Consulting Engineers South Africa

QMIG

November 2011

Quality Management

Implementation Guideline for

Consulting Engineers

The Bigger Picture

Quality Management preemptively mitigates the factors that potentially detract during construction/manufacture from the intended performance of a product or that potentially detract during operation from the intended performance of an organization. Quality Management is strategic in that it explicitly identifies detracting factors and systematically minimizes their impact in terms of standard processes and distinct criteria.

Quality Management developed at an ever increasing pace over the past hundred years in the wake of the industrial revolution. The need for Quality Management is driven by the relentless and increasing demand for products and services by the discerning populations of the world and by the associated depletion of natural resources and the devastating deterioration of the environment.

Quality Management is the wellspring of industrial progress and sustainability in the face of the exponentially escalating demands for goods and services and rapidly diminishing resources.

Quality Management has evolved from something nice-to-have to an enterprise management system that affects every functional aspect of an organization. More and more companies are now regarding Quality Management as mandatory for the financial survival of the organization.

Developing Perceptions of Quality

The perception of quality has changed dramatically during the past hundred years. At the start of this period, quality was viewed mainly as *inspection to identify and sort* good products from bad products. Following World War I up to the middle of the twentieth century, *quality control* techniques were introduced which included statistical techniques, sampling tables and process control charts. In the ensuing period towards the end of the twentieth century, quality control evolved into *quality assurance* with the emphasis on problem avoidance rather than detection. Quality assurance principles emerged such as the cost of quality, zero defect programs, reliability engineering and total quality control.

A revolution in the perception of quality has occurred during the past twenty years. Quality used to be viewed as the responsibility of blue collar personnel. It is now considered to be everyone's responsibility throughout the organization. Defects in quality that used to be hidden from customers are now brought to the surface for corrective action. Quality problems that used to lead to blame and excuses now form the basis for cooperative solutions. Problems that were previously overcome with the minimal documentation are now documented as lessons learnt and are being used to ensure that mistakes are not repeated. It was believed that increased quality control would increase costs whereas it is now accepted that quality control reduces costs and improves business. Quality was considered to be an internal matter, but is now focused on the customer. It was mistaken that quality would not occur without close supervision. Now people want to produce quality products of their own accord. Quality was believed to occur during project execution and now is known to start with project initiation and requires to be planned for within the project. Improvements have occurred multi-dimensionally in supply, equipment, ergonomic, training, organizational charter, attitude, leadership, management and product quality.

Drivers of Quality

Quality is driven by customers and markets requiring higher performance, faster product development, higher technological sophistication, maximal exploitation of materials and processes, acceptable costs, matching of quality and cost, lower manufacturing profits, fewer defects and/or rejects, product and process social acceptability, high degree of safe product operability, high product availability to perform intended functions, high product reliability and assured performance under prescribed maintenance. Customer demands are addressed using Total Quality Management as an ever-improving and continuous cyclic system for integrating organizational elements and customer satisfaction within the design, development and product manufacturing/construction processes.

Risk and Quality Management - Two Sides of the Same Coin

Product/Project Quality Management implicitly ensures that the product/project is *capable* of performing the intended task, on the intended delivery date and at the intended cost. Enterprise Quality Management implicitly ensures that the business is sufficiently robust and well enough cared for to continuously grow in size and stature and that it is financially sustainable in the long term. Quality Management pursues these objectives by explicitly structuring a number of set processes in terms of standard procedures and preeminent criteria. Quality Management focuses on the *capacity* of the product/project or the enterprise to withstand the effects of detracting factors.

Product/Project Risk Management ensures that the *demands* imposed on the product/project are not unduly onerous. Enterprise Risk Management likewise ensures that the *demands* imposed on the resources of an organization are not unduly onerous. Risk Management pursues these objectives by *a priori* and explicitly identifying the risks that are involved, evaluating their occurrence and mitigating their impact in terms of structured procedures and accepted norms. Risk Management focuses on the *demands* that risks impose on the performance of products/projects or on the sustainability of enterprises.

It is evident that Quality Management and Risk Management are two sides of the same coin that cannot on their own assure the performance of a product/project or the sustainability of a business.

This distinction will assist you to understand that although Quality and Risk Management are separate processes, they are complimentary and inter-dependent and may even be inter-related. Knowing that they are separate processes will raise your awareness that they both need to be addressed in a structured manner and that both need to be systematically managed in order to maximize the performance of a product/project and the success of your business.

Purposes of QMIG

This document presents guidelines for the *implementation* of good Quality Management in engineering practice. It is not just another of so many references on Quality Management. The main purposes are to enable engineering practitioners to determine the *status* of Quality Management in their businesses and to confirm *compliance* with CESA's requirement that engineering consultancies pursue Quality Management at an appropriate level. Both purposes are pursued in terms of straightforward Yes/No checklists which are capable of completion by principals based on their levels of familiarity with their businesses that are in any event expected of them.

