.
- Take pride in one's work.

CHA espouses the "Plan, Do, Review, Document" system for Quality Management:

Plan: Work tasks are thoroughly planned and documented in the PDP developed by the PM, and further refined through resource planning by the TTMs and technical team. All project team members are invited to the Project Kickoff Meeting where the PDP and QMP (or PSQMP) are presented, requirements conveyed, and expectations discussed. The PDP is a living document, and the Kickoff Meeting is the first (of many) opportunities for the Project Team to contribute and enable change.

Do: Following the distribution, acknowledgement, and acceptance of the PDP and QMP (or PSQMP) by the Project Team, performance of work on the Project may begin. Self-checking, peer checking, and peer reviews are integral to CHA's quality-based design process and are completed as part of the standard workflow processes. Work products are systematically developed and advanced to the next necessary level for the appropriately scheduled reviews. The TTM and technical contributors prepare the completed and checked work product (as appropriate for the designated milestone) into the required format for review. The TTM (or designee) is responsible to initiate the review process with the PM.

Review: As identified in the QMP (or PSQMP), reviews will be completed by independent and/or senior reviewers at pre-determined milestones within the project development process. Project reviewers who have been identified in the QMP (or PSQMP) are to be engaged during the design progression and made aware of planned and forthcoming review schedules. The format, schedule, and process of reviews are identified in the QMP (or PSQMP). *Bluebeam Revu Studio* is CHA's preferred review process for the collaborative review of plans and other documents conducive for conversion into .pdf format. MS-Word track changes or other cloud-based collaboration tools may be more suitable for text documents and reports and are acceptable and approved practices for conducting reviews. Although the use of technology and innovation is preferred and encouraged, manual hardcopy reviews and color-coded mark-ups are also an acceptable form of quality review under certain circumstances and in limited instances. Proper and recoverable document management of any quality review process is paramount in CHA's ability to retain chronological evidence of the quality review process.

Reviews should always culminate with a conference between the reviewer(s) and the Project Team to allow direct one-on-one discussion of review issues uncovered with an objective for consensus-based resolution and agreement. Unresolved or significant review comments may be escalated, as needed, using the CHA's escalation procedures. See Section 9 for *Conflict Resolution and Escalation*.

Document: All internal and external "checks" and "reviews", including subsequent comment resolution documentation, are to be memorialized and retained in a standard format for future reference. A comprehensive document control system is used to catalog the checks and reviews and resulting actions. See Section 11 for *Document, Information, and Records Control/ Management*.

See Appendix for *Plan–Do–Review–Document Flowchart*.

5.2 Controls to Deliver Consistent, Predictable, Repeatable, and Defensible Quality Outcomes

Design controls are an integrated set of management practices (polices, processes, and procedures) which are applied to control design activities while assessing quality and correcting deficiencies through an iterative development process. Design controls are intended to be identified within a QMP (or PSQMP) and implemented by the Project Team to contribute to quality activities whereby all final requirements of the design and work products are met during the design development and delivery process.

In general, design control is about planning, design execution, testing against specifications (inputs) and requirements (user needs), and uncovering and addressing non-conformity at an early stage (risk reduction). Design controls are critical to quality compliance and accomplishment by identifying and/or defining the following requirements:

- Design development planning.
- Design basis.
- Design delivery, verification, and review.
- Design changes.

5.3 Design Development Planning

The PM is responsible for the development of the PDP that identifies and documents the necessary actions and responsibilities to successfully develop, produce, and deliver each design development activity. See *CHA Project Management Manual*.

Design Process: The design process is a methodical approach to producing quality work products consistent with the requirements established in the executed Agreement that will be used as the basis for the final deliverable or constructed product/ project.

Activity Assignments: Assigning technical and operational activities that contribute to quality execution are an outcome of proper planning of the design and verification activities as a responsibility of the PM. Appropriate project planning includes assessment of resource needs, coordination with technical disciplines, and the use of CHA staffing, backlog, and revenue forecasting tools. The outcomes of project planning are to be documented in the PDP and retained in the project files.

Organizational and Technical Interfaces: Organizational and technical interfaces are identified and documented in the PDP and include, but are not limited to, the following:

- Technical Task Manager (TTM) for each discipline.
- Project Team members.
- Identified professionals who will be required to stamp or otherwise certify the work being performed within the appropriate discipline and/or geographic jurisdiction (Certifying Professional or Engineer of Record). Stamping or certification of the work will be completed by those who are in responsible charge as outlined and identified in the following:
  - *Certification of Plans and Reports Policy*
  - *Authorized List for Certifying Documents*
  - *A Guide for Digital Signatures and Seals*
  - *Digital Signatures, Title Blocks, and Sealing of Documents*
  - *Technical Bulletin: Work Product or Deliverable Digital Certification*
- Subconsultant or subcontractor project manager and team members, as applicable.

5.4 Design Development Basis

The Design Development Basis (design inputs, requirements, standards) is to be identified and documented in the PDP. The design basis is to be communicated to the Project Team, coordinated with the client, and typically include the following items:

- Technical scope of work.
- Applicable design standards.
- Technical requirements including CADD/ BIM or other digital design development and delivery method standards.
- Project deliverables.
- Schedules.
- Permits and approvals.
- Health and safety planning.
- Client's project budget and/or funding.
- Testing requirements.
- Conceptual design requirements and other design parameters.
- Documentation of a plan for collecting and reporting client feedback.

5.5 Design Delivery

Technical resource teams and TTMs have responsibility for the technical development and design execution that supports project advancement and delivery, including, but not limited to, the following:

- Assigning resources and scheduling work.
- Establishing the basis of design approach.
- Monitoring design progress, budget, and schedule.
- Monitoring conformance of design to client's expectations and requirements.
- Executing the requirements of the QMP (or PSQMP).
- Delivering project requirements at set milestones.
- Providing support to the PM with client communications.

Responsibility for the conformance of design delivery to contractual requirements rests with the technical teams assigned to each design aspect of the Project. Responsibility for conformance of design to the applicable codes, laws, and generally accepted professional standards resides with the TTM, under the responsible charge of the EOR. Where there is no requirement of licensure for the certification of a work product, the responsibility for conformance of design output to contractual and legal requirements rests with the TTM. The PM is responsible for the project work products that are released by CHA with a reliance on the qualifications and competencies of the individual contributors responsible for the various components that make up the entirety of the deliverable.

5.6 Work Product Verification

Work product verification is the process conducted to support the development of design work products or outputs that are consistent, predicable, and repeatable with the relevant design inputs, including functionality and serviceability for its intended purpose for the end user. Design verification may include performing alternative calculations, comparison with similar proven designs or methods, and review of the design documented by an independent peer reviewer. Work product verification occurs continuously throughout the design development process. Ongoing feedback between project contributors will produce design inputs and outputs that are more efficiently integrated into subsequent design phases.

Work product verification activities are planned by the PM, are outlined in the QMP (or PSQMP), and are implemented by the technical teams. The QMP (or PSQMP) also identifies the technical review team members. These are the professionals who carry out the work product reviews and verify the suitability of the work product based on generally accepted technical principles and industry standards, and conformance to the project scope and contractual requirements.

Design checking, or other means used to verify the design, are performed by professionals other than those who originated the design, with appropriate qualifications for the check being performed. Verification personnel may be supervisors who are not actually involved in the design but are familiar with the requirements of the Project. Calculations are checked by other design professionals using alternate methods if possible.

5.7 Work Product Design Review

Work product review is a methodical approach carried out by knowledgeable, qualified, and competent persons with experience and skillsets in the required technical practice area to offer experience-based, constructive, and opinion-based input or feedback on the work product.

Work product review procedures and checklists are prepared by the technical teams for each discipline and indicate the items of the design documents that are to be reviewed. The purpose of the work product review is to determine that the design requirements have been adequately addressed by, and incorporated into, the design documents.

Work product review differs from work product verification in the fact that work product verification is the process by which one verifies or validates the truthfulness of the work product output and contributing elements. Work product review is a broad overlook or survey of the design output and contributing elements for conformance and consistency.

5.8 Design Changes

Design changes can occur during both the development and the construction phases of the Project. Changes that occur during development will be identified, documented, reviewed, and reported to the client for approval (if applicable) prior to being implemented. The investigation of alternate design approaches during the initial design development process is generally not considered a design change. A design change is considered a "change" only after the design approach has previously been selected and that design requires modification.

Design changes are subject to the same level of checking and review as the original design. Only design documents approved for release by the PM and the client are issued and used on the Project.

Changes initiated after design development completion may be necessary during the construction phase of a project. These are generally triggered by the following:

- Owner-requested changes (or changes made through or by an appropriately authorized stakeholder).
- Differing field conditions uncovered during construction.
- Contractor-initiated Requests for Information/ Interpretation (RFI's).

Construction-related design changes are subject to the same level of checking and review as the original design. Only design documents approved for release by the PM and the client are issued and used on the Project.

5.9 Responsibility and Accountability for Consistent, Predictable, Repeatable, and Defensible Quality Outcomes

The individual who provides a service or creates or prepares a work product or deliverable bears the primary responsibility for the completeness, content, form, and technical accuracy of his/ her work. The PM is ultimately responsible for all aspects of a project, including Quality, but that responsibility relies heavily on the competence of all team members working with the common goal to produce a quality product that conforms to the requirements of the Agreement with the Client and applicable industry standards.

Every PM is responsible for developing a PDP, with QMP (or PSQMP), tailored to the specific project. That responsibility includes modification of the PMP and QMP (or PSQMP) as warranted throughout the project lifecycle and maintaining all project quality records (project management, technical execution, quality reviews and checks, inspections and test reports, and client feedback).

6.0 Quality Control Process

6.0 QUALITY CONTROL PROCESS

6.1 Quality Control

Quality Control (QC) is the action of checking, reviewing and documenting. QC encompasses the regularly scheduled and re-occurring processes, practices, and checks that are in place to control the quality of product development. QC is the action of checking, reviewing, and documenting through the examination and documentation of services provided, and work done to demonstrate that contractual requirements are met. QC emphasizes testing and/or checking of products to uncover non-conformities and reporting in a timely and constructive manner to an appropriately qualified and authorized person(s) who will make the decision to allow or deny the release of conforming work products. QC is the way in which accuracy is controlled through review by a "second set of eyes" before distributing outside of the Project Team. The QC process to be used on any project is formalized and identified in the QMP (or PSQMP).

An effective and comprehensive QC process requires the following activities:

- Self-checking by the design professional preparing the work product.
- Independent technical check of the work project prior to review.
- The scheduled technical review (coordinated, milestone, peer).
- Coordination and compilation of review input.
- A post-review conference to discuss review comments, as needed.
- The work product is corrected as necessary to address review comments and then backchecked.
- The project reviewer confirms all comments have been adequately addressed and/or resolved.

Quality is every individual's responsibility and as such, self-checking and peer-checking of work products is foundational in any comprehensive QC process and is required prior to review initiation.

Work products and deliverables will undergo the appropriate examination and documentation of services provided and work done to demonstrate that contractual requirements are met, with an emphasis on uncovering and addressing any non-conformities prior to release. Technical checks and technical reviews will be performed by individuals with requisite familiarity, knowledge, and experience in the subject matter for which they are reviewing. A *Technical Review and Quality Control Form* shall be completed, signed-off by the appropriate team members, and provided to the PM and/or QM (or designee) prior to issuance of a deliverable. The individuals responsible for scheduled QC activities are identified in the QMP (or PSQMP) as qualified and competent professionals for their respective technical disciplines. The *Technical Review and Quality Control Comment Summary Form* may also be used to supplement review comments. The *QAQC Project Submission Log* is another tool that can be used to organize and document the QC and QA activities.

6.2 Checks

A "check" is the verification that individual components of the work product or deliverable were verified to be correct, generally by repeating the original process and achieving the same result. A "check" is generally performed by a Project Team member involved in the work product development using CHA's established process for document checking. See Appendix for detailed *Checking/ Review Process*.

6.3 Reviews

A "review" is a comprehensive examination of the application of individual components into an overall work product or deliverable. A "review" is generally performed by a competent and qualified senior-level professional(s) (Project Manager, Technical Task Manager, Section Manager, Quality Manager, or Technical Reviewer) using CHA's established process for document review. See Appendix for detailed *Checking/ Review Process*.

6.4 Processes

CHA's checking and review processes are tailored to specific document types. The key with any process is consistent, predictable, and repeatable results, and the documentation of such actions for future reference.

Collaborative/ Technology – Bluebeam Review (.pdf Documents)

CHA has adopted *Bluebeam Revu Studio* (Bluebeam) as CHA's preferred collaborative checking and reviewing process for review of plans and .pdf-formatted technical documents. To the extent practical, the use of Bluebeam will be implemented by CHA on all projects. There may be occasions where the use of Bluebeam is not the most appropriate application for the intended need or purpose, and that determination will typically be made on a case-by-case basis by the PM with the concurrence from the Business Practice Chief Engineer.

Bluebeam is a cloud-based platform for collaborative checking, reviewing, and document management of .pdf work products, allowing multiple users to collaboratively check or review documents concurrently, sequentially, or randomly. Bluebeam allows for real time collaborative reviews and eliminates the need for the retention of hardcopy records by allowing the chronological sequence of reviews and resolutions to be retained within CHA's electronic data management system established for a project. Comments appear to all users in real-time, greatly increasing the efficiency of the process, and reducing or eliminating multiple or repetitive comments. The fundamental quality review aspects that are used in the Bluebeam sessions are consistent with CHA's traditional "Red-Green-Yellow" (RGY) color-coded process for editing, managing, marking-up, designing, and sharing hardcopy documents. With the incorporation of Bluebeam into the workflow, CHA's traditional quality review workflow has been improved and streamlined.

This process provides a standardized color coding of comments by their status (correction, comment, backchecked, verified, etc.), and provides a recoverable record of the entire process for documentation and chronological reference. All actions are sortable by color-codes (completion status) allowing efficient determination of the completeness of the check or review.

The Bluebeam process is appropriate for all documents in .pdf format. At the conclusion of the check and/or review process, the completed "studio" version of the document is to be copied from the collaborative cloud-based session and saved on the secure CHA network under the appropriate project folder. Reports can be generated specific to the comment status for review of completeness.

Collaborative/ Technology – Track-Changes (MS Word Documents)

Documents developed in MS Word can be converted into .pdf format and checked and/or reviewed using the Bluebeam process. However, conversion of a Word document to .pdf for the purposes of review and collaboration, particularly during document development, may be cumbersome and inefficient. The use of the "Review" tools in MS Word, such as "Track Changes", provides a more natural process for review (editing, commenting, etc.) of narrative documents. Comments can be "replied to" and "resolved" without loss of the review history. In order to provide a record of the review, immediately prior to

"accepting" changes and stop tracking, the document is saved into the appropriate project folder on the secure CHA-Network.

A limitation of simply using MS Word for this check and/or review process is that it does not provide collaboration or allow multiple users access to the same document at the same time. If collaboration is needed, posting the document with collaborative software such as MS Teams allows all users access through the cloud-based tools, with comments appearing to all users in real-time, greatly increasing the efficiency of the process, and reducing or eliminating multiple or repetitive comments.

