



NATIONAL CONSTRUCTION INDUSTRY COUNCIL OF MALAWI

**MALAWI INFRASTRUCTURE DELIVERY MANAGEMENT
STANDARDS**



FOREWORD

The IDMS guidelines have been authored and written as a guide to all Construction Industry players in implementation of quality infrastructure. The guidelines have been developed to respond to poor project planning and management which often results in poor quality infrastructure in the Construction Industry. The Council regulates the Construction Industry to ensure quality infrastructure in the country, however, there has been a gap between the Industry players and the Client organizations. Based on observations by the Council, a good number of client organizations do not fully understand the processes of Construction Project Management lifecycle. The IDMS addresses the gap that exists in the Construction Industry and provides the user with rich knowledge on how infrastructure projects are supposed to be conceived, planned, designed, procured, implemented and maintained.

The guidelines have seven subsystems namely; 1-Infrastructure planning system, 2-infrastructure gateway system, 3-infrastructure procurement system, 4-project management system, 5-operation and maintenance system, 6-supply chain management, 7-infrastructure technical audit system. These subsystems are very useful in quality infrastructure delivery in the country.

The IDMS is an informative resource because it outlines simplified steps which can be followed for the management of life cycle of infrastructure. The guidelines have been written in a simplified manner for easy understanding and use by every player in the Construction Industry. The IDMS will contribute greatly to delivery of quality infrastructure in the country when put to the right use.

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Chief Executive Officer

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6) Receive and consider inputs from the project team and take any necessary actions.	30

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MALAWI INFRASTRUCTURE DELIVERY MANAGEMENT STANDARDS

1.0 INTRODUCTION

The National Construction Industry Council of Malawi (NCIC) was established by Act of Parliament (Cap 53:05 of the Laws of Malawi), with the mandate of Regulation, Promotion and Development of the Construction Industry in Malawi. As part of its mandate the NCIC monitors the conduct and performance of construction stakeholders to ensure that players in the industry are operating legally, ethically and professionally. To enhance construction projects delivery and ensure infrastructure projects are planned, designed and executed efficiently, the NCIC is developed Malawi Infrastructure Delivery Management Standards (MIDMS). The MIDMS will provide a simple consistent system and best practices in Infrastructure Planning, Budgeting, Procurement, Delivery, Maintenance, Operation, Monitoring and Evaluation of infrastructure projects in the country.

2.0 RATIONALE

The Council regulates the Construction Industry to ensure quality infrastructure in the country, however, there has been a gap between the Industry players and the Client organizations. Based on observations by the Council, a good number of client organizations do not fully understand the processes of Construction Project Management lifecycle. In order to address the gap, the Council has developed the IDMS Client Guidelines. This Document will address the following issues:

- i. How the projects are conceived, planned and defined,
- ii. How projects are procured and implemented
- iii. The conduct and capacity of the parties coordinating and implementing the projects and
- iv. how the final products are utilized managed and maintained.

These aspects have been done in different ways depending on the knowledge and experience of the parties involved which has resulted into various challenges. To address these challenges and to ensure efficiency and value for resources invested in infrastructure projects, a systematic approach is required that will guide the client at every stage of infrastructure delivery.

3.0 COMPOSITION OF THE IDMS

The IDMS comprise a set of interrelated systems and subsystems that establish processes throughout the Infrastructure / Construction Value Chain which transform inputs into outputs. It should be noted that the IDMS assumes that there are other systems that exist within institutions that are supposed to guide the general operations of the institutions such as the financial management system, the internal audit system and the risk management system which will interface with the IDMS.

3.1. AN INFRASTRUCTURE PLANNING SYSTEM (IPS);

This system will deal with strategy and planning processes at national, local, institutional as well as individual level and it will also incorporate portfolio (a number of projects and prioritising) planning and package (Combination and nature of projects to be implemented) planning.

3.2. AN INFRASTRUCTURE GATEWAY SYSTEMS (IGS);

The gate way system is a control system where a project should not proceed to the next level before it is subjected to a control test. This is where prescribed conditions have to be fulfilled before a project can proceed to proceed to the next level. It is also a stage that allows for exit in case the necessary conditions are not fulfilled. All infrastructure projects should be subjected to this Gateway System to ensure that there is efficient delivery. Every phase of a project should be subjected to the control system to ensure that each phase has been concluded in the most effective way.

3.3. A CONSTRUCTION PROCUREMENT SYSTEM (CPS);

Selection of the right players in the industry is very important to ensure efficient delivery of infrastructure projects. This system will incorporate procurement planning and strategy, processes of solicitation and contract administration. The aim is in establishing a procurement strategy that addresses all the objectives direct and indirect. The standard will prescribe requirements for selection of procurement methods and required documentation. It is important to have the right contract documentation in order to ensure that the right contractor and/ or consultant or construction materials supplier has been engaged on a project.

3.4. A PROGRAMME AND PROJECT MANAGEMENT SYSTEM (PMS);

This System will prescribe project management requirements during the implementation/ execution of infrastructure projects and it will consider all aspects of the project management life cycle of projects. It will prescribe Client Management processes and Implementer Management Processes to ensure that projects are executed efficiently.

3.5. AN OPERATIONS AND MAINTENANCE SYSTEM (OMS)

This system will prescribe requirement for of operations and maintenance of the delivered infrastructure products, custodian asset management processes, budgeting for operations, maintenance and surrender processes.

3.6. SUPPLY CHAIN MANAGEMENT SYSTEM (SCM)

The supply chain management system (SCM) is the design, planning, execution, control and monitoring of supply chain activities in the delivery of goods, services or works, with the objective of creating net value and providing oversight and co-ordination of information and finances within the supply chain.

3.7. INFRASTRUCTURE PROJECTS TECHNICAL AUDIT (IPTA)

This standard requires that IPTA are incorporated and done in all infrastructure projects to ensure review of compliance to contract and project requirements as well as provide an opportunity for continuous improvement through implementation of corrective measures as well as the documented lessons.

INFRASTRUCTURE PLANNING SYSTEM

Definitions / Glossary

- Technical personnel – means any person who is qualified in a construction field
- Design brief - a document that outlines the core details and expectations of a design project for a brand.
- Stage - a point, period, or step in a process or development
- Senior Management - individuals at the highest level of management of an organization who have the day-to-day tasks of managing that organization
- Corporate Board -
- Client - as in registration regulations
- Construction Industry Players – means clients, contractors, consultants, and material suppliers

Abbreviations or Acronyms

- IPS - Infrastructure Planning System
- IDMS - Infrastructure Delivery Management Standards
- ICT - Information Communication and Technology

Article I.

INFRASTRUCTURE PLANNING

Section 1.01 General

- 1.1** Infrastructure planning is a critical stage in infrastructure development and management system. This stage will assist the client to assess the current infrastructure against prevailing demands and utilization.
- 1.2** The Client should ensure that they have capable human resource that can effectively carry out the activities under this stage. The Client should have qualified technical personnel who are registered as:
- 1) a Graduate or Professional Architect in terms of the BOAQS Act;
 - 2) a Graduate, Associate or Professional Engineer in terms of MEI Act;
or
 - 3) a Graduate or Professional quantity surveyor in terms of the BOAQS Act.
- 1.3** Where the client has existing infrastructure, the client will be required to assess the capacity of the available infrastructure against the demand in order to establish if there is need to construct new infrastructure or manage the existing to fit with the demand. Where the client does not have capacity to carry out this assessment, the client should hire technical personnel to carry out the assessment.
- 1.4** In order to achieve this goal, the client or technical personnel shall:
- (a) examine the relationship between previous outputs of infrastructure plans and outcomes achieved and consider implications for future planning;
 - (b) identify the policy drivers, strategies and long-term objectives of the client;
 - (c) formulate objective decision-making criteria relating to the selection and prioritization of projects;
 - (d) produce a portfolio infrastructure plan for the forecasted long-term acquisition, refurbishment, rehabilitation and maintenance of infrastructure which provides a projected list of projects described by category, location, type, economic classification and function and links prioritized projects to a forecasted budget for a minimum of three years, described by:
 - (e) the intervention options and the rationale for the selected intervention;

- (d) the independent project or program of projects to which each project is allocated during the development of a construction procurement strategy, if any or if known,
- (f) the category in which the project falls;
- (g) the broad scope of work;
- (h) the time schedule;
- (i) the estimated total project cost including unit rate analysis and annual cash flows;
- (j) the geographical location;
- (k) any known hindrances such as land availability, land ownership and zoning rights including the current status and estimated timeframes for removing these encumbrances; and
- (l) records of decision regarding environmental issues.

1.5 Assess current performance of infrastructure against desired outcomes and perform a needs analysis informed by factors such as desired outcomes, policies, norms and standards, condition assessments, functional performance or nature of existing infrastructure, demographic trends, current and forecasted utilization trends, service levels and desired outcomes which results in:

- (a) a documented and credible forecast of current and projected net demand for services (i.e., demand for services minus the existing supply plus inputs needed to maintain existing and projected supply for services) over a range of time horizons including the 3-year and a period of not less than 10 years; and
- (b) a broad description of what additional (over and above existing supply) infrastructure outputs need to be provided to support services for each of the time horizons.

1.6 Produce and obtain infrastructure plan approval.

Update the portfolio infrastructure plan at least once a year and include updated information obtained from the concept report produced.

Remove projects associated with packages from the portfolio infrastructure plan which are not to be carried forward past stages 3 or stage 4; and obtain infrastructure plan approval.

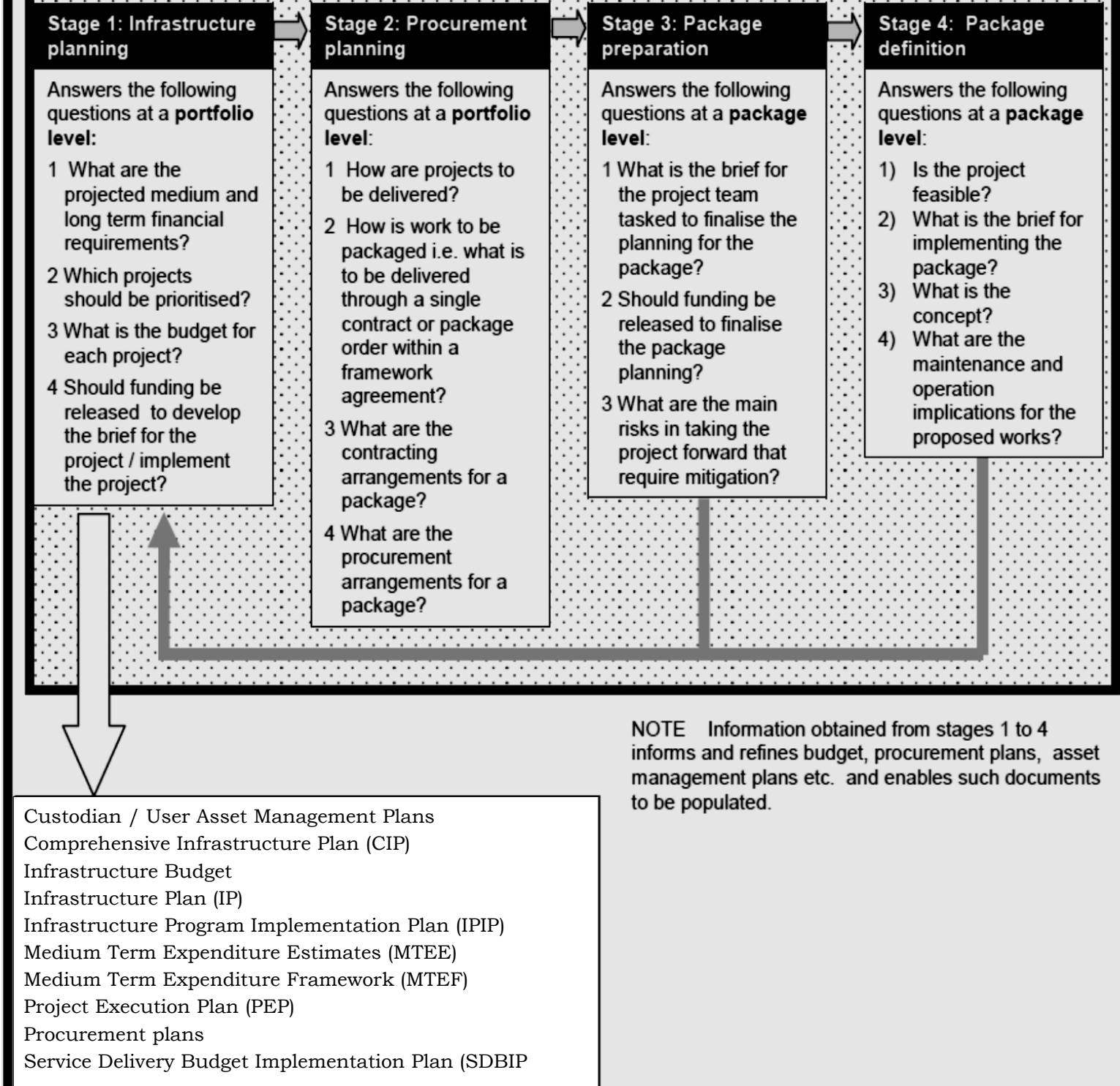


Figure 1: Activity on each planning stage

Section 1.02 Infrastructure plan

2.1 The Infrastructure plan should:

- provide solutions which is fit for purpose and provides value for money over its service life;
- provides infrastructure in the right quantity and quality, in the right places, at the right time, and in accordance with constitutional and legislative

mandates, strategic priorities, accepted norms and standards (planning guidelines) and which is affordable in terms of current and future budgetary projections;

ensures that optimal utilization is made of existing infrastructure as demand patterns shift over time; and

- (c) enable infrastructure to be maintained so that it remains fit for purpose in use.

2.2 It is important to note that the client should only undertake any work on a project associated with stages subsequent to this process after the infrastructure plan has been approved by Senior Management.

2.3 The activities identified shall be undertaken to produce a construction procurement strategy at a portfolio level for implementing projects in the approved infrastructure plan.

Article II.

PACKAGE PREPARATION

Section 2.01 General

1.1 Depending on the size and scale of the required infrastructure and government policies such as affirmative action, the client may define units and packages that can be delivered. The packages will form part of the procurement strategy that the client can develop or implement.

1.2 When packaging the infrastructure works, the client will undertake the following stages which will also be used to develop a project brief. This project brief will be submitted to corporate board and or senior management for approval. During this stage, the client will undertake the following:

- a) define the package objectives, business need, user requirements, acceptance criteria and client priorities and aspirations, as relevant;
- b) confirm the scope of the package and identify any constraints;
- c) establish the project criteria including as relevant, the performance and reliability requirements, design life, service life of components, function, maintenance and replacement requirements, mix of uses, scale, location, quality, value, time, safety, health, environment and sustainability;

- d) where necessary, conduct preliminary investigations, stakeholder consultations, site visits or desk studies to obtain data or to interrogate outstanding risks relating to matters such as the site, bulk services, the environment, heritage, safety, activity schedule;
- e) identify procedures, project team, key constraints, statutory permissions (e.g., environmental, heritage, social, planning, building control), and utility approvals, policies (e.g., environmental, developmental, social, maintenance or facilities management) and strategies to take the package forward;
- f) identify risks that need to be mitigated;
- g) establish the control budget for the package, ownership costs and schedule for the package; and
- h) develop, finalize and obtain acceptance of the project brief.

1.3 After this stage, the client will submit the project brief for approval, once approval is sought, the client will then engage an external registered design professional (Architect or Engineer) who shall report to the client through the clients in house project team.

Article III.

PACKAGE DEFINITION

Section 3.01 General

- 1.1** During this stage, the Consultant's role will be to interpret the client's Project brief into a design that responds to the client's needs. The Client will develop the Terms of Reference for the Consultant which will include but not limited to the following:
- a) obtain site studies and specialist advice, as necessary;
 - b) establish the feasibility of satisfying the project brief for the package within the control budget with or without modification;
 - c) determine the initial design criteria and design options to construct, refurbish, rehabilitate, alter or extend infrastructure or the methods and procedures required to maintain the condition of infrastructure for the package;
 - d) investigate alternative designs and recommend the preferred design;
 - e) establish the detailed brief, scope, scale, form and cost plan for the package;

- f) develop an indicative schedule for documentation and construction or maintenance services associated with the package;
- g) produce as necessary a site development plan or other suitable schematic layouts of the works and obtain the necessary statutory permissions or utility approvals to proceed with the works associated with the package;
- h) undertake where necessary, studies to determine service life costs and to forecast revenue over the lifetime of the infrastructure associated with the project to confirm the financial sustainability of the project;
- i) produce a risk report which incorporates the need for further surveys, tests, other investigations and consents and approvals, if any, during subsequent stages and identified health, safety and environmental risk;
- j) produce a logistic support plan if new infrastructure is created; and develop, finalize and obtain the clients acceptance of the concept report.

Section 3.02 Logistic support

2.1 The following activities shall, where required, be undertaken to produce the logistic support plan:

(i) Client:

To ensure that the facilities are well maintained. The client shall be responsible that facilities are well maintained and kept in a good condition. In addition, the client may hire a facilities manager who shall be responsible for maintenance of infrastructure.

(ii) Consultant:

- a) establish logistic requirements in respect of facilities and/or engineering infrastructure;
- b) specify requirements, if any, for the contractor or implementer to provide operational and maintenance manual for all facilities and engineering infrastructure

2.2 Upon completion of this stage, the Consultant will submit a package definition document for approval to the client. The client will assess the document and if it is deemed to be fit for purpose, the client will then approve and the process will proceed to the next stage of design.

Article IV.

DESIGN DEVELOPMENT/DETAILED DESIGN ACTIVITY

Section 4.01 General

- 1.1** This stage is where the Consultant has submitted the final detailed design to the client.
- 1.2** This is a critical stage where the client should assess and review the designs and make an informed decision on whether the design should be revised by the consultant or they should be accepted.
- 1.3** The client should ensure qualified technical professional who are registered as:
- 1)a Graduate or Professional Architect in terms of the BOAQS Act;
 - 2)a Graduate, Associate or Professional Engineer in terms of MEI Act;
- or
- 3)a Graduate or Professional quantity surveyor in terms of the BOAQS Act.,
- who shall undertake the following step:
- a) Check whether the design is compliant to standards, use, functionality and budget
 - b) check the detailed form, character and cost plan, defining all components in terms of overall size, typical detail, performance as relevant;
 - c) Check the final detailing, drawings, performance definition, specification, sizing and positioning of all systems and components enabling either construction (where the contractor is able to build directly from the information prepared) or the production of manufacturing and installation information for construction;
 - d) Ensure all documents are reviewed by relevant qualified professionals' depending on the nature and scope of the project such as Architects, Engineers, Quantity Surveyor and Physical Planners
 - e) Ensure that the Consultant has produced Contractor procurement documents, contract documents and other relevant documents that will form part of the construction contract; and
 - f) review the cost plan included in the concept report;
- 1.4** The technical personnel shall prepare a report to Management for approval
- 1.5** Management shall accept or reject the design report

Article V.

MANUFACTURE, FABRICATION AND CONSTRUCTION INFORMATION

Section 5.01 General

- 1.1** For highly specialized works the following activities shall be undertaken (manufacture, fabrication and construction) to produce, manufacture, fabrication and construction information:
- (a) Contractor: produce the manufacture, fabrication and construction information based on the production information.
 - (b) Client: review the manufacture, fabrication and construction information prepared by others, based on the production information for design intent and conformance with scope of work including environmental safe guards.
- 1.2** Upon approval the client will solicit and engage a contractor who will execute the works. The Consultant will be responsible for supervision of the works and will work as a project manager or contracts administrator on behalf of the client.

Article VI.

PROCUREMENT PLANNING

Section 6.01 General

- 1.1** This stage, the client should identify a procurement strategy that will suit project delivery. The client should refer to subsystem-3. The Client should ensure that personnel who are registered as:
- 1)a Graduate or Professional Architect in terms of the BOAQS Act;
 - 2)a Graduate, Associate or Professional Engineer in terms of MEI Act;
 - or
 - 3)a Graduate or Professional quantity surveyor in terms of the BOAQS Act;
- Are involved on this stage.
- 1.2** The activities in stage are outlined in Table 1 shall be undertaken to produce a construction procurement strategy at a portfolio level for implementing projects in the infrastructure plan over at least the planned period.

1.3 For such procurements as Public Private Partnership, procedures established by Government shall be followed for those categories of spend which are identified in the construction procurement strategy as being delivered through a PPP.