The principles of Quality Management are briefly presented for the sake of completeness. Users who are familiar with these principles can go directly to the *Compliance* Checklist in **Table 1**. This checklist is based on the FIDIC Guide to Quality Management in the Consulting Engineering Industry, 2001. Confirmation of Compliance in the Annual Declaration will enable CESA to monitor compliance. CESA will not require 100% Compliance with the Checklist, but will require that outstanding items be addressed within the next cycle.

How to Ensure Quality in Your Practice

Quality Management in a consulting engineering practice can be achieved by ensuring that the actions implied by the questions in **Table 1** are proactively pursued and formally documented. CESA Member Firms will be requested to confirm that they have implemented Quality Management at the appropriate level in their organizations by inclusion of the compliance checklist in their Annual Declaration. The degree of compliance may be monitored by scrutiny of an organization's quality documentation and records during random audits.

"Quality Management Implementation Guideline"

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June 2011

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1. INTRODUCTION

This Guideline is based on the ISO 9001:2000 (SANS 9001:2000) *Quality Management System – Requirements* and on the FIDIC *Guide to Quality Management in the Consulting Engineering Industry, 2001*. Guidance is given in *ISO 9001 for Small Businesses – What to do – Advice from ISO/TC 176, 2002* on how the ISO 9001:2000 Quality Management system standard applies to the small business sector.

Most businesses find it difficult to implement a Quality Management system. In small businesses, these difficulties are exacerbated by limited resources, perceived cost and difficulties in understanding and applying the standard, especially with regard to continual improvement. For a Quality Management system to be economically viable, the improvement in enterprise profit should justify the investment needed to implement and maintain the system.

The need for this Guideline arose directly from the difficulties that the Single Practitioner members of CESA encountered in implementing Quality Management systems. When developing this guideline, it soon became apparent that a limited number of CESA members are ISO certified, secondly, it is likely that the number of members that will become ISO certified will always be limited and, thirdly, that CESA requires a process to standardize its requirements for Quality Management in its member organizations and to regulate compliance by its members with such requirements. It appeared at the same time that a sensible guideline for Single Practitioners could apply to all the CESA members that are not yet, or perhaps never will be, ISO certified.

This Guideline is therefore presented to all the CESA members that are not ISO certified for the purpose of readily facilitating compliance with CESA's requirements on Quality Management. It should be noted that CESA does not require its members to be ISO certified, but that they should at least implement a formal Quality Management System along the lines presented in this Guideline.

2. BASIS AND LAYOUT OF GUIDELINE

The standard documentation on Quality Management contains a considerable amount of very good and relevant information, but owing to the volume thereof distracts from the main purpose of ***implementing*** Quality Management. This Guideline contains only the essential theory on the principles and requirements needed to implement Quality Management with the least effort. It does not contain any motivation on why Quality Management is required and what the benefits are.

It has been said that Risk and Quality Management are two sides of the same coin, Kirsten and Van Rensburg (2007). Risk and Quality cannot be pursued independently, they go hand in hand and only by dealing with them together can the success of a business be assured. The concepts of Risk and Quality Management are therefore briefly introduced and compared with each other in **Section 3**.

The Guideline is by and large based on and laid out along the lines of the FIDIC Guide to Quality Management in The Consulting Engineering Industry, 2001. CESA requires this as the starting point, because of its close liaison with FIDIC on an international level.

The eight principles of Quality Management in **Section 4** in this Guideline are an extract of **Section 2.3** in the FIDIC Guide to Quality Management in The Consulting Engineering Industry, 2001. A thorough understanding and appreciation of these principles is essential to Quality Management.

The requirements for Quality Management in **Section 5** of this Guideline are a summary of the Requirements for Quality Management Systems from *ISO 9001 for Small Businesses – What to do – Advice from ISO/TC 176*. The purpose of the summary is to enable persons that have not previously been involved with Quality Management to understand the underlying structure and concepts of the ISO 9000:2000 standard which are very difficult to comprehend at first sight.

The FIDIC Quality Management Compliance Checklist referred to in **Section 6** is based on the requirements for Quality Management in **Section 5** and is an extract in the form of questions of **Appendix B** in the FIDIC *Guide to Quality Management in The Consulting Engineering Industry, 2001*. This checklist has been expanded to include Risk Management as integral part of Quality Management.

The aspects that should be complied with by Single Practitioners are highlighted in yellow in the checklist referred to in **Section 6** and should be marked as shown to indicate compliance. The aspects that should be complied with in addition by all other non-ISO certified members of CESA are highlighted in rose. All aspects in the checklist should be complied with by members qualifying for full ISO certification.