Collaborative/ Technology – Track-Changes (MS Excel Spreadsheets)

It is oftentimes advantageous to check and/or review spreadsheets created in MS Excel directly from the source document. This allows reviewers access to the formulae associated with spreadsheet calculations for testing of inputs and outputs. MS Excel allows for the addition of review comments, and a response to the comments. To provide a record of the review, immediately prior modifying the spreadsheet based on the review comments, the document is saved into the appropriate project folder on the secure CHA network.

A limitation of using MS Excel for this check and/or review process is that it does not provide collaboration or allow multiple users access to the same document at the same time. If collaboration is needed, posting the document with collaborative software such as MS Teams allows all users access through the cloud-based tools, with comments appearing to all users in real-time, greatly increasing the efficiency of the process, and reducing or eliminating multiple or repetitive comments.

If access to the embedded formulas and calculations are not needed for a check or review, the spreadsheet should be converted into a .pdf format and checked or reviewed using Bluebeam.

Collaborative/ Technology – Adobe Document Cloud for Review of Marketing and Proposal Documents (.pdf Documents)

CHA has adopted *Adobe Document Cloud (Adobe DC)* as CHA's preferred collaborative checking and reviewing process for the review of proposals and .pdf-formatted marketing documents. To the extent practical, the use of Adobe DC will be implemented by CHA on all marketing and proposal documents.

Adobe DC is a cloud-based platform for the collaborative reviewing of .pdf work products, allowing multiple users to collaboratively review documents concurrently, sequentially, or randomly in a web browser. The software allows for real-time collaborative reviews and eliminates the need for combining the comments from multiple .pdf files by allowing the chronological sequence of reviews and resolutions to be retained within CHA's electronic data management system established for a proposal. Comments appear to all users in real-time, significantly increasing the efficiency of the process and reducing or eliminating multiple or repetitive comments. Users open the .pdf in any web browser through the link provided and edit the document using comment boxes/ pins, strikethrough, highlight, and drawing tools. Other reviewers can be tagged with questions or comments; they will receive an email with the question/ comment and the link to answer/ address. Tagging allows whoever is inputting the edits to focus on the edits instead of tracking down clarifications.

CHA's traditional proposal quality review workflow has been improved and streamlined by incorporating Adobe DC into the marketing workflow. Marketing staff can overlay comments directly in InDesign and integrate the information into the document.

The Adobe DC process is appropriate for all marketing and proposal documents in .pdf format. At the conclusion of the review process and when the proposal draft is complete, the document's completed "cloud" version should be copied from the collaborative cloud-based session and saved on the secure CHA network in the appropriate marketing or proposal folder.

Traditional/ Manual – "Red-Green-Yellow" Checking/ Review Process

The conventional "Red-Green-Yellow" (RGY) Process is the default checking and reviewing process when use of Bluebeam is unavailable, impractical, or otherwise deemed not prudent. The RGY process requires all work products be printed in hardcopy, and the checking and/or reviewing is completed directly on the hardcopy prints using a standardized protocol of colored highlighters or pens. This is a sequentially stepped process, beginning first with the *Originator/ Initiator*, then going to the *Backchecker*, then to the *Corrector*, and finally to the *Verifier*. At the conclusion of the process, the color-coded review document must be scanned in color and saved into the appropriate project folder on the secure CHA Network. See Section 11 for *Document, Information, and Records Control/ Management*.

Software-Based Calculations and Spreadsheets

Calculations developed or performed with software, including commercially-prepared software or internally-prepared spreadsheets utilized for design of a project, shall have both inputs and outputs checked (100%) prior to use in design development, unless the software has been previously approved for use by CHA. For software previously approved and utilized for design by CHA, it shall have all inputs checked (100%) and outputs shall be reviewed for reasonableness and spot checked for accuracy.

Contract-Specified Software

Specific software programs denoted in an executed Agreement for use in analysis and design development are considered approved, do not need to be verified, and will be identified as project-specific approved computer programs. Outputs shall be reviewed for reasonableness.

Internally Developed Spreadsheets

Verification of spreadsheets is a pre-requisite for use on a project. Internally developed spreadsheets may be used; however, they shall be verified by performing hand calculations to check output or by checking the formulas used in the calculations before being used as a design tool. A comparison shall be made between the computer-generated output and the hand calculations to validate the accuracy of the output. Project specific spreadsheets for high risk or high complexity design elements shall have input, logic, and equation checks performed by a qualified and competent professional for all calculations within the spreadsheet. An option to this verification approach is to have an independent set of calculations performed by a qualified and competent professional with familiarity and experience in the identified critical item(s).

Third-Party Software

Vendor-supplied (third-party) software must be "pre-validated" so that repetitive uses do not require an in-depth check or review for anything other than the case specific input. Qualified individuals (those familiar with the type of design that the program performs) must perform the pre-validation check/ review.

Third-party computer programs may be verified by one of the following methods:

- Using the hand calculation method as described for spreadsheet verification.

- Using the same input as another approved computer program and comparing output.
- Supplying documentation from the manufacturer or program-writer verifying the accuracy of the program.
- A check/ review of the program code.
- Sample runs of the program for various input conditions.

CHA will not use software for application until the software is approved by this process. Once approved, the approved software version is considered "pre-validated" and may be used by CHA for other design applications.

Documents Not Requiring Formal Review

Project execution items such as Meeting Agendas, Meeting Minutes, and similar documents should undergo a peer review for reasonableness, grammar, punctuation, and accuracy and interpretation (to the extent appropriate), but such items are not required to undergo formal quality reviews. Meeting Minutes are unique in that they serve as the record to interpret, capture, and document salient points, opinions, decisions, and/or commitments that have been verbalized as part of a conversation, discussion, or presentation. CHA subscribes to a best practices policy for the preparation of Meeting Minutes by first preparing a draft version which is distributed to all meeting attendees. The attendees are requested to review and offer comment or input to the preparer specific to the accuracy, interpretation or content of the information captured and recorded by the preparer in the draft. Comments or input are compiled, interpreted, resolved, and incorporated into final Meeting Minutes by the initial preparer. The final Meeting Minutes are then issued for retention in the project records.

Documents of External Origins

Documents not produced or prepared by CHA but determined by CHA to be necessary for project planning and/or execution shall be identified, documented, and their distribution controlled or limited by the Project Manager. If the needed external document is accessible in a public domain or on a publicly maintained website, it is preferred that an active link or the web address with a notation to date the last time the user visited the site (e.g., www.chacompanies.com "last viewed November 16, 2020") for the document be included in the documentation most relevant to the task or deliverable that it is associated with.

Where a needed external document must be purchased, it is preferred that an appropriately licensed electronic copy of that document be maintained in the project files.

Documents Provided Prior to, or without, Formal Quality Review

Occasionally, CHA may be requested to provide a document or work product that is under development. Documents or work products that are under development are to be distinguished and recognized a "Work in Progress". Under certain instances, such "Work in Progress" documents may not have undergone internal CHA quality checks and reviews. Submittal of unchecked design products or work products (e.g., drawings, specifications, or other design deliverables) requires written approval of both the PM and the responsible, credentialed EOR, Certifying Professional, or Chief Engineer, who are technically and legally qualified to release the design deliverables. Similarly, submittal of other unchecked work product(s) (e.g., estimates, budgets, forecasts, schedules, etc.) requires written approval from both the PM and the responsible EOR or Certifying Professional. In the event a circumstance dictates the issuance of unchecked work product, the client must be notified in writing by the PM of such status, and the project documents will be stamped or annotated to indicate that they are of a preliminary nature.

6.0 QUALITY CONTROL PROCESS

Unchecked project documents that are under development and requested for distribution will be stamped as follows:

This Document is under development and is being provided as requested. This document has not undergone internal CHA Quality Reviews and is Work in Progress.

7.0 Quality Assurance Process

7.0 QUALITY ASSURANCE PROCESS

7.1 Quality Assurance

Quality Assurance (QA) is the systematic monitoring and evaluation of the various aspects of a product, service, or facility to maximize the probability that the appropriate standards of quality are being attained by the production process. QA establishes the framework of Quality Control (QC) for a project and monitors compliance with that process. QA is performed throughout project development to assess the progress of the work product and its compliance with established QC protocols. QA is a process, not an event. Although QA cannot absolutely guarantee the production of quality products, the QA procedures and activities support the objectives that the QC processes are in place, being followed, and documented. QA identifies the who, what, where, how, and when.

The completed and signed *Technical Review and Quality Control Form* (or equivalent) provides a summation of the completed QC process which serves as objective evidence for QA purposes. This form provides evidence that all required aspects of QC were completed and signed-off by the appropriate project team members identified as being in responsible charge for the QC. This form shall be provided to the PM, QM, and EOR, or Certifying Professional prior to issuance of a deliverable.

7.2 Quality Audit

A Quality Audit is an action typically undertaken by CHA's Chief Engineer(s) or a project's Quality Manager (QM) to assess whether the Quality Management System is being implemented as planned, adequately and appropriately complied with and documented, and whether it continues to be effective.

CHA has established performance objectives to define the requirements for planning, scheduling, conducting, and reporting audits of quality management systems, processes, and projects. Quality audits should be conducted in accordance with the following considerations:

- Occur with sufficient frequency to support conformance to and effective implementation of policies, procedures, work instructions, and other control activities as defined in a project specific QMP.
- Serve as leading indicators to identify opportunities for preventing, or where necessary, correcting non-conformity to requirements.
- Serve as leading indicators to identify opportunities for early identification and mitigation/ elimination of risk.
- Provide reliable data for assessing overall effectiveness of CHA's QMS and its implementation.
- Serve as input for management review, trend analysis, and continual improvement.

The *Quality Assurance Review Certification Form* provides a means for the documentation and sign-off of the Quality Assurance Process.

8.0 Continuous Improvement

8.0 CONTINUOUS IMPROVEMENT

Continuous Improvement is a fundamental underpinning of Quality that involves continuous efforts to improve and innovate upon products, services, or processes, and benefits from knowledge transfer and the sharing of experience. Any team member may, and is encouraged to, identify and propose a change to a process or procedure that will contribute to or improve the collaborative environment for developing, evaluating, and delivering more effective and efficient work products and services. Knowledge sharing or knowledge transfer contributes to continuous improvement, and can include project specific experiences, industry forums, anecdotal information, Communities of Practice, or any other means by which to promote and distribute the tenets of quality and betterment.

Consideration of project-specific or project-related improvement actions may be first identified by any member of the CHA team. Upon initial identification, the continued evaluation, development, and implementation of any quality-related improvement action will require authorization from, and collaboration with, the PM and CHA Chief Engineers.

The policies and procedures that will be followed for any continuous improvement initiative will involve a consistent, pragmatic, and rigorous process to identify, document, track, and resolve any non-conformance to the contract documents. Opportunities to advance continuous improvement actions may evolve from project, technological, or innovative advancements, or they may result from the identification of non-conformance/ non-compliance.

8.1 Best Practices

The identification, evaluation, and implementation of Best Practices is a key part of continuous improvement within the CHA QMS. As part of CHA's commitment to continuous improvement, CHA will strive to identify, vet, and deploy Best Practices as a standard quality practice for purposes of identifying alternative methods for achieving superior results or to standardize various elements. Disseminating Best Practices is intended to support continuous improvement throughout the entire project team.

8.2 Corrective Action

When there is evidence that a project requirement has not been met, Corrective Action is required to eliminate the cause of identified non-conformity and to prevent recurrence. Upon the identification of a non-conforming element, the PM will be notified of the identified non-conformance. The PM will evaluate the non-conformance and determine whether it is an isolated one-time occurrence or whether it is of sufficient consideration to warrant the preparation of a Continuous Improvement Form. See Appendix for *Continuous Improvement Identification and Action Form*.

The development and issuance process of a Continuous Improvement and Action Form will be as follows:

- Investigate and determine/ conclude whether the identified non-conformance is an isolated one-time occurrence or an event that requires implementation of a systematic or comprehensive corrective action procedure.
- Identify, document, and implement any short-term or near-term actions that are necessary to promptly address the non-conformance.
- Evaluate and determine underlying cause(s) or contributing nature of, or associated with, the non-conformance.
- Identify, define, and implement actions that will address the underlying cause(s) and prevent future occurrences.
- Verify and audit the effectiveness of the action and the Continuous Improvement Form.

8.3 Formal Client/ Stakeholder Feedback

Client and stakeholder feedback are foundations for continuous quality and delivery improvement. CHA will compile and evaluate qualitative and quantitative input from clients and stakeholders to develop a comprehensive and unbiased insight into what is working well with a project and with the project team performance and service. Client and stakeholder opinions help to ensure that the work products will meet their expectations, solve their problems, and fulfill their needs. Feedback may provide CHA with opportunities for improvement to make the project experience better. The request, collection, and interpretation of client feedback shall be a collaborative and coordinated effort that is initiated and led by an independent internal source with input from the PM.

8.4 Experience Gained and Lessons Learned

The ability to share project-related experiences within the organization as a commitment to CHA's continuous improvement is beneficial for our professionals and our business. The capturing and sharing of project-related experience(s) is not a substitute for sound professional judgment and/or proactive escalation. It is paramount that a potential situation or circumstance that might result in, or contribute to, a risk to CHA be properly identified and considered through consultation with the appropriate CHA Legal Counsel(s) and Chief Engineer(s) as a first order standard of practice.

The opportunity to gain and share project-related experience is intended to promote, support, and contribute to CHA's aspirational commitment to *"responsibly improving the world we live in"* through continuous improvement of our Operational and Technical Excellence initiatives. Gaining experience is the process of doing and seeing things, and of having things happen that can be reflected upon, shared with others, and serve as a catalyst for improvement. A benefit of "gaining experience" is founded in the professional collaboration and betterment that is the result of interpreting, applying, understanding, and disseminating appropriate information. Experience can be found or created in all aspects of the project delivery cycle. The objective of this section is to capture select aspects of the project process that have contributed to or resulted in an increased level of experience that was not, or would not be otherwise contemplated or recognized, and use this as an opportunity to share experience(s) gained with others.

An "experience gained" process is included in the CHA Project Delivery Plan and should be incorporated into the design development process typically at major milestones and at the project close-out to identify improvement opportunities or improvement areas. This process is intended to be a constructive evaluation and should include a frank and open dialogue with appropriate Project team members of what worked well and what activities, processes, or procedures would benefit from improvement or enhancement. This process may result in the implementation of changes to a QMP or PSQMP in the case of milestone experience gained reviews, or potentially changes to the QMS for future projects in the case of project experience gained reviews conducted post-project completion.

CHA's Lessons Learned are an alternate form of knowledge sharing expressly reserved for enterprise-wide publication and distribution by CHA's Chief Engineers. The venue for Lessons Learned document management is the CHA Intranet Programs & Committees portal under Technical Excellence. Lessons Learned are prepared by CHA Chief Engineers and posted on the CHA Intranet on regular cadence. Lessons Learned are intended for a broad CHA audience and provide a diverse range of vantage points and subject matters relevant to CHA's business or the industry as a whole. Lessons Learned are commonly broader in nature than any singular project-specific experience gained subject matter.

8.5 Non-Conformance (Non-Compliance)

8.0 CONTINUOUS IMPROVEMENT

Services or work products that are identified or found to be in non-conformance when reviewed against the contract documents will be addressed by CHA in one or more of the following ways:

- Verifying and acting promptly to eliminate, resolve, or correct the identified non-conformance.
- Evaluating and then authorizing its use, release, or acceptance as acknowledged and approved by the appropriate authority.
- Taking decisive and authoritative action to document, notice, and preclude its use or application permanently, or until such time that the non-conformance is resolved and authorized by the PM for the Project.