Activity		Sub- activity		Step		Output
#	Description	#	Description	#	Description	
1	Develop a delivery management strategy	1.1	Gather and analyze information	1	Conduct a spend analysis	Spatially located work items in the infrastructure plan grouped into categories of spend with common attributes.
				2	Conduct an organizational analysis	Descriptions of client organizational characteristics
				3	Conduct a market analysis	Descriptions of market characteristics
		1.2	Formulate procurement objectives	1	Formulate primary procurement objectives	Identified primary procurement objectives
				2	Formulate secondary procurement objectives	Documented and prioritized secondary procurement objectives
		1.3	Make strategic delivery management decisions	-	Decide on how needs are to be met	A delivery management plan which indicates how each categories of spend or portions thereof are to be delivered. i.e. through a Public Private Partnership, Implementing Agent leasing of property, outsourcing or own resources
		1.4	Decide on delivery mode (project or program)	-	Decide on program of projects or series of independent projects	Categories of spend or portions thereof delivered as a program of projects or a series of independent projects
		1.5	Package works	1	Identify opportunities for framework agreements	Categories of spend or portions thereof to be implemented through own framework agreements.
				2	Identify packages	A package plan for construction and maintenance projects or a combination thereof which states the mode of delivery for and identifies each package
		2	Decide on contracting arrangements	2.1	Allocate risks for packages	1
2	Decide on pricing strategy					
3	Decide on form of contract					
2.2	Establish requirements for outsourced professional services				Identify services areas that are required	Identified professional services which need to be procured
2.3	Package professional service contracts			1	Decide on contracting strategy	Requirements for outsourced professional services categorized as single discipline or multidisciplinary
				2	Decide on the type of contract	Requirements for outsourced professional services linked to a specific package or a program or a number of undefined packages or program
2.4	Allocate risks for professional service contracts			1	Decide on pricing strategy	Identified pricing strategy for required professional services
				2	Decide on form of contract	Identified standard form of contract for a professional service contract

Activity		Sub- activity		Step		Output
#	Description	#	Description	#	Description	
3	Decide on procurement arrangements	3.1	Decide on quality strategy	-	-	Suitable quality strategies
		3.2	Decide on procurement procedure	-	-	A suitable procurement procedure
		3.3	Decide on targeted procurement strategy	-	-	Suitable targeted procurement procedures
		3.4	Decide on tender evaluation procedure	-	-	A suitable tender evaluation strategy
4	Document the construction procurement strategy	-	Document the identified construction procurement strategy using the recommended headings provided in Table 5	-	-	A documented construction procurement strategy that documents the logic behind the choices that are made at each step
5	Acceptance of construction procurement strategy	-	Accept construction procurement strategy	-	-	An accepted construction procurement strategy

Table 1: Procurement Development process

#	Heading	Subheadings
1	Background / introduction	
2	Delivery management strategy	2.1 Nature and spatial arrangement of projects and clusters 2.2 Client organisation characteristics 2.3 Market characteristics 2.4 Primary procurement objectives 2.5 Secondary procurement objectives 2.6 Delivery management plan 2.7 Delivery mode 2.8 Packaging strategy
3	Contracting arrangements	3.1 Risk allocations for packages 3.1.1 Contracting and pricing strategies 3.1.2 Forms of contract 3.2 Professional services contracts 3.2.1 Requirements for outsourced services 3.2.2 Packaging for professional service contracts 3.2.3 Allocation of risks for professional service contracts
4	Procurement arrangements	4.1 Quality strategy 4.2 Procurement procedure 4.3 Targeted procurement procedure 4.4 Tender evaluation procedure
5	Satisfying primary and secondary objectives	5.1 Construction procurement strategy 5.2 Issues to be dealt with in contracts which are not addressed elsewhere

Table 2: Recommended headings in a construction procurement strategy

Article VII.

PROFESSIONAL SERVICES

Section 7.01 General

- 1.1** Professional services are required as inputs into most of the activities associated with a stages in order to produce a deliverable. Such services may be provided by suitably qualified employees, contracted individuals or professional service providers appointed by either the client or a contractor.
- 1.2** Professional services, as necessary and provided for in 6.3 shall be provided in support of the activities identified.

1.3 Persons providing services shall:

- a) observe all relevant statutes, by-laws and associated regulations, standards of professional conduct and industry norms established in relevant standards published or standards recommended by professional associations;
- b) plan, design and review the works, installation or system, as relevant, taking into account pragmatic elements such as cost, construction limitations and technology and adjust their designs where the cost of the package exceeds the control budget, unless the client agrees to an increase in the control budget;
- c) do so using the skill and care normally used by professionals providing services similar to the required services;
- d) provide the required services for each stage or part thereof for which they are appointed in accordance with the relevant provisions of this standard;
- e) develop the deliverables associated with the end of a stage in sufficient detail so that it can be used to form the basis of the scope of work for taking the package forward in terms of the selected contracting strategy as shown in Table 3 (see Figure 3);
- f) maintain in full force and effect all consents and approvals and implement all actions required in accordance with their respective terms within the period of their validity;
- g) provide advice relating to the works or portions thereof that they are responsible for during the evaluation of tender offers;
- h) provide the necessary inputs into the client's occupational health and safety specification for incorporation into the scope of works associated with a construction works contract; and
- i) provide copies of all certifications associated with the provision of services relating to the project required in terms of legislation.

1.3 The client may in respect of a package, separately appoint a project leader, a lead designer, designers and a cost consultant. Alternatively, the client may appoint a person to perform more than one role or all the roles

Table 3: Key deliverables associated with the scope of work of a contracting strategy

Contracting strategy		Key deliverable which forms the basis of the scope of work associated with a contract	
Strategy	Description	Stage associated with the deliverable	Deliverable
Management contractor*	Contract under which a contractor provides consultation during the design stage and is responsible for planning and managing all post-contract activities and for the performance of the whole of the contract	3 Package preparation	Client accepted strategic brief*
Design and construct	Contract in which a contractor designs a project based on a brief provided by the client and constructs it	4 Package definition	Client accepted concept report
Develop and construct	Contract based on a scheme design prepared by the client under which a contractor produces drawings and constructs it	5 Design development	Client accepted design development report
Design by employer	Contract under which a contractor undertakes only construction on the basis of full designs issued by the employer	6a Design documentation (Production information)	Completed and client accepted production information

1.4 The client may appoint a designer to perform a discipline specific service (e.g. according to those described in Table 4 for building works) in which case, the designer shall provide the service in relation to the identified discipline, subject to the person appointed as the designer for architectural design services relating to a building ensuring that the planning and design of buildings, spaces and structures and associated site works:

- a) is properly co-ordinated between the different design disciplines as relevant; and
- b) satisfies the relevant prescriptive and functional requirements prescribed by relevant legislation in relation to structural design, dimensions, public safety, site operations, excavations, foundations, floors, walls, roofs, stairways, glazing, lighting and ventilation, drainage, non-water-borne means of sanitary disposal, storm water disposal, facilities for disabled persons, fire protection, space heating and fire installation.

1.5 The responsibilities for definition (i.e. develop the deliverable associated with a stage) and review (confirm that the deliverable satisfies the package information) services for each of the services provided for each stage in terms of different contracting strategies are as stated in Table 5

1.6 Persons providing services shall establish the need for specialist advice, studies, tests and surveys relevant to design input, including the necessity of appointing a specialist to design a component of the fire protection component of buildings described in Table 6 and advise the client accordingly. They shall thereafter, as necessary, brief the specialist, co-ordinate the advice, studies, tests and surveys, advise the client on payments due, collate outputs of specialist study surveys, advise on implications of findings, report to the client and obtain further instructions

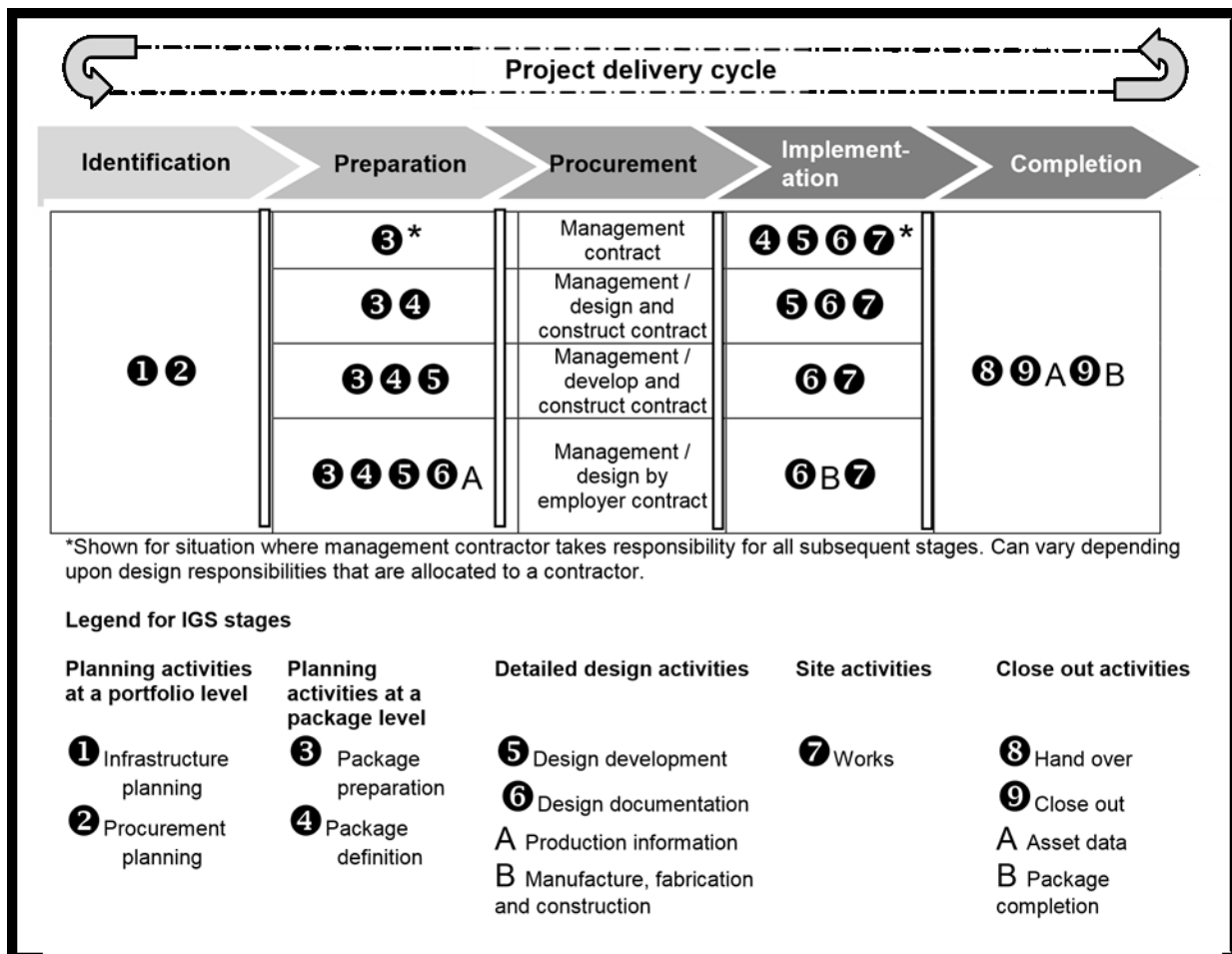


Figure 2: Project delivery cycle

Table 4: Design services relating to buildings

Service	Principal activities
Architectural design	Plan, design and review the construction, extension or refurbishment of buildings, spaces, structures and associated site works for the use of people by the creative organization of materials and components with consideration to mass, space, form, volume, texture, structure, light, shadow, materials and the project brief.
Acoustic design	Plan, design and review the construction of buildings and building components to achieve acoustical outcomes
Civil engineering	Plan, design and review the construction of site works comprising a structure such as a road, pipeline or sewerage system or the results of operations such as earthworks or geotechnical processes.
Electrical engineering	Plan, design and review the installation of the electrical and electronic systems for and in a building or structure
Facade engineering	Plan, design and review the installation of structures to enclose spaces in buildings and spaces
Fire safety	Plan, design and review the fire protection system to protect people and their environments from the destructive effects of fire and smoke.
Landscape architectural design	Plan, design and review the construction of outdoor and public spaces to achieve environmental, socio-behavioural, or aesthetic outcomes or any combination thereof
Mechanical engineering	Plan, design and review the construction, as relevant, of the gas installation, compressed air installations, thermal and environmental control systems, materials handling systems or mechanical equipment for and in a building
Structural engineering	Plan, design and review the construction of buildings and structures or any component thereof to ensure structural safety and structural serviceability performance during their working life in the environment in which they are located when subject to their intended use in terms of one or more of the following: i) external and internal environmental agents; ii) maintenance schedule and specified component design life; or iii) changes in form or properties
Wet services	Plan, design and review the construction, within buildings or from a point of drainage installations intended for the reception, conveyance, storage or treatment of sewage and water installations or water installation which conveys water for the purpose of fire-fighting or consumption within a building.

Table 5: Allocation of responsibilities for services in the different contracting strategies

Contracting strategy (see Table 3)	Stage (See Figure 1)	Client's responsibilities	Contractor's responsibilities
Management contractor*	4, 5 and 6A	Review services	Definition services
Design and construct	4	Definition services	None
	5 and 6A	Review services	Definition services
Develop and construct	4 and 5	Definition services	None
	6A	Review services	Definition services

Design by employer	4, 5 and 6A	Definition services	None
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Table 6: Specialist fire design services

Design, install and maintain automatic sprinkler system in accordance with relevant standard
Design and install a lightening protection system in accordance with relevant standardsT
Design, install, test and maintain the pressurization of emergency routes and components in accordance with the relevant
Design, install and maintain a fire detection and alarm system in accordance with relevant regulation
Design, install and maintain a fixed automatic fire-fighting system that is in accordance with relevant regulation
Perform a rational assessment of building materials and components to determine their fire resistance in accordance with relevant standard.

Section 7.02 Drawings

2.1 Professional service, in providing services shall:

- a) maintain a register of all drawings and other production information issued for construction purposes.
- b) provide record drawings indicating all deviations from the construction drawings.

2.2 The drawings shall clearly indicate the following:

- a) the project title;
- b) the drawing title;
- c) the drawing number and date;
- d) the revision number and date; and
- e) the drawing status i.e. for acceptance, for construction or for fabrication/manufacture.

2.3 The structural drawings shall contain the following information:

- a) the design standards;
- b) the loads which the structure is designed to withstand;
- c) the key geotechnical parameters used in the design;
- d) the basic engineering properties of the construction materials; and
- e) the construction standards;

Section 7.03 Scope of professional services

(a) Stage 1 (Infrastructure planning) services

General services

3.1 The professional shall provide the following services, as necessary, to develop and update the end of stage deliverable:

- a) identify infrastructure needs (demand) based on:
 - 1) the client's service mandate which has been translated into infrastructure norms and standards and service delivery priorities;
 - 2) strategic objectives and policy mandates from the strategy development process including targets for delivery of basic infrastructure and the addressing of backlogs; and
 - 3) assessment reports, if any, (usually based on asset register reports and life cycle plans associated with each asset);
- b) translate needs into preliminary projects which include a brief description of the item so that they may be readily identified;
- c) categorise projects into the following time frames:
 - 1) long term – projects which may be initiated after the current Medium Term Expenditure Framework (MTEF) period;
 - 2) medium term – projects which will be initiated in the current Medium Term Expenditure Framework (MTEF) period; or
 - 3) short term – projects which have been initiated or will be initiated in the current or next financial year;
- d) review the status of existing infrastructure (supply) by generating data from the asset register and obtaining confirmation from the:
 - 1) user (entity that uses or intends to use infrastructure) regarding considerations such as utilisation, suitability for services delivered, cost effectiveness and availability of the infrastructure as well as the anticipated duration that such assets will be required for; and
 - 2) custodian (entity that is responsible for the efficient and effective management of infrastructure throughout their lifecycle) regarding considerations such as life cycle management information, condition assessments and maintenance requirements to confirm the actions that need to be taken, namely:
 - i) infrastructure is in an acceptable condition to the user in which case normal maintenance is to continue;
 - ii) infrastructure is suitable to the user's requirements, but require technical condition assessment as the asset

- performance does not meet minimum functional requirements; or
 - iii) infrastructure is unsuitable to the current user's requirements;
- e) conduct a gap analysis by comparing:
 - 1) the demand for and supply of infrastructure and
 - i) categorise these gaps into non-infrastructure solutions (leasing, disposal or transfer of infrastructure between users) and infrastructure solutions; and
 - ii) schedule when these solutions are required; or
 - 2) required versus current service levels;
- f) describe the consequences of not addressing the gaps;
- g) develop a range of proposed projects to address the identified gaps or schedule projects to minimise the consequences of not addressing gaps;
- h) conduct preliminary assessments on proposed projects in accordance with the requirements of section b to screen and to sift through the merits of solutions and competing projects.
- i) where appropriate conduct further assessments and prepare:
 - 1) more detailed cost estimates for the cost of the project;
 - 2) a credible revenue forecast over the lifetime of the infrastructure associated with the project to determine financial sustainability; and
 - 3) reports on aspects of the project based on desk top studies to confirm the viability of the project and to ensure that the cost estimates are realistic;
 - 4) to increase confidence in budgetary value, the project value proposition or project risk profile and thereby facilitate improved management decision making.
- j) categorise projects under the following broad categories:
 - 1) maintenance (preventative, corrective, scheduled or routine);
 - 2) refurbishment and rehabilitation
 - 3) acquisition (construction, extension, alteration, or leasing); and

- 4) demolition/transfer of infrastructure between users; and
- k) further categorise projects to facilitate reporting and collate all the estimated costs and schedules of these costs in respect of each category of project and develop a preliminary multiyear cash flow focusing on the MTEF period, taking into account the available funding, priorities based on objective criteria and commitments carried over from the previous financial year and costs to manage the implementation of the infrastructure plan.

(b)Preliminary assessment

- 3.4** Conduct a preliminary assessment on the range of options to resolve the identified gaps in order to arrive at an initial decision as to whether or not:
- a) a proposal is worthy of consideration; and
 - b) funding should be committed to take the project forward.
- 3.5** Provide information, as appropriate on the following:
- a) the problem description or opportunity i.e. the objective of the project;
 - b) particulars of the proposal such as location, timeframe and indicative costs;
 - c) alternative solutions; and
 - d) perceived benefits, potential risks and other considerations, based primarily on professional judgement rather than detailed research and planning
- 3.6** Establish objective decision making criteria based on factors such as those relating to strategic objectives, the level of stakeholder support, legislative compliance, risk considerations and financial justification.
- 3.7** Identify risks and categorise in accordance with provisions of Table 7.

Table 7: Categorization of risks in preliminary assessments

Risk category	Description
A	Low risk - no apparent material risks detected. Project viable and should proceed rapidly
B	Medium risk - some material risks detected which need to be considered and mitigated against before proceeding. Project potentially viable subject to further assessment.
C	High risk – material risks detected with limited prospects for mitigation or elimination.

- 3.8** Make a recommendation for the acceptance or rejection of the proposed project and, if relevant, select the preferred solution, based on the merits and impact of the problem and the solutions offered.

3.9 Document findings, assumptions and recommendations in a brief report.

Section 7.04 Stage 2 (Procurement planning) services

4.1 The Professional, in providing services, shall follow step by step procedure contained in MIDM Guidelines Subsystem 2 - Construction Procurement Strategy to develop or update the end of stage deliverable.

Section 7.05 Stage 3 (Package preparation) services

5.1 The Professional shall provide services shall as set out in Table 8, to develop the end of stage deliverable.

Section 7.06 Stage 4 (Package definition) services

6.1 The Professional shall provide services set out in Table 9 to develop the end of stage deliverable.

6.2 Where others develop the concept report (e.g. in terms of a management contractor contracting strategy), professionals appointed by the client shall review the concept report for general conformity with the scope of work in their respective areas of expertise.

Section 7.07 Stage 5 (Design development) services

7.1 The Professional shall, as necessary, provide the services set out in Table 10 to develop the end of stage deliverable.

7.2 Where others develop the concept report (e.g. in terms of a management consultant or design and construct contracting strategy), professionals appointed by the client shall review the concept report for general conformity with the scope of work in their respective areas of expertise.

Section 7.08 Stage 6 (Design documentation) services

8.1 The professional shall perform services set out in Table 11 and 12 to develop the end of stage deliverable.

8.2 The professional shall provide the services associated with the development of the logistic support plan.

Section 7.09 Stage 7 (Works), Stage 8 (Handover) and Stage 9 (Close out) services

9.1 The professional shall provide services set out in Table 13 to develop the end of stage deliverables.

9.2 In addition the professional shall perform services associated with the performance of one of the roles identified in Table 14 in relation to the contract entered into with the contractor.

9.3 The professional shall provide construction monitoring services as required by the client at the level indicated in Table 15.

9.4 The Professional shall record in a book, which shall be kept on site in the same place as the health and safety file required in terms of the client's occupational health and safety specification, all site visits and any notifications or instructions to the contractor regarding defects and the rectification thereof which occur prior to completion of the works.