All members of CESA will be requested to confirm compliance with CESA's Quality Management requirements at the appropriate level as part of their Annual Declaration. The credibility of this procedure may be assured by conducting a randomly selected 5–10% audit of registered members.

3. JUXTAPOSITION OF QUALITY & RISK MANAGEMENT

Quality Management consists of a number of processes that are aimed at improving the effectiveness and efficiency of a business. Quality Management enhances the capacity of a business and assures its robustness against internal and external threats. A Quality Management system consists of documenting the processes as they apply to a business and regularly controlling, auditing and improving the processes.

A Quality Management system is concerned with the quality of management and not with that of the product or service, albeit that they are complementary and that the latter flows from the former.

Risk Management on the other hand represents a process by which a business is protected against internal and external threats. The process can vary in complexity from a simple set of house rules on business ethics and conduct to an advanced system in which risks

are systematically identified, quantified, evaluated, remedied/mitigated and administered for sustainability.

Risk and Quality Management are two sides of the same coin and neither can, on its own, ensure the successful outcome of a business. The intricate relationship between Quality Management and Risk Management is evident from the observation that Quality Management by and large comprises direct and indirect preemptive risk mitigation. As such Quality Management corresponds to the penultimate stage in Risk Management.

This distinction assists one to understand that Risk and Quality Management are separate processes. They are complimentary and inter-dependent and they may even be inter-related. To know that they are separate processes will raise one's awareness that they both need to be addressed in a structured manner. This, however, does not mean that they should always be separately identified before dealing with them. The important aspect is that both risk and quality should be systematically managed in order to maximize the success of a business.

4. EIGHT PRINCIPLES OF QUALITY MANAGEMENT

The eight principles of Quality Management may be extracted as follows from **Section 2.3** in the FIDIC Guide to Quality Management in The Consulting Engineering Industry, 2001.

a) ***Customer-Focused Organization***

i) *Customer Satisfaction*

Quality Management adds value for the client. A proactive pursuit of customer satisfaction is therefore a critical element. Internal customers are the next person in line in generating the final product for the external customer and their wants and needs should also be observed in delivering the required quality.

ii) *Client Relationship*

Understanding client needs, what the real project objectives are, who the real clients are, and what all the expectations are, is an essential step in achieving quality objectives related to the client. The activities before project inception are

crucial to a close working relationship with the client and the development of mutual trust and confidence.

b) ***Leadership***

i) *Top Management Commitment*

Top management must demonstrate clearly and visibly, in words, actions and initiatives, their full commitment to Quality Management. The CEO must demand that the Quality Management System is adhered to and must remove all barriers and obstacles to achieving this requirement.

ii) *Proactive Leadership*

Proactive leadership is a style of management that empowers staff and delegates responsibility and authority to the staff to act on a clear vision and on the principle-based values of the organization.

iii) *Plan to Achieve Purpose*

Leadership must plan to establish a quality policy, acquire knowledge of quality, effectively involve staff, improve communication and information systems, develop a service-oriented plan and arrange a client-driven delivery system.

c) ***Involvement of People***

i) *Employee Involvement*

Every member of staff is involved every day in the delivery of the professional services of the business and unless they are fully committed to quality, the benefits of Quality Management will not be realized.

ii) *Synergized System Implementation*

Synergy generates success of the whole that is greater than the sum of the individual staff contributions. Synergy can be developed by creating trust as underlying foundation to staff empowerment.

iii) *Communication*

Effective ongoing verbal and written communication on all aspects of a project is essential to the successful implementation of Quality Management in the organization.

iv) *Teamwork*

Mutually supportive, synergistic teamwork ensures project quality in all respects.

v) *Working Environment*

Working environment includes both the global environment of the organization and the environment in which the specific project work is performed. Adequate resources, adequate lighting, absence of noise, air, olfactory, sound and visual pollution and suitable ergonomics contribute to a quality working environment and associated quality performance.

vi) *Recognition*

What gets rewarded gets repeated. As an alternative to demanding quality work, management should strongly support staff training on the quality of their responsibilities in addition to their technical skills.

d) ***Process Approach***

i) *Processes*

All processes must be identified and controlled for correctness and correct execution to ensure quality services and products. The requirements of employees on which the processes depend must be duly considered in this respect.

ii) *Planning*

To ensure that the desired quality is achieved requires that adequate time is spent on planning the work.

iii) *Document and Information Management*

The collection, storage, retrieval, sharing, processing, updating and ultimate presentation of data and information are at the core of delivering quality products and services. The systems to effectively facilitate all of these actions are an essential part of Quality Management.

e) ***System Approach to Management***

Identifying, understanding and managing inter-related processes as a system contributes to the effectiveness and efficiency of the organization in achieving its objective.

f) ***Continuous Improvement***

In the absence of continuous improvement, quality withers in time. Every process must be continuously reviewed for effectiveness and efficiency in a **P**lan-**D**o-**C**heck-**A**ct cycle (**P** – identify relevant factors and plan improvement process; **D** – implement and test process; **C** – analyze results; **A** – install process as standard)

g) ***Factual Approach to Decision Making***

i) *Measurements*

The expected results of Quality Management must be identified and the quality achieved measured for improvement. Appropriate methods are required to monitor the Quality Management System.

ii) *Auditing*

The defined conditions in existing protocols for randomly selected aspects of project work in the Quality Management System must be examined in detail. The number of material departures from the norms must be recorded, described, counted and reported to management for remedial action.

iii) *Management Review*

The Quality Management System must be analyzed and reviewed for suitability, effectiveness and relevance. The review must focus on measurable aspects of services and products as direct indicators of poor adherence to procedures. The oversights analyzed should include changes in regulatory standards, increments in scope of services, achievement of quality objectives, audit results, non-conformance, customer complaints and corrective and preventive actions.

iv) *Client and or Other External Feedback*

External feedback is crucial for a Quality Management System and may include client evaluations (by direct inquiry, questionnaire or repeat appointment), benchmarking criteria of competitors, follow-up debriefings on proposals, independent external audit and peer review.

v) *Prevention Focus*

The ***process*** should be checked rather than the ***product***. Quality cannot be inspected into a product or service. It must be built or designed in at every step of every project phase as preventive intervention aimed at getting it right, first time, every time. ***Product checking*** cannot preempt lapses in quality that are much more costly to correct than to prevent. ***Process checking*** which is focused on error prevention at the very early stages leads to reduced project costs and avoids wasted resources.

h) ***Mutually Beneficial Supplier Relationships***

Mutually beneficial relationships with sub-consultants, contracted organizations and long-term suppliers require trust, knowledge of personnel capabilities and understanding of each others' quality cultures that are developed over time. Such relationships are crucial to the quality of projects that almost always rely to some extent on external inputs.

5. ISO 9001:2000 REQUIREMENTS FOR QUALITY MANAGEMENT

The ISO 9001:2000 requirements for Quality Management are quite difficult for the uninitiated to comprehend and have therefore been summarized below to enable newcomers to understand the underlying structure and concepts of the standard. This summary should not be used in lieu of the standard. It is reiterated that CESA does not require its members to be ISO certified.

a) ***Quality Management System***

i) *General Requirements*

The organization shall establish, document, implement and maintain a Quality Management system and continually improve its effectiveness in terms of appropriate processes. The organization shall exercise control over any outsourced process that affects product conformity.

ii) *Documentation Requirement*

(1) *General*

The documentation for the Quality Management system shall include statements on the quality policy and quality objectives, a quality manual, specified procedures, planning operation and control processes, and specified records.

(2) *Quality manual*

The organization shall establish and maintain a quality manual that includes the scope and procedures of the Quality Management system and a description of the interaction between the processes of the system.

(3) *Control of documents*

Documents required by the Quality Management systems shall be controlled in terms of a documented procedure covering all relevant aspects.

(4) *Control of records*

Records shall be established and maintained to provide evidence of conformity to requirements and of the effective operation of the Quality Management system. A documented procedure shall be established to define the controls needed for all aspects of the use of the records.

b) ***Management Responsibility***

i) *Management Commitment*

Top management shall provide evidence of its commitment to the development and implementation of the Quality Management system and continually improving its effectiveness.

ii) *Customer Focus*

Top management shall ensure that customer requirements are determined and that the organization aims to enhance customer satisfaction.

iii) *Quality Policy*

Top management shall ensure that the quality policy suits the organization, includes commitment to comply with requirements and to continual improvement, provides for review of the policy, is communicated and understood in the organization and is reviewed for continued suitability.

iv) *Planning*

Top management shall ensure that quality objectives are established at relevant functions and levels in the organization and are measurable and consistent with the quality policy. Top management shall ensure that the Quality Management system is planned and that its integrity is maintained when changes are contemplated.

v) *Responsibility, Authority and Communication*

Top management shall ensure that responsibilities and authorities are defined and communicated in the organization. Top management shall appoint a member of management who shall have responsibility and authority to ensure that Quality Management processes are in place, report on the performance of the Quality Management system and ensure that the awareness of customer requirements are promoted in the organization. Top management shall ensure that appropriate communication processes are in place and that communication on the effectiveness of the Quality Management system takes place.

vi) *Management Review*

Top management shall review the Quality Management system for continuing suitability, adequacy, effectiveness, opportunity for improvement and the need for changes. The relevant input and output requirements shall be duly regarded in the review.

c) ***Resource Management***

i) *Provision of Resources*

The organization shall determine and provide the resources needed to implement and maintain the Quality Management system, continually improve its effectiveness and to enhance customer satisfaction.

ii) *Human Resources*

The competence of personnel performing work affecting product quality shall be assured by appropriate education, training, skill and experience. The organization shall evaluate personnel competence, provide the necessary remedial action, evaluate the effectiveness of the remedial action, ensure that personnel are aware of the importance of their contribution to quality, and maintain records of the remedial actions taken.

iii) *Infrastructure*

The organization shall determine, provide and maintain the infrastructure needed to achieve conformity to product requirements.

iv) *Work Environment*

The organization shall determine and manage the work environment needed to achieve conformity to product requirements.

d) ***Product Realization***

i) *Planning of Product Realization*

The organization shall plan and develop the processes needed for product realization consistent with the requirements of other processes of the Quality Management system.

ii) *Customer Related Processes*

The organization shall determine customer requirements, requirements necessary for intended use, and statutory and regulatory requirements. The organization shall review the requirements prior to commitment to supply a product and shall

record the results of the review. The organization shall put in place effective arrangements for customer communication.

iii) *Design and Development*

The organization shall plan and control the design and development of products and shall review and update the planning output as the process progresses. Product input requirements shall be determined and recorded. The form of design and development outputs shall enable verification against inputs. Records of the results of verification shall be maintained. Validation of design and development shall be performed to ensure that the resulting product is capable of meeting requirements. Records of the results of validation shall be maintained. Design and development changes shall be identified and records maintained.

iv) *Purchasing*

The organization shall ensure that purchased product conforms to specified purchase requirements. Purchasing information shall describe the product to be purchased. The organization shall ensure that purchased product meets specified purchase requirements.

v) *Production and Service Provision*

The organization shall plan and carry out production and service provision under controlled conditions. The organization shall validate any process for production and service provision where the output cannot be verified by monitoring and measurement. The organization shall identify the product throughout product realization and shall exercise care with customer property under its control. The organization shall preserve the conformity of product during internal processing and handling.

vi) *Control of Monitoring and Measuring Devices*

The organization shall determine the required monitoring and measurement and the devices needed to provide evidence of conformity of product to requirements. The organization shall put in place processes to ensure that monitoring and measurement can be and are being carried out consistent with requirements.

e) ***Measurement, Analysis and Improvement***

i) *General*

The organization shall plan and implement the monitoring, measurement, analysis and improvement processes needed to demonstrate conformity of the product,

ensure conformity of the Quality Management system and continually improve its effectiveness.

ii) *Monitoring and Measurement*

The organization shall monitor information relating to customer perception on meeting its requirements. The organization shall conduct internal audits to determine whether the Quality Management system conforms to planned arrangements and requirements and is effectively implemented and maintained. The organization shall apply suitable methods for monitoring and measurement of the processes of the Quality Management system against planned results. The organization shall monitor and measure the characteristics of the product to verify that requirements have been met in accordance with planned arrangements.

iii) *Control of Nonconforming Product*

The organization shall ensure that product that does not conform to requirements is identified and prevented from unintended use or delivery. The organization shall deal with nonconformity in an appropriate way. Records of nonconformities and subsequent actions taken shall be maintained.

iv) *Analysis of Data*

The organization shall determine, collect and analyze relevant data to demonstrate the suitability and effectiveness of the Quality Management system and to evaluate where continual improvement of the system can be made.

v) *Improvement*

The organization shall continually improve the effectiveness of the Quality Management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review. The organization shall take action to eliminate the cause, occurrence and recurrence of nonconformities

6. FIDIC QUALITY MANAGEMENT COMPLIANCE CHECKLIST

All businesses already have a management structure and are carrying out many of the ISO 9001:2000 requirements, but have not necessarily stated explicitly how this is done. It is likely that the systems installed are quite effective, but are informal and probably not well

documented. The existing management structure should be the basis on which a formal Quality Management system is built.

A starting point is therefore for the management of an organization to determine what they are doing with regard to Quality Management and what aspects may be outstanding. The checklist in **Table 1** enables this to be done. It can be applied at basic, intermediate and comprehensive level to suit respectively single practitioners, non-ISO certified members and members that qualify for ISO certification. The aspects in **Table 1** are divided into three progressively more onerous categories of which the first is highlighted in yellow and the second in rose. The most onerous category is not highlighted. The higher category organizations have to satisfy all lesser levels of aspects in the checklist. The outstanding aspects in an organization are immediately evident by completing the checklist at the appropriate level. At the same time this enables the organization to communicate to CESA the status of its compliance with CESA's requirements.

Once the status of the Quality Management in a business has been established in terms of the checklist in **Table 1**, management is in a good position to take the necessary steps to implement or further develop the Quality Management system.

CESA provides short courses for members who require assistance to implement Quality Management systems in their practices at any one of the three levels.

Confirmation of Compliance in the Annual Declaration ensures that members observe the Quality Management requirements posed by CESA. The credibility of the procedure may be assured by conducting an unannounced randomly selected audit of 5–10% of the members.

7. REFERENCES

a) FIDIC Guide to Quality Management in the Consulting Engineering Industry, 2001.
b) ISO 9001:2000 Quality Management System – Requirements.
c) ISO 9001 for Small Businesses – What to do – Advice from ISO/TC 176, 2002.
d) Kerzner, H. Project Management, A Systems Approach to Planning, Scheduling and Controlling. John Wiley & Sons, Inc., Tenth Edition, 2009.

e) Kirsten, H A D and Van Rensburg, J. Risk Management Implementation Guideline for Consulting Engineers. CESA, 2007.

Table 1: FIDIC Quality Management COMPLIANCE Checklist			
•	Aspects related to Risk Management have been inserted as highlighted in light blue		
•	The aspects that are required by CESA to be complied with by Single Practitioners are highlighted in yellow		
•	The aspects that are required by CESA to be complied with additionally by all other non-ISO certified members are highlighted in rose		
•	The aspects should be checked at the relevant level to indicate compliance or not		
•	Documented evidence should be presented on request to confirm compliance indicated		
Item	**Aspect**	**Compliance**	
		Yes	**No**
	Quality Management System		
1	Do the organization's vision, mission and policies address quality?	✓	
2	Are these values and principles regularly reinforced and updated?	✓	
3	Does a Quality Manual exist which specifies who does what, when and where?		
4	Does the Quality Manual include standard operating procedures for controlling and assuring quality in:		
•	Customer relationships?		
•	Staff relationships?		
•	Assessments and studies?		
•	Design?		
•	Procurement?		
•	Shop drawing review?		
•	Construction observation and review?		
•	Internal quality audits?		
•	Customer satisfaction?		
5	Does a quality plan exist for each area of organizational activity or for each assignment?		
6	Have the requisite quality control, quality assurance and continuous process improvement and training programmes been identified and are they in place?		
7	Is there a method to identify needed improvements?		
	Risk Management System		
1	Are risk and quality management guidelines included in the Organizational Plan?		
2	Are significant risks at system, process and product levels identified and addressed?		
3	Are the house rules in the FIDIC Risk Management Manual 1997 implemented and maintained in the organization?	✓	
4	Are the standards and procedures given in the CESA Advisory Notes observed?	✓	
	Strategic & Business Planning		
1	Are the internal and external organizational critical success factors including legal requirements identified and prioritized?		
2	Are the management processes to be controlled and/or improved to satisfy the relevant interested parties, identified?	✓	
3	Are the processes modeled into a cohesive management system?	✓	
4	Are arrangements to ensure legal compliance in place?		
	Management Responsibility		
	Leadership		
1	Have the leaders developed and documented the organization's vision and mission?	✓	
2	Do the leaders facilitate achievement of the vision and mission?	✓	
3	Have the leaders developed and documented the organization's values for long term success?	✓	
4	Have the leaders implemented these values by appropriate action and behaviour?	✓	
5	Are the leaders involved in the implementation of the business management system?	✓	

Item	Aspect	Compliance	
		Yes	No
	Commitment		
6	Is the CEO committed to ensuring that quality standards are identified?	✓	
7	Do senior executives provide effective leadership and direction in implementing and maintaining quality standards?	✓	
8	Is the responsibility for risk management in the organization placed with a specific principal?	✓	
	Quality Policy		
9	Is a Policy Manual established to serve as gateway into the management system?	✓	
10	Is the quality policy clearly defined, implemented and maintained?	✓	
11	Does the organization have a policy or policies demonstrating its commitment to meeting requirements and to establish an overall sense of direction and principles of action?	✓	
12	Do the policies provide a framework for setting the organization's various objectives and targets?	✓	
13	Are all employees aware of the quality policy?	✓	
14	Are quality objectives established for each employee assignment?	✓	
	Organizational Planning and Structure		
15	Are business performance measurement systems included in the Organizational Plan?		
16	Are change management guidelines included in the Organizational Plan?		
17	Are planned organizational changes conducted in a controlled manner?		
18	Are resource management systems included in the Organizational Plan?		
19	Are adequate human, infrastructural and financial resources in place?	✓	
	Operational Planning		
20	Do the planning arrangements for the operational processes include actions for achieving operational objectives and targets?	✓	
21	Are the arrangements for communication within the organization and to/from external sources in place?	✓	
22	Is an Operational Procedures Manual for implementation by Functional Managers developed and documented?		
23	Are control measures needed to implement and maintain control of revenue generating processes, operational processes and product risk assessment included in the Operational Procedures Manual?		
24	Is management of employees, contractors and temporary staff including personnel development re awareness & training and performance management/appraisal included in the Operational Procedures Manual?		
25	Are operational management and maintenance of infrastructure, plant, facilities, work environment, finance, etc, included in the Operational Procedures Manual?		
26	Are the arrangements for those who supply and contract their services to the organization formalized?		
27	Are arrangements to manage Joint Ventures with other consultants and to manage Construction Contract processes and procedures (including tendering, evaluation and supervision controls, quality systems, health and safety, environmental controls, commissioning, documentation, etc) included in the Operational Procedures Manual?		
28	Is the management of documents that are essential to the successful implementation and operation of the management system (including authority, issue, review, backup, record keeping, etc) included in the Operational Procedures Manual?		
	Organizational Responsibility and Authority		
29	Are the responsibility, authority and interrelationships of all who manage, perform and verify work, clearly defined?	✓	
30	Is a responsible person(s) to identify and take action on quality problems appointed?	✓	
31	Is an authorized person(s) to develop improvement systems appointed?	✓	
32	Is a clearly defined way to verify the implementation and results of the proposed systems for improvement available?	✓	
33	Is an authorized person(s) to standardize successful improvement systems appointed?		

Item	Aspect	Compliance	
		Yes	No
	Verification Resources and Personnel		
34	Are verification requirements identified?		
35	Do personnel have adequate training and resources to verify activities?		
36	Do verification activities include:		
•	Review at designated benchmarks?		
•	Checking of the output?	✓	
•	Review of the adequacy of the constructed product?	✓	
•	Audits of the quality system processes & products?		
	Quality Management Staff		
37	Has a quality leader been appointed to be responsible for the quality management system?		
38	Does the quality leader report directly to senior management or serve as part of the senior management team?		
	Control of Documents		
39	Are documented procedures for controlling all documents and data required for the quality management system, including output documents available?		
40	Are all documents required for the quality management system reviewed and approved by authorized personnel prior to issue?		
41	Are current copies of appropriate documents available at all locations where operations require their use?		
42	Have personnel who review and approve document changes access to pertinent data upon which to base their decisions?		
43	Where sets of preliminary or status documents are submitted do these documents have a unique identification?		
44	Is there a master control list that identifies the current version of documents?		
	Quality Records		
45	Are documented procedures for the identification, collection, indexing, filing, storage, maintenance, and disposition of quality records available?		
46	Are quality records being generated and maintained?		
47	Do these records demonstrate achievement of the required quality and the effective operation of the quality system?		
48	Are quality records easily accessible?		
49	Have retention times of quality records been defined and recorded and agreed to by client?		
50	Where necessary are quality records available for evaluation by customers?		
	Management Review		
51	Is the quality management system periodically reviewed to ensure its suitability, adequacy and effectiveness?		
52	Do these reviews include analysis of results of internal quality audits?		
53	Does management act on these reviews?		
54	Are records of these reviews kept and maintained?		
55	Are the organization's requirements to monitor and measure customer perception and critical processes and procedures included in the review process?	✓	

Item	Aspect	Compliance	
		Yes	No
	Resource Management		
	Employees		
1	Is information on an individual's skills and experience recorded, maintained and updated?	✓	
2	Is this information communicated?	✓	
3	Do employees, whose activities affect quality, have appropriate education, training and experience for the assigned tasks?	✓	
4	Are continuing education, conferences, workshops, seminars, professional societies, on-the-job training and self-study encouraged to develop the employees' skills and knowledge in needed areas?	✓	
5	Are appropriate training records kept & maintained?	✓	
6	Does compensation and recognition for groups and individuals reinforce work effectiveness and quality assurance?		
7	Does each employee know and understand what is expected in his/her job?		
	IT Equipment		
8	Is purchased computer software verified prior to use?	✓	
9	Are computers and software compatible and standardized?	✓	
10	Is it assured that computer files are regularly updated and backed-up?	✓	
11	Are bugs in software and "workarounds" properly handled?	✓	
	Financial Management		
1	Does the firm manage its finances properly and assure adequate cash flow?	✓	
2	Does the firm have project specific accounting information?	✓	
3	Does the firm share accounting information with its department and project managers?		
4	Is accurate accounting information in the form of profit and loss statements made available within days of closing regular accounting cycles?	✓	
5	Does the firm submit its accounts and operations to an independent outside financial audit once a year?	✓	
	Product/Service Realization		
	Processes and Procedures		
1	Have the service providing processes, which directly affect quality, been identified?		
2	Have the primary process characteristics, which affect quality, been identified?		
3	Are documented procedures for each of these processes available and do they address these primary process characteristics?		
4	Are the procedures up to date and in use?		
5	Do procedures ensure qualified personnel to perform the activities constituting a process?		
6	Do the procedures ensure that personnel have adequate resources and equipment to adequately perform their jobs?		
7	Are formal documented criteria for output requirements and processes available?		
8	Are standard check sheets or checklists used to ensure conformance to requirements?		
9	Are documented checklists for the following project phases ensuring completeness and complaince with all risk remedies available?		
•	Feasibility phase		
•	Appointment phase		
•	Conceptual design phase		
•	Design phase	✓	
•	Contract award phase	✓	
•	Implementation phase	✓	
•	Commissioning and post contract phase	✓	

Item	Aspect	Compliance	
		Yes	No
	Proposals/Contract Review		
10	Are criteria for determining what constitutes a contract available?		
11	Is a proposal/contract reviewed both technically and legally?	✓	
12	Is proposal/contract review a coordinated activity?	✓	
13	Are proposal/contracts reviewed for adequately defined and documented requirements?	✓	
14	Are differences between the initial proposal and the proposed contract resolved?	✓	
15	Are proposals/contracts reviewed to ensure that the capability to meet contractual requirements exists?	✓	
16	Are records of such contract reviews maintained?		
	Planning		
17	Are the necessary activities for performing the services identified?	✓	
18	Is responsibility for each activity identified?	✓	
19	Is this responsibility updated as the work evolves?		
20	Are verification activities integrated into the planning?	✓	
	Organizational and Technical Interfaces		
21	Are organizational and technical interfaces between different groups identified and coordinated?	✓	
22	Is the necessary project update information documented, transmitted and regularly reviewed?	✓	
23	Are effective lines of communication established between different internal groups and with external parties?	✓	
24	Are regular, documented project meetings held?	✓	
	Input		
25	Are input requirements identified and documented?	✓	
26	Are these input requirements reviewed for adequacy?	✓	
27	Are unclear or conflicting requirements resolved?	✓	
28	Are the conflict resolutions coordinated with those responsible for establishing the requirements?		
	Output		
29	Is output documented in terms of requirements, calculations, and analyses?	✓	
30	Is output reviewed for conformance with input requirements?	✓	
31	Does the output contain or reference acceptance criteria?	✓	
32	Is the output reviewed for conformance to regulatory requirements regardless of whether these are specified in the input information?	✓	
33	Are characteristics crucial to the safe and proper functioning of the final product identified?	✓	
	Verification		
34	Is it verified that the output conforms to input requirements?		
35	Does verification include documented reviews, checking, qualification tests or demonstrations, alternative calculations, or comparisons of the new design with a similar proven design already available?		
36	Are controls in effect assuring applicable drawings, change notices, and specifications in use during production and construction review?		
37	Are the checklists for potential risks in the following project phases duly completed and action taken where necessary?		
•	Feasibility phase		
•	Appointment phase		
•	Conceptual design phase		
•	Design phase	✓	
•	Contract award phase	✓	
•	Implementation phase	✓	
•	Commissioning and post contract phase	✓	

Item	Aspect	Compliance	
		Yes	No
	Changes		
38	Are all changes or modifications of the services provided reviewed and approved?		
39	Is documentation that changes, or modifications that are made known to all parties affected available?		
	Purchasing		
40	Are subcontractors and suppliers evaluated and selected on the basis of their ability to meet contract requirements, including quality?	✓	
41	Is the result of this evaluation of subcontractors and suppliers documented?		
42	Is the risk assessment and availability of professional liability insurance part of the selection criteria for purchasing?		
	Measurement, Analysis and Continuous Improvement		
	Client Satisfaction		
1	Is there an effective an ongoing system of measurement of client satisfaction?	✓	
2	Are adequate client satisfaction records maintained by the firm?		
3	Have follow-up procedures been developed and effectively implemented?		
	Internal Quality Audits		
4	Has a documented, comprehensive system been developed for conducting internal quality audits?		
5	Is the internal quality audit system capable of verifying the efficiency and the effectiveness of the quality management system?		
6	Are audits scheduled on the basis of importance and tests of the activity?		
7	Are audit procedures and follow-up actions defined and documented?		
8	Are audit results brought to the attention of the responsible personnel in the area audited?		
9	Are audit results documented?		
10	Are audit result brought to the attention of the appropriate management so that corrective action may be taken?		
11	Is corrective action taken on the deficiencies found in the audits?		
	Corrective Action/Control of Non-Conformances		
12	Are documented procedures for corrective and preventive action available?		
13	Are non-conformances investigated to search for trends, as to their common or root cause?		
14	Are action items implemented and evaluated?		
	Continuous Improvement/Kaizen		
15	Are employees empowered to seek improvement?	✓	
16	Is such empowerment communicated and monitored for appropriateness?	✓	
17	Can it be demonstrated that the service quality and the effectiveness/efficiency of the complete operation is continuously improved?		
18	Does management review the system to ensure its continuing suitability, adequacy and effectiveness and does management instruct improvements and new directions when found necessary?		