8.6 Opportunities for Improvement (OFI)

Continuous improvement in quality benefits from knowledge transfer and the sharing of experiences. Any team member may identify and propose a change to a process or procedure that will contribute to, or improve the collaborative environment for developing, evaluating, and delivering more effective and efficient work products and services. The identification and implementation of an action to improve or enhance a service, work product, or deliverable can be considered an OFI process.

8.7 Preventive Action

When a risk of potential non-conformance is identified, Preventive Action is the appropriate course of action to proactively address, resolve, or eliminate the cause of potential non-conformity or other potential undesirable situations before occurring. Preventive Actions are required when assumptions, services, deliverables, or procedural requirements are anticipated, forecasted, or observed not to be met in the future. Preventive Actions are proactive measures to address a potential non-conformance or potential discrepancy that is not otherwise covered, accommodated for, or accounted for by another established process or policy. The PM will evaluate the potential non-conformance or discrepancy and determine whether it is an isolated one-time occurrence or whether it is of sufficient consideration to warrant the preparation of a Continuous Improvement and Action Form. See Appendix for *Continuous Improvement Identification and Action Form*.

The development and issuance process of a Continuous Improvement Form will be as follows:

- Determine the underlying contributory cause(s) of the potential non-conformance.
- Identify actions to address the cause and prevent the non-conformance.
- Document the Prevention Action taken, including dates by which the action will be completed.
- Verify and audit the effectiveness of the action and the Continuous Improvement Form.

8.8 Root Cause Analysis

Root Cause Analysis (RCA) commonly begins with a clear and accurate definition of the problem which is then followed with information gathering (data, inputs, assumptions, etc.). Using the gathered information, the next step is a detailed evaluation with the objective being focused on identifying the underlying cause(s) that contributes or is responsible for the non-conformance. After determining the underlying cause(s), an appropriate and well-founded Corrective Action or Preventive Action can be implemented. The PM or the QM (if one is designated for the specific project) will typically initiate the RCA, but an RCA can be initiated by any authoritative member of the project team. The PM, QM, or Chief Engineer shall contribute in the RCA strategy development.

9.0 Conflict Resolution and Escalation

9.0 CONFLICT RESOLUTION AND ESCALATION

CHA supports and cultivates an atmosphere of "challenge, then support", where any team member, regardless of organizational level, should not hesitate to identify issues, ask questions, or challenge an idea or point in a tactful, timely, constructive, and professional manner. CHA supports professional working relationships, and provides a professional working environment, that is grounded in trust and transparency, mutual respect for our peers, open and honest communication, and a commitment to a common goal. To be truly effective as a collaborative team, every team member must feel their input is important and that they have a voice that will be heard. It is imperative to achieving quality that any disputes, conflicts, or discrepancies involving project communications or decisions are resolved in a way that promotes an unbiased and non-threatening workplace environment that does the following:

- Ensures accurate communications are distributed appropriately, succinctly, timely, and decisively.
- Maintains the professional and project delivery expectations and obligations.
- Prevents on-going or re-occurring difficulties.

Efficient, accurate, and timely communication is key to effective decision-making and quality-driven success in project delivery.

9.1 Conflict Resolution

When an issue or conflict surfaces, CHA's goal is to ensure that it be dealt with in a timely, pragmatic, and professional manner, and in most cases by and at the most appropriate and effective level within the team organizational structure to resolve the conflict. Typically, the hierarchy of resolution will be sequential in its level of initial identification and interaction.

The increasing levels of technical, management, and leadership involvement and engagement will be based upon the potential or likely nature, consequence, and/or risk associated with the circumstance or conflict. The higher the risk or more complex the matter, the higher the level of authoritative engagement and decision-making. For example, at the most fundamental technical issue level, collaborative peer-to-peer dialogue, analysis, and resolution itself will be most effective when it involves specific technical decisions or immediate resourcing matters relevant to discrete elements of the project.

Once a challenge or conflict is identified, thoroughly discussed and vetted, and a resolution or decision is reached by the involved parties, it is then incumbent upon every team member to ensure that the decision is supported, and the messaging is accurate, clear, and consistent.

9.2 Escalation

Escalation is the strategy of addressing conflicts at the lowest appropriate level to support prompt, collaborative, and effective resolution, allowing those involved closure with minimal consequence to themselves, the team, or the team's goals and objectives. The underlying premise for effective escalation is to decisively resolve matters or issues at the lowest and/or most appropriate level within the project team based upon the specifics of the situation, the involved parties, and the level of consequence or risk associated. If resolution is not achieved at the lowest levels, the issue is then escalated up the established hierarchy until satisfactory resolution is achieved. Ensuring accuracy, clarity, and consistency of involvement and communication within and outside of CHA is paramount to the collective success of CHA and the clients that we serve. Escalation is a formal process that should be treated as a professional act and should be done in an unbiased and timely manner.

9.3 Escalation Process

When parties are unable to achieve acceptable resolution at the lowest appropriate level, an alternate and structured procedure for notification or involvement of individuals of increasing authority must be considered. Escalation is the structured process of involving incrementally higher levels of authority within the project team to support or provide decision-making. The increasing incremental involvement of management authority is intended as a sequential action plan to resolve challenges though collaboration and commitment to provide an acceptable and supported outcome by all team members. See Appendix for *Escalation Involvement Ladder*.

Starting from the least formal level of peer-to-peer baseline dialogue, an issue is escalated further with each increased level of involvement, influence, and authoritative decision-making through the various levels of the organizational structure with the prospect for inclusion of subject matter experts, independent peers, management, and ultimately leadership (as needed and commensurate with the level, nature, risk, and consequences associated with the circumstance).

When a circumstance might involve policy decisions, public health, safety and well-being, or significant risk, the level of engagement may require assembly of executive-level leadership with representation from the Business Practice, Business Line, Business Sector, Legal, Chief Engineers, and Executive Team. Additionally, the sequential and hierarchical approach also supports the involvement and input of independent or outside resources when necessary or appropriate at any level (e.g., Human Resources, Operations, Legal, etc.).

Some known situations that might call for engagement of the escalation protocol include the following:

- Risks or issues related to project objectives or project quality.
- Resource behaviors and inter-personnel or group conflicts.
- Ambiguous roles and responsibilities.
- Scope, technical, or contractual interpretations, applications, or disagreements.
- Third party (subconsultant) interactions or dependencies.

Such issues may require a sequentially higher level of judgment and intervention because the authority, decision making, resources, or effort required to resolve the situation or circumstance are beyond the horizon of those immediately involved or affected.

Because the escalation process will inevitably involve multiple parties and sequentially higher levels of authority for engagement and interaction to ensure effective resolution, clearly defined and published roles, responsibilities, and expectations are paramount. For the escalation process to be most effective, the project team must support a project culture where it is acceptable and encouraged, when appropriate, to escalate issues in a timely and professional manner to the next level of management without fear of retribution or aggravating the issue. Exhibiting professionalism, good judgment, and skill in this escalation process are traits that are an expectation of every team member.

9.4 Escalation Steps

To establish a consistent, predictable, and repeatable procedure for escalation, CHA will be guided by a defined and agreed upon escalation protocol established for every project with escalation contact points, escalation paths for different complaint or basis areas and levels, resolution strategies, and resolution/ decision timeframes.

9.0 CONFLICT RESOLUTION AND ESCALATION

Following are some fundamental best practices that are to be considered in the evaluation and escalation of issues:

Clearly Identify the Potential Scope, Scale, Complexity, and Risk of the Complaint or Problem: It is incumbent upon the originator of the complaint or problem to identify the specifics of the situation as clearly, factually, accurately, and succinctly as possible. The originator should be informative as possible and avoid conjecture on possible impacts or outcomes.

Attempt to Resolve the Complaint or Problem at the Lowest Appropriate Level: The originator of the complaint or problem should exhaust reasonable and practical efforts within a timely manner to resolve the situation at the lowest appropriate level by engaging or applying the commensurate resolution strategies.

Attempt to Resolve the Complaint or Problem Prior to Escalation by Engaging Additional Horizontal Involvement: If the originator cannot reach an acceptable resolution with the primary involved parties, involvement of additional staff of similar experience or project role/ responsibility should be considered as an additional opportunity to reach effective and efficient resolution prior to escalation.

Escalate the Process Following the Established Protocols in the Escalation Involvement Ladder: When successful resolution cannot be accomplished through horizontal involvement, escalation must be considered, evaluated, and acted upon to ensure effective and efficient closure. The escalation process shall follow a sequential increase in levels of authority consistent with the protocol defined in the *Escalation Involvement Ladder*.

10.0 Risk Management

10.0 RISK MANAGEMENT

Every project involves risks, and risk events will occur no matter the level or extent of quality-driven project planning and project execution. Risk is the possibility of loss as a function of an adverse event occurring and the consequential impacts that result. Risk management is the strategy of identifying, evaluating, and prioritizing risks and risk impacts associated with the Project, and then addressing identified risks through elimination, avoidance, prevention, minimization, reduction, transfer, and/or mitigation strategies.

CHA's risk management process involves the following five-step process:

Step 1 – Identify the risk: A deliberate and systematic information gathering effort to understand and document a comprehensive inventory of potential project risks. Comprehensive project risk identification should consider all risks, regardless of whether such risks are deemed significant or within CHA's direct control. Objective risk identification strives to identify unwanted events, undesirable outcomes, emerging threats, as well as existing and emerging opportunities. Risk identification is not an exact science and therefore should be an ongoing process throughout the project, especially as it enters a new phase, or as new personnel bring different experiences and viewpoints to the project development process.

Step 2 – Assess the risk: The assessment of risks involves making an objective and professional opinion on the likelihood that a contributing factor or hazard will occur (occurrence probability) to impact an outcome or a result, and how severe the consequences (risk impact) might be should the contributing factor or hazard occur. External elements completely out of project team's control (acts of God, force majeure, political uncertainty, etc.) may also be considered in the risk assessment.

Step 3 – Prioritize or rank the risk: The prioritization or ranking of risk is based upon the overall effect of an individual event occurrence to the project. Every project is unique and as such the evaluation process must be considerate of the project context and specific project circumstances. Typically, the risks with the highest potential impact and the highest probability of occurrence are determined to be the highest priority.

Step 4 – Address or resolve the risk: The outcomes of the risk assessment can yield decisions to address or resolve the risk through avoiding the risk, eliminating the risk, reducing the risk, sharing the risk, transferring the risk, or accepting the risk.

Step 5 – Monitor and review the risk: Following Step 4, continuous improvement will benefit from an on-going and proactive process whereby those actions taken to address or resolve a risk are monitored to determine the effectiveness of the action, whether the action has resulted in any secondary or residual risks, or any other risk attributes have resulted.

A project-specific risk register will be maintained to document information associated with identified risks (negative outcomes) and opportunities (positive outcomes). The risk register is the responsibility of the PM and will contain, as a minimum, the following risk considerations:

- Identification
- Description
- Ownership
- Impacts
- Response

11.0 Document, Information, and Records Control – Management and Security

11.0 DOCUMENT, INFORMATION, AND RECORDS CONTROL – MANAGEMENT AND SECURITY

11.1 Documents and Data

Accurate documentation and document controls are essential and required so that all work products are consistently and logically filed and memorialized for every aspect of a project. Records will be prepared at the time of an activity or when an action is taken, and superseded documents will be retained in the project files following the established CHA document management procedures. CHA utilizes a regimented electronic project folder filing conforming to CHA's Network Folder Structure with all digital information stored on a secure CHA network. See *Network Folder Structure Guide and File Management Presentation*. Good documentation involves reviews, approvals, and updates; recoverable documentation of changed and current revision status; relevant versions of applicable documents at appropriate points of use; legibility and accuracy; and origin and distribution control and proper security classification as per CHA's *Information Handling Procedure* and CHA's *Information Handling Policy* found on the CHA Intranet under the Information Security portal. The Policy and Procedures detail the steps required to apply a classification scheme to CHA systems and data.

The CHA PM is responsible for working within the confines of CHA's Information Security requirements to establish the protocols that project data files are appropriately restricted based on content, client requirements, sensitivity, and risk. Information Security is summarized in the following sections, however, for a comprehensive understanding of CHA's Information Security requirements it is imperative that CHA employees rely upon the most current information security policies, procedures, and protocols implemented by the CHA Cybersecurity Task Force or their designee. All CHA employees are directed to the CHA Intranet Departments portal for Information Security. CHA's Information Security policies, procedures, and protocols are categorized for Public Documents, Private Documents, and Internal Documents. Specific definitions and criteria for each of the three document categories and their associated policies, procedures, and protocols are readily available and accessible to CHA employees.

Documents of external origins determined by CHA to be necessary for project planning and/or execution shall be identified, documented, and their distribution controlled or limited by the PM. If the needed external document is accessible in a public domain or on a publicly maintained website, it is preferred that an active link or the web address with a notation to date the last time the user visited the site (e.g., www.chacompanies.com "last viewed November 16, 2020") for such document be included in the documentation most relevant to the task or deliverable that it is associated with.

Where a needed external document must be purchased, it is preferred that an appropriately licensed electronic copy of that document be maintained in the project files.

Any document or data that is used during a project, up to and including the final deliverable, is considered a project document that is subject to CHA's quality compliance testing and acceptance. Project documents can include input (documents, data, and/or electronic communications) from project team members, outside sources, subconsultants, subcontractors, and others; check prints used in the fulfillment of this procedure; documents or data prepared during the life of the project such as drawings, specifications, calculations, schedules, public involvement hand-outs and displays, reports, cost estimates, and all final project deliverables.

To the extent practicable, chronological records provide a recoverable and defensible accounting of a project's evolution and development. Consistent, predictable, and repeatable documentation involves, but is not limited to the following:

- Reviews.
- Approvals and updates.

- Correspondence and communications which influence project direction, status, or decisions.
- Recoverable documentation of changed and current revision status.
- Relevant versions of applicable documents at appropriate points of use.
- Legibility and accuracy.
- Origin, distribution, and chronological control.

Documents are classified in one of the following categories:

1) **Input Data:** Input data includes, but is not exclusively limited to, information used as the basis for calculations, analysis, reasoning, decision-making, and/or discussions; reports or publications; and information received from the client, subconsultants, subcontractors, authorities, internal and/or external contributors, and field data collection activities. Input Data is saved and filed as appropriate within the given file structure, with customized subfolders as appropriate for the logical storage and retrieval of information.

2) **Data Process:** Data process includes, but is not exclusively limited to, work-in-progress (not ready for review or submission) such as draft reports, drawing development, cost estimates, etc. Data Process is filed similarly to Input Data, with the work product placed where appropriate for the logical storage and retrieval of information following the established CHA folder structure. Some data, such as CADD files, must reside in the dedicated *DESIGN* folder.

3) **Deliverables:** Deliverables generally are defined as work products that are sent to a client or regulatory agency. Deliverables will commonly be in digital format. The various versions of these documents, and how they are organized and controlled, will be defined in the following section on Information and Records Control. All Deliverables are organized in the *Deliverable* folder, under appropriate subfolders.

4) **Project Reviews:** Project Reviews include internal design reviews, milestone reviews, and client reviews. These documents (marked-up drawings or written comments) are saved and filed in the *Qual_Mgmt* subfolder of the *Project Management* folder. Regulatory agency reviews are saved and filed in the appropriate subfolder of the *Permitting* folder.