Section 7.10 Procurement services

10.1 The Professional shall develop, where required by the client, procurement documents (calls for expressions of interest, tender documents and contracts) in accordance with the provisions of applicable Standard

10.2 The Professional shall lead and evaluate, where required by the client, calls for expressions of interest and tenders in accordance with the agreed procurement standard

Section 7.11 Project management services

11.1 The professional shall provide where required by the client, the following services, as necessary:

- a) manage the planning and implementation of packages in terms of the infrastructure gateway system stages in a manner that enables the client to achieve its objectives and in such a manner that:

- 1) all projects are developed and managed in terms of a common procedural and programmatic approach and integrated with the client's administrative processes and are institutionalised;
- 2) the various elements of the projects are properly co-ordinated;
- 3) the projects include all the work required, and only the work required, to complete the project successfully;
- 4) the timely completion of the projects is facilitated;
- 5) projects are completed as far as is reasonably possible, within the budget that is agreed from time to time with the client;
- 6) the project satisfies the needs for which it was undertaken;
- 7) effective use of the people involved with projects is made;
- 8) timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project and package information occurs; and
- 9) the systematic identification, analysis, and response to project risk occurs.

b) act as the client's agent in terms of the contracts that the client has with professionals

Table 8: Stage 3 (Package preparation) services

Project leader	Lead designer	
<ol style="list-style-type: none"> 1.) Establish the need for specialist advice and studies and procure or facilitate the procurement of such advice and studies. 2. Obtain outline statement from the client setting out the client's requirements and objectives including cost and schedule for the package. 3. Identify and document constraints to the development of design proposals or solutions. 4. Identify stakeholders and facilitate the necessary consultations in consultation with the client. 5. Facilitate the development and finalization of the strategic brief. 	<p>In addition to providing services as set out for the designer, coordinate the advice and input of designers and cost consultants</p>	<ol style="list-style-type: none"> 1. Provide discipline specific advice, data or input into the need for specialist advice and studies, liaison with stakeholders and the development of the strategic brief. 2. Carry out, where instructed by the project leader, discipline specific preliminary studies and information gathering to assist in establishing the strategic brief. 3. Advise on the need for surveys, analyses, tests or investigations which will be required in stage 4 to refine the production information and assumptions made during stage 3 and the availability and location of

<p>6. Document findings, assumptions and recommendations on studies and work undertaken in developing the strategic brief in a brief report.</p> <p>7. Obtain the client's acceptance of the strategic brief</p>		<p>related infrastructure and services.</p> <p>4. Collaborate and assist</p>
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Table 9: Stage 4 (Package definition) services

Project leader	Lead designer	Designer	Cost consultant
<p>1) Assist the client with the procurement of the services of suitable qualified persons to provide discipline specific services.</p> <p>2) Brief the client and the project team on procedures to complete stage 4 and to meet project objectives.</p> <p>3) Initiate, obtain agreement and direct implementation of management and reporting procedures for stage 4.</p> <p>4) Obtain instructions from client on allocation of design responsibilities within project team.</p> <p>5) Receive advice on constraints that may affect the accepted strategic brief, obtain instructions on how the client wishes to proceed and incorporate any agreed amendments and adjustments in the concept report or revised construction procurement strategy.</p> <p>6) Receive and consider inputs from the project team and take any necessary actions.</p> <p>7) Facilitate the development and finalization of the concept report</p>	<p>1) Assist the client with the procurement of the services of suitable qualified persons to provide discipline specific services.</p> <p>2) Brief the client and the project team on procedures to complete stage 4 and to meet project objectives.</p> <p>3) Initiate, obtain agreement and direct implementation of management and reporting procedures for stage 4.</p> <p>4) Obtain instructions from client on allocation of design responsibilities within project team.</p> <p>5) Receive advice on constraints that may affect the accepted strategic brief, obtain instructions on how the client wishes to proceed and incorporate any agreed amendments and adjustments in the concept report or revised</p>	<p>1) Implement the established management and reporting procedures to complete the concept report in response to the strategic brief.</p> <p>2) Visit the site, carry out initial appraisal and advise on physical restrictions that might affect the package information and the control budget.</p> <p>3) Collaborate with the project team and provide discipline specific advice, data or input into the need for specialist advice and studies, liaison with stakeholders, consultations with and documents required by statutory bodies, funders and utility providers and the development and finalisation of the concept report.</p> <p>4) Advise on further surveys, analyses, tests and investigations which may be required and advise on payments due to specialists for specialist investigations, tests and studies.</p> <p>5) Develop the design or maintenance approach with the project team so that the design achieves the required quality, health and safety and environmental standards, satisfies all regulatory requirements and consents and is integrated within the project team and with the requirements of utility providers and</p>	<p>5) Provide cost advice to support the development of design approach or solutions so that the selected design or solution achieves the required quality and health and safety standards within the control budget.</p> <p>6) Receive details of options and preliminary design</p>

<p>including the obtaining of any approvals or in principle acceptances of elements within the concept report.</p> <p>8) Obtain the client's acceptance of the concept report.</p>	<p>construction procurement strategy.</p> <p>6) Receive and consider inputs from the project team and take any necessary actions.</p> <p>7) Facilitate the development and finalization of the concept report including the obtaining of any approvals or in principle acceptances of elements within the concept report.</p> <p>8) Obtain the client's acceptance of the concept report.</p>	<p>interfaces with related projects of existing infrastructure.</p> <p>6) Advise and comment on matters, regulations or guidelines with which the project must comply and comment on implications on package information.</p> <p>7) Establish design options or solutions and motivate preferred options or solutions.</p> <p>8) Provide information for or establish cost and life cycle cost estimates of components or elements of the package.</p> <p>9) Prepare preliminary design information or repair and maintenance information in the form of sketches, design notes, drawings or any combination thereof and outline performance specifications sufficient to describe the scope, scale, form and character of works for concept report and to develop a realistic cost plan; and</p> <p>10) Assemble concept design information and narrative describing developed brief and evolving design or maintenance</p>	<p>information or solutions and prepare cost plan for the concept report based on preliminary and elemental or equivalent cost estimates.</p> <p>7) Advise on the effect of market conditions on cost plan.</p> <p>8) Assemble the cost plan and related reports for inclusion in the concept report and motivate or propose cost reduction measures where the cost plan exceeds the control budget.</p>
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		intent for inclusion in concept report	
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Table 10: Stage 5 (Design development) services

Project leader	Lead designer	Designer	Cost consultant
<p>1) Direct</p> <p>a) project team considerations and investigations of alternative design solutions that comply with the package information.</p> <p>b) risk management process, allocate to project team risk mitigation actions, and assess impact on package information.</p> <p>c) value management process, allocate to project team proposals for value management, and assess impact on package information. d) receive reports/proposals and obtain instructions from client.</p> <p>2) Monitor</p> <p>a) progress of consultations with utility providers.</p>	<p>1) approach so that the design achieves the required quality, is coordinated within the project team and is in conformity with package information.</p> <p>2) Co-ordinate work of discipline specific design consultants and cost consultant.</p> <p>3) Give design direction to consideration of design options.</p> <p>4) Give design direction and coordinate</p> <p>a) provision of briefing information to</p>	<p>1) Advise on updating design schedule.</p> <p>2) As the design develops, review compliance with regulations and advise on any implications.</p> <p>3) Collaborate and assist in preparing design development report.</p> <p>4) Receive and with project team discuss client comments on or amendments to design development report, advise on impact of any amendments or additional requirements and changes.</p>	
		<p>5) With project team, develop design approach and periodically review so that the design achieves required quality, is co-ordinated and is in conformity with package information.</p> <p>6) Prepare design options for elements of works and test options with project team against package information and agree preferred option.</p>	<p>5) design approach so that the design achieves required quality, is co-ordinated within project team and in conformity with package information.</p> <p>6) Contribute to periodic reviews of development of the design for conformity with project team, assess need for changes, advise on impact on package information and incorporate agreed changes.</p>

<p>b) finalization of design criteria. c) provision of principal elements to assist in establishing cost plan.</p> <p>3) Refine, obtain agreement and direct implementation of management procedures and reporting procedures.</p> <p>4) Receive inputs from project team, assess impact on package information and, as necessary, submit to client and obtain instructions or agreement.</p> <p>5) Manage and monitor liaison and consultations with statutory authorities to agree submission requirements, report to client and arrange payment of fees.</p> <p>6) Prepare and assemble design development report and submit to client for acceptance.</p> <p>7) Obtain client comments on or amendments to design development report, discuss with project team, advise on impact of any amendments or additional requirements, agree changes and resubmit design development report to the client for acceptance.</p> <p>8) Obtain statutory permissions that are required.</p>	<p>specialists, and suppliers.</p> <p>b) integration of the design and requirements of project team.</p> <p>c) integration of the design and requirements of specialists and suppliers.</p> <p>5) Lead and coordinate liaison and consultations with statutory authorities to agree submission requirements.</p>	<p>7) Develop strategy for use, cleaning, maintenance and subsequent construction.</p> <p>8) Advise where elements of works are most appropriately designed (wholly or in part) by specialists/suppliers, provide briefing information.</p> <p>9) Receive and advise on outputs of specialist studies and surveys and incorporate into the design.</p> <p>10) Liaise with utility providers as necessary and incorporate into the design their requirements.</p> <p>11) Prepare calculations in sufficient detail to facilitate and verify design development.</p> <p>12) Finalise design criteria for works.</p> <p>13) Develop actions for risk mitigation and assess with project team impact on package information.</p> <p>14) Contribute to value management process and assess impact on package information.</p>	<p>7) Update cost plan and advise on budget. 8) Prepare cash flow forecasts and monitor expenditure against cost plan and report. 9) Advise on effect of market conditions including forecast of construction cost.</p> <p>10) Prepare cost studies to assist project team in testing options.</p> <p>11) Consider cost aspect of strategy for use, cleaning and maintenance and subsequent construction.</p> <p>12) Receive and advise on outputs of specialist studies and surveys and incorporate into the cost plan.</p> <p>13) Provide cost information for liaison with utility providers.</p> <p>14) Support development of actions for risk mitigation and assess impact on package information with project team.</p> <p>15) Contribute to value management process and assess impact on package information with the project team.</p> <p>16) Receive information on principal elements to establish approximate quantities.</p>
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		<p>15) Provide information on principal elements to assist in establishing cost plan.</p> <p>16) Establish critical construction details, tolerances, performance tolerances and anticipated movements, defining critical co-ordination clearances.</p> <p>17) Advise on scope of performance and prescriptive specifications, and procurement implications.</p> <p>18) Liaise with project team and contribute to consultations with statutory authorities to agree submission requirements.</p> <p>19) Prepare design development drawings defining detailed form, function and character of works with the primary components being defined in terms of overall size and typical detail, including general arrangement plans, sections, elevations and details in sufficient detail to show design intent.</p> <p>20) Prepare outline specifications for components of works defining performance and quality.</p>	<p>17) Receive details of design development and prepare cost details for inclusion in the design development report.</p> <p>18) Assemble cost plan and reports for inclusion in design development report.</p>
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		21) Assemble design development drawings, outline specifications and agreed visualizations for inclusion in design development report.	
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Table 11: Stage 6A (Production information) services

Project leader	Lead designer	Designer	Cost consultant
<p>1) Refine or initiate, obtain agreement and direct implementation of refined management procedures and reporting procedures.</p> <p>2) Receive:</p> <p>a) project team advice on scope, content, assembly, packaging and sequencing of production information, and updating of design schedule and report to client and obtain instructions.</p> <p>b) results of periodic review of the development of the design for conformity with package information and advice on need for change, advise on impact, submit to client and obtain instructions.</p>	<p>1) Co-ordinate work of discipline specific design consultants and cost consultant.</p> <p>2) Co-ordinate advice on scope, content, assembly, packaging and sequencing of production information and implementation of client's instructions.</p> <p>3) Give direction to development of production information in conformity with package information.</p> <p>4) Give design direction and</p>	<p>1) Advise on scope, content, assembly, packaging and sequencing of production information and implement instructions.</p> <p>2) Advise on updating design schedule.</p>	
		<p>3) Develop production information in conformity with package information.</p> <p>4) Periodically review development of the design for conformity with package information, assess with project team need for changes and advise on impact on package information.</p> <p>5) Incorporate non-material changes to the design. 6) Confirm strategy for construction, use, cleaning and subsequent maintenance.</p>	<p>3) Support development of production information in conformity with the package information.</p> <p>4) Contribute to the periodic review of the development of the design for conformity with package information, advise on conform if with the package information, assess with project team need for changes and advise on impact on package information.</p> <p>5) Contribute to confirmation of strategy for use, cleaning and maintenance and subsequent construction.</p>

<p>3) Monitor and manage development of production information in conformity with package information.</p> <p>4) Direct work of project team, allocate actions, assess impact on package information, report to client and obtain instructions.</p> <p>5) Contribute to strategy for construction, use, cleaning and subsequent maintenance, and report to client and obtain agreement.</p> <p>6) Manage and monitor project team liaison and submissions to statutory authorities and report to client.</p> <p>7) Receive production information drawings and schedules of work sufficient for construction and assemble works information and undertake package review.</p> <p>8) Obtain any outstanding statutory permissions</p>	<p>coordinate integration of the design requirements of project team and specialist and suppliers into package information.</p> <p>5) Lead and co-ordinate project team liaison and making of submissions to statutory authorities.</p>	<p>7) Develop actions for risk mitigation and assess with project team impact on package information. 8) Contribute to value management process, develop proposals for value management and assess with project team impact on package information.</p> <p>9) Integrate the design and requirements of project team into package information</p> <p>10) Integrate the design and requirements of specialists and suppliers into package information.</p> <p>11) Prepare drawings and integrate information from specialists and suppliers.</p> <p>12) Liaise with project team and contribute to submissions to statutory authorities.</p> <p>13) Prepare production information drawings and schedules of works sufficient for construction or preparation of manufacturing and installation drawings and production information by other project team members.</p>	<p>6) Advise on effect of market conditions including forecast of construction cost.</p> <p>7) Support development of proposals for risk mitigation and assess with project team impact on package information.</p> <p>8) Contribute to value management process, support development of proposals for value management and assess with project team impact on package information.</p> <p>9) Review integration of the design and requirements of specialists and suppliers into package information for conformity with cost plan.</p> <p>10) Receive production information drawings and schedules of work sufficient for construction or preparation of manufacturing and installation drawings and undertake cost check exercise, monitor cost and update cash flow projections</p>
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		<p>14) Receive confirmation of setting out information and dimension drawings.</p> <p>15) Prepare detailed specifications for components of works for inclusion in scope of work, defining performance, quality, operating and maintenance requirements.</p> <p>16) Incorporate appropriate facilities for commissioning within the system design.</p>	
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Design lead	Discipline specific designer
Professionals appointed by client (review service)	
Coordinate work of discipline specific design consultants:	<p>1) Advise on need for instructions relating to Manufacture Fabrication & Construction information.(MF&C)</p> <p>2) Review schedule for submission of MF&C information to meet needs of procurement pre-installation testing, and construction schedule.</p> <p>3) Provide information required to clarify production information drawings and specifications.</p> <p>4) Receive and review MF&C information for general conformity with scope of work and consider need for amendments and resubmissions for further review and issue comments.</p>

	<p>5) Advise on need to amend production information or design included in scope of work and assess impact on changes on package information with project team.</p> <p>6) Advise on contractor’s proposals relating to elements of the works to be designed by contractor.</p> <p>7) Receive and review samples of materials, components and assemblies for general conformity with scope of work and consider the need for amendments and resubmission for further review and issue comments.</p> <p>8) Comment on contractor’s method statements in so far as they reflect on design intent of the works.</p> <p>9) Monitor progress with completion of MF&C information.</p> <p>10) Review operation and maintenance manuals for components and systems, record drawings and schedules of design criteria of works as constructed, for general conformity with scope of work information and completeness.</p> <p>11) Update production information, general arrangement drawings and schedules, incorporating changes instructed during construction.</p>
<p>Professional appointed by the contractor</p>	
<p>Coordinate work of discipline specific design consultants:</p>	<p>1) Consider production information and advice on issues requiring supplementary information or clarification.</p> <p>2) Advise on design schedule that meets needs of procurement, pre-installation testing, construction works contract and construction schedule.</p> <p>3) Regularly review design schedule for receipt and issue of information, submissions for approval, and testing and commissioning during construction. Issue schedule of drawings and other information to be provided.</p>

- 4) Develop actions for risk mitigation and assess impact with construction contract team/project team.**
- 5) Contribute to value management process. Develop proposals for value management. With Construction Contract team/project team assess impact on construction works contract.**
- 6) Request and obtain information required to clarify production information drawings and specifications.**
- 7) Prepare co-ordinated manufacture and installation drawings of elements and/or components and relevant testing and commissioning information, based on production information. Integrate with construction, manufacture and installation drawings.**
- 8) Periodically review development of the design for conformity with production information. With construction contract team/project team assess need for changes and advise on impact on construction works contract.**
- 9) Obtain reviews and approvals for MF&C information. Provide, for review and approval, technical submissions detailing quality and performance of materials and equipment to demonstrate compliance with production information.**
- 10) Provide clarification of MF&C information as required.**
- 11) Update drawings and schedules to reflect changes in components and installations as construction progresses.**
- 12) Assess impact of variations on production information and advice.**
- 13) Define quality control and testing procedures to demonstrate compliance with construction works contract. Receive results of performance demonstration tests, adjust MF&C information as required and re-test. Obtain reviews for results of tests.**
- 14) Advise on need for special inspections or tests during construction.**

	15) Assist with preparation of maintenance manuals for components and systems, record drawings and schedules of design criteria of works as constructed.
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Project leader	Lead designer	Designer	Cost consultant
1) Deal with any outstanding issues 2) Monitor - review of record information and issue to client - liaise with project users in use of systems - respond to queries about use, cleaning, maintenance and subsequent operation - obtain outstanding statutory permissions 3) Lead post-Project review 4) Assemble records and archive originals and copies as appropriate	n addition to performing discipline specific Design Consultant tasks co-ordinate - review of record information - liaison with project users in use of systems - assistance with queries about use, cleaning, maintenance and subsequent operation - the obtaining of any outstanding statutory permissions	1) Deal with any outstanding issues 2) Contribute to post-project review 3) Assemble records and archive originals and copies as appropriate.	
		4) Complete inputs into record information 5) Liaise with Project users in use of systems 6) Assist with queries about use, cleaning, maintenance and subsequent construction 7) Assist with obtaining of any outstanding statutory permissions.	

Table 12 Roles provided for in different forms of contract (stage 7)

Form of contract		Role as provided for in the contract
FIDIC	Red, Yellow, Silver or Gold Book	Engineer

	Green	Employer's representative
GCC 2010		Engineer
JBCC series 2000 PBA and MWA		Principal agent
		Agent
NEC3	Engineering and construction contract	Project manager
		Supervisor
	Engineering and construction short contract	Employer's representative
	Supply contract	Supply manager
	Term service contract	Service manager
	Term service short contract	Employer's representative

Table 13 Levels of construction monitoring (stage 7)

Level	Description
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<p>1</p>	<ul style="list-style-type: none"> • Monitor the outputs from another party's quality assurance schedule against the requirements of the plans and specifications. • Visit the works at a suitable frequency to review important materials, critical work procedures and/or completed elements or components
<p>2</p>	<ul style="list-style-type: none"> • Review, preferably at the earliest opportunity, a sample of each important: <ul style="list-style-type: none"> a) work procedure; and b) construction material <p>for compliance with the requirements of the works information and review representative samples of important completed work prior to enclosure or completion as appropriate.</p> <ul style="list-style-type: none"> • Visit the works at a suitable frequency to review important materials, critical work procedures and/or completed elements or components
<p>3</p>	<ul style="list-style-type: none"> • Maintain a part-time presence on site to review random samples and review important completed work prior to enclosure, or on completion, as appropriate.
<p>4</p>	<ul style="list-style-type: none"> • Maintain a full time presence on site to constantly review: <ul style="list-style-type: none"> a) work procedures b) construction materials • for compliance with the requirements of the plans and specifications and review completed work prior to enclosure or on completion as appropriate.

INFRASTRUCTURE GATEWAY SYSTEM

INFRASTRUCTURE GATEWAY SYSTEMS (IGS)

SCOPE

The infrastructure gateway system is a control system where a project should not proceed to the next stage before it is subjected to control tests. The gateway system prescribes the conditions that need to be fulfilled before a project can proceed to the next stage. Should a project not meet the control test conditions specified, the gateway system will allow for termination of the project. All infrastructure projects should be subjected to this Gateway System to ensure that there is efficient delivery. Every stage of a project should be subjected to the control system to ensure that each phase has been concluded in the most efficient way. The gateway subsystem has got 9 control gates.

The stages, key deliverables and principal actions associated with the delivery and maintenance of infrastructure shall be as stated in Table 1 and illustrated in Figure 1. Stages 5 and 6, depending upon the package information that is available at the end of stage 4, may be omitted

Table 14:Key deliverables and activities associated with the gateway system

Activities	Stage		Key deliverable
	No	Description	
Planning at a portfolio level	1	Infrastructure planning	Client approved infrastructure plan
	2	Procurement planning	Client accepted construction procurement strategy for implementing the infrastructure plan
Planning at a package level	3	Package preparation	Client accepted strategic brief
	4	Package definition	Client accepted concept report including where necessary, a logistic support plan
Detailed design	5	Design development	Client accepted design development report
	6a	Design documentation (Production information)	Completed and client accepted production information
	6b	Design documentation (Manufacture, fabrication and construction information)	Client accepted manufacture, fabrication and construction information
Site	7	Works	Completed works which are capable of being occupied or used and accepted by the client.
	8	Hand over	Works which have been taken over by the user complete with record information
Close out	9a	Asset data	Archived record information and updated asset register

	9b	Package completion	Completed contract or package order
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Article I.

G1 Infrastructure Plan

Section 1.01 General

- 1.1** At the start of each project, the client needs to have a clear understanding of the project that they intend to undertake. The client shall document the scope of the project, funding etc. in the client's brief.
- 1.2** The client's brief needs to be the basis on which the infrastructure plan is prepared.
- 1.3** The design brief shall be prepared by qualified technical personnel who is registered as:
- 1) a Graduate or Professional Architect in terms of the BOAQS Act;
 - 2) a Graduate, Associate or Professional Engineer in terms of MEI Act;
- 1.4** The design brief shall be part of the infrastructure plan.
- 1.5** The infrastructure plan should include:
- a) The Client's brief
 - b) Site information from site investigations
 - c) Feasibility study report
 - d) Preliminary Cost Estimate
 - e) Preliminary Programme of Works

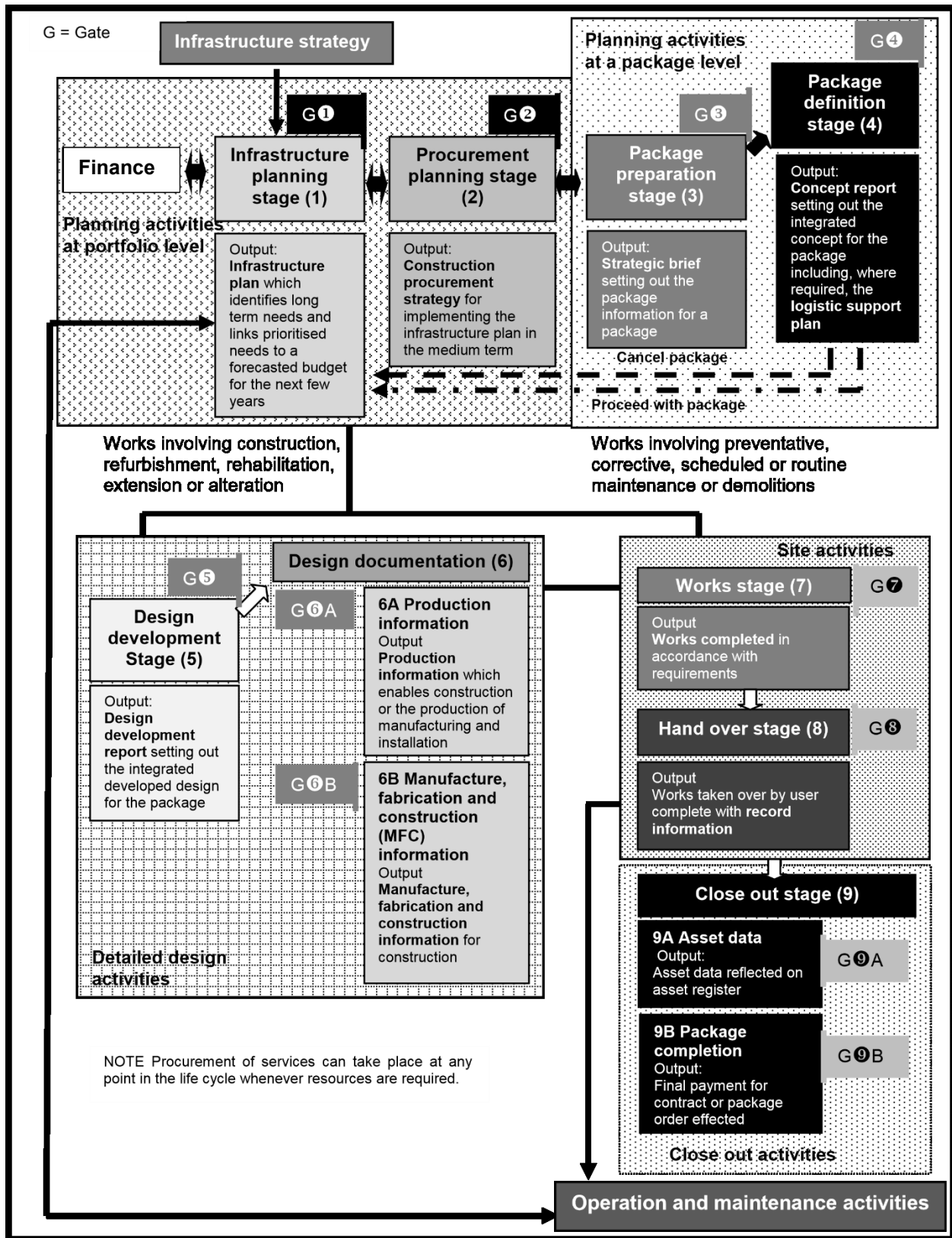


Figure 4: The stages and gates of the Infrastructure Gateway System

1.6 The project should only proceed when the infrastructure plan contains the information mentioned above and that senior management has signed it off.

1.7 If a project does not meet the above-mentioned minimum requirements; the project shall be stopped.

Deliverable is approved infrastructure plan

Section 1.02 Infrastructure planning

2.1 The infrastructure plan for a portfolio of projects or packages which require implementation shall cover a period of not less than five years. Such a plan shall be:

- a) described by the high-level scope of work for each project, the proposed time schedule, the estimated total project cost and annual budget requirement, the geographical location, any known encumbrances and estimated timeframes for removing these encumbrances; and
- b) aligned with all prescribed planning, budgeting, monitoring and reporting requirements

2.2 The following activities shall be undertaken during stage 1 (infrastructure planning) to develop an infrastructure plan:

- a) identify the policy drivers, strategies and long term objectives of government which impact upon the client's mandate;
- b) formulate objective decision making criteria relating to the selection and prioritisation of projects;
- c) produce a portfolio infrastructure plan for the forecasted long term acquisition, refurbishment, rehabilitation and maintenance of infrastructure which provides a projected list of projects described by category, location, type, economic classification and function and links prioritised projects to a forecasted budget for the next three to five years; and
- d) undertake specific activities prescribed by law or by any funding requirements including the making of applications for funds;
- e) update the portfolio infrastructure plan at least once a year and include updated information obtained from the concept report produced at the end of stage 4 and the mapping of projects falling within the financing period to packages which are identified in the latest construction procurement strategy;

- f) remove projects associated with packages from the portfolio infrastructure plan which are not to be carried forward past stages 3 or stage 4; and
- g) obtain infrastructure plan approval.

Article II.

G2 Construction Procurement Strategy

Section 1.01 Procurement strategy

- 1.1** Upon obtaining approval of the infrastructure plan, the client must develop a procurement strategy.
- 1.2** The procurement strategy shall be determined based on the information contained in the client approved infrastructure plan.
- 1.3** The procurement shall be developed by the project management unit which shall be led by technically qualified personnel who shall be registered as:
 - (a) a Graduate or Professional Architect registered in terms of the BOAQS Act,
 - (b) a Graduate or Professional Engineer in terms of MEI Act;or
 - (c) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.
- 1.4** The following activities need to be undertaken
 - a) Establishment of the Internal Procurement and Disposal of Assets Committee
 - b) Establishment of tender evaluation team
 - c) Determine the form of contract to be used
 - d) Determine the procurement route
 - e) Prepare the project's construction procurement strategy

The procurement process document is approved by senior management and shall satisfy requirements as stipulated in the MIDMS subsystem 3.

- 1.5** The Construction Procurement Strategy Should Specify:
 - a) The members of the Internal Procurement and Disposal of Assets
 - b) The members of the tender evaluation team
 - c) The form of contract to be used
 - d) The procurement route to be used

- e) The tender document preparation team
- f) The tender documentation review team
- g) The type of contract to be used

1.6 The Project Management team shall submit the procurement strategy to management for approval

1.7 The project shall only proceed when the construction procurement strategy has been approved.

1.8 Should a project not meet the above-mentioned minimum requirements; the project shall not proceed to the next phase

Section 2.01 Procurement planning

2.1 The following activities shall be undertaken at a portfolio level, using the step by step procedure contained in the Subsystems 1 and 3 during stage 2 (procurement planning) to produce a construction procurement strategy for implementing the infrastructure plan over the period:

- a) develop a delivery management strategy;
- b) decide on contracting arrangements;
- c) decide on procurement arrangements;
- d) document the identified construction procurement strategy, preferably using the recommended headings provided in Table 2;
- e) review and update the construction procurement strategy at least once a year;
and
- f) obtain construction procurement strategy approval

Article III.

G3 Package definition

Section 3.01 General

1.1 Upon approval of the Procurement strategy, the client shall develop package definition which shall be documented in the strategic brief.

#	Heading	Subheadings
1	Background / introduction	
2	Delivery management strategy	2.1 Nature and spatial arrangement of projects and clusters 2.2 Client organisation characteristics 2.3 Market characteristics 2.4 Primary procurement objectives 2.5 Secondary procurement objectives 2.6 Delivery management plan 2.7 Delivery mode 2.8 Packaging strategy
3	Contracting arrangements	3.1 Risk allocations for packages 3.1.1 Contracting and pricing strategies 3.1.2 Forms of contract 3.2 Professional services contracts 3.2.1 Requirements for outsourced services 3.2.2 Packaging for professional service contracts 3.2.3 Allocation of risks for professional service contracts
4	Procurement arrangements	4.1 Quality strategy 4.2 Procurement procedure 4.3 Targeted procurement procedure 4.4 Tender evaluation procedure
5	Satisfying primary and secondary objectives	5.1 Construction procurement strategy 5.2 Issues to be dealt with in contracts which are not addressed elsewhere

Table 15: Recommended headings in a construction procurement strategy

1.2 The strategic brief shall be developed by the project management team which shall be led by technically qualified personnel who shall be registered as:

- (a) a Graduate or Professional Architect registered in terms of the BOAQS Act,
- (b) a Graduate or Professional Engineer in terms of MEI Act;
- or
- (c) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.

1.3 In order to develop the strategic brief, the following documents need to be available:

- a) Concept Architectural designs
- b) Concept Landscape designs
- c) Concept Structural engineering designs
- d) Concept services designs
- e) Project specifications

f) Preliminary feasibility study

1.4 The Strategic brief should include:

- a) The client's needs from the client's brief
- b) NCIC's comment on constructability
- c) Consultants' quality control and assurance requirements

1.5 Client shall review the strategic brief to ensure that it meet the organisational goals.

1.6 Shall only proceed upon the approval of the strategic brief

Section 3.02 Strategic brief

2.1 The following activities shall be undertaken during stage 3 (package preparation) to develop a strategic brief:

- a) define the package objectives, business need, user requirements, acceptance criteria and client priorities and aspirations;
- b) confirm the scope of the package and identify any constraints;
- c) establish the project criteria including as, relevant, the performance and reliability requirements, design life, service life of components, function, maintenance and replacement requirements, mix of uses, scale, location, quality, value, time, safety, health, environment and sustainability;
- d) where necessary, conduct preliminary investigations, stakeholder consultations, site visits or desk top studies to obtain data or to interrogate outstanding risks relating to matters such as the site, bulk services, the environment, heritage, safety, planning;
- e) identify procedures, organizational structure, key constraints, statutory permissions (e.g. environmental, heritage, social, planning, building control), and utility approvals, policies (e.g. environmental, developmental, social, maintenance or facilities management) and strategies to take the package forward;
- f) identify risks that need to be mitigated;
- g) establish the control budget for the package, ownership costs and schedule for the package; and
- h) develop, finalise and obtain acceptance of the strategic brief

Article IV.

G4 Concept Report

Section 4.01 General

- 1.1** Upon approval of the strategic brief, the client shall develop the project concept report.
- 1.2** The concept report should outline the logic support plan. This needs to be prepared by the project manager team.
- 1.3** The Concept report should include
 - a) Detailed aim of the project
 - b) Detailed scope of the project
 - c) Three preliminary design options
 - d) preliminary cost estimate (Bills of Quantities)
 - e) preliminary programme of works
 - f) preliminary quality assurance plan
 - g) A detailed logic support plan
 - h) Preliminary geotechnical surveys and site investigations
 - i) Health and safety plan
- 1.4** The logic support should indicate how the project programme and strategy interlink in the project's effort in achieving the project's objective.
- 1.5** The project shall only proceed to the next phase after the approval of the strategic brief.

Section 4.02 Package definition

- 2.1** The following activities shall be undertaken during stage 4 (package definition) to develop a concept report setting out the integrated concept for the package:
 - a) obtain site studies and specialist advice, as necessary;
 - b) establish the feasibility of satisfying the strategic brief for the package within the control budget with or without modification;
 - c) determine the initial design criteria and design options to construct, refurbish, rehabilitate, alter or extend infrastructure or the repair methods and procedures required to maintain the condition of infrastructure for the package;
 - d) investigate alternative solutions and recommend the preferred solution;
 - e) establish the detailed brief, scope, scale, form and cost plan for the package;

- f) develop an indicative schedule for documentation and construction or maintenance services associated with the package;
- g) produce a site development plan or other suitable schematic layouts of the works and obtain the necessary statutory permissions, funding approvals or utility approvals to proceed with the works associated with the package;
- h) undertake where necessary, studies to determine whole life costs and to forecast revenue over the lifetime of the infrastructure associated with the project to confirm the financial sustainability of the project
- i) produce a risk report which incorporates the need for further surveys, tests, other investigations and consents and approvals, if any, during subsequent stages and identified health, safety and environmental risk;
- j) produce a logistic support plan in accordance with the provisions of section 4.03 if new infrastructure is created; and
- j) develop and finalise and obtain the clients acceptance of the concept report.

Section 4.03 Logistic support

1.1 The following activities shall, where required, be undertaken to produce the logistic support plan:

- a) **Client:** identify additional organisational structure required for operation and maintenance over life span, and office, stores, furniture, equipment, information technology and staff training requirements to run operation and maintenance facilities as well as engineering infrastructure
- b) **Professional:**
 - i) establish logistic requirements in respect of facilities and/or engineering infrastructure;
 - ii) specify requirements, if any, for the contractor to provide a servicing and maintenance plan for all facilities and engineering infrastructure

Article V.

G5 Design Development

Section 5.01 General

1.1 Detailed construction designs and specification are prepared by design consultants and checked by the client's project manager to ensure that they are well coordinated. These designs need to be of a detail enough to enable the contractor to execute the works on the project.

1.2 The design development report should include:

- a) Detailed architectural designs
Including; but not limited to *Finishes, window schedules, ironmongery, shop drawings etc*
- b) Detailed engineering designs
Including; but not limited to *Structural layout, bending schedules, construction details, Electrical, Mechanical; etc*
- c) Building systems design information
Including; but not limited to *Heating, Ventilation, Air Conditioning, Plumbing*
- d) Detailed specifications
- e) Detailed cost estimate (Bills of Quantities)
- f) Detailed programme of works
- g) Detailed quality assurance plan
- h) Preliminary geotechnical surveys and site investigations

1.3 The project shall proceed only when the design report has been approved

Section 5.02 Design development

1.1 The following activities shall be undertaken during stage 5 (design development) to develop the design development report:

- a. develop in detail the accepted concept to finalise the design and definition criteria;
- b. establish the detailed form, character, function and cost plan, defining all components in terms of overall size, typical detail, performance and outline specification, as relevant;
- c. confirm or revise the cost plan included in the concept report; and
- d. develop and finalise and obtain the clients acceptance of the design development report

Article VI.

G6A Production Information

Section 6.01 General

1.1 Gate G6A and G6B are interrelated in the manner that they involve the production of documents.

1.2 Gate G6A should put together all documents prepared in the earlier design stages and should include the following in the order as stated;

- a) Detailed aim of the project
- b) Detailed scope of the project
- c) Detailed design development report
- d) Tender evaluation criteria
- e) General conditions of contract
- f) Special conditions of contract
- g) Detailed architectural designs and specifications
- h) Detailed Engineering designs and specifications
- i) Detailed bills of quantities
- j) Proposed programme of works
- k) Detailed quality assurance plan
- l) A detailed logic support plan

The documents need to be prepared by the tender preparation team set up at **G2: Construction Procurement Strategy** earlier.

1.2 The project shall proceed only when the design report has been approved by the client.

Section 6.02 : Production information

2.1 The following activities shall be undertaken during stage 6A (production information) to produce the production information:

- a. produce the final detailing, performance definition, specification, sizing and positioning of all systems and components enabling either construction (where the contractor is able to build directly from the information prepared) or the production of manufacturing and installation information for construction; and
- b. obtain the clients acceptance of the production information

Section 6.03 Production information

1.1 The following activities shall be undertaken during stage 6A (production information) to produce the production information:

- a. produce the final detailing, performance definition, specification, sizing and positioning of all systems and components enabling either

construction (where the contractor is able to build directly from the information prepared) or the production of manufacturing and installation information for construction; and

b. obtain the clients acceptance of the production information.

Sub-system		Example of assemblies or components
Structure	Foundation	Shallow (ground beam, raft, etc.) Deep (deep footing, pile, diaphragm wall, etc.)
	Carcass	Column, beam, panel, slab, shell, lattice structure, etc.
External envelope	Envelope below ground	Base, side and top envelope (solid floor, basement wall, underground roof, etc.) Openings (pipe entry, shaft, etc.)
	Envelope above ground	Base, side and top envelope (exposed floor over external space, wall, roof) Openings (door, window, roof-light, etc.)
Spatial dividers outside the envelope	External vertical divider	Partitions (wall, balustrade, etc.) Openings (door, grille, etc.)
	External horizontal divider	Floors (terrace, balcony, porch roof, etc.) Openings (trap-door, etc.)
	External staircase	Stairs, ramp, etc.
Spatial dividers within the envelope	Internal vertical divider	Partitions (wall, balustrade, cupboard, etc.) Openings (door, etc.)
	Internal horizontal divider	Floors Openings (trap-door, etc.)
	Internal staircase	Stairs, ramp, etc.
Services	Water distribution and disposal	Water distribution (pipes, taps, tank, pump, etc.) Sanitary appliance (basin, sink, bath, shower, bidet, WC, etc.) Waste water disposal (pipes, traps, bullies, etc.) Rain water disposal (pipes, tanks, etc.) Sewerage (pipes, inspection chamber, septic tank, cesspool, etc.)
	Heating and ventilation	Gas fuel distribution (pipes, taps, tank, etc.) Liquid fuel distribution (pipes, taps, tank, etc.) Primary heat source (boiler, chimney, etc.) Water circuit (pipes, plant room, etc.) Air circuit (ducts, air vent, ventilator, etc.)
	Gas distribution	Compressed air distribution (pipes, plant, etc.) Gas distribution (pipes, plant room, etc.)
Services (continued)	Electrical	High voltage grid (lines, etc.) Transformer Low voltage grid (writing, switch, socket, lighting, etc.) Emergency electrical system and equipment
	Telecommunication	Telephone system (writing, telephone, etc.) Intercom system (writing, bells, door opener, intercom, etc.) Radio and television distribution (writing, aerial, etc.)
	Mechanical and electromechanical transport	Lift (plant room, car, cables, etc.) Escalator and moving walkway (plant, stairs, etc.) Facade cleaning equipment (cradle, cables, plant, etc.) Hoist (pulleys, etc.)
	Pneumatic and gravity transport	Refuse disposal (ducts, etc.) Central vacuum cleaning (ducts, plant, etc.) Linen chutes (ducts, etc.) Pneumatic transporter (ducts, plant, etc.)

Safety	Lightning protection (conductor, cable, earth connection, etc.) Fire protection (pipes, tank, fire alarm, smoke detector, etc.) Intrusion protection (burglar alarm, etc.)
<p>NOTE 1 This table lists the physical parts of the building fabric in terms of sub-systems which exclude furniture and furnishings. This approach is based on the consideration of function only, being independent of any particular method, material or order of constructing the building.</p> <p>NOTE 2 Examples of common components or assemblies which perform the functions of each sub-system are given in brackets.</p>	

Article VII.

G6B Manufacture, fabrication and construction information

Section 7.01 General

1.1 The client approved production information at G6A is developed as the project progresses. The following documents are developed at this stage

- a) architectural designs and specifications
- b) engineering designs and specifications
- c) Actual quantities of works done
- d) Planned schedule and actual works

1.3 The project shall proceed only when the design report has been approved by the client.

Article VIII.

G7 Site activities

Section 8.01 Construction stage

1.1 The following activities shall be undertaken during stage 7 (works) in relation to the works:

- a) provide temporary works
- b) provide permanent works in accordance with the contract
- c) manage risks associated with health, safety and the environment on the site,
- d) confirm that design intent is met; and
- e) correct notified defects which prevented the client or end user from using the works and others from doing their work

1.2 During this stage, the project management unit shall manage the construction contracts

Section 8.02 Handover stage

2.1 The following activities shall be undertaken during stage 8 (handover):

- a) finalise and assemble record information which accurately reflects the infrastructure that is acquired, rehabilitated, refurbished or maintained
- b) hand over the works and record information to the user and, if necessary, train end user staff in the operation of the works.

Article IX.

Close out stage

Section 9.01 Stage 9A: Asset Data

1.1 The following activities shall be undertaken during stage 9A (asset data) in relation to the works:

- a) archive record information
- b) update portfolio asset register

1.2 This stage involves the obtaining of the required information for the asset register, the validation of the information and the entering of the information into the asset register.

Section 9.02 Stage 9B: Package completion

2.1 The following activities shall be undertaken during stage 9B (package completion) in relation to the works:

- a) correct all defects that are detected during the defects liability period;
- b) complete the contract by finalising all outstanding contractual obligations including the finalisation and payment of amounts due after the expiry of the defects correction period
- c) evaluate package outcomes; and
- d) compile a completion report for the package outlining what was achieved in terms of key performance indicators and suggestions for improvements on future packages of a similar nature

2.2 At completion, before the preparation of a completion certificate the project manager needs to ensure that the following activities are undertaken in liaison with the client, consultants and contractor;

- a) Testing and commissioning of all the components of the project to ensure that they are fit for use.
- b) Check for and rectify all defects
- c) Evaluating the project's performance in terms of conformance with cost, quality, scope and time.
- d) Conduct preoccupancy assessment
- e) Verify the achievement of the intended project outcomes.
- f) Verify the amount to be paid on penultimate certificate.
- g) As built architectural designs and specifications
- h) As built engineering designs and specifications
- i) Prepare draft facilities operation and management manual.

Deliverable: a client accepted completion certificate.

- 2.3** Only a project that is fit for purpose should be signed off by the client. The project manager needs to ensure that all works have been closed out.
- 2.4** At this stage, completed works which are capable of being occupied or used and accepted by the client.
- 2.5** Should a project not meet the above-mentioned minimum requirements, the client should not occupy the premises and not issue a completion certificate.

Article X.

G8 Record information and Handover Certificate

Section 10.01 General

- 1.2** At this stage, the contractor has completed all construction works and the infrastructure is ready for operation and occupation by the client. The completion certificate should be handed over to the contractor.
- 1.2** The handover certificate is prepared. The following reports need to be filed and retained for future use:
 - a) Report assuring the construction product is fit for use.
 - b) Report highlighting the project's performance in terms of cost, quality, scope and time.
 - c) Preoccupancy assessment report
 - d) Detailed report on all payments done on to date
 - e) Verify the amount to be paid on penultimate certificate.

- f) As built architectural designs and specifications
- g) As built engineering designs and specifications

Deliverable: Prepare facilities, operation and management manual.

1.3 At this stage, the construction product is being used by the client. The project management consultant needs to prepare facilities, operation and management manual.

1.4 This manual should contain all the above-mentioned documents. The facilities, operation and management manual should be stored carefully for use during the useful life of the building.

Section 10.02 Handover

2.1 The following activities shall be undertaken during stage 8 (handover):

- a) finalise and assemble record information which accurately reflects the infrastructure that is acquired, rehabilitated, refurbished or maintained
- b) hand over the works and record information to the user and, if necessary, train end user staff in the operation of the works

Article XI.

G9A Confirmation of entry in asset register

Section 11.01 General

1.1 All assets need to be added to the asset register to ensure that there is proper tracking of the same. The asset register needs to contain among other things:

- a) Description of the construction asset
- b) Funder of the asset
- c) User of the asset
- d) Location of the asset
- e) Its date of completion
- f) The value of the construction asset at completion
- g) Maintenance records, previously done and planned

Deliverable: Updated records on asset register.

1.2 The asset register needs to be stored properly and used during the useful life of the construction product.

Section 11.02 Asset data

2.1 The following activities shall be undertaken during stage 9A (asset data) in relation to the works:

- a) archive record information
- b) update portfolio asset register

Article XII.

G9B Final Account

Section 12.01 General

1.1 At the end of the defect liability period, the project manager needs to ensure that the financial closure of the project is undertaken. The final account needs to be prepared after ensuring that the following activities have been undertaken and completed:

- a) All defects were corrected and signed off by the consultant(s)
- b) The construction product is fit for use

Deliverable: Final payment done to contractor and consultants

1.2 The construction product is in use and maintenance is done as separate contracts throughout its useful life. The facilities, operation and management manual is used and updates into the assets register needs to be done after each maintenance is undertaken.

Section 12.02 Package completion

2.1 The following activities shall be undertaken during stage 9B (package completion) in relation to the works:

- a) correct all defects that are detected during the defects liability period;
- b) complete the contract by finalising all outstanding contractual obligations including the finalisation and payment of amounts due after the expiry of the defects correction period
- c) evaluate package outcomes; and
- d) compile a completion report for the package outlining what was achieved in terms of key performance indicators and suggestions for improvements on future packages of a similar nature

Article XIII.

G9C Integrated feedback

Section 13.01 General

The construction product needs to be maintained throughout its useful life. The maintenance information needs to be updated in the asset register. The maintenance information needs to be well stored and updated.

CONSRUCTION PROCUREMENT SYSTEM

Article I. GENERAL

Section 1.01 SCOPE

1.1 This subsystem establishes an infrastructure procurement and delivery management by client organizations. The aim of the standard is to provide guidance to Client Organization on management procurement for services and delivery of infrastructure projects. This subsystem guides Client Organization as follows:

- a) provides a control framework for the planning, design and execution of infrastructure projects, the tracking of such projects and the monitoring of performance which:
 - 1) enables risks to be proactively managed;
 - 2) is capable of being audited;
 - 3) is aimed at ensuring that any infrastructure acquired or to be acquired:
 - i. is in accordance with the legal mandates and strategic priorities;
 - ii. is delivered in the right quantity and quality, and at the right place and time;
 - iii. is financially, economically and technically viable and offers value for money over its life cycle;
 - iv. is affordable in terms of existing budget and future budgetary projections after taking into account life cycle costs;
 - v. is used optimally as demand patterns change over time prior to acquisition of new infrastructure;
 - vi. can be readily and economically maintained; and
 - vii. is designed and constructed in accordance with its intended purpose and use;
- b) provides a control framework for infrastructure procurement;
- c) establishes requirements for the following matters as applied to infrastructure procurement and delivery management:
 - organization arrangements;
 - demand management;
 - acquisition management;
 - contract management;
 - logistics management;
 - disposal management;
 - reporting of supply chain management information;
 - regular assessment of supply chain management performance;

- risk management and internal control; and
- d) establishes minimum requirements for infrastructure procurement.

Article II.

CONTROL FRAMEWORK FOR INFRASTRUCTURE PROCUREMENT

Section 2.01 General

- 1.1** Infrastructure procurement shall be implemented in accordance with the provisions of the control framework indicated in Figure 1 which contains:
- a) procurement gates;
 - b) framework agreement gates;
 - c) reporting points, where applicable, for interfacing with the National Construction Industry Council (NCIC) register of projects; and
 - d) a gate relating to the interface with a financial management system.
- 1.2** The activities associated with the control framework indicated in Figure 1 are set out in Tables 1 and 2 whenever a negotiated, competitive selection or competitive negotiations procedure is applied, with the exception of the shopping procedure. Procurement Gates 6 and 7 may be combined in the case of the quotation (RFQs) procedure and the negotiation procedure where the value of the contract is less than the threshold set for the quotation procedure.
- 1.3** The level of detail contained in the documentation upon which a decision is made at a gate shall be sufficient to enable informed decisions to be made to proceed to the next activity or to undertake a particular procedure.
- 1.4** The approvals or acceptances at each gate shall be retained for record and audit purposes for a period of not less than five years of such acceptance or approval in a secured environment.

Section 2.02 Specific requirements relating to the review of procurement documents

- 2.1** The approval of procurement documents at Procurement Gate 3 or Framework Agreement Gate 2 shall be based on the contents of a procurement documentation review report. Where the procurement relates to the provision of new infrastructure or the rehabilitation, refurbishment or alteration of existing infrastructure, such a report shall be prepared by one or more persons who participated in the review and who are registered as:
- a) a Graduate or Professional Architect registered in terms of the BOAQS Act;
 - b) a Graduate or Professional Engineer in terms of MEI Act;

or

- c) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.

2.2 The review of procurement documents associated with the negotiation, competitive selection or competitive negotiation procedure shall confirm that:

- a. the procurement documents have been formatted and compiled in accordance with the requirements of the PPDA in case of public institutions or the financiers or as agreed by senior management or the board
- b. appropriate prompts (points) for judgement are included in procurement documents whenever quality is evaluated and scored in the evaluation of calls for expressions of interest or tender offers;
- c. the selected form of contract in the case of a tender that is solicited is in accordance with the requirements of section 6.02 and any standard templates required by the Client Organization have been correctly applied;
- d. the necessary approval has been obtained for additional clauses or variations to the standard clauses in the conditions of contract, conditions of tender or conditions for the calling for expressions of interest, as relevant, not provided for in the approved templates;
- e. the selected submission data in the case of a call for an expression of interest, or tender data and contract data options in the case of a tender, which are likely to yield best value outcomes;
- f. the scope of work adequately establishes what is required and the constraints to the manner in which the contract work is to be provided;
- g. the submission or returnable documents are necessary and will enable submissions to be evaluated fairly and efficiently; and
- h. the risk allocations in the contract and pricing data are appropriate.

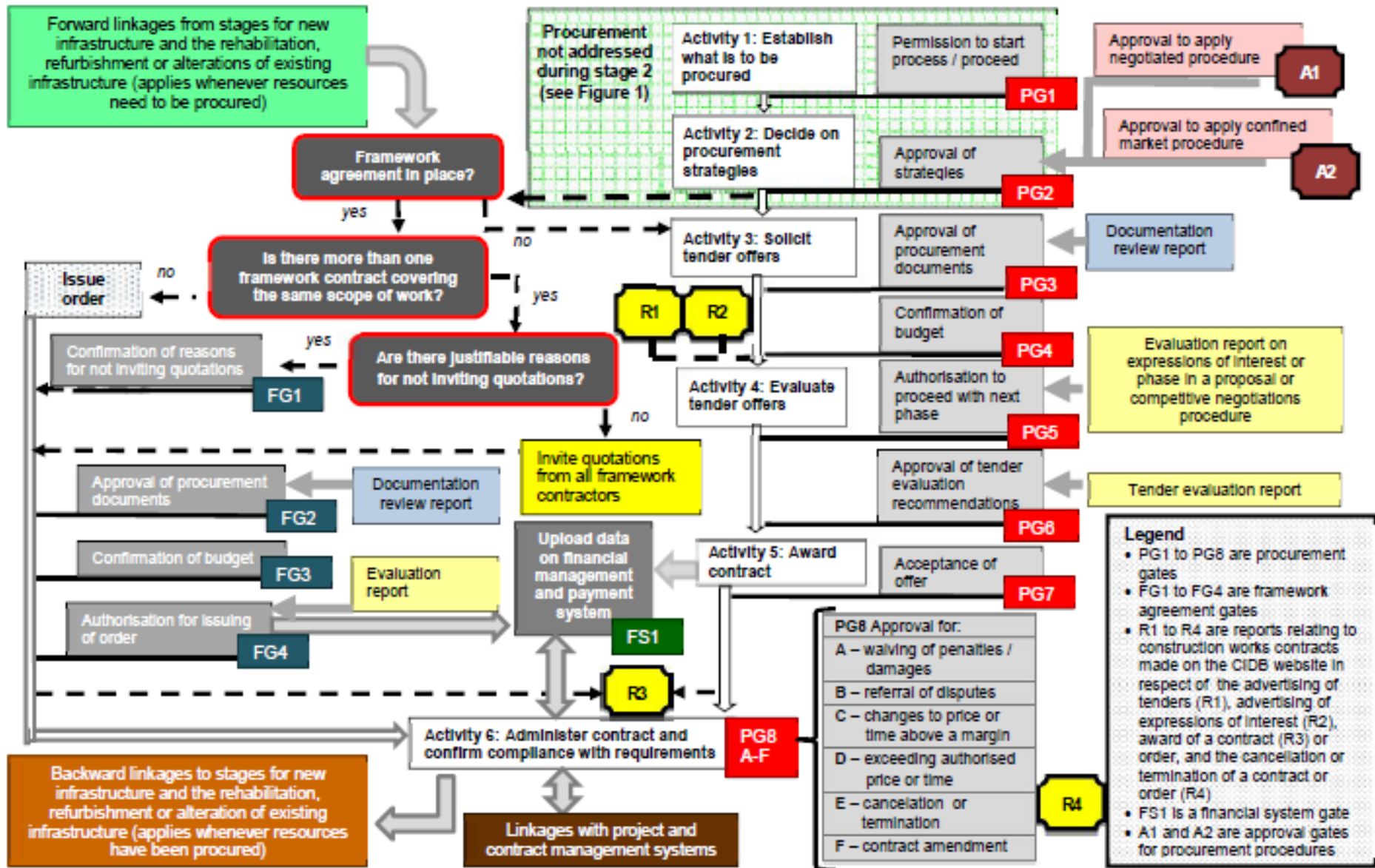


Figure 5 Control framework for procurement (acquisition and contract management) processes

Table 16: Procurement activities and gates associated with the formation and conclusion of contracts

Activity		Sub-Activity*	
1	Establish what is to be procured (Applies only to works and services not addressed in a procurement strategy developed in terms of 4.1)	1.1	Prepare broad scope of work for procurement
		1.2	Estimate financial value of proposed procurement
		1.3 PG1	Obtain permission to start with the procurement process
2	Decide on procurement strategy (Applies only to works or services not included in a procurement strategy developed in terms of 4.1)	2.1	Establish opportunities for using procurement to promote developmental procurement policies, if any
		2.2	Establish contracting and pricing strategy
		2.3	Establish targeting strategy
		2.4	Establish procurement procedure
		2.5 PG2	Obtain approval for procurement strategies that are to be adopted, including specific approvals to approach a confined market or the use of the negotiation procedure
3	Solicit tender offers	3.1	Prepare procurement documents
		3.2 PG3	Obtain approval for procurement documents
		3.3 PG4	Confirm that budgets are in place
		3.4	Invite: <ul style="list-style-type: none"> • -tender offers; or • -expressions of interest (qualified procedure or restricted, competitive negotiations procedure)
		3.5	Receive submissions
		3.6	Open and record submissions received
4	Evaluate tender offers	4.1	Evaluate and prepare evaluation report on submissions received
		4.2 PG5	Obtain authorization to proceed with next phase of tender process
		4.3	Invite tender offers from qualified respondents or selected tenderers
		4.4	Open and record submissions received and, if necessary, repeat 4.1 to 4.4
		4.5	Evaluate tender offers and prepare a tender evaluation report
		4.6 PG6	Confirm recommendations contained in the tender evaluation report
5	Award contract	5.1	Notify unsuccessful tenderers of outcome
		5.2	Compile contract document
		5.3 PG7	Award contract
		5.4	Capture contract award data on management systems
		5.5 GF1	Save/keep data in financial management and payment system
6	Administer contracts and confirm compliance with	6.1	Administer contract in accordance with the terms and provisions of the contract

requirements	6.2	Confirm compliance with requirements
	6.3	Capture contract completion / termination data
	6.4 PG8A	Obtain approval to waive penalties or low performance damages
	6.5 PG8B	Obtain approval to notify and refer a dispute to an adjudicator, or for final settlement to an arbitrator or court of law
	6.6 PG8C	Obtain approval to increase the total of prices, excluding contingencies and price adjustment for inflation, or the time for completion at the award of a contract or the issuing of an order up to a specified percentage
	6.7 PG8D	Obtain approval to exceed the total of prices, excluding contingencies and price adjustment for inflation, or the time for completion at award of a contract or the issuing of an order by more than 25% for NCB or 40% for ICB. However the Project Manager can vary up to 15% for NCB and 20% for ICB
	6.8 PG8E	Obtain approval to cancel or terminate a contract
	6.9 G8F	Obtain approval to amend a contract
	6.10	Close out the contract

Table 17: Procurement activities and gates associated with the issuing of an order

Activity	
1 FG1	Confirm justifiable reasons for selecting a framework contractor where there is more than one framework agreement covering the same scope of work
2	Prepare procurement documents
3 FG2	Obtain approval for procurement documents
4 FG3	Confirm that budgets are in place
5	Quotations amongst contractors not shortlisted invited: Issue draft order documentation and consult with contractor and prepare evaluation report. Quotations amongst framework contractors invited: Invite quotations from all framework contractors participating in the agreement, receive and evaluate submissions and prepare evaluation report
6 FG4	Authorize the issuing of the order
7	Add or enter the order onto management system
8	Issue order to contractor
9	Notify issuing of order to oversight person
10	Administer orders in accordance with contract and confirm compliance with requirements

2.3 The review of procurement documentation associated with the issuing of an order shall confirm that:

- a) any standard templates required by the Board or senior management or the financier, have been correctly applied;

- b) the necessary approval has been obtained for additional clauses or variations to the standard clauses in the conditions of contract not provided in the Client Organization's approved templates or the contract;
- c) the scope of work adequately establishes what is required and the constraints to the manner in which the contract work is to be provided;
- d) the provisions for competition amongst framework contractors, if relevant, and the selected options are likely to yield best value outcomes; and
- e) the risk allocations are appropriate.

2.4 The review conducted to confirm the provisions of **2.2** and **2.3** shall identify sections, if any, which require amendments or improvements.

2.5 The documentation review report shall:

- a) list the names and qualifications of the persons involved in the review of the report;
- b) confirm that the documents are in accordance with the requirements of this standard;
- c) capture any comments or opinions which the team may wish to express; and
- d) recommend that the procurement documents be accepted with or without modifications.

Section 2.03 Specific requirements relating to the evaluation of submissions

3.1 The authorization to proceed with the next phase (Procurement Gate 5), the approval of tender evaluation recommendations (Procurement Gate 6) and the authorization for the issuing of an order (Framework Agreement Gate 4) shall be based on the contents of an evaluation report.

3.2 The evaluation report shall be prepared by one or more persons who are conversant with the nature and subject matter of the procurement documents or the framework contract, and who are registered as:

- a) a Graduate or Professional Architect in terms of the BOAQS Act;
 - b) a Graduate, Associate or Professional Engineer in terms of MEI Act;
- or
- c) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.

- 3.3** All communications with respondents and tenderers during the procurement process to obtain information and clarifications shall be made in writing through the Client's agent named in the submission or tender data. Records of all communications in this regard shall be made and retained for auditing purposes.
- 3.4** Submissions shall be evaluated strictly in accordance with the provisions of the procurement documents.
- 3.5** Where quality is evaluated, at least three persons who satisfy the requirements of **3.2** shall undertake such evaluation. Quality shall be scored in terms of the prompts for judgement, with fixed scores assigned to each prompt, either individually and averaged or collectively, as appropriate.
- 3.7** Those involved in the evaluation of submissions shall record their scores for quality against each of the criteria during the process of evaluation, preferably with notes to substantiate the scores.
- 3.8** Individuals should record their own markings on a separate sheet. These documents shall be placed on file as an audit trail and may form the basis of any debriefing that takes place.
- 3.9** Evaluation reports shall be prepared in accordance with the content headings and relevant guidelines contained in Tables 3 or 4, with modifications as necessary where a two-envelope, two-stage process or competitive negotiation procedure is followed.
- 3.10** Such reports shall contain extracts from the procurement documents which are linked to the evaluation of submissions, such as eligibility criteria, criteria associated with evaluation methods, referencing, quality criteria (including prompts for judgement), the method by which tenders are reduced to a common base and lists of returnable documents.
- 3.11** Such references shall enable those who are tasked with making decisions based on these documents to do so without having to refer back to submissions in order to understand the content of the report.
- 3.12** An evaluation report which recommends the award of a contract shall contain in annexures the reports, if any, of prior processes, e.g. a call for an expression of interest, a round in a competitive negotiation procedure or a stage in a competitive selection procedure.

3.13 An evaluation report covering the application of the negotiated procedure for the award of a contract or the issuing of an order, shall confirm that the negotiated amounts are market-related and represent value for money.

3.14 Tender prices for all types of infrastructure procurement shall be certified as being fair and reasonable by a Professional Quantity Surveyor registered in terms of the BOAQS Act or a registered Graduate Quantity Surveyor with not less than 5 years practical experience or a Professional Engineer registered in terms of the MEI Act or a registered Graduate Engineer with no less 5 years practical experience in measurements.

3.15 Authorization to proceed with the next phase of the procurement process:

The person authorized to enable a procurement process to progress to the next phase of the process shall review the evaluation report and either refer the report back to the evaluation team or the Procurement unit or authorize the procurement process to proceed to the next phase after:

- a) confirming that the report is complete and addresses all considerations necessary to make a decision;
- b) confirming the validity and reasonableness of reasons provided for the elimination of tenderers or respondents; and
- c) considering commercial risks and identifying any risks that have been overlooked which warrant investigation prior to making a final decision.

3.16 Authorization for issuing of an order:

The person responsible for authorizing an order shall, prior to authorizing the issuing of an order:

- a) confirm that the required services, or any combination thereof, are within the scope of work associated with the relevant framework contract; and
- b) consider the recommendations of the evaluation report where competition amongst framework contracts takes place or a significant proportion of the total of the prices is negotiated, based on the financial parameter contained in the framework contract, and either confirm the reasonableness of such recommendations and sign the acceptance of the order, or refer the evaluation report and recommendation back to those who prepared it.

Table 18: Content of an evaluation report relating to an expression of interest

Section heading	Subsection heading		Guidelines for the preparation of content
1 Summary			<p>Provide an overview of the parameters associated with the expression of interest, preferably in tabular form, including the following as relevant:</p> <p>Contract / project no and contract / project description</p> <ul style="list-style-type: none"> • Purpose of the expression of interest • Media in which advertisement was placed • Advertisement date(s) • Estimated value of contract or orders which are likely to be awarded during the term of the contract, if applicable • Date from which documents were available • Number and title of addenda issued • Closing date • Details of clarification meeting, including date and place, if any • Number of submissions made • Number of responsive submissions received • Recommended outcomes of the process
2 An overview of the evaluation process			<ul style="list-style-type: none"> • Provide an overview of the procurement process, indicating the eligibility criteria that were applied. • State points relating to evaluation criteria, prompts for judgement and weightings relating thereto. • Reproduce the list of returnable documents. • Provide, if applicable, an overview as to how the quality aspects of the submissions were scored. • Record that those involved in the evaluation of tenders have no conflicts of interest or have declared any conflict of interest that they may have, and the nature of such conflict
3 Evaluation process	3.1	Submissions received	<ul style="list-style-type: none"> • List the submissions that were received. • Describe any noteworthy events regarding the opening of submissions, e.g. the returning of late submissions
	3.2	Completeness of submissions received	<ul style="list-style-type: none"> • Compare submissions received against the list of returnable documents. • State if any submissions were incomplete and outline how clarifications were obtained. • Confirm if respondents took into account addenda, if any, in their submission.
	3.3	Responsiveness of respondents	Identify which of the submissions received were non-responsive and provide clear reasons for declaring respondents to be nonresponsive
	3.4	Evaluation of submissions	Record the manner in which submissions were evaluated. Record, where relevant, and preferably in a tabular form, the scores for each of the evaluation criteria and the total score (excluding those who failed to score above a threshold, if any).
	3.5	Reasons for disqualification on the grounds of corrupt or fraudulent practice	State reasons if applicable.
	3.6	Compliance with legal	Confirm as relevant that respondents are not barred from

		requirements	participation, tax matters are in order, are registered, etc
4 Tender recommendation			Make a recommendation for the outcome of the process, e.g. admit to a database or prequalify / shortlist respondent to be invited to submit tender offers. Record the names and qualifications of those who performed the evaluation
5 Confirmation of recommendations			Make provision for the confirmation or amendment of the recommended action

Table 19: Content of an evaluation report relating to the solicitation of tender offers

Section heading	Subsection heading	Guidelines for the preparation of content
1 Summary		<p>Provide an overview of the parameters associated with the solicitation of the tender, preferably in tabular form, including the following as relevant:</p> <ul style="list-style-type: none"> • Contract / Project / Tender number • Contract description • Contract duration • Purpose of tender • Contracting strategy, pricing strategy, form of contract and targeting strategy • Procurement procedure and method of tender evaluation • Tender validity expiry date • Alternative tenders (not permitted or state conditions under which permitted) • Media in which advertisement was placed, if not a nominated or qualified competitive selection procedure or a restricted competitive negotiations procedure • Date of advertisement(s) • Date from which documents were available • Details of clarification meeting, including date and place, if any • Tender closing date • Number and title of addenda issued • Number of tenders received • Number of responsive tenders • Recommended tender(s) • Cost estimate (budget), unless a framework contract • Lowest responsive and realistic tender used for comparative purposes (tender price, specific goals, etc.)
2 An overview of the tender evaluation process		<p>Provide an overview of the procurement process, indicating the eligibility criteria that were applied and the evaluation criteria.</p> <p>State specific goals and points relating to preferences, as well as any quality evaluation criteria, prompts for judgement and weightings relating thereto.</p> <p>Reproduce the list of returnable documents.</p> <p>Provide an overview as to how the quality aspects of the tender were scored.</p>

			Record that those involved in the evaluation of tenders have no conflicts of interest or have declared any conflict of interest that they may have, and the nature of such conflict.
3 Tender evaluation process	3.1	Tender offers received	List the tender offers that were received. Describe any noteworthy events regarding the opening of submissions, e.g. the returning of late tenders and the declaring of submissions non-responsive on the grounds that they were not received in the prescribed manner.
	3.2	Completeness of tenders received	<ul style="list-style-type: none"> • Compare tender submissions received against list of returnable documents. • State if any tender submissions received were incomplete and indicate what was not complete. Indicate what steps were taken to make incomplete tenders complete, only where this does not affect the competitive position of the tenderer in question. List all communications with tenderers. • Confirm if tenderers took into account addenda, if any, in their tender submission.
	3.3	Responsiveness of tenderers	Identify which of the tenders received were non-responsive and provide clear reasons for declaring such tenders to be nonresponsive.
	3.4	Evaluation of tender offers	Record the manner in which tenderers were reduced to a common basis: Record preferably in a tabular form: <ul style="list-style-type: none"> • the scores for each of the evaluation criteria; • the total score (excluding those who failed to score above a threshold); • the pricing parameters that were tendered to enable compensation events to be evaluated of contractors to be paid in cost reimbursable or target cost contract. • Provide reasons for not granting a preference or considering a financial offer to be unrealistically low
	3.5	Reasons for disqualification on the grounds of corrupt or fraudulent practice	State reasons if applicable
	3.6	Compliance with legal requirements	Confirm as relevant that tenderers are not barred from participation, tax matters are in order, are registered, etc.
	3.7	Acceptability of preferred tenderer	<ul style="list-style-type: none"> • State any reasons why the tenderer with the highest points should not be considered for the award of the tender, e.g. commercial risk, restrictions, lack of capability and capacity, legal impediments, etc. • Also state any arithmetical corrections that have been made
4 Outcome of the evaluation			Make a recommendation for the award of the tender and state any qualifications / conditions associated with such an award. Record the names and qualifications of those who performed the evaluation
5 Confirmation of recommendations			Make provision for the recommendations for the award

Article III.

RISK MANAGEMENT AND INTERNAL CONTROL

Section 3.01 Risk management

- 1.1** Risk registers shall be established and maintained to enable risk mitigation relating to infrastructure procurement and delivery management to be proactively managed at a portfolio, program, project and contract level. Such registers shall as a minimum contain:
- a) the entry date of the risk;
 - b) a description of the risk, i.e. risk event, cause and possible outcome;
 - c) the measures and action to mitigate risk, i.e. a description of the action, responsibility for action and timetable for implementation;
 - d) action status, i.e. actioned, take no action, monitor and review or to be actioned.
- 1.2** Those responsible for establishing and maintaining risk registers shall issue risk reports when called upon to do so.

Section 3.02 Internal control measures

- 2.1** The gates in the control frameworks provided above shall be used, as appropriate, to:
- a) authorize the proceeding with an activity within a process, or commencing with the next process;
 - b) confirm conformity with requirements; or
 - c) provide information which creates an opportunity for corrective action to be taken.
- 2.2** The client shall develop templates to be used to record the approval or acceptance of documents at the gates provided in the control framework established

Article IV.

INFRASTRUCTURE PROCUREMENT REQUIREMENTS

Section 4.01 General

- 1.1** Infrastructure procurement shall be undertaken in accordance with all applicable legislation and;

- a) the relevant requirements of the NCIC such as the Joint Venture and Subcontracting regulations, Compliance Regulations, Registration Regulations etc;
- b) the administrative procedures embedded in the approved standard forms of contract identified in this subsystem; and
- c) the provisions of this subsystem.

1.2 All contracts that are entered into with contractors following a procurement process shall be in writing.

1.3 Quality may be evaluated in tender submissions as other objective criteria as provided.

1.4 The preference points system and procurement threshold shall be applied.

1.5 The publication of the award of a contract shall contain at least the following information:

- a) contract numbers and title;
- b) a brief description of goods, services or works;

1.6 the names of successful tenderers and the total of the prices at award, the duration of the contract and procurement method used according to Project Registration Procedures

1.7 Orders:

- a) shall cover only works or services, or any combination thereof, falling within the scope of work associated with the agreement which may not be amended for the duration of the contract;
- b) may not be issued after the expiry of the term of the framework agreement; and
- c) may be completed even if the completion of the order is after the expiry of the term.

1.8 The issuing of orders with a number of framework contractors covering the same scope of work may be made with and without requiring competition amongst framework contractors.

Where competition is required amongst framework contractors, it shall be conducted in a non-discriminatory manner such that competition is not distorted.

1.9 Competition amongst framework contractors for orders shall take place where:

- a) there is no justifiable reason for issuing an order to a particular framework contractor, such as:

- 1) the framework contractor provided the most economical transaction when the financial parameters included in the contract are applied, and has the capacity to deliver;
 - 2) the required goods, services or works cannot technically or economically be separated from another contract or order previously performed by a specific contractor;
 - 3) the service or works being instructed are largely identical to work previously executed by that contractor;
 - 4) the value of the order is less than the threshold for the quotation procedure;
 - 5) the schedule for delivery necessitates that each of the framework contractors be issued with orders on a continuous basis; or
 - 6) capacity to execute the order;
- b) the terms in the framework agreement are insufficiently precise or complete to cover the particular requirement, e.g. delivery time scales or time estimates to complete the order (productivity); or
- c) a better quality of service can be obtained through a competitive process.

Article V.

DESIGN COMPETITIONS

Section 5.01 General

- 1.1** A single- or two-stage design competition may be used as a means to identify one or more suitable consultants to provide design services.

The conditions for a design competition shall clearly state the purpose of the competition and the intentions of the promoter or developer or client, the nature of the problem that is to be solved and all the practical requirements to be met by the competitors.

- 1.2** A design competition shall be initiated following a call for an expression of interest.
- 1.3** All respondents who satisfy the admission requirements for a design competition and complete an application form shall be admitted to the competition as participants.
- 1.4** A jury who is independent of participants in the competition shall be appointed to collectively decide on the outcome of the competition.
- 1.5** Such a jury shall be autonomous in its decisions or opinions and endeavor, adopt decisions on each individual submission by consensus and record its decisions in writing.

Not less than 60% of the members serving on the jury shall have relevant professional qualifications in the subject matter of the competition.

- 1.6** The design competition shall be conducted in such a manner that the identity of any particular participant during the process is not known to the jury until after competition winners are announced.

Solicitation of designs requires time and effort by the designers, a form of compensation should be given to all participants.

- 1.7** A contract may be negotiated with the winner of the design competition. Where more than one contract is awarded to participants in a design competition, all competitors in the final stage of the competition shall be invited to submit tender offers.
- 1.8** Tender offers shall be evaluated in terms of method 4 (ISO 10845-3), with the score for quality being based solely on the ranking of the competition jury.

Article VI.

PROCUREMENT DOCUMENTATION

Section 6.01 General

- 1.1** Procurement documents may be developed in accordance with the provisions of **ISO 10845-1** and **ISO 10845-2** and, where aspects of the national register of contractors and register of projects are established in terms of the NCIC requirements
- 1.2** The Form of Offer and Acceptance contained of **ISO 10845-2** maybe be used, with minimal contract-specific amendments, to form the basis of agreement arising from the solicitation of tender offers.
- 1.3** The formation of a contract in the single volume approach shall occur once:
- a) the schedule of deviations has been completed to reflect each and every amendment to the tender documents:
 - 1) made in terms of addenda issued prior to the close of tenders; and
 - 2) permitted in terms of the conditions of tender, and agreed to in the process of offer and acceptance; and
 - b) the acceptance portion of the Form of Offer and Acceptance has been signed by the person authorized to do so.

- 1.4** The formation of the contract in the three-volume approach may take place after:
- a) each and every amendment to the tender documents made in terms of addenda issued prior to the close of tenders, and those permitted in terms of the conditions of tender and agreed to in the process of offer and acceptance have been incorporated into the final contract;
 - b) a brief summary of the changes made in the final contract document is included in the schedule of deviations so as to allow the reader to understand the nature and extent of the changes; and
 - c) the acceptance portion of the Form of Offer and Acceptance has been signed by the person authorized to do so.
- 1.5** A tenderer’s covering letter shall not be included in the final contract document or referenced in the schedule of deviations. The agreed provisions of such a letter shall be stated in the schedule of deviations.
- 1.6** Standard returnable documents for infrastructure procurement contained shall, where appropriate, form part of the Returnable Documents in procurement documents.
- 1.7** Standard documentation issued by an authority for non-infrastructure procurement shall not be included in infrastructure procurement documents unless they are found to be compatible, and not in conflict with the provisions of a procurement document which complies with the provisions of this standard.

Section 6.02 Standard forms of contract

2.1 The standard forms of contract maybe selected from, and be suitable for use under the conditions described in Table

Table 20: Standard forms of contracts

Form of contract	Code	Intended usage
National Construction Industry Council (NCIC)		
Standard Professional Service Contract	SPSC	Professional services
General Conditions of Works	GCW	An order form type of contract for low-value goods without any incidental work or services on or before a specified date being required
Contract for the Supply and Delivery of Goods		Simple, regional purchase of readily available materials or commodities which require almost no management of the buying and delivery process, minimal testing, installation and commissioning on delivery
General Conditions of Service	GCS	An order form type of contract where low-value services on or before a specified date are required.

International Federation of Consulting Engineers (FIDIC)		
FIDIC Short Form of Contract	Green Book	Building or engineering works of relatively small capital value, or for relatively simple or repetitive work, or for work of short duration. Use for design by employer- or contractor-designed works.
FIDIC Conditions of Contract for Construction for Building and Engineering Works designed by the Employer	Red Book	Building or engineering works designed by the employer. (The works may include some elements of contractor-designed works.)
FIDIC Conditions of Contract for plant and design-build for electrical and mechanical plant, and for building and engineering works, designed by the contractor	Yellow Book	The provision of electrical or mechanical plant and the design and construction of building or engineering works
FIDIC Conditions of Contract for EPC Turnkey Projects	Silver Book	The provision on a design and construct (turnkey) basis of a process or power plant, of a factory or similar facility, or an infrastructure project or other type of development
FIDIC Conditions of Contract for Design, Build and Operate Projects	Gold Book	"Green field" building or engineering works which are delivered in terms of a traditional design, build and operate sequence with a 20-year operation period. (The contractor has no responsibility for the financing of the project/package or its ultimate commercial success.)
Joint Building Contracts Committee (JBCC)		
JBCC Principal Building Agreement	PBA	Buildings and related site works designed by the employer.
JBCC Minor Works Agreement	MWA	Buildings and related site works of simple content designed by the employer
Institution of Civil Engineers (ICE)		
NEC3 Engineering and Construction Contract	ECC	Engineering and construction including any level of design responsibility
NEC3 Engineering and Construction Short Contract	ECSC	Engineering and construction which do not require sophisticated management techniques, comprise straightforward work and impose only low risks on both the employer and contractor
NEC3 Professional Services Contract	PSC	Professional services, such as engineering, design or consultancy advice
NEC3 Professional Services Short Contract	PSCC	Professional services which do not require sophisticated management techniques, comprise straightforward work and impose only low risks on both the client and consultant
NEC3 Term Service Contract	TSC	Manage and provide a service over a period of time
NEC3 Term Service Short Contract	TSSC	Manage and provide a service over a period of time, or provide a service which does not require sophisticated management techniques, comprises straightforward work and imposes only low risks on both the employer and contractor
NEC3 Supply Contract	SC	Local and international procurement of high-value goods and related services, including design

NEC3 Supply Short Contract	SSC	Local and international procurement of goods under a single order or on a batch order basis and is suitable for use with contracts which do not require sophisticated management techniques, and impose only low risks on both the purchaser and the supplier.
PPDA SBD		

- 2.2** The standard forms of contract shall be used with minimal contract amendments which do not change their intended usage and shall only be amended when absolutely necessary to accommodate special needs.
- 2.3** Adjudication shall be used to resolve disputes arising during the performance of a contract prior to proceeding to either arbitration or litigation.

Section 6.03 Tender assessment schedules

- 3.1** Tender assessment schedules shall be used to take account of all tendered financial parameters that have an impact upon the final value of the contract.

Article VII. GUARANTEES

Section 7.01 General

- 1.1** Bonds which guarantee performance with a stated financial benefit in the event of non-performance:
- a) should as a general rule not be required in service, professional service and supply contracts; and
 - b) shall be between 5% and 12,5% of the contract or package order value, excluding VAT, and may be either a fixed or variable guarantee.
- 1.2** Advance payment, where required in contracts and approved by the Senior Management or Board, may only be made to contractors against the lodging of a suitable advance payment bond.

Section 7.02 Retention monies

- 2.1** Retention monies that are held shall not exceed 10% of any amount due to a contractor. The total amount of retention monies held shall not exceed 5% of the contract or package order price.

Section 7.03 Communications

3.1 All procurement documents and communications shall be in English.

Section 7.04 Intellectual property rights

4.1 Clients, shall as a general rule own the rights over the materials specifically prepared by a contractor in relation to a contract.

Section 7.05 Budgetary items

- 5.1** Provision for budgetary items in procurement documents shall as far as possible be avoided.
- 5.2** Assumptions should rather be stated in the pricing data so that they can be priced and adjusted in terms of the contract, should these assumptions be incorrect.
- 5.3** Where unavoidable, estimates of the likely costs may be included in the contract to cover identified work or services to be performed by a subcontractor appointed in terms of the contract.
- 5.4** No provision for contingencies or price adjustment for inflation shall be made in the pricing data or included in the contract price at the time that the contract is awarded or an order is issued.

Section 7.06 Professional indemnity insurance

6.1 Professional service appointments shall as a general rule be subject to proof of current professional indemnity insurance being submitted by the contractor/consultant in an amount of not less than MK10 million in respect of each claim, without limit to the number of claims.

Article VIII.

DEVELOPMENTAL PROCUREMENT POLICY

Section 8.01 General

- 1.1** Clients shall utilize a procurement method to promote Malawian Contractors and Consultant, and, where appropriate, to promote:
- a) work opportunities for target groups; and
 - b) national development goals

- 1.2** Not less than 50% of the points allocated to preference in a points scoring system in the evaluation of tenders shall be allocated to Malawian Contractors
- 1.3** Minimum local participation shall be included in contracts in accordance with the MSME order and the Joint Venture and Sub Contracting Regulations.
- 1.4** Requirements shall be evaluated in tenders through declarations made by tenderers and shall be included in the scope of work associated with the contract.

INFRASTRUCTURE PROJECT MANAGEMENT SYSTEM

Article I. PROJECT MANAGEMENT SYSTEM

Section 1.01 General

- 1.1** The implementation of projects is managed according to the traditional approach to project management. This approach requires division of the project's life cycle into a number of distinct "phases" (also called "stages"), based on the intrinsic logic of the project development process.
- 1.2** Projects are implemented in four phases, i.e. (1) planning, (2) design, (3) works and (4) close-out, with each phase consisting out of a number of sub-phases. Each project phase has its own objectives, usually expressed in terms of the completion of one or more phase deliverables.
- 1.3** Approval of these phase deliverables is normally a pre-requisite for commencing with the subsequent phase of the project.
- 1.4** This outlines the process and procedures recommend pertaining to infrastructure project management. It is the subject that is addressed in this document. This element / process will prescribe project management requirements during execution of infrastructure projects.
- 1.5** The implementation of packages and projects are preceded by a Portfolio Management process. The portfolio planning process is aimed at the identification, definition, appraisal and evaluation of "Potential Projects" to be listed in the Infrastructure portfolio.
- 1.6** On completion of the works (as described in the project/package scope of works) the constructed/renovated/refurbished/repaired infrastructure or immovable asset is officially handed-over to the Operations and Maintenance Team for on-going management. The duties and responsibility of this Team.

Table 21: The recommended Management Framework for the Implementation of Infrastructure Projects

PHASE	DESCRIPTION	GOALS	PHASE CONTROL GATE
1.0	PLANNING		
1.1	Package Preparation	To develop a Strategic Brief (a user requirement specification) for each Package.	1. Acceptance by the Client of the Strategic Brief; 2. Approval by the Client of Project Execution Plan
1.2	Package Solution	To develop a design concept that will enable the client to establish the feasibility of satisfying the package requirements.	1. Acceptance by the Client of the Concept Report; 2. Approval by the Client of Project Execution Plan
1.3		To develop Work Plans in response the User Departments Works List.	Approval by the User Department
2	DESIGN		
2.1	Concept Design	To develop the accepted concept and to finalize the design and definition criteria.	1. Acceptance by the Client of the Design Development Report; 2. Approval by the Client of Project Execution Plan
2.2	Detail Design and Specification	To produce the final detailing, performance definition, specification, sizing and positioning of all systems and components.	1. Acceptance by the Client of the Production Information; 2. Approval by the Client of Project Execution Plan
2.3	Manufacture, Fabrication and Construction Information (if required)	To produce the manufacture, fabrication and construction information based on the production information	Acceptance by the Client of the Manufacture, Fabrication and Construction Information

3	Works		
3.1	Construction/Delivery	To construct/deliver the works according to the working drawings and specifications.	1. Acceptance of the completed works for occupation by the Client; 2. Issue of a Practical Completion Certificate; 3. Approval of Project Execution Plan
3.2	Handover	To facilitate smooth transition of the completed works from the project team to the Operations and Maintenance personnel.	1. Acceptance by the Client of the completed works; 2. Completion Certificate; 3. Approval of Project Execution Plan
4	Close-out		
4.1	Close-out	1. To close out the project by verifying the scope of the work done by all Consultants and Contractors; 2. To effect final payments to all service providers; 3. To archive all record information and statutory certificates.	1. Client of record information and statutory certificates; 2. Issue of a Final Completion Certificate. 3. Approval of Completion Report. 4. Acceptance of Project Execution Plan
4.2	Post Project Evaluation	To assess the actual project benefits against the	Submit evaluation report.

1.7 The Framework is based on the assumption that certain “pre-project” planning activities have already taken place. These activities are normally described as:

- a) The *conceptualization and/or initiation* of the project and include actions such as the *identification* of a need or requirement
- b) The *justification* for addressing this need or requirement by means of a description of the *benefits* that the project will yield
- c) The appraisal and evaluation of the proposed project against pre-determined criteria
- d) The inclusion of, and budgeting for a project in a User Infrastructure budget

Section 1.02 Project Management Framework

- 2.1** The Project Management Framework requires strict adherence to the principle of phase controls, i.e. the approval of certain phase deliverables as a prerequisite for the commencement of the next phase of the project.
- 2.2** The key deliverables at the end of each phase also need to be accepted by the client to ensure that scope creep and project risks are understood and agreed to before proceeding to the next phase of implementation.
- 2.3** Where the cost estimate indicates that the available budget will be exceeded, either additional budget must be obtained or the package information adjusted such that the cost is within the available budget. This needs to be undertaken before proceeding to the next phase of implementation
- 2.4** The end of each phase is regarded as a “control gate” which needs to be opened to allow access into the next phase of the project.
- 2.6** These control gates play a very important role in the planning and control of a project: the actual date of approval can be measured against the planned date of approval in order to evaluate whether the project is before or behind schedule. Gate approval can also be seen as a “milestone” and indicator of overall progress.

Article II.

PROJECT GOVERNANCE

Section 2.01 General

- 1.1** Governance is the framework by which an organization is directed and controlled.
- 1.2** Project governance includes, but is not limited to, those areas of organizational governance that are specifically related to project activities. Project governance may include subjects such as the following:
 - a) defining the management structure;
 - b) the policies, processes and methodologies to be used;
 - c) limits of authority for decision-making;
 - d) stakeholder responsibilities and accountabilities;
 - e) interactions such as reporting and the escalation of issues or risks.
- 1.3** The responsibility for maintaining the appropriate governance of a project is usually assigned either to the project sponsor or to a project steering committee.

1.4 The project management committee or team should have members or at least one member who are registered as:

- d) a Graduate or Professional Architect registered in terms of the BOAQS Act;
- e) a Graduate or Professional Engineer in terms of MEI Act;

or

- f) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.

Section 2.02 Stakeholders and project organization

2.1 The project stakeholders, including the project steering committee should be described in sufficient detail for the project to be successful.

2.2 The roles and responsibilities of stakeholders should be defined and communicated based on the organization and project goals. Typical project stakeholders are shown in Figure 1.

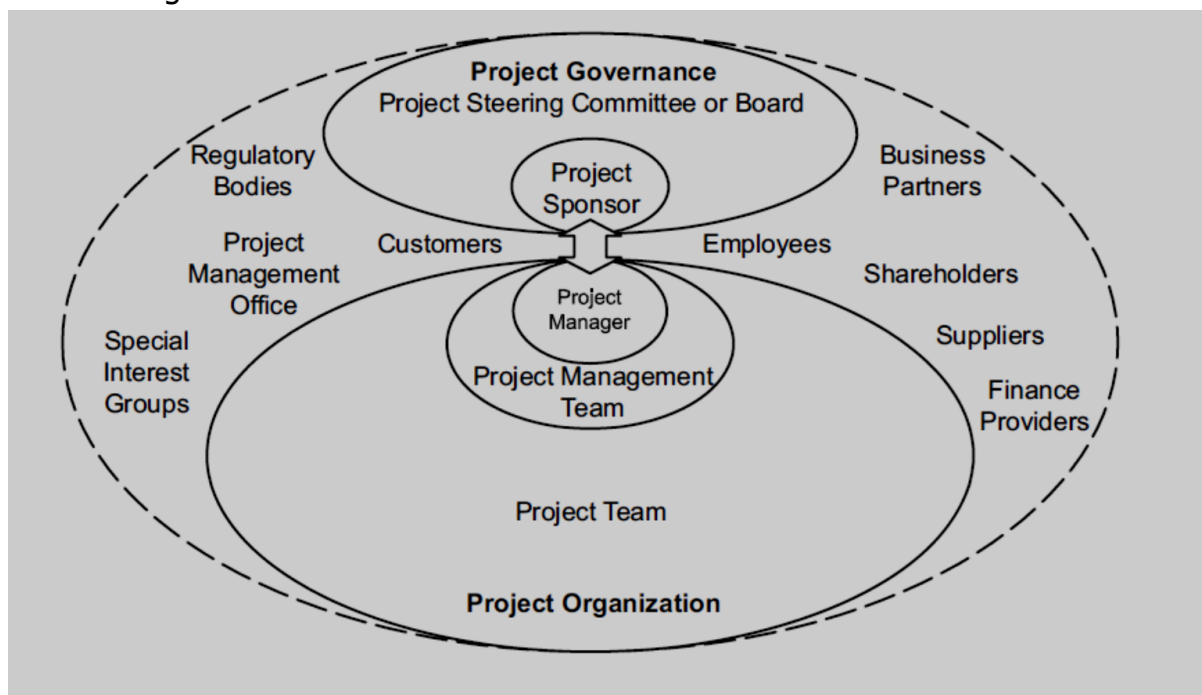


Figure 6: Typical project stakeholders

Stakeholder interfaces should be managed within the project through the project management processes described in Article III.

2.4 The project steering committee is the temporary structure that includes project roles, responsibilities and levels of authority and boundaries that need to be defined and communicated to all stakeholders of the project.

- 2.5** The project organization may be dependent on legal, commercial, interdepartmental or other arrangements that exist among project stakeholders.
- 2.6** The project organization may include the following roles and responsibilities:
- a) the project manager, who leads and manages project activities and is accountable for project completion;
 - b) the project management team, which supports the project manager in leading and managing the project activities;
 - c) the project team, which performs project activities.

Section 2.03 Project governance

3.1 Project may involve the following:

- a) the project sponsor, who authorizes the project, makes executive decisions and solves problems and conflicts beyond the project manager's authority;
- b) the project steering committee or board, which contributes to the project by providing senior level guidance to the project.
- c) customers or customer representatives, who contribute to the project by specifying project requirements and accepting the project deliverables;
- d) suppliers, who contribute to the project by supplying resources to the project;
- e) the project management office, which may perform a wide variety of activities including governance, standardization, project management training, project planning and project monitoring.

Section 2.04 Competencies of project personnel

4.1 Project personnel should have competencies in diverse disciplines which are affected by the project as well as project management in order to achieve project objectives and goals.

4.2 The project steering committee shall at minimum have at least one member who shall be registered as:

- a) a Graduate or Professional Architect registered in terms of the BOAQS Act;
- b) a Graduate or Professional Engineer in terms of MEI Act;

or

- c) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.

4.3 The project steering committee shall be led by a project manager who shall be registered as:

- a) a Graduate or Professional Architect registered in terms of the BOAQS Act;

b) a Graduate or Professional Engineer in terms of MEI Act;

or

c) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.

- 4.4** The project steering committee shall have competent individuals who are capable of applying their knowledge and experience to provide the project deliverables.
- 4.5** Any identified gap between the available shall be promptly filled to avert risks that may arise due to such gaps.

Article III.

Article III.

PROJECT MANAGEMENT PROCESSES

Section 3.01 Project management methods

- 1.1** This Standard identifies the recognizes that there are numerous project management process that can be applied during execution of infrastructure projects.
- 1.2** This standard recommends that the project management process should allow significant coordination such that each process or stages are appropriately aligned and connected with other processes.
- 1.3** Project steering committee and other project stakeholders, should carefully consider the project management processes identified and apply them as appropriate to the project to realize organizational needs.
- 1.4** The Project Manager should tailor the project management processes for the infrastructure project or project phase by determining what processes are appropriate and the degree of rigor to be applied for each process. The tailoring should be accomplished in accordance with the relevant organizational policies.
- 1.5** In order for a project to be successful, the following actions should be accomplished:
- a) determine appropriate processes that are required to meet the project objectives;
 - b) use a defined approach to develop or adapt the product specifications and plans to meet the project objectives and requirements;

- c) comply with requirements to satisfy the project sponsor, customers and other stakeholders;
- d) define and manage the project scope within the constraints, while considering the project risks and resource needs to provide the project deliverables;
- e) obtain proper support from each performing organization, including commitment from the customers and project sponsor.

Section 3.02 Project management process

- 2.1** This Stage immediately succeeds Initiation stage, where the project conceptualization has been completed and actual construction is about to kick off. The Client needs to pay detailed attention to the following steps in order to successfully manage infrastructure projects:
- 2.3** Ensure that a signed contract is available which clearly specifies roles, obligations for each party of the contract (e.g. defects liability period, payment period, provision personnel etc.), scope, dispute resolution mechanisms, reporting lines, communication channels and risk allocation
- 2.4** The client must ensure that there are adequate funds and other resources for the project
- 2.5** Hold kick off meeting and ensure that the Construction site is handed over to the Contractor in accordance with Contractual provisions. Produce a report and submit to Senior Management and Corporate Board.
- 2.6** Ensure that the Contractor fully mobilizes the construction site as specified in the Contract document. This may include but not limited to the following; erection of temporal infrastructure for Hygiene, Safety, traffic detours, site offices, personnel transport arrangements, staff accommodation, reliable source of water and others. These must be certified by the Project Manager.
- 2.7** Then the Contractor can commence execution of the actual works under full supervision of the registered supervising Consultants or Project Manager.
- 2.8** Ensure that only approved, updated and complete technical drawings are used at any section of works in execution.
- 2.9** Each component of the completed work's claim must be fully certified by the project Manager prior to Client payment.
- 2.10** In case of any Scope Creep during project implementation, the Project manager must recommend for approval to the Client in writing and no change shall be effected on the works without client's approval. This also applies to any Cost Variation on the project.

- 2.11** All Instructions must be formally written and copied to all contracted parties on a project before their implementation.
- 2.12** Client shall at all times have an access to site records regarding to the project implementation.
- 2.13** Any work done by the Contractor in absence of the supervising Consultant Engineers shall not be accepted unless otherwise provided for.
- 2.14** Ensure that the Project Manager interprets technical details of the project to Client's understanding before an approval is granted on any issue
- 2.14** Ensure that there are timely payments to the contractors and Consultant engaged on the project and all retention money are retained in line with the provisions of the contract
- 2.15** Ensure that engaged contractors and consultants have valid licenses.
- 2.16** Identifying, managing and controlling risks
- 2.17** Evaluate the performance and capacity of Contractors and Consultant against agreed performance criteria continuously throughout the project and report to Senior Management and Corporate Board who shall report to the NCIC.
- 2.18** Ensure compliance to all laws related to the construction industry, ESIA report, donor requirement and many other regulations throughout project life cycle
- 2.19** Ensure stakeholder management and timely dispute resolution in accordance with provisions of the contract
- 2.20** Carry out site visit, attend progress meetings and produce monthly progress reports for Senior Management or Corporate Board and copied to all contracted parties.
- 2.21** Track project progress against the project baseline, inform Senior Management or Corporate Board on any challenges, deviations from the planned time and financial schedule and lessons.
- 2.22** Ensure timely response to matters raised by consultants and/or contractors in accordance to the provisions of the contract.
- 2.23** Escalate issues or matters to Senior Management or Corporate board that require their action
- 2.24** All instructions or changes on the project be given to the contractor through the Project Manager.
- 2.25** Review and approve operation and maintenance plan
- 2.26** Capture contract completion / termination data
- 2.27** Ensure proper Demobilization stages have been followed by the Contractor prior to project handovers and handover minutes are agreed by all parties.
- 2.28** Where applicable, ensure that partial handovers of infrastructure components follow set acceptance criteria and approved by the Senior Management or Corporate Board.
- 2.29** Undertake an Infrastructure Technical Audit, at any stage of the project, and document corrective measures and lessons.

Section 3.03 Asset data /close out stage

- 3.1** The client will need to ensure that the information obtained is stored where it can be easily retrieved. Where necessary during this stage, in relation to the works, the client will have to:
- 3.2** Agree on a date for practical completion and project handover
- 3.3** Inspect and test infrastructure components to ensure that they comply with agreed specification;
- 3.4** Develop a snag list for all nonfunctioning components and ensure that they are corrected as provided in the contract document
- 3.5** Ensure that practical completion certificate is issued to the contractor and at most 50% of the retention money released to the contractor depending on the contractual provision.
- 3.6** Ensure that all recoveries e.g. penalties, advance payments etc. have been recovered.
- 3.7** Where applicable, ensure that performance bonds or any other bonds are released to the Contractor within a reasonable time and as provided in the contract document.
- 3.8** Ensure that all outstanding payments to all suppliers are made.
- 3.9** Ensure that final project management plans and all necessary documents about the project are updated and archived in the company records.
- 3.10** Ensure that lessons learned are documented should be stored in the organizational process assets of the company.
- 3.11** Ensure that operation and maintenance manuals and as built drawings are produced and stored in the archive.
- 3.12** update portfolio asset register
- 3.13** Produce a report and submit

Section 3.04 Project completion

- 4.1** During this stage after considerable completion and the client has possessed the works, the contractor will be expected to correct all defect that may arise for a specific period of time specified in the contract conditions. The following activities shall be undertaken where necessary during this stage in relation to the works:
 - a) Ensure that all defects that are detected during the defect's liability period are corrected;
 - b) complete the contract by finalizing all outstanding contractual obligations including the finalization and payment of amounts due after the expiry of the defect's correction period
 - c) establish if the objectives of the project have been achieved; and
 - d) compile a completion report for the project outlining what was achieved in terms of specifications and make suggestions for improvements on future projects of a similar nature

Section 1.01 Handover stage

- 5.1** After the contract has been successfully completed, the client will be required to keep a record of the infrastructure and update his portfolio. During this stage, the consultant will be required to produce a final account which he will submit to the client.
- 5.2** The consultant will be required to ensure that these products/documents have been handed over and stored. Thus, the client needs to ensure that the Consultant must:
- a) finalize and assemble record information which accurately reflects the infrastructure that is acquired, rehabilitated, refurbished or maintained; and
 - b) hand over the works and record information to the user and, if necessary, train end user staff in the operation of the infrastructure.

Article IV.

IN-USE EVALUATION

Section 4.01 General

- 1.1** During use of the structure, the client will be required to constantly evaluate performance of the structure against the desired performance.
- 1.2** It is recommended in this guideline that such an exercise should be done for a period of up to one year depending on the size and complexity of the infrastructure.
- 1.3** This process can be undertaken on new, modified, refurbished or rehabilitated infrastructure. The client will have to:
- a) observe infrastructure in use; and
 - b) produce a report which provides integrated feedback aimed at continuous improvement of delivered infrastructure.

OPERATION AND MAINTENANCE SYSTEM

Article I.

BACKGROUND

Section 1.01 **General**

1.1 Asset Management: Operations and Maintenance (O&M) consists of all operational work from the moment assets have been recognized into the infrastructure asset register and handed over to Operations from Projects until the disposal of an asset. It considers the strategic and decision-making work that takes place during the asset strategy determination, asset portfolio planning and physical project implementation processes. The O&M process is linked to the overall service delivery plan of any institution. This stage will guide users in fulfilling their obligations by following the following processes:

- a) Recognize and accept assets
- b) Mobilisation for Facilities Management
- c) Operations
- d) Maintenance
- e) Demobilise Facilities Management

Article II.

PROCESS MAP

Section 2.01 **General**

1.1 Figure 1 below depicts the processes for the Asset O&M and indicates the most important inputs and outputs from and to other asset management processes.

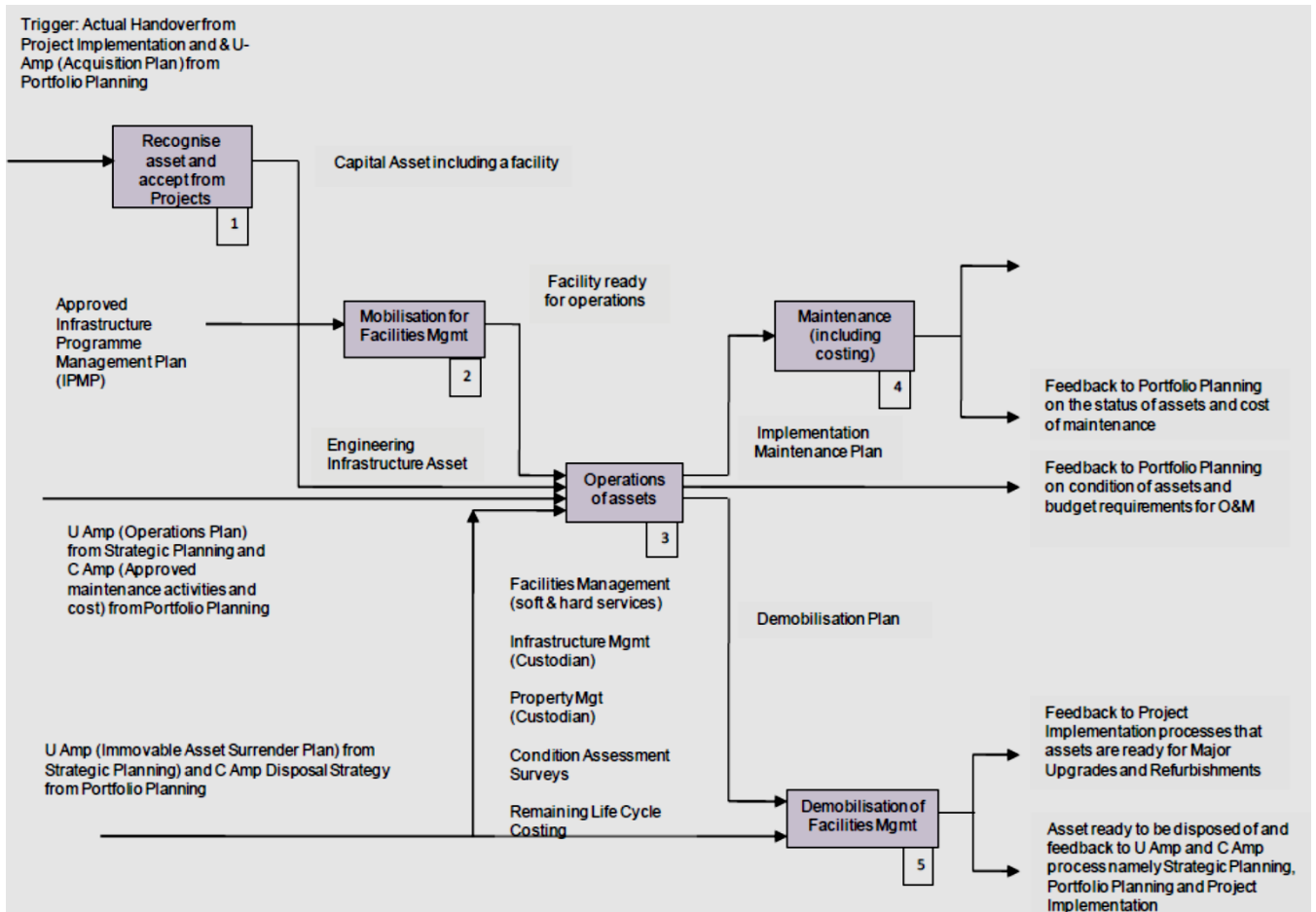


Figure 7: Process map

Article III.

ASSET OPERATIONS AND MAINTENANCE PROCESSES

Section 3.01 General

- 1.1** O&M is the process of receiving assets into the Infrastructure Asset register (IAR), managing and maintaining it over the life cycle and eventually demobilising the asset when required to be terminated.
- 1.2** Asset O&M includes the day-to-day management of assets such as Facilities Management, Property Management and Engineering Infrastructure Management, all of which will require maintenance, costing and budgeting, and maintaining an asset register.

- 1.3** Excluded from Asset O&M are the strategy determination, portfolio planning, acquisition planning and acquisition implementation processes.
- 1.4** Although Asset Disposal is seen as one of the life-cycle phases of an asset it does not form part of O&M. The physical disposal of an asset will be planned and executed by Projects whereas the demobilisation of facilities will be planned and managed by O&M.
- 1.5** Demobilisation of facilities that are earmarked for upgrades, renovation or refurbishment will also be planned and managed by O&M and then handed over to Projects for the physical execution.
- 1.6** The generic process of Asset O&M is covered by the following sub-processes:
1. Asset recognition
 2. Mobilisation for Facilities Management
 3. Operations of assets
 4. Maintenance
 5. Demobilisation of Facilities Management

Article IV.

RECOGNISE ASSET AND ACCEPT FROM PROJECT

Section 4.01 General

- 1.1** The purpose of this process is to recognise the asset into the infrastructure asset register and accounting system. Figure 2 below shows the breakdown of the sub-process "Asset Recognition".

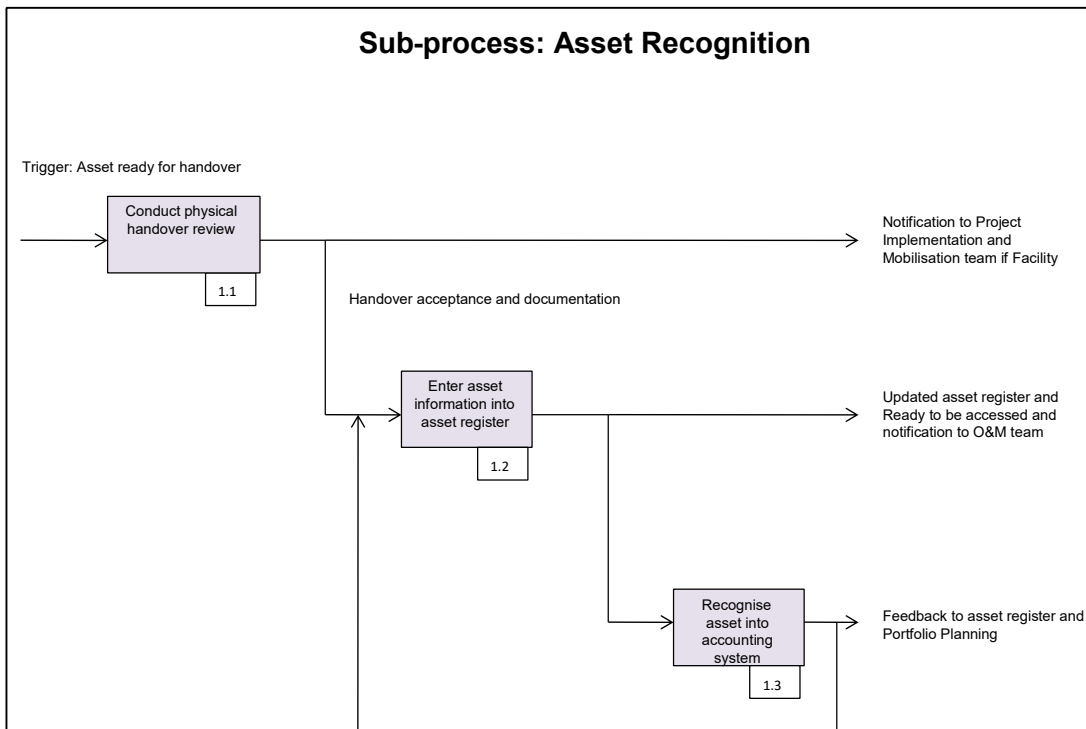


Figure 8: Asset recognition process

Article V.

SUB-PROCESS - ACCEPT THE PHYSICAL ASSET AT HANDOVER

Section 5.01 General

- 1.1** The purpose of this sub-process is to ensure acceptance of the asset by O&M prior to the handover of the asset by the Contractor to Client.
- 1.2** This sub-process is subsequent to the Gate Approval to handover the project from the Contractor to Client, which also requires the input and acceptance by O&M staff and includes the following steps:
- i. Get prior notification of handover date from the contractor to Client
 - ii. Walk through and assess the asset deliverables including serviceable systems
 - iii. Identify non-performance against asset operational requirements
 - iv. Establish snagging lists/defects
 - v. Verify all required spares according to specifications
 - vi. Verify all required documentation such as O&M manuals and as-built drawings

- vii. Verify vendor items and vendor information
- viii. Give Client the go-ahead to continue with the handover from the contractor.

1.3 It is important that O&M takes part in the asset handover process and to ensure that all elements of the asset are exactly as what was specified and in a serviceable condition and that the complete set of documents are handed over.

1.4 This sub-process ends with the issuance of a "go-ahead" notice from O&M staff to Clients to complete the handover process from the Contractor.

Article VI.

SUB-PROCESS - ENSURE THAT RELEVANT INFORMATION IS CAPTURED INTO THE INFRASTRUCTURE ASSET REGISTER

Section 6.01 General

1.1 The purpose of this sub-process is to ensure that the required initial information on the new asset is captured into the infrastructure asset register. Infrastructure Asset Register is a detailed list of all immovable assets which are owned by an organization.

Section 6.02 Asset register

2.1 The infrastructure asset register should have as a minimum, three parts of information, namely:

- i. Generic information e.g., asset identification, location
- ii. User information e.g., functionality related (entered/controlled by user)
- iii. Custodian information e.g., technical condition related (entered/controlled by custodian).

2.2 Typical information to be captured in an infrastructure asset register is (but not limited to):

- i. Date of capitalisation and total acquisition cost (at cost price)
- ii. Ownership of land, registration, location
- iii. Asset identification, tagging number
- iv. Asset condition (functional and technical)

- v. Asset value (replacement, economic value, etc)
- vi. Insurance if applicable
- vii. Dates and costs of upgrades, replacement, disposal etc as well as costs
Leasing information.

2.3 The basic steps for this sub-process are:

- i. Obtain the required information of the new asset for the infrastructure asset register¹
- ii. Validate information
- iii. Enter the information into the infrastructure asset register.

2.4 The sub-process starts when Projects have submitted the final asset information to O&M and ends when the information is captured in the infrastructure asset register.

2.5 It is important validated information that needs to be captured for accounting purposes is the final acquisition cost of the asset and the date of practical completion.

Article VII.

RECOGNISE THE ASSET INTO THE ACCOUNTING SYSTEM

Section 7.01 General

1.1 This sub-process starts when the general asset information is captured in the infrastructure asset register and that the department responsible for finances is notified as such. The basic steps are:

- i. Obtain asset value
- ii. Obtain Asset identification information
- iii. Verify and validate information
- iv. Enter information into the accounting system.

1.2 The sub-process ends when a confirmation notification is sent out from the -department responsible for finances that the asset is entered into the accounting system.

¹ i.e., as built drawings, O&M manuals, full design report, project report and any other information the client may deem necessary

Article VIII.

MOBILISATION FOR FACILITIES MANAGEMENT

Section 8.01 General

1.1 The purpose of the process is to prepare a new asset for occupation and to ensure that all internal and Facilities Management (FM) service providers are ready and trained to manage the asset. Figure 3 below shows the breakdown of sub-process Mobilisation.

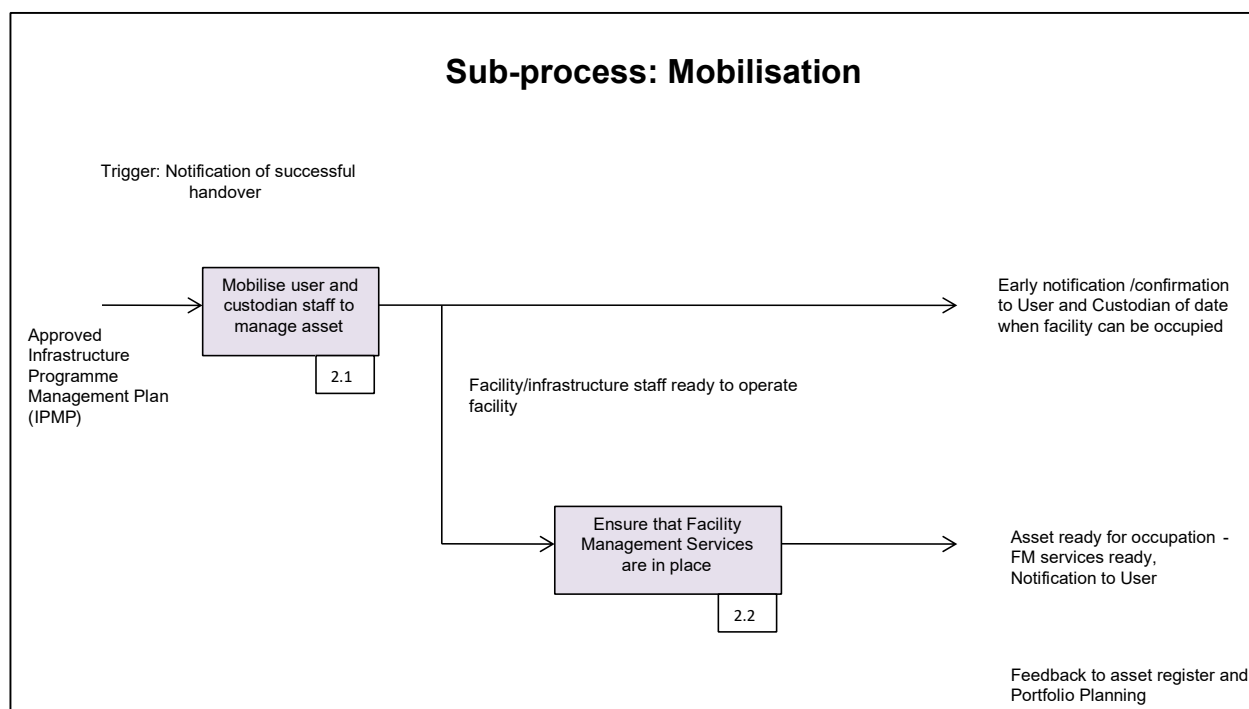


Figure 9: Mobilization process

Article IX.

MOBILISE USER AND CUSTODIAN STAFF TO MANAGE ASSETS

Section 9.01 General

1.1 This sub-process should start in advance to ensure that the asset is ready at least two weeks before occupation. It includes the following steps:

- i. Identify user and custodian staff well ahead of the start-up of operations
- ii. Place and train staff, ready to mobilise facilities management contracts and services.

1.2 The sub-process is triggered by the following documents:

- i. Final notification when handover of asset will be completed and when access will be given to O&M
- ii. The final approved Infrastructure Programme Management Programme (IPMP).

1.3 It is important that O&M continuously follows up with Client on the expected date for practical completion and handover so that the planning and implementation of the mobilisation process can be completed in time for occupation. The sub-process ends with the notification of readiness of user and custodian staff to continue with mobilisation process.

Article X.

SUB-PROCESS: ENSURE THAT FACILITIES MANAGEMENT SERVICES ARE IN PLACE AND OPERATIONAL

Section 10.01 General

1.1 The purpose of this sub-process is that the trained user and custodian staff now ensure that all FM contracts are in place and that the FM service providers have mobilised to conduct facilities management tasks and also to ensure that they have the skills and know-how how to manage and operate the asset and other engineering systems and structures.

1.2 Basic activities in this sub-process are:

- i. Obtain the projected practical handover and user occupation dates of facilities well in advance
- ii. Conduct a facilities management services requirement
- iii. Establish a Statement of Work and prepare tender documentation for facilities management services
- iv. Follow the procurement process to appoint facilities management service providers
- v. Appoint service providers after the tenders have been adjudicated and contracts have been awarded

- vi. Conclude contracts (including signing thereof)
- vii. Provide access to the assets to the facilities management service providers
- viii. Ensure via the contract the readiness of all soft and hard services at least two weeks prior to occupation by the user
- ix. Notify user of readiness of facilities management services.

Article XI.

OPERATIONS OF ASSETS

Section 11.01 General

1.1 This phase involves the operational management of all assets and includes facilities management, engineering infrastructure management, property management, technical condition assessment surveys, maintenance of assets and remaining life cycle costing. Figure 4 below shows the breakdown of sub-process Operations of Assets.

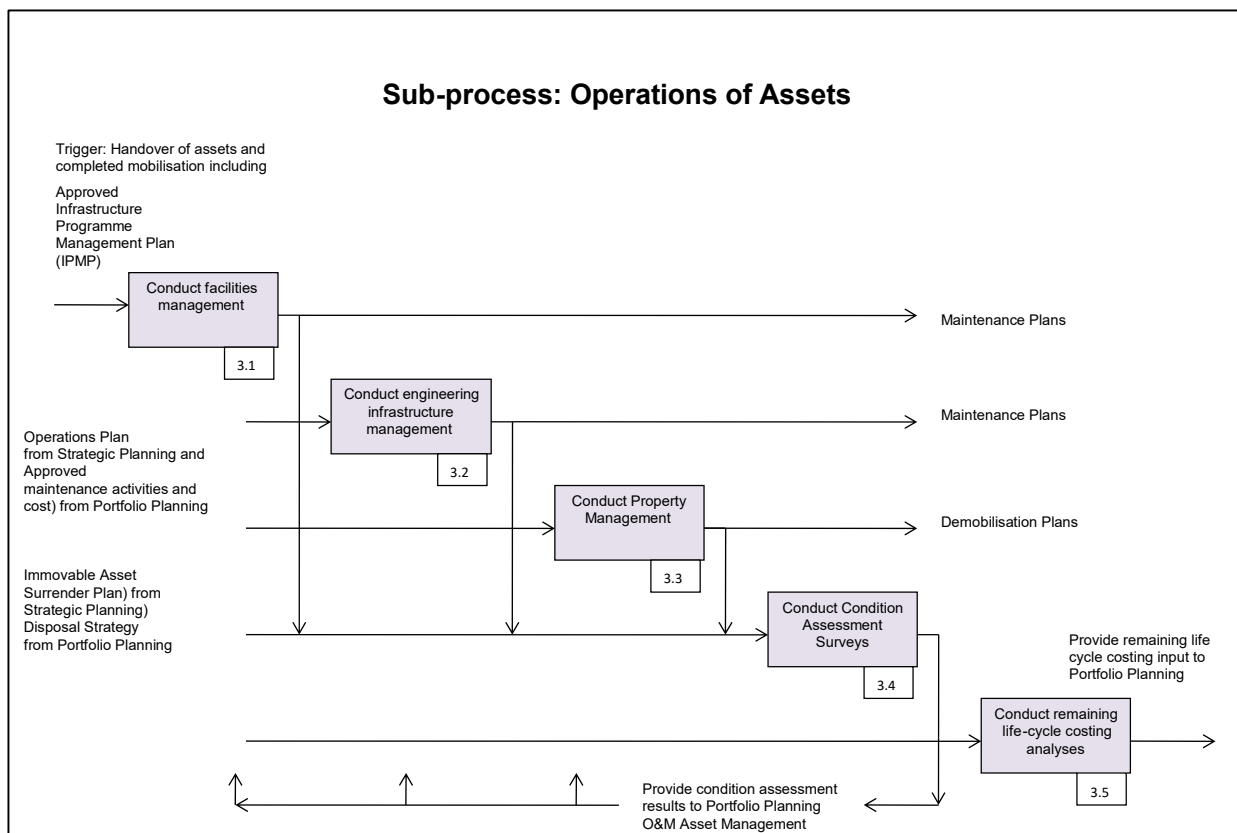


Figure 10: Operation of asset process

Article XII.

CONDUCT FACILITIES MANAGEMENT

Section 12.01

1.1 The purpose of this step is to carry out the management of the facilities including planning and budgeting and includes the following activities:

- i. Identify and establish inspection and maintenance plans as per the operating and maintenance manuals and check, test or replace asset systems, subsystems, assemblies or components
- ii. Ensure that preventative (scheduled, routine) maintenance plans are in place.
- iii. Ensure that all breakdowns are being addressed immediately
- iv. Ensure that facility/asset Condition Assessment Surveys (CAS) are being planned and conducted as per requirements.
- v. Ensure that the required funds are allocated and that facilities management contracts are being placed to ensure continuation of services.

1.2 Outputs from this process are:

- i. Implementation of preventative maintenance plan
- ii. Facilities demobilisation plans
- iii. Inspection plans
- iv. Facilities management operations plans
- v. Facilities management budget.

Article XIII.

CONDUCT CONDITION ASSESSMENT SURVEYS

Section 13.01 General

1.1 The purpose of this sub-process is to ensure that CASs are scheduled to take place at regular intervals and that assets that do not meet the minimum operational requirement

are immediately addressed to improve the asset functionality and to bring it back to the original asset value

1.2 This process includes the following activities:

- i. Ensure that the user conducts a perception technical condition assessment of all immovable assets occupied and that results are being reported
- ii. Establish a technical condition assessment plan to conduct the surveys on all assets within a period of 5 years
- iii. Determine manpower requirements (professional, trained, skilled) to conduct the technical condition surveys as per the plan
- iv. Budget and get funds approval to implement the technical condition assessment plan

1.3 The sub-process ends with the issuance of Condition Assessment Reports on all assets.

Article XIV.

CONDUCT REMAINING LIFE-CYCLE COSTING

Section 14.01 General

1.1 The purpose of this step is, during the Planning and Budgeting process (in the Portfolio Planning Module), to conduct a complete life-cycle costing (LCC) from project initiation until the asset disposal stage including upgrades, refurbishment or renovations.

1.2 This sub-process only addresses the costing of the remaining life of the asset and includes the following activities:

- i. Determine the cost elements of the remaining asset life
- ii. Split cost elements into recurring and non-recurring capital investment costs and into operating sustaining costs
- iii. Decide on the operating method and technology required to run technical systems for the remaining life.

- iv. Determine cash flows for each costing element per annum and for the decided operating method. Cash flows should be presented in a specific time-value, namely either constant (real) money terms or current (nominal) money terms
- v. Conduct an optimisation analysis (best operating approach and technology for the least cost) and select the best remaining life solution per cost element
- vi. For the remaining life selected operating solution and corresponding cash flows, determine the total annual cumulated cash flows
- vii. Compare with original life cycle estimates and submit reports.

Article XV.

MAINTENANCE OF ASSETS

Section 15.01 **General**

1.1 The purpose of this sub-process is to attend to the execution of maintenance plans, primarily preventive maintenance, and also the repair of breakdowns. Figure 5 below shows the breakdown of sub-process Maintenance of Assets.

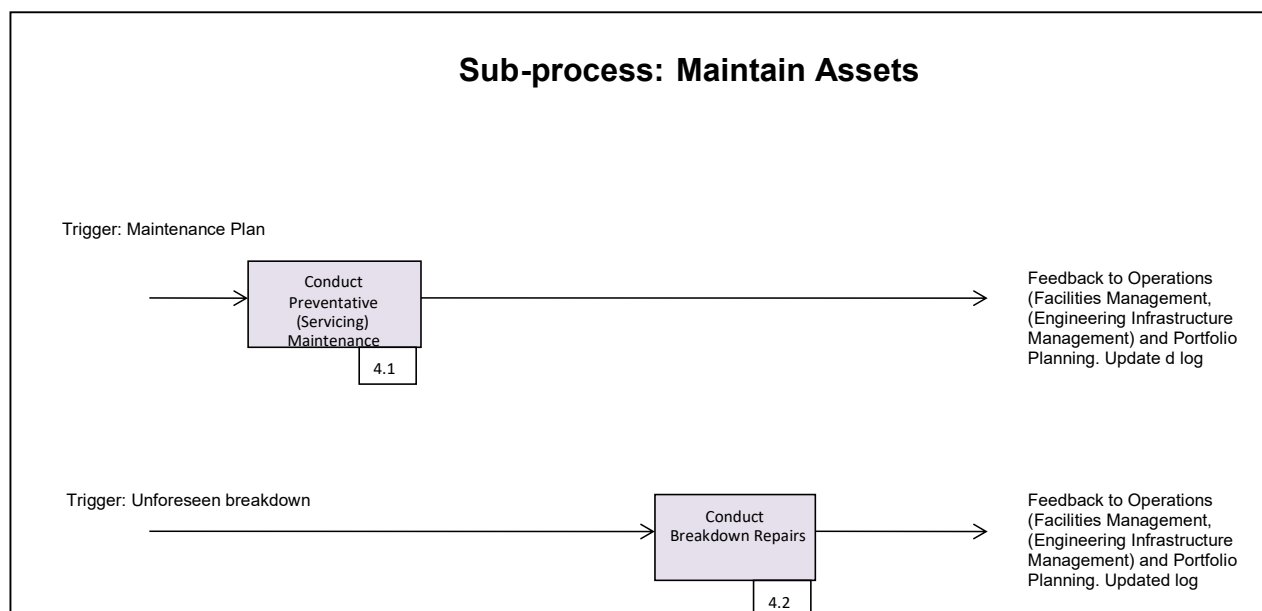


Figure 11: Maintain asset process

Article XVI.

CONDUCT PREVENTATIVE (SERVICING) MAINTENANCE

Section 16.01 General

1.1 The purpose of this step is to attend to the implementation of the preventative maintenance plans.

- i. Instruct the maintenance service provider to implement the preventative maintenance plan
- ii. Ensure records and warranty documentation for all maintenance completed
- iii. Monitor performance of the service provider as per contract
- iv. Consolidate monthly maintenance activities, analyse and submit a monthly preventative maintenance report.

1.2 The sub-process ends with the issuance of preventative maintenance reports.

Article XVII.

CONDUCT BREAKDOWN REPAIRS

Section 17.01 General

1.1 The purpose of this sub-process is to attend to the work to be undertaken when a sudden breakdown of a system or damage to an asset has been reported. It includes the following activities:

- i. Accumulate reports on breakdowns and establish a monthly prioritised repair schedule
- ii. Instruct the repair service provider to repair breakdowns as per the schedule
- iii. Ensure records and warranty documentation of all repairs completed
- iv. Monitor performance of the service provider as per contract
- v. Consolidate monthly repair activities, analyse and submit a monthly breakdown repair report.

Article XVIII.

DEMOBILISATION OF FACILITIES MANAGEMENT

Section 18.01 General

1.1 Demobilisation of Facilities Management is required for assets that will be disposed of as well as assets earmarked for upgrades, refurbishments or renovations. This process refers to the demobilisation of facilities/engineering plants. Figure 6 below shows the breakdown of sub-process Demobilisation.

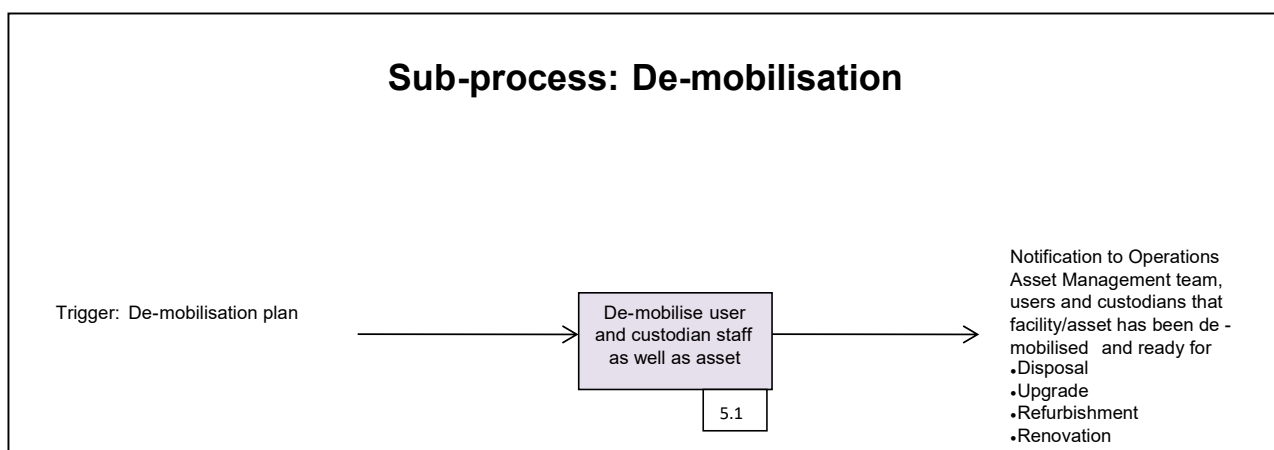


Figure 12: Demobilization of asset process

Article XIX.

DEMOBILISE FACILITIES MANAGEMENT

Section 19.01 General

1.1 The purpose of this step is to ensure the removal of staff and shut down of selected systems prior to the start of the disposal process or upgrades or refurbishments of an asset and includes the following activities:

- i. Establish a demobilisation plan after receipt of notification of an asset to be disposed of or to be upgraded/refurbished
- ii. Implement demobilisation plan and if required removal and storage of re-usable items and systems
- iii. Notification of readiness to hand over asset to Client
- iv. Handover of asset to Client with a stock/inventory/equipment list and condition thereof

- v. Acceptance by Client of asset from handