CIVIL & STRUCTURAL ENGINEERING CONSULTANTS

CISTEC - Document 6

QUALITY ASSURANCE POLICY

Our civil & structural engineering team consists of competent engineers and technicians, each with significant Quality Assurance experience. Each project will be allocated to an experienced engineer to act as the project engineer for all the design works and an experienced technician for drafting works. All the engineers and technicians working on a project will report and coordinate with the project engineer, in the grand-scale all the design works are ultimately supervised and overlooked by a design manager (who is a chartered engineer and chartered structural engineer) for overall control.

Though Cistec is a young and recently established company, but it's actively working to develop a comprehensive Quality Assurance program to achieve a better design and high quality documentation system, with fewer RFI's and change orders during construction, hopefully a better product for the client.

By having a Quality Assurance program we are hoping to define a set of procedures and standards to use to facilitate design and documentation of that design, which will result in the following:

- Better design
- Better drawings
- More efficient design process
- Fewer mistakes
- Fewer RFI's and Change Orders
- Increase client satisfaction
- Enhanced reputation
- Increased profit

Our comprehensive QA programme is achieved by the following components:

- Adequate training for young engineers.
- Design standards (design guides, formal design procedures and checklists).
- Drafting and CAD standards (standardised drafting procedures, CAD checklists, typical detail library, 'go-by' drawings, and standard block library).
- Project delivery system.
- Knowledge base.
- Involvement of the QA Manager and QA reviews.

We have a written formal design procedures, standards and methodologies in order to produce consistently high quality design and to minimize the risk of errors due to miscommunication. The idea is to have a set of formally established office standards so that there is no confusion regarding the design procedures and methodologies. The purpose of office design standards is to keep everyone on the same page and to provide a roadmap to insure uniformity of design between all the engineers and technicians working on the project.

As part of our quality assurance we have some checklists, which will be useful tools both for engineers new to the profession as well as for experienced engineers trying to remember the hundreds of things that go into design and documentation of a building structure. Checklists include the myriad of things needed to produce complete and legible drawings. They cover things as seemingly minor as making sure north arrows are shown on the framing plans to more important items such as making sure that beam reactions are indicated.

We have comprehensive structural engineering typical detail library, which contains over hundreds of typical details. "Go-by" drawings are reference drawings that show examples of how to indicate information on framing plans, schedules, etc. "Go-

by" framing plans for various structural systems provide engineers and drafters a single point of reference to see how to properly draw anything they will encounter on the plans. The use of "go-by" drawings prevents younger engineers from using previous projects for learning how to show things on the drawings. A standard block library is essential for increasing productivity and maintaining drawing uniformity.

We have a Project Delivery System, which is a library of forms, checklists, procedures and correspondence templates used for administratively carrying a project from inception through construction. The PDS is divided into five sections:

- Project start-up (such as a design criteria, form listing, design information , i.e. the applicable building code, design standards, loads, wind, snow and specific design criteria, summary of the structural systems being used and fire ratings required, etc.).
- Schematic design
- Design development
- Contract documents
- Construction administration (contains meeting agenda templates for the pre-steel detailing meeting, the pre-concrete meeting, meetings with the inspector as well as checklists to be used when reviewing shop drawings, etc.).

Each project will be allocated to a QA manager, a senior level engineer who will be responsible for establishing and maintaining engineering standards and for verifying that all design is done in accordance with those standards.

The QA manager has the following responsibilities:

- Establishing and maintaining design and drawing standards
- Answering technical questions as appropriate.
- Staff training
- Maintaining familiarity with all projects during design and providing input and suggestions as required.
- Signing off on sections and details prior to them going to the CAD drafting technician. (A cursory review and Sign-off of sections and details by the QA manager is required to catch mistakes before sending sections and detail to the drafting person.
- Performing quality assurance reviews on all projects.

Quality Assurance reviews are in-house reviews conducted to verify that all design is performed and documented in conformance with the procedures and standards mandated by the QA program. QA reviews serve two purposes; the primary purpose is to provide redundancy via a second set of experienced eyes on the drawings to catch mistakes, errors or omissions. The second purpose is to monitor the effectiveness of the QA program.

A variety of tactics are employed when performing QA reviews, these includes following:

- Look at the big picture
- Verify load paths
- Review framing sizes
- Look at connection details (constructability)
- Look for mistakes
- Look for subtleties
- Look at the drawings for constructability
- Review for clarity
- Look for omissions
- Look for "little" little things
- Look for the "big" little things
- Verify that the structural drawings match the architectural, M&E and any other drawings for the project.

Hopefully our comprehensive QA programme will ultimately help us to succeed and benefit our clients.

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