CHA uses of a well-defined electronic filing system for all project documents and data. This file structure is established at the inception of every project and provides the necessary guidance to the project team for the logical filing of all project-related documents. CHA's electronic filing system is prescribed and regimented but does afford flexibility to allow the user to customize subfolders for the logical filing of various aspects of project information.

11.2 Information and Records

Information includes all assets, whether electronic or non-electronic, that involve data that is of value to CHA to achieve CHA's goals, provide return on investment, and generate revenue.

A business record is any tangible preservation of information in any medium. A "Record" documents and substantiates the legal and operational (e.g., administrative, contractual, financial, research, or tax) positions and actions of CHA and its employees. A Record may be formal or informal, official or unofficial, draft or final, or an original or a copy.

Records control and management are required to ensure the effective planning, operation, and implementation of the processes described throughout this QMS and how those records are to be identified,

stored, protected, retrieved, and retained so that they remain legible, readily identifiable, and retrievable, until such time as they can be disposed.
Records include, but are not necessarily limited to, the following:

- Writings, whether printed, typed, or handwritten.
- Work product such as designs, estimates, calculations, drawings, specifications, reports, and proposals.
- Visual recordings, sound recordings, microforms, tapes, disks, or other electronic or magnetic recordings, including information retained solely in electronic form (such as on computer hard drives, servers, or databases).
- Notes, letters, memoranda, announcements, drawings, and charts.
- Calendars, appointment books, and day planners.
- E-mails and voicemails.
- Books of account, financial information, payroll data, and employee files.
- All other business documents used by CHA and its personnel.

CHA's business records include any records prepared by an agent of CHA that are related to CHA's business in any respect.

Employee personal records such as calendars, appointment books, e-mail, and diaries are business records of CHA when they include business content.

E-mail does not constitute a separate class of business record. Rather, each employee shall, on a case-by-case basis, determine whether an e-mail falls into a category of document that is required to be retained in accordance with this QMS, and shall retain that document accordingly.

All project-related (broad definition) e-mails must be retained. Whether they are internal-to-internal; internal-to-external; or external-to-internal. Every project-related e-mail is a "Record" and needs to be treated as such.

In order to maintain control of all work product submissions and be fully cognizant of the status of each document, a Record Control file naming hierarchy is implemented for each project. Record Control provides for the systematic naming convention for all deliverable documents. A document is considered "a deliverable" as defined under *Documents and Data* and placed in the *Deliverable* folder. For guidance on document naming conventions, saving, and storage, see *Network Folder Structure Guide and File Management Presentation*.

11.3 Information Security

CHA has a responsibility to appropriately classify and secure information. Safeguarding digital information is critical. CHA's Information Security Awareness Program on the CHA Intranet Information Security portal is designed to address security awareness and training needs within CHA through a comprehensive and measurable awareness program. The Program is based on the globally recognized NIST SP800-16 and NIST SP8000-50 standard for Information Technology Security Training and industry recommended practices, and will assist CHA with designing, planning, and implementing a security awareness and training program.

CHA's information security program begins with CHA's *Information Security Policy* and CHA's *Information Security Governance Plan*. These documents set the direction of the CHA's information security programs to identify and define security plans and procedures applying a risk-based approach.

CHA's *Information Security Risk Assessment Procedure* defines risk assessments that inform decision makers and support risk responses by identifying relevant direct and indirect threats, internal and external vulnerabilities, impacts, and the likelihood of harm.

With security-related threats becoming more numerous and diverse, they have also become more damaging and disruptive. CHA's *Information Security Incident Response Plan* defines how information security risks should be identified, assessed, and mitigated to acceptable levels on a continuous basis.

To protect electronic information, CHA routinely requires password updates and requires employees to follow the security guidelines which include reporting e-mail spam and phishing attempts, not opening suspicious e-mails or attachments, storage of project files only on the CHA secure network and use of multi-factor authentication when working remotely.

11.4 Records Retention and Handling

Records retention is the planned and systematic control of business records, in all their forms and formats, from their creation through their final disposition. All business records and information are assets of CHA, and CHA has the right to direct how to retain records and information, and when and if they will be destroyed.

Records shall be retained in accordance with CHA's *Record Retention Policy*, unless specifically identified and required by more stringent applicable local, state, provincial, county, regional, and federal (national) laws and regulations.

CHA will do the following:

- Identify, maintain, and safeguard records required for the conduct of CHA's business (including litigation, audit, or government investigation).
- Ensure compliance with legal and operational (e.g., administrative, contractual, financial, research, or tax) requirements.
- Retain records for the time period established by the approved records retention schedules.
- Enhance productivity and competitive advantage by maintaining current information.
- Preserve the institutional memory by identifying and protecting vital and historical records.
- Provide proper storage and retrieval of inactive records in low-cost, secure facilities.
- Properly destroy records that are no longer required to be retained.

Records shall be correctly indexed and stored in a manner permitting easy access and retrieval.

Retention of e-mails will be accomplished using CHA's *Project Email Manager* (PEM). Maintenance of a complete communication archive for every CHA project is required from an Information Technology, Operations, and Legal perspective. Archiving project e-mails is required to ensure all project team members are aware of every project communication, to ensure complete and accurate records are maintained post project completion, and to mitigate legal issues that can arise related to projects. An archive of project emails is particularly useful when new team members join a project, or when there is a change of personnel assigned to a project. Providing access to a full set of project background, history, and details is essential for all project team members. It is the responsibility of all project team members to maintain and preserved project communications of any type, including emails.

All records not necessary for legal or business reasons and not required to be retained by law or regulation shall be destroyed to reduce storing, indexing, and handling of documents that would otherwise accumulate.

Records must be destroyed consistently and non-selectively when they become obsolete. If records exist and are requested, then they must be produced regardless of when they could have been legally destroyed. When destroying records, it must be certain to do it in accordance with ordinary business practices (a consistent, non-selective, well-documented manner). Destruction of records shall take place only in compliance with

CHA's *Data and Information Destruction Procedure* requirements set forth by CHA Legal, or applicable laws or regulations.

The privacy and security of records shall be appropriately protected.

If there is a question regarding the retention of any record, it should be directed to CHA Legal.

11.5 Organizational CADD Standards

Organizational CADD requirements are oftentimes provided to, referred to, or made available to, CHA by an owner or client for application and/or use on a particular project(s). In those instances, whereby the owner or client provides, directs, or advises CHA of an established organizational CADD standard as a client or project-specific requirement or preference, then CHA will be guided accordingly to interpret and conform with such organizational CADD standard(s).

In the event(s) a client or project-specific provided, directed, or advised organizational CADD standard is not available to CHA, then CHA will, at its discretion, implement an organizational CADD standard of CHA's choice.

The complexity and effectiveness of CHA's engineering designs depends on the precision and presentation of CADD documents. The *CHA CADD Standards – Organizational CADD Standards Document* introduces appropriate standards so that each CADD document developed is accurate, professional, and meets the level of quality expected at CHA. The use of the *CHA CADD Standards – Organizational CADD Standards Document* and its procedures, standards, and policies are effective on new CHA projects beginning after 11/17/2022, unless otherwise authorized.

12.0 Subconsultant or Third-Party Service Provider Quality Management

12.0 SUBCONSULTANT OR THIRD-PARTY SERVICE PROVIDER QUALITY MANAGEMENT

When the involvement of a subconsultant or third-party service provider is required by CHA, the work products or deliverables for which they are responsible shall be performed under a QMP specific to that third party, unless otherwise agreed to and authorized by CHA, and which is reviewed and approved by CHA prior to execution of the work.

Each subconsultant will be required to develop, own, maintain, and audit/ update their project specific QMP. Any project specific QMP prepared by a subconsultant must, at a minimum, be consistent with the requirements set forth in CHA's QMP (or PSQMP). CHA can provide guidance to subconsultants in the development of their project specific QMP, however, each subconsultant is ultimately responsible for its QMP. Likewise, each subconsultant will be responsible and accountable for their own work product(s) and implementation and execution of quality management activities.

CHA will be responsible for verifying that subconsultants have performed their quality management requirements consistent with their project specific QMP through the review or audit of subconsultant produced and provided documentation or evidence supporting compliance of subconsultants' work.

Should a subconsultant have a best practice(s) implemented as part of their own project specific QMP that is identified as exceeding the quality requirements otherwise set forth by this QMS, then CHA and subconsultant may recognize and institute the approved best practice as the subconsultant's standard of care for the specific task, work product, or deliverable.

Should a subconsultant chose not to prepare their own project specific QMP, they will be required to adopt, accept, and comply with the spirit and intent of CHA's QMS as applicable and appropriate to their specific project involvement, work product, and/or deliverables.

To ensure consistency, predictability, and repeatability in the management, implementation, execution, documentation, and continuous improvement of subconsultant quality, CHA will make available, upon request, to each subconsultant involved in a CHA project, the most current version of this QMS.

Work products, submittals, or deliverables prepared by a subconsultant will not be transmitted to the client until such time that specific documentation evidencing that the subconsultant, as verified by CHA, has performed an appropriate level and documentation of QA checks has been conducted.

Appendices

Appendices

A1: *Plan – Do – Review – Document Flowchart (.pdf)*

A2: *Project Engineering and Review Responsibility Matrix (.pdf)*

A3: *Sample Technical Review and Quality Control Form (.pdf)*
- *Technical Review and Quality Control Form (fillable form)*

A4: *Sample Technical Review and Quality Control Comment Summary Form (.pdf)*
- *Technical Review and Quality Control Comment Summary Form (fillable form)*

A5: *Sample QAQC Project Submission Log (internal template) (.pdf)*
- *QAQC Project Submission Log (internal fillable template)*

A6: *Checking/ Review Process (.pdf)*

A7: *Sample Quality Assurance Review Certification Form (.pdf)*
- *Quality Assurance Review Certification Form (fillable template)*

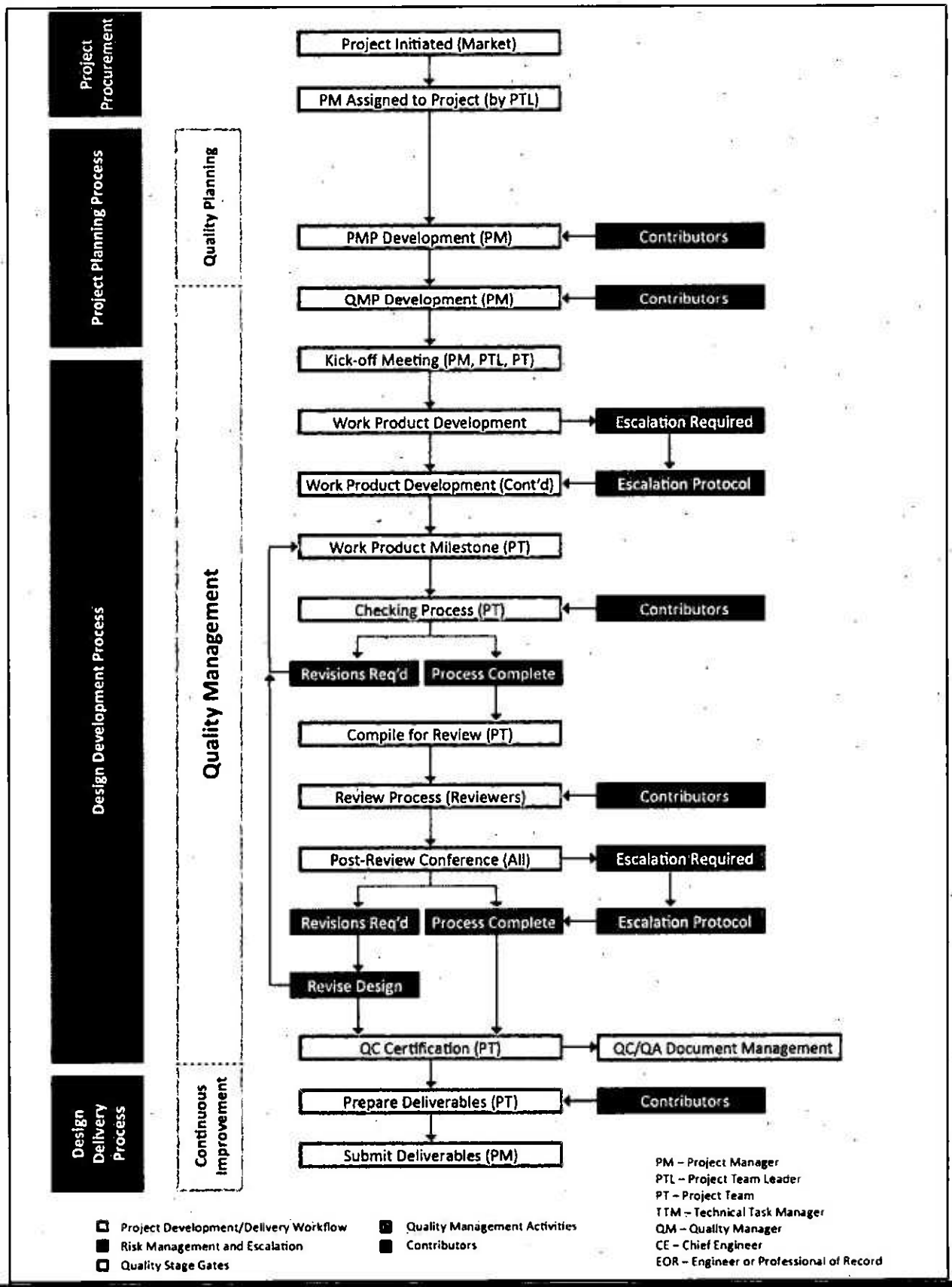
A8: *Sample Continuous Improvement Identification and Action Form (.pdf)*
- *Continuous Improvement Identification and Action Form (fillable form)*

A9: *Escalation Involvement Ladder (.pdf)*

A10: *Sample PSQMP Template (.pdf)*
- *PSQMP Template (fillable form)*

A1: Plan – Do – Review – Document Flowchart

Plan – Do – Review – Document Flowchart



A2: Project Engineering and Review Responsibility Matrix

Project Engineering and Review Responsibility Matrix

TASKS	Business Practice Leader	Project Team Leader	Section Manager	Project Manager	Quality Manager	Technical Task Manager	CADD Coordinator	Project Team	Certifying Professional/ Engineer-of-Record	Chief Professional/ Chief Engineer	Technical Reviewers	Coordinated Reviewers
General												
Assure Project is following QMP				S	P					S		
Perform Quality Audits				S	P					S		
Client Communication				P		S						
Project Planning Process/Quality Planning												
Assign Project to Project Team Leader	P											
Assign PM	S	P										
Assign Certifying Professional/EOR		S	P									
Assign TTMs			P									
Assign Technical Reviewers		S	P	S								
Assign Coordinated Reviewers		S	P	S								
Develop PMP				P								
Develop QMP				S	P	S						
Define Project Roles				P								
Assign Project Team Resources		S	P	S		S						
Define CADD Standards				P			S					
Define Design Standards			S	P		S						
Establish Schedule of Deliverables				P								
Establish Schedule of Reviews				S	P							
Design Development Process/Quality Management												
Project Kickoff Meeting				P								
Discipline-specific Kickoff Meeting						P						
Set up Document Standards and Folders						P		S				
Set up CADD Standards							P					
Establish Basis of Design						P						
Design and Delivery Process/Quality Management												
Provide Technical Direction and Support			S			P				S		
Monitor Scope, Schedule, and Budget				P		S						
Prepare and Save Work Product						S		P				
Check Work Product						S		P				
Check Work Product compliance with CADD Stnds							P					
Prepare Work Product for Review								P				
Complete Technical & Milestone Coord Reviews			S						S	S	P	P
Perform QA Activities				S	P					S		
Resolve Technical Comments						S		P				
Approve Deliverables for Release				S	S				P			
Sign Seal Deliverables (as req'd)									P			
Issue Deliverables				P		S						
Maintain Live Set						S	P					
P = Primary Responsibility												
S = Secondary Responsibility												

A3: Technical Review and Quality Control Form

Technical Review and Quality Control Form

Technical Review and Quality Control Form (fillable form)

Technical Review and Quality Control Form - *Review Type Auto-populates from Selection Below*

Project Overview

Project #	Enter Project Number
Project Name	*Auto-populates from Deltek*
Client Name	*Auto-populates from Deltek*
Submission	Enter Submission Type
Review Scope	Enter Review Type
Lead Discipline	*Auto-populates from Deltek*
Project Manager	*Auto-populates from Deltek*
Project TTM	*Auto-populates from Deltek*

Part 1 - Work Product Review *(Discipline-Specific Reviews - Identify all applicable disciplines)*

By completing this section, the Reviewer verifies that the work product applicable to their discipline has been reviewed for compliance with the project scope, client's requirements, and applicable standards.

Discipline	Reviewer	Date Completed	Comments
Project Review	Select Reviewer from drop down	Select Date	Select from drop down list
Select from drop down list	Select Reviewer from drop down	Select Date	Select from drop down list
Select from drop down list	Select Reviewer from drop down	Select Date	Select from drop down list

Part 2 - Review Verification

By completing this section, the Backchecker verifies that the comments made in Part 1 have been adequately addressed.

Discipline	Backchecker	Date Completed
Project Review	Manual fill	Select Date
Discipline Auto-populates from Part 1	Manual fill	Select Date
Discipline Auto-populates from Part 1	Manual fill	Select Date

Part 3 - CADD Standards Review *(If applicable)*

Will a CADD Standards Review be conducted?

☒ Yes ☐ No

By completing this section, the CADD Reviewer verifies that the CADD files are in compliance with the Client and CHA Standards.

Discipline	CADD Reviewer	Date Completed
Project Review	Manual fill	Select Date
Discipline Auto-populates from Part 1	Manual fill	Select Date
Discipline Auto-populates from Part 1	Manual fill	Select Date

Part 4 - Final Quality Control and Document Release

Discipline	Certifying Professional	Date Completed

Project Review	Manual fill	Select Date
Discipline Auto-populates from Part 1	Manual fill	Select Date
Discipline Auto-populates from Part 1	Manual fill	Select Date

Final QC and Document Release

By checking the box below, the Project TTM / Project Manager (or designee) confirms that the document review has been completed in accordance with the project-specific Quality Management Plan, includes all applicable documents/attachments, and is ready for submission to client.

Project TTM / Project Manager (or designee) Signature ☑ Signed by *Auto-populates when checked by PTTM / PM / Designee*

A4: Technical Review and Quality Control Comment Summary Form

Technical Review and Quality Control Comment Summary Form

Technical Review and Quality Control Comment Summary Form (fillable form)

Technical Review and Quality Control Comment Summary Form

RESPONSE INFORMATION ('Response' and 'Status' to be completed by the Project Engineer)

Responses to specific comments are provided:

- ☐ as redline markups on the documents
- ☐ as summarized on the following page(s)

Quality Manager: *Date:*

Project Engineer: *Date:*

COMMENT NO.	REF. OR PAGE	COMMENT	RESPONSE	STATUS
		Submittal Document Reviewed: QC Documents Reviewed:		

COMMENT SUMMARY FORM

RESOLUTION DOCUMENTATION FORM

COMMENT NO.

COMMENT:

Resolution:

Reviewer's Initials:	*Date:*	*Project Engineer's Initials:*	*Date:*

Engineer of Record Acknowledgment

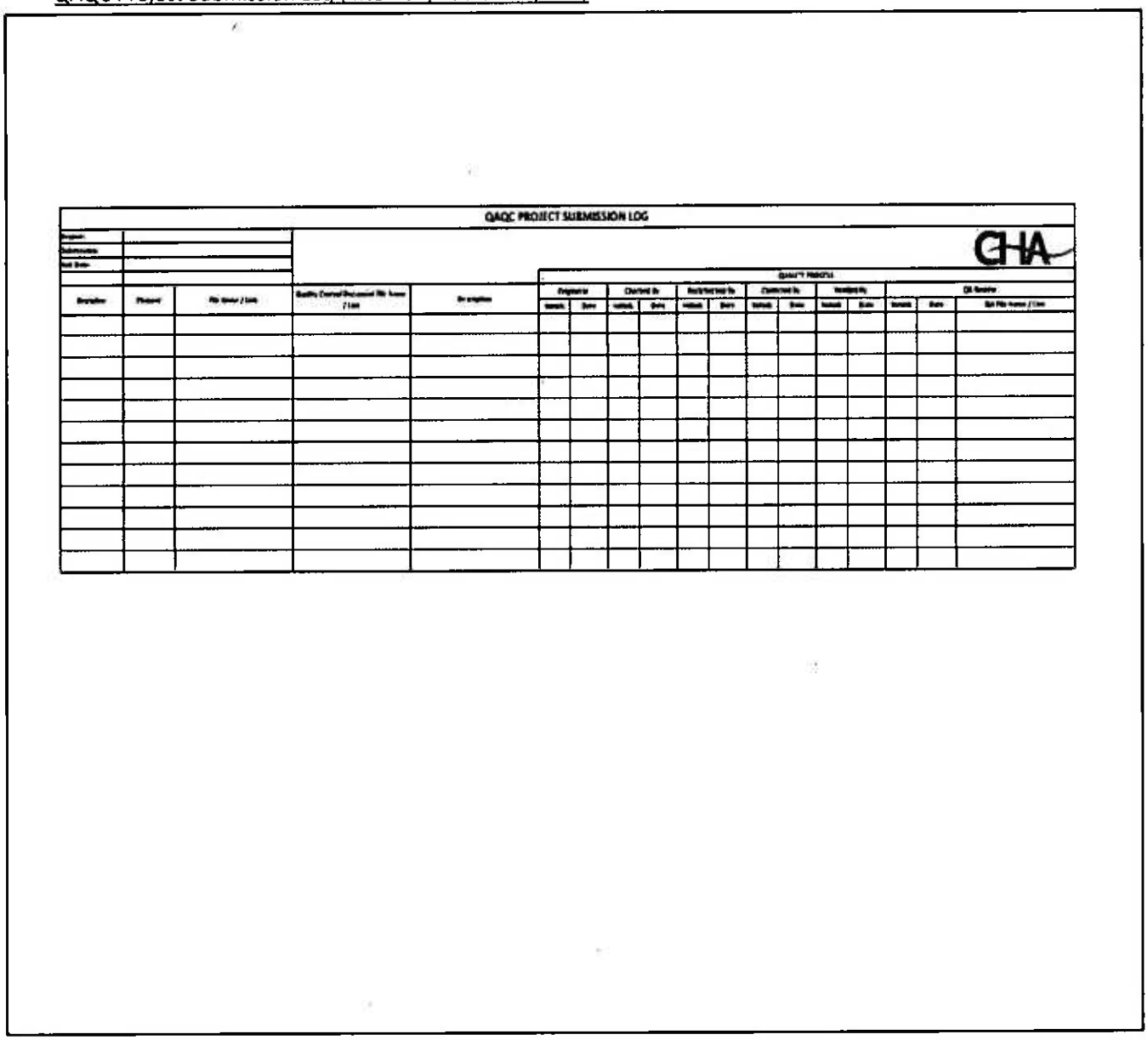
Engineer's Initials:	*Date:*

A5: QAQC Project Submission Log

APPENDICES

QAQC Project Submission Log

QAQC Project Submission Log (internal fillable template)



QAQC PROJECT SUBMISSION LOG

CHA

A6: Checking/ Review Process

CHA Checking/ Review Process

The purpose of a Check is to provide assurance that all components of the work product have been verified to be correct by a second "set of eyes". The purpose of a Review is to provide an overall evaluation that the work product meets the project requirements and established standards, is biddable and constructible, and void of conflicts between different disciplines.

Although the process outlined below for Checks and Reviews is similar, Checks and Reviews are differentiated by their purpose.

A "CHECK" is the process by which the design, or elements of the design, have been verified to be correct, generally by repeating the original process and achieving the same result. Checking is generally performed by an independent team member not directly involved with the design being checked. Checking work products is an essential activity in the QC Process. All work products (designs, plans, reports, calculations, diagrams, etc.) are required to be checked prior to submitting for Technical Review or released to the Client.

A "REVIEW" is a comprehensive examination of the application of individual components or systems into an overall design. Reviews are generally performed at the Senior-level (Project Manager, Technical Manager, Quality Manager, Chief Engineer, or Technical Reviewer). Reviewing work products is an equally essential activity in the QC Process. All work products (designs, plans, reports, calculations, diagrams, etc.) are required to have undergone a Review following the Checking Process, prior to being released to the Client.

Checking Process

The following process is specific to digital checking of documents compiled in .pdf format using *Bluebeam Revu Studio*. It is CHA's strong preference that Checks are performed using *Bluebeam*, however, it is recognized that for some small projects and minor deliverables, manual or non-digital format Checks may sometimes be prudent, pragmatic, effective, and appropriate. The Checking process that follows focuses on digital work product but is also applicable to non-digital work products.

1) The individual, commonly recognized as the design professional, responsible for a work product (identified as the *Initiator/ Originator*) completes the required components of such work product, including plans, reports, calculations, design criteria, etc. This can be done immediately prior to a milestone review or at regular intervals throughout the project's design life.

2) The work product is digitally saved as a .pdf format document and filed on the CHA Secure Network within the Project Folder, using the established file storing and naming convention.

3) The *Initiator/ Originator* begins a *Bluebeam Revu Studio* session, inviting those assigned to perform the checking process through e-mail notification.
   - For hardcopy checks, the document(s) are printed and a checkstamp (see below) is embossed on each sheet or cover sheet (as appropriate). The *Initiator/ Originator* fills in the header information and signs off as the *Initiator/ Originator*.

4) The CHA Checking Process utilizes a color-coded system to provide a defined, consistent, and visual means of determining the status of the Checks. In *Bluebeam Revu*, this color-coding is automatically assigned when using the "Set Status" tool. The individual performing the Check is recognized as the *Checker*. The individual that verifies that a corrective action has been satisfactorily completed following review by the *Checker* is identified as the *Backchecker*.

- Work product that is determined to be correct is set to the "Backchecked" status, colored Yellow or Gold, by the *Checker*. No further action is required.
- Work product that requires correction is set to the "Correction" status, colored Red, by the *Checker*. Additional steps are required to resolve this correction.
    - If the Backchecker reviews the Checker's comment and agrees, the comment is status is set to "Agree with Comment/ Correction", or colored Red. The work product is then addressed/ changed to conform with the agreed upon comment.
    - If the Backchecker disagrees with the Checker's comment, the status is set to "Disagree with Comment/ Correction" or colored Cyan (or for hardcopy work product, the word "STET" [Latin for Let it Stand] is written next to the comment). Ultimately, resolution between the Backchecker and the Checker will be required to close this comment.
    - If it is determined that the comment is valid, the comment is corrected by the Corrector and the status is set to "Correction Made", colored Green.
    - The correction made based on the comment is then "Verified" by the Verifier, and if done correctly, the status is set to "Backchecked", or colored Yellow or Gold. No further action is required.
- Commentary or questions to work product are typed or drawn by the *Checker* and set to the "Comment/ Question" status, or colored Blue. Additional steps are required to resolve this comment.
    - If the *Backchecker* reviews the *Checker's* comment and agrees, the comment is status is set to "Agree with Comment/ Correction", or is colored Red.
    - If the *Backchecker* disagrees with the *Checker's* comment, the status is set to "Disagree with Comment/ Correction" or is colored Cyan (or for hardcopy work product, the word "STET" is written next to the comment). Ultimately, resolution between the *Backchecker* and the *Checker* will be required to close this comment.
    - If it is determined that the comment is valid, the comment is corrected by the *Corrector* and the status is set to "Correction Made", or colored Green.
    - The correction made based on the comment is then "Verified" by the *Verifier*, and if done correctly, the status is set to "Backchecked", or colored Yellow or Gold. No further action is required.

5) The Checking Process is completed when all work products and checked comments are shown to be colored Yellow or Gold, or additional editorial comments are addressed and closed.
    - The Checked work product (the version shown to be entirely colored Yellow or Gold) is saved in the Project Folder.

6) At the conclusion of the Checking Process, a clean, corrected work product is produced, saved, and ready for Review.

Review Process

The Review process follows a similar process used for Checks as outlined above for digital reviewing of documents (.pdf format using *Bluebeam Revu Studio*). It is CHA's strong preference that all Reviews are completed using *Bluebeam*, however it is recognized that for small projects and minor deliverables, manual hardcopy Reviews may sometimes be as appropriate. The process outlined below focuses on digital work product but is also applicable to non-digital work products.

APPENDICES

1) Following the completion of the Checking Process, the work product (plans, reports, calculations, design criteria, etc.) is compiled digitally as PDFs, including a *Technical Review and Quality Control Form*, and made available to the Technical Reviewers previously identified in the QMP. The digital work product shown to have been "checked" under the Checking Process is also made available to the Technical Reviewer.

2) The digital work product is filed in the CHA Secure Network under the Project Folder, using the established file storing and naming convention. The completed "checked" documents are also saved in this location. The PM is notified.

3) The PM, or designee, begins a *Bluebeam Revu Studio* session, inviting the original design professional and those identified in the QMP to complete the "Review".

4) For hardcopy reviews, the document(s) are printed and a checkstamp (see attached) is embossed on each sheet or cover sheet (as appropriate). The *Initiator/ Originator* fills in the header information and signs off as the *Initiator/ Originator*.

5) The Review Process utilizes a color-coded system to provide a visual means of determining the status of comments, similar to the checking process identified above, and not repeated here. *(Note: It is not the intent of the "Review" to repeat the "Checking" process and comprehensively check every component. That was the purpose of the Checks. The Review compares the design to established standards, evaluates interfaces between design disciplines for conflicts and compatibility, evaluates the constructability and bidability of the work product, and determines the completeness of the design.)*

6) The Checking Process is completed when all Review comments are shown to be colored Yellow or Gold and/or additional editorial comments are addressed and closed.

7) The Reviewed work product (the version shown to be colored Yellow or Gold) is saved in the appropriate Project Folder.

8) At the conclusion of the Reviewing Process, the *Technical Review and Quality Control Form* is completed and signed-off by the *Reviewer* and the *Initiator*, and then provided to the PM. A *Technical Review and Quality Control Comment Summary Form* may also supplement the *Bluebeam Studio* process for additional editorial and generalized comments that may not fit well into the *Bluebeam Studio* process. Work product cannot be released until all signoffs are complete.

Sample Checkprint Stamp:

Project Name: _____ CHA #: _____ Submission: _____ Date: _____ Engineer: _____ CHECK PRINT (# _____)
Checker: _____ Date: _____ Backchecker: _____ Date: _____ Corrector: _____ Date: _____ Verifier: _____ Date: _____

A7: Quality Assurance Review Certification Form

Quality Assurance Review Certification Form

Quality Assurance Review Certification Form (fillable template)

Quality Assurance Review Certification

Project Name: _____ **Project Number:** _____

Submission: _____ **Date:** _____

Submission Discipline: _____ **Project Engineer:** _____

☐ Project Engineer certifies that Review Package is complete and all materials have received a Technical Check

Part 1. – Document Review

Technical Review

REVIEW SUMMARY: I have reviewed the documents and related materials for compliance with the project scope and client's requirements. My general conclusions are as follows:

ADDITIONAL SPECIFIC COMMENTS ARE PROVIDED:

☐ as redline markups on the documents ☐ as summarized on the Comment Summary Form

Technical Reviewer:	*Reviewer's Initials:*	*Date:*

CADD Standards Review ☐ CADD Review not applicable for this submission

REVIEW SUMMARY: I have reviewed the CADD files for compliance with client and CHA standards. My general conclusions are as follows:

CADD Reviewer:	*Reviewer's Initials:*	*Date:*

Quality Manager Review

REVIEW SUMMARY: I have examined the documents, related materials, and reviewers' comments. My general conclusions are as follows:

ADDITIONAL SPECIFIC COMMENTS ARE PROVIDED:

☐ as redline markups on the documents ☐ as summarized on the Comment Summary Form

Quality Manager:	*QM's Initials:*	*Date:*

Part 2. – Comment Resolution *(To be completed by the Technical Reviewer)*

☐ I have verified that all comments have been correctly incorporated into the documents.

☐ I acknowledge that all issues have been resolved with the Engineer of Record and all other comments have been correctly incorporated

Reviewer's Initials:	*Date:*

Part 3. – Final Quality Control and Document Release *(To be completed by the Quality Manager)*

☐ *The document review has been completed in accordance with the Quality Design Process.*

Quality Manager's Initials:	*Date:*

COMMENT SUMMARY FORM

COMMENT NO.	REF. OR PAGE	COMMENT	RESPONSE	STATUS

RESOLUTION DOCUMENTATION FORM

COMMENT NO.

COMMENT:

Resolution:

Reviewer's Initials:	*Date:*	*Project Engineer's Initials:*	*Date:*

Engineer of Record Acknowledgment

Engineer's Initials:	*Date:*

A8: Continuous Improvement Identification and Action Form

Continuous Improvement Identification and Action Form

Continuous Improvement Identification and Action Form (fillable form)

CHA Continuous Improvement Identification and Action Form
Opportunity for Improvement/Preventative Action/Corrective Action

CHA Project Number: _____ **CHA Project Manager:** _____

Business Practice: _____ **Informed Chief Engineer:** _____

Sector: _____ **Requires Escalation?** **Yes** ☐ **No** ☐

Description/Nature of Non-Conformity: _____ **Initials:** _____ **Date:** _____

Opportunity for Improvement: **Yes** ☐ **No** ☐ **Preventative Action:** **Yes** ☐ **No** ☐

Corrective Action: **Minor** ☐ **Major** ☐ (Minor may be identified as a one-time occurrence that could have minimal to nominal consequences; Major may be a systemic process that could result in significant detriment)

Description/Nature of Action Taken: _____ **Initials:** _____ **Date:** _____

Root Cause (If Applicable): _____ **Initials:** _____ **Date:** _____

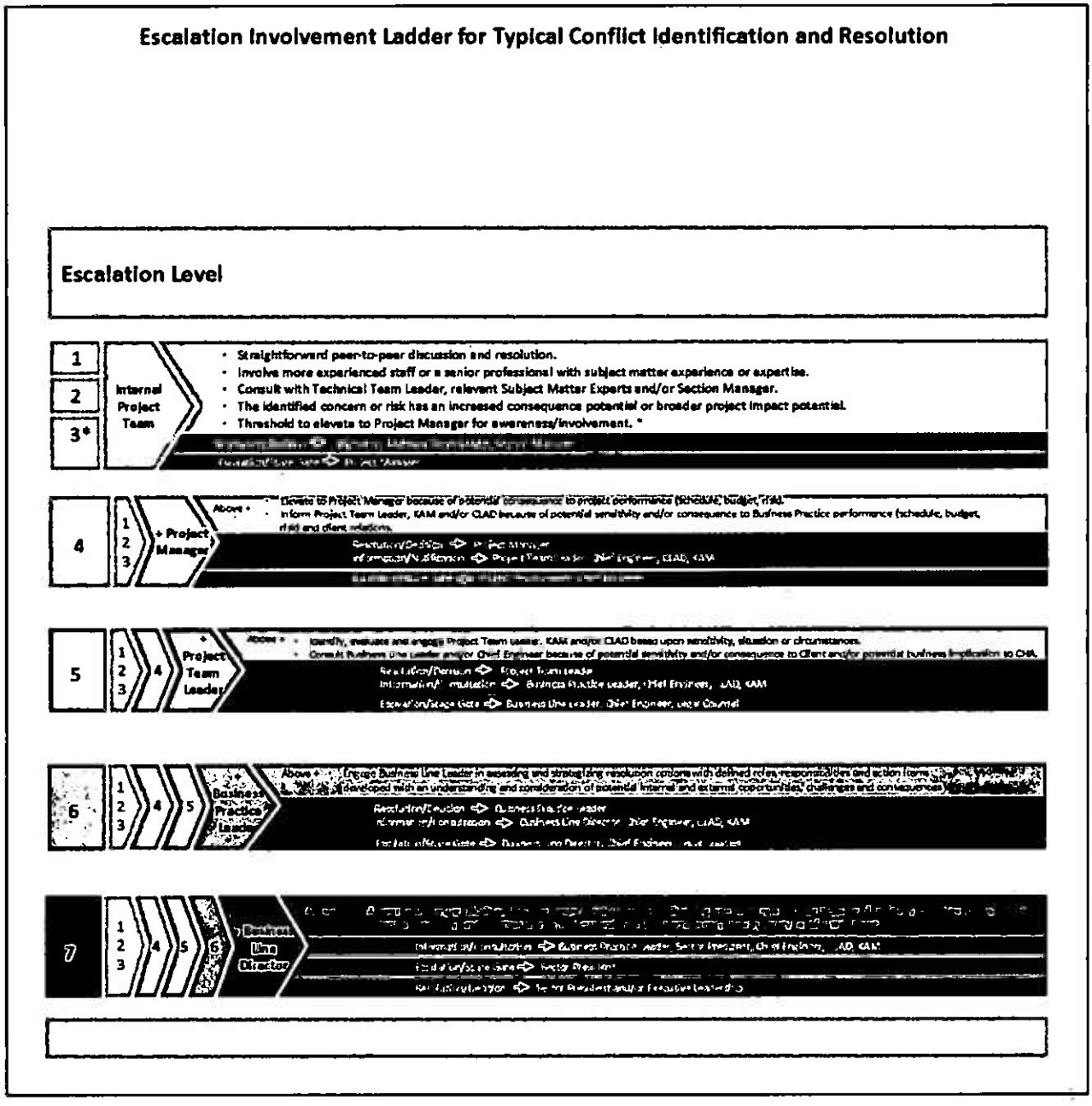
Process Closure Audit: _____ **Initials:** _____ **Date:** _____

Required Next Steps or Follow-up: _____ **Initials:** _____ **Date:** _____

A9: Escalation Involvement Ladder

13.0 APPENDIX

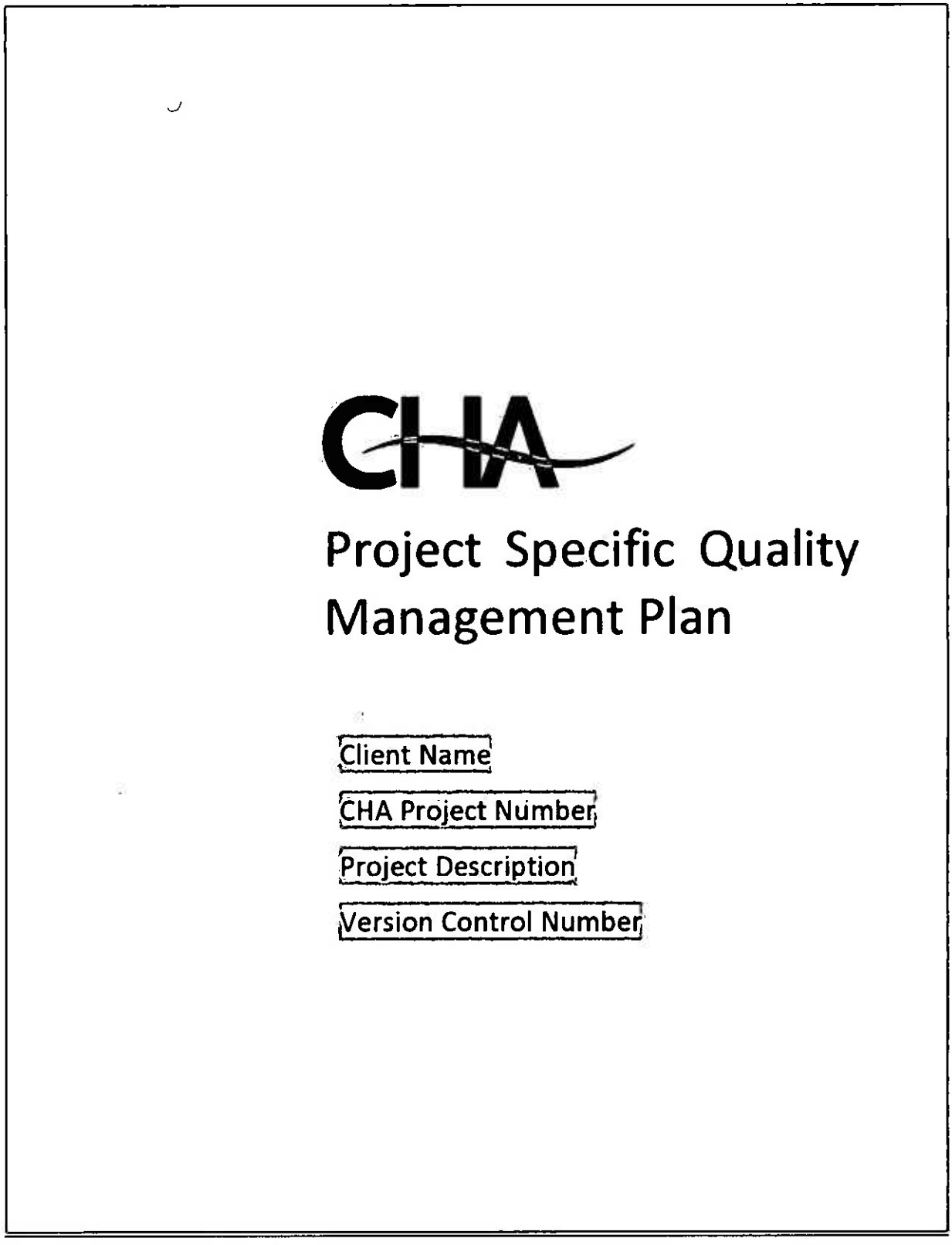
Escalation Involvement Ladder



A10: PSQMP Template

PSQMP Template

PSQMP Template (fillable form)



Project Specific Quality Management Plan

Client Name

CHA Project Number

Project Description

Version Control Number

Prepared for

Enter Client Information

Prepared by

CHA Consulting, Inc.

Enter Office Location Information

Date

Enter Date and Version Information

*This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential and exempt from disclosure under applicable law. Any dissemination, distribution or copying of this document is strictly prohibited.

This Project Specific Quality Management Plan is consistent with the spirit and intent of the Quality Management Systems recognized and implemented by CHA Consulting, Inc. and establishes the application of Quality Management System requirements specific to this Project.

Project Specific Quality Management Plan

Project Name
Enter Descriptive and Recognizable Project Name

Prepared For
Enter Client Name or Recipient

Prepared By
CHA Consulting, Inc.

CHA Project Number
Enter CHA Project Number

Project Quality Plan Version Control

The information presented in the following version-controlled chronology is intended to summarily document revisions that are made to this document subsequent to the release of the initial PSQMP. The latest version that is annotated in the table below will supersede previous issuances. This table is complimentary to the PSQMP Revision Audit Log included in Section 9.0 of this document.

Version	Date	Author	Change Description
1			
2			
3			
4			
5			
6			
7			

13.0 APPENDIX

Table of Contents

1.0 Introduction

1.0 INTRODUCTION

1.1 Project Overview

Provide a concise description of the Project in terms that are easily understood by the reader with the goal of making clear the purpose of the Project, the intended goals and objectives of the Project, and CHA's role in the Project.

1.2 Technical Scope of Work (TSOW)

This document provides specific guidance and procedures for quality management intended specifically and solely for application to this Project, and will be implemented in the execution of the following tasks:

Provide a description of the scope of work that is included in the executed agreement. The executed agreement can be referenced for clarity of the Project records.

1.3 Project Specific Quality Management Plan (PSQMP)

CHA's PSQMP will support and contribute to the development and maintenance of the Project files in accordance with CHA's and Client's Quality Management System (QMS) requirements. Documents, work products or deliverables will be subject to an appropriate level of rigor in quality management through qualified checks, reviews, and sign offs conducted prior to issuance or distribution.

2.0 Project Specific Quality Management Plan (PSQMP) Purpose

2.0 PROJECT SPECIFIC QUALITY MANAGEMENT PLAN (PSQMP) PURPOSE

The purpose of this PSQMP is to establish appropriate and acceptable quality control and quality assurance standards, policies, and procedures for implementation and execution by the CHA team in the development and delivery of products or results to Client. This PSQMP will document the policies, procedures, and actions that are instituted to provide Client with products, processes or results which are in general compliance with the requirements as set forth by Client in the executed Project Agreement between Client and CHA; as required by reference within the executed Project Agreement; as previously established and recognized as Client requirements; or as identified as relevant, industry-accepted standards, codes, guidelines, policies, or procedures.

This PSQMP is an attribute predicated on CHA's enterprise-wide Quality Management System (QMS). This PSQMP incorporates relevant and applicable elements of CHA's corporate-wide QMS to establish quality control (QC) and quality assurance (QA) expectations and requirements specific to this Project. Pragmatic QC and QA involvement and methods will support consistency, predictability, and repeatability in the development and verification of the work products. Compliance with this PSQMP will contribute to technical work products that are well-founded and defensible, and of the type and quality needed for its intended purpose, function, and use.

This PSQMP will meet the specific Project needs by clearly defining, documenting, and disseminating the agreed upon Project quality management requirements; by establishing clearly-defined roles and responsibilities within the Project Team; by identifying qualified and competent professionals to perform tasks specific to their area of subject matter expertise; by establishing and implementing rigorous quality control (QC) protocols which are documented and auditable; and by establishing and implementing comprehensive quality assurance (QA) protocols for process conformance, compliance verification, management escalation, and opportunities for continuous improvement.

Documents or data that are used during the Project – up to and including the final deliverable – are required to comply with the established acceptance criteria referenced in this PSQMP. This includes all relevant Project documents, including but not necessarily limited to, input documents or data received from Client, subconsultants, subcontractors, and others; check prints used in the fulfillment of this procedure; documents or data prepared during the life of the Project such as drawings, specifications, calculations, schedules, reports, cost estimates, and collateral materials; and final Project deliverables.

The level of briefly paraphrase or describe CHA's TSOW responsibilities or involvement to be carried out by CHA and CHA's subconsultants shall be such that the work products will contribute to, or result in, clear and understandable describe deliverables that satisfy the requirements as outlined in the Technical Scope of Work (TSOW) within the executed Project Agreement for the intended function, purpose and/or use.

3.0 Project Team Organization

3.0 PROJECT TEAM ORGANIZATION

Provide most current project organizational chart here. This is intended to be a visual and intuitive "roadmap" for the Client to see the breadth and depth of the Project Team and so that they can readily see the team member roles, responsibilities, and relationships within and throughout the Project Team. A reminder that this PSQMP is a "living document" that may be updated throughout the Project execution process; organizational changes to key contributors should be updated.

3.1 Project Manager's (PM) Responsibilities

Identify CHA person and title is the designated Project Manager (PM) for this Project entrusted with primary responsibility and accountability for scope, schedule, and budget performance that are the result of Project planning, Project plan implementation, Project execution, and Project delivery. The PM is generally the primary liaison between CHA, Client, and the Project Team. The PM is responsible for the development, monitoring, and maintenance of the Project Delivery Plan (PDP) and PSQMP which establishes the quality expectations and activities for the life of the Project. Coordination of all quality efforts is the responsibility of the PM, including, but not necessarily limited to:

- Reviewing work products, deliverables, and/or supporting documentation identified within, or associated with, the project proposal.
- Developing the PDP and PSQMP with input from technical, operational, and market resources.
- Verifying that the requirements of the PDP and PSQMP are adhered to.
- Updating the PDP and PSQMP as needed to meet Project change requirements or directives.
- Monitoring scope, schedule, budget, and financial controls for the Project.
- Initiating and monitoring problem resolution sub-processes when necessary.
- Assuring that progress and milestone reviews are completed.
- Assuring that professional approvals/ certifications of the finished work product or deliverable are applied.
- Being the primary point of contact for Client, and Project Team communication, interaction, coordination, and collaboration.

3.2 Project Quality Manager's (PQM) Responsibilities

Identify CHA person and title is the designated Project Quality Manager (PQM) for this Project. He/she will assist the CHA PM in accomplishing the design team's compliance with the established Project-specific quality processes by:

- Providing guidance and suggestions for this PSQMP development.
- Providing training in QC/QA processes.
- Assisting with Project-specific QC/QA training.
- Participating in regular Project review processes to verify ongoing application of the QC requirements.
- Confirming that CHA's QMS procedures are being followed.
- Conducting periodic audits to verify that all QC/QA implementation is effective and remains in compliance with this PSQMP.
- Confirming completeness/ robustness of the quality process.
- Maintaining documents and records that demonstrate compliance with CHA's QMS procedures and the requirements of this PSQMP.

3.0 PROJECT TEAM ORGANIZATION

3.3 Quality Team Roles, Responsibilities, and Accountability

The key roles and responsibilities for quality advocacy, implementation, execution, and compliance to accomplish the quality standards within the design development and delivery process are as follows:

Position/ Role	Project Quality Assurance Responsibilities
Project Executive (Exec) CHA person's name and title	Monitor Client's satisfaction; has the authority to make contractual changes if necessary.
Project Manager (PM) CHA person's name and title	Ultimately responsible for the quality of the delivered work on the Project. Conveys quality requirements and expectations to the Project Team, including subconsultants. Signs off on the release of deliverables.
Project Quality Manager (PQM) CHA person's name and title Note: Depending upon the Project Team organizational structure, the PM may also function as the PQM. In those instances, the Project Quality Assurance Responsibilities will be assigned to the PM/PQM.	• Confirm QMS procedures are followed. • Confirm completeness/ robustness of the Quality process. • Maintenance of documents and records that demonstrate compliance with QMS procedures and QMP requirements. • Quality Audits (Quality Auditor).
Technical Team Manager (TTM) CHA person's name and technical lead discipline CHA person's name and technical lead discipline CHA person's name and technical lead discipline CHA person's name and technical lead discipline	• Focuses solely on Project technical quality, its planning, and resources. • Quality of work produced within the technical discipline under their supervision. • Directly involved in assigning and/or performing QC review activities for their discipline. • Can conduct Quality Audits. • Can perform Technical and/or Coordinated Reviews.
Originator Individual responsible for providing the service, performing the calculation or developing the work product within the Project Team.	• Performs the work and self-checks. • Prepares document transfer to Technical Checker.

13.0 APPENDIX

3.0 PROJECT TEAM ORGANIZATION

Position/ Role	Project Quality Assurance Responsibilities
Technical Checker Individual with appropriate skills, experience, or training in the subject matter area.	• Performs independent checking and review of interim and final work products and signs off on their technical adequacy. Uses the care, diligence, skill, and judgment expected of any auditor in similar circumstances. • Reviews compliance with QC review procedures. • Can perform Technical and/or Coordinated Reviews.
Backchecker Preferred to be the Originator.	• Reconciles the Reviewer/ Checker comments. • Coordinates with the Checker to resolve • disagreements. • Refers irreconcilable differences to Project • TTM, CHA PM or CHA Chief Engineer/ Architect/ Scientist/ Planner for resolution.
Updater May or may not be the Originator; can be a supervised designee.	• Updates original Project documents in accordance with reconciled check prints.
Re-checker or Verifier Preferred to be the Checker.	• Verifies that corrections have been made to the original documents by the Updater in accordance with the backchecked check prints.

4.0 Project Quality Management Processes

4.0 PROJECT QUALITY MANAGEMENT PROCESSES

4.1 Quality Control (QC)

Work products will undergo the appropriate examination and documentation of services provided and work done to demonstrate that contractual requirements are met. The QC efforts will involve technical checks and technical reviews performed by individuals with appropriate and requisite familiarity, knowledge, and experience in the subject matter for which they are reviewing. The appropriate document management shall be completed, signed off by the appropriate team members, and provided to CHA's designated PQM and/or PM prior to issuance of a deliverable.

4.2 Quality Assurance (QA)

Project deliverables and accompanying QC documentation from the TTMs will be reviewed by the PQM (PM/PQM) or a qualified designee. The primary purpose of the PQM's QA review will be for the evaluation of QC compliance with the established design quality processes contained within this PSQMP and the quality standards established by CHA. Prior to external distribution of identified deliverables, appropriate documentation recording the quality compliance will be signed by the PQM (or designee) and then provided to the CHA PM for signature, along with relevant supplemental quality documentation for that current submission.

4.3 Quality Implementation

Accountability provides a direct measurement to both Project-level performance and individual performance. Every professional involved in the Project will be responsible and accountable for their portion of the Project. Each TTM shall provide ample time for their discipline's review to be conducted by a qualified individual with the knowledge of, and experience in, the technical subject matter. Time will be identified and allocated within the development and delivery process to allow ample opportunity to conduct internal QC checks and reviews, and to address any resulting internal review and coordinated review comments prior to submission to Client. Technical reviews shall be performed and documented at each milestone submission as identified in this PSQMP.

CHA's quality management processes provide a defensible and auditable means by which work products are checked and reviewed, and the status of changes/ revisions/ alterations are documented in a clear and succinct manner. Accountability for the development and preparation of deliverables, as well as for the design checks and reviews, is provided through documentation of the different steps in the workflow process and verified through QA compliance and quality audits.

Deliverables shall not be released to Client until the design quality process has been completed and the individual(s) in responsible charge has signed off on the release of deliverables, utilizing the appropriate document control protocols.

4.4 Quality Management Standards and Compliance

The quality standards applied to this Project shall contribute to work products that strive to protect and benefit the health, safety and well-being of the end user(s), associated individuals or groups, and the public at large. Work products will be clear, recognizable, and understandable; compliant with applicable codes,

specifications, policies, and procedures; meet the applicable requirements as identified in the TSOW; and conform to other identified or recognized industry standards specific to accomplishing the Project goals and objectives.

This Project is/ is not a multi-disciplinary effort requiring collaboration and involvement from specialty services (unique skillsets that may or may not be internal to CHA) and multiple technical discipline areas. To provide consistency, predictability, and repeatability in the interpretation, application, and implementation of quality requirements for this Project, CHA contributors will be guided by the appropriate CHA procedures as established in the CHA QMS and the Project Delivery Plan (PDP) and communicated to Project contributors.

4.4.1 Applicable Specifications and Codes

The quality standards for design development and code compliance are predicated on the interpretation and application of the following Client-provided requirements and industry recognized codes and standards:
List standards, codes, guidelines, etc. that are applicable to the project.

4.4.2 Subconsultant or Third-Party Service Provider Quality Management

To support CHA in the development and delivery of this Project, CHA has engaged the services of subconsultants or third-party service providers. The work products or deliverables for which they are responsible shall be performed under a QMP specific to that entity, unless otherwise agreed to and authorized by CHA, and which is reviewed and approved by CHA prior to execution of the work.

Each subconsultant or third-party service provider will be required to develop, own, maintain, and audit/ update their Project-specific QMP. Any Project-specific QMP prepared by a subconsultant or third-party service provider must, at a minimum, be consistent with the requirements set forth in CHA's PSQMP. CHA can provide guidance in the development of their Project-specific QMP, however, each subconsultant or vendor is ultimately responsible for their QMP. Likewise, each subconsultant or third-party service provider will be responsible and accountable for their own work product(s) and implementation and execution of quality management activities.

CHA's PQM (PM/PQM) or a qualified designee will be responsible for verifying that subconsultants or third-party service providers have performed their quality management requirements consistent with their Project-specific QMP through the review or audit of produced and provided documentation or evidence supporting compliance of work performed.

Should a subconsultant or third-party service provider not have an acceptable Project-specific QMP, then they will be required to adopt, accept, and comply with the spirit and intent of CHA's PSQMP as applicable and appropriate to their specific Project involvement, work product and/or deliverables. CHA will make available, upon request, the most current version of this PSQMP.

Should a subconsultant or third-party vendor have a best practice(s) identified and implemented as part of their own Project-specific QMP that is reviewed and approved by CHA as exceeding the

quality requirements otherwise set forth by this PSQMP, then that best practice may be recognized and instituted as an approved standard of care for the specific task, work product, or deliverable.

Work products, submittals, or deliverables prepared by a subconsultant or vendor will not be transmitted to the Client until such time that an appropriate level and documentation of QA checks has been conducted by CHA's PQM (PM/PQM) or a qualified designee.

The subconsultants to CHA involved in this Project, and their designated involvement, are as follows:
List subconsultants or third-party vendors and role that they provide in the TSOW.

5.0 Project Quality Control (QC)

5.0 PROJECT QUALITY CONTROL (QC)

5.1 Project Deliverables

Milestone Tasks	Internal Milestone Date from CHA Project Plan	External Milestone Delivery Date from CHA Project Plan
Milestone Task Description	Date	Date

5.2 Project Quality Control Procedures

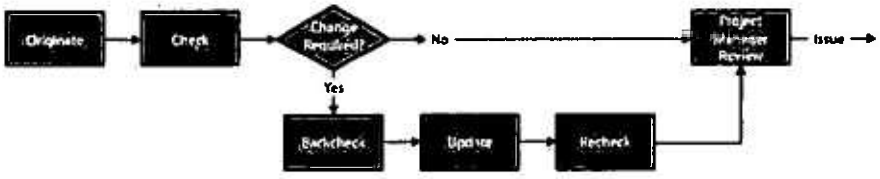
Deliverables require a formal quality control (QC) check and review prior to issuance.

- Check: A "check" is the verification that an individual component of the work product was verified to be correct, generally by repeating the original process and achieving the same result. A "check" is generally performed by a Project Team member.
- Review: A "review" is a comprehensive examination of the application of individual components into an overall work product. A "review" is generally performed by a Senior-level professional, including but not limited to CHA PM, TTM, PQM, or Chief Engineer/ Architect/ Scientist/ Planner.

CHA's quality review process consists of two levels of compliance applied to various Project document types and at various stages of Project execution. The two-level approach (checks and reviews) provides degrees of redundancy, as well as independency, to develop high confidence levels which will support service, product, or deliverable acceptance.

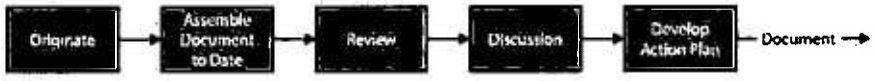
5.2.1 Checks

Checks are the systematic and detailed inspection of Project documents, regardless of their stage of completion, to verify that they meet specified requirements in terms of fit for purpose, accuracy, correctness, coordination, etc. Checks are to be performed by a technically qualified individual, other than the Originator. Checks (level 1) address the varying types of Project documents typically developed during Project execution. The general process for checking is depicted by the graphic below.



5.2.2 Reviews

A general review of work in progress or of a completed Project document before passing it to the next step in the process (e.g., issuing for use to the Client, contractors, other design disciplines, or placing it in the Project file). Reviews (level 2) are intended to assess the performance, conduct, and/or progress of the Project document. It is conducted by a qualified individual (or team of qualified individuals). The intent is for the reviewer(s) to apply their accumulated experience and professional judgment to verify Project document development is consistent with established standards and requirements. A review may also be conducted to confirm that Checks (level 1) have been completed and all comments resolved.



The Review (level 2) verifies the work is conceptually correct, complete, logical, has followed the required procedures, and/or has used the correct requirements. The Review (level 2) is established as a "second pair of eyes" to validate the information.

The Project documents to be reviewed may or may not have been developed by CHA. In the case where the Project documents were produced outside of CHA, or produced by a CHA subconsultant, only one CHA review is required above and beyond the satisfactory application of the outside entity's own and accepted quality management procedures.

5.0 PROJECT QUALITY CONTROL (QC)

5.3 Project Documentation, Testing, and Acceptance

Any document or data used in the Project, up to and including the final deliverable, is considered a Project document that is subject to CHA's quality compliance testing and acceptance. Project documents can include, but are not limited to input, documents or data from Client, subconsultants, subcontractors, and others; check prints used in the fulfillment of this quality management procedure; documents or data prepared during the life of the Project such as drawings, specifications, calculations, schedules, reports, cost estimates, or collateral materials; and all final Project work products or deliverables.

Accurate documentation and document controls are essential and required for every aspect of the Project. Records will be prepared at the time of an activity or when an action is taken, and superseded documents will be retained in the Project files following CHA's Document Control Procedures. Good documentation involves reviews, approvals, and updates; recoverable documentation of changed and current revision status; relevant versions of applicable documents at appropriate points of use; legibility and accuracy; and origin and distribution control.

5.4 Document Control Procedures

CHA will adhere to established document control procedures on this Project so that work products are logically and securely filed and memorialized. Documents are classified in one of the three following categories:

1. Input Data: Any and all data, reports, and information received from Client, subconsultants, subcontractors, authorities, and field data collection activities. All data input shall be saved and filed in digital format.
2. Data In Process: Work-in-progress (not ready for review or submission) such as draft reports, drawing development, cost estimates, etc.
3. Deliverables: All work products prepared and ready for issuance. Deliverables will be in hard copy/, digital/ combination format.

CHA has pre-defined electronic filing requirements for all Project documents and data. This file structure is established at the outset of every Project and provides the necessary guidance to the Project Team for the file management of all Project-related documents. This system is purposefully structured with a degree of flexibility to allow the user to customize subfolders for specific Project needs.

5.5 Documents Not Requiring Formal Review (Internal Sources or Production)

Project execution items such as Meeting Agendas, Meeting Minutes, and similar documents should undergo a peer review for reasonableness, grammar, punctuation, accuracy, and interpretation (to the extent appropriate), but such items are not required to undergo formal quality reviews. Meeting Minutes are unique in that they serve as the record to interpret, capture, and document salient points, opinions, decisions; and/or commitments that have been verbalized as part of a conversation, discussion, or presentation. CHA subscribes to a best practices policy for the preparation of Meeting Minutes by first preparing a draft version which is distributed to meeting attendees. The attendees are requested to review and offer comment or input to the preparer specific to the accuracy, interpretation or content of the

information captured and recorded by the preparer in the draft. Comments or input are compiled, interpreted, resolved, and incorporated into final Meeting Minutes by the initial preparer. The final Meeting Minutes are then issued for retention in the Project records.

5.6 Documents Not Requiring Formal Review (External Sources or Production)

Documents not produced or prepared by CHA but determined by CHA that are necessary for Project planning and/or execution shall be identified, documented, and their distribution controlled or limited by the PM. If the needed external document is accessible in a public domain or on a publicly maintained website, it is preferred that an active link or the web address with a notation to date the last time the user visited the site (e.g. www.chacompanies.com (last viewed November 16, 2020)) for the document be included in the documentation most relevant to the task or deliverable that it is associated with.

Where a needed external document must be purchased, it is preferred that an appropriately licensed electronic copy of that document be maintained in the Project files.

5.7 Documents Provided Prior to, or Without, Formal Quality Review

Occasionally, CHA may be requested to provide a document or work product that is under development. Documents or work products that are under development are to be distinguished and recognized a "Work in Progress". Under certain instances such "Work in Progress" documents may not have undergone internal CHA quality checks and reviews. Submittal of unchecked design products or work products (e.g. drawings, specifications, or other design deliverables) requires written approval of both the PM and the responsible, credentialed Engineer-of-Record (EOR) or CHA Chief Engineer/ Architect/ Scientist/ Planner who are qualified and authorized to release the design deliverables. Similarly, submittal of other unchecked work product(s) (e.g., estimates, budgets, forecasts, schedules, etc.) requires written approval from both the PM and the responsible EOR or Certifying Professional. In the event a circumstance dictates the issuance of unchecked work product, Client must be notified in writing by the PM of such status, and the Project documents will be stamped or annotated to indicate that they are of a preliminary nature.

Unchecked Project documents that are under development and requested for distribution will be stamped as follows:

This Document is under development and is being provided as requested. This document has not undergone internal CHA Quality Review and is Work-in-Progress.

5.8 Vendor Supplied (third-party) Software

Vendor supplied (third-party) software must be "pre-validated" so that repetitive uses do not require an in-depth check or review for anything other than the case-specific input. Unless determined to be a commercially prepared, widely recognized, and industry-accepted/ industry-adopted software or application that has been through rigorous development and testing; qualified individuals (those familiar with the type of design that the program performs) must perform the pre-validation check/ review.

Third-party computer programs and applications that are not recognized as industry-accepted/ industry-

adopted tools may be verified by one of the following methods:

- Using the hand calculation method as described for spreadsheet verification.
- Using the same input as another approved computer program and comparing output.
- Supplying documentation from the manufacturer or program-writer verifying the accuracy of the program.
- A check/ review of the program code.
- Sample runs of the program for various input conditions.

CHA will not use "non-industry accepted/ industry-adopted" software for application until the software is approved by this process. Once approved, the approved software version is considered "pre-validated" and may be used by CHA for other design applications.

5.9 Calculations, Design Software, and Spreadsheets

Calculations developed or performed with software, including commercially prepared software or internally prepared spreadsheets utilized for development of a Project, shall have both inputs and outputs checked (100%) prior to use in design development, unless the software has been previously approved for use by CHA. For software previously approved and utilized for design by CHA, it shall have all inputs checked (100%) and outputs shall be reviewed for reasonableness and spot checked for accuracy.

5.10 Contract-Specified Software

Specific software programs denoted in the Agreement for use in the Project are considered approved, do not need to be verified, and will be added to the Project Plan. All other commercially available software programs needed for the Project shall be verified and added to the Project Plan.

5.11 Internally Developed Spreadsheets

Verification of spreadsheets is a pre-requisite for use on a Project. Internally developed spreadsheets may be used; however, they shall be verified by performing hand calculations to check output or by checking the formulas used in the calculations before being used as a design tool. A comparison shall be made between the computer-generated output and the hand calculations to validate the accuracy of the output. Project specific spreadsheets for high risk or high complexity design elements (determined by the TTM or Chief Engineer/ Architect/ Scientist/ Planner) shall have input, logic, and equation checks performed by a qualified and competent professional for all calculations within the spreadsheet. An option to this verification approach is to have an independent set of calculations performed by a qualified and competent professional with familiarity and experience in the identified critical item(s).

6.0 Project Quality Assurance (QA)

6.0 PROJECT QUALITY ASSURANCE (QA)

6.1 Quality Assurance Procedures

Quality Assurance (QA) procedures will be the responsibility of the PQM (PM/PQM) or a qualified designee and will involve the collection and assessment of information obtained from the quality control findings or quality audits. When reviewing quality control findings or conducting a focused quality audit, the PQM will look for opportunity areas or areas of non-conformance as a basis for continuous improvement. Should an area of non-conformance be identified, the PQM (PM/PQM) or a qualified designee will evaluate the non-conformance in greater detail to identify any trends, patterns, or gaps which may be attributable as a root cause.

The primary QA procedures for this Project will be a combination of "over the shoulder" reviews and interviews to monitor progress, supplemented by formal Quality Audits during the Project development process. A final quality audit re-visit will be scheduled with the Project Team following the completion of the Project for the purposes of reviewing and discussing the overall Project quality performance. The primary objective for the quality audit re-visit is to use it as an opportunity for the Project Team to "learn from the past, apply to the present, and plan for the future" as the aspiration for continuous improvement.

6.2 Quality Assurance Recording Processes

The PQM (PM/PQM) or a qualified designee will complete a Project Quality Control Audit Report form following the completion of formal quality audits. Copies of the completed Project Quality Control Audit Report will be distributed to the Project Team to be used as the basis for an opportunity for improvement, and the original will be retained in CHA's project files.

7.0 Project Auditing and Continuous Improvement

7.0 PROJECT AUDITING AND CONTINUOUS IMPROVEMENT

7.1 Auditing and Addressing Non-conformance

CHA's PM or PQM will conduct internal audits to assess compliance with quality processes and client service objectives as a function of the Project delivery milestones.

Audit criteria, scope, frequency, and methodology will be established by the PM or PQM. At a minimum, one audit will be performed define some time period(s) based upon the project duration.

Project Quality Audit Review	Planned Date	Quality Review Auditor	Comments

Non-conformance identified during audits will be addressed promptly with the PM and/or PQM and reported to the CHA Chief Engineer/ Architect/ Scientist/ Planner responsible for that specific discipline as a means of assessing the processes and determining root cause and opportunities for improvement.

Work identified as non-conforming will be addressed as follows:

- taking action to eliminate or correct;
- authorizing use, release, or acceptance as approved by Client; or
- taking action to preclude use or application until non-conformities are addressed to the satisfaction of the PM or PQM.

Work that is identified or found to be potentially non-conforming will be addressed in one or more of the following ways:

- verifying and acting promptly to eliminate, resolve, or correct;
- evaluating and then authorizing its use, release, or acceptance as acknowledged and approved by the appropriate authority; and/or
- taking decisive and authoritative action to document, notice, and preclude its use or application permanently, or until such time that the non-conformance is resolved and authorized by the PM or PQM.

7.2 Corrective, Preventive, and Continuous Improvement Activities

The policies and procedures that will be followed for any Corrective and/or Preventive Action will follow a consistent, pragmatic, and rigorous process to identify, document, track, and resolve non-conformance.

7.0 PROJECT AUDITING AND CONTINUOUS IMPROVEMENT

7.2.1 Corrective Actions

Corrective Actions are required when assumptions, services, deliverables, or procedural requirements have not been met. Corrective Actions are risk-based and may involve the identification of a deficiency that is not otherwise covered, accommodated, or accounted for by another established process or policy.

When a non-conforming element is identified, the PM or PQM will be notified of the identified non-conformance. Any corrective action will be evaluated by the PM or PQM to do the following:

- investigate and determine/ conclude whether the identified non-conformance is an isolated one-time occurrence or an event that requires implementation of a systematic or comprehensive Corrective Action procedure;
- identify, document, and implement any short-term or near-term actions that are necessary to promptly address the non-conformance, including dates by which the action will be completed;
- evaluate and determine underlying cause(s) and the contributing nature or association with the non-conformance;
- identify, define, and implement actions that will address the underlying cause(s) and prevent future occurrences; and
- verify and audit the compliance effectiveness of the action.

7.2.2 Preventive Actions

Preventive Actions are required when assumptions, services, deliverables, or procedural requirements are anticipated, forecasted, or observed not to be met in the future. Preventive Actions are proactive measures to address a potential non-conformance or discrepancy that is not otherwise covered, accommodated for, or accounted for by another established process or policy.

Preventive Actions are specific and risk-based to address the cause of a potential non-conformance and prevent it from happening. The seriousness and impact of the non-conformance will be evaluated so that the actions to be taken are commensurate with the risk.

Potential non-conformance will be identified to, and evaluated by, the PM or PQM to do the following:

- determine the underlying contributory cause(s) of the potential non-conformance;
- identify actions to address the cause and prevent the non-conformance;
- document the Preventive Action taken, including dates by which the action will be completed; and
- verify and audit the effectiveness of the action.

7.0 PROJECT AUDITING AND CONTINUOUS IMPROVEMENT

7.2.3 Improvement Actions/ Best Practices Implementation

Continuous improvement in quality benefits from knowledge transfer and the sharing of experiences. Any team member may identify and propose a change to a process or procedure that will contribute to or improve the collaborative environment for developing, evaluating, and delivering more effective and efficient work products and services.

Consideration of improvement actions may be first identified by any member of the CHA team. Upon initial identification, the continued evaluation, development, and implementation of any improvement action will require authorization from, and collaboration with, the PM.

Identified improvement actions will be documented by the PM or PQM or a qualified designee on a Project Quality Opportunities for Improvement Form and distributed to the Project Team. The PM or PQM or a qualified designee will be responsible for subsequent follow-up with the Project Team to evaluate and document the status and implementation of the identified action items.

8.0 Escalation and Risk Management

8.0 ESCALATION AND RISK MANAGEMENT

Escalation is the strategy of addressing conflicts at the lowest appropriate level to support prompt, collaborative, and effective resolution, allowing those involved closure with minimal consequence to themselves, the team, or the team's goals and objectives. The underlying premise for effective escalation is to decisively resolve matters or issues at the lowest and/or most appropriate level within the Project Team based upon the specifics of the situation, the involved parties, and the level of consequence or risk associated. If resolution is not achieved at the lowest levels, the issue is then escalated up the established hierarchy until satisfactory resolution is achieved.

8.1 Management Escalation Organization Level

Escalation Level	Management Title(s)	Name(s)
Executive Sponsorship	CHA organizational title here	
Technical Excellence	Chief Engineer/ Architect/ Scientist/ Planner	
Managerial Lead	Project Manager	
Technical Discipline Lead(s)	CHA organizational title(s) here	

8.2 Escalation Process

The plan for the escalation of communication and involvement of increasing management authority is intended as an incremental and sequential action plan based on identifying and resolving challenges at the most appropriate, efficient, and effective levels though collaboration and commitment toward a "win-win" outcome.

This escalation plan demonstrates the communication protocols for identification of a challenge/ situation and the appropriate resolution stages/ strategies beginning at the lowest appropriate level and progressing incrementally higher with more authoritative involvement based upon complexity, risk, magnitude, etc.

Position/ Role	Sequential Escalation Process
Originators (within Design Team)	• First level of challenge/ opportunity identification and resolution. • Collaborative engagement between parties with a common goal of consensus.
Technical Team Manager (TTM) Engineer of Record (EOR) Certifying Professional (CP)	• Second level of challenge/ opportunity identification and resolution when unresolved at first level or when identified level of risk is apparent or increased. • Involves conference with Originators to assess the unresolved situation founded on a comprehensive understanding of the background and considerations contributing to the situation. • Involves assessment and decision-making based upon breadth and depth of experience.

8.0 ESCALATION AND RISK MANAGEMENT

Project Quality Manager – Insert name here CHA Chief Engineer/ Architect/ Scientist/ Planner – Insert name(s) and BP(s) here	• TTM, EOR or CP requested consultation and engagement. • Identified concern or risk profile elevation stemming from peer review or quality audits. • Involves assessment and decision-making based upon breadth and depth of experience. • Elevated to Leadership Management level of awareness/ involvement within CHA.
Project Manager – Insert name here	• Ultimately responsible for Project quality and customer satisfaction. • TTM, EOR, CP, PQM, or Chief Engineer/ Architect/ Scientist/ Planner notification of a circumstance that may have a consequence to Client (schedule, budget, risk). • Requires thorough and unbiased assessment of cause-and-effect considerations.
Executive Sponsor – Insert name and title here Regional Counsel – Insert name here General Counsel – Michael Platt	• Ultimately responsible for CHA services being provided to Client. • TTM, EOR, CP, PQM, Chief Engineer/ Architect/ Scientist/ Planner, or PM notification of a complex circumstance of sufficient magnitude that may have a high risk or significant consequence to CHA, Client, or the public at large. • Requires thorough and unbiased assessment of cause-and-effect considerations. • Elevated to Executive Management level of awareness/ involvement within CHA; may include CHA counsel consultation or involvement.

8.3 Risk Management

Risk management is the strategy of identifying, evaluating and prioritizing risks and risk impacts associated with the Project, and then addressing identified risks through pragmatic and prudent avoidance, prevention, minimization, reduction, transfer, or mitigation strategies. A Project-specific risk register will be maintained to document information associated with identified risks (negative outcomes) and opportunities (positive outcomes). The risk register is the responsibility of the PM and will contain, as a minimum, the following risk considerations: identification, description, ownership, impacts, ownership, and response.

9.0 PSQMP Revision Audit Log

9.0 PSQMP REVISION AUDIT LOG

Prior to issuance of a version-controlled release, subsequent to the original work product, any revision(s) made to this PSQMP must comply with the QC requirements as applicable to a CHA work product or deliverable. This PSQMP Revision Audit Log is to be populated only after satisfactory completion of an appropriate check and review of revisions made to this PSQMP. Completion of the following revision audit log will be the basis for version-controlled release of a new document that will supersede the previous PSQMP. The version-controlled release will be annotated in Preface (prior to the Table of Contents).

PSQMP Revision Audit Log

Review Date	Activity Reviewed	Reason	Resolution

10.0 PSQMP Preparation and Approvals

10.0 PSQMP PREPARATION AND APPROVALS

Prepared by _____

Project Quality Manager (sign and date)
Name and Title

Approved by _____

Project Manager (sign and date)
Name and Title

or **Approved by** _____

Executive (sign and date)
Name and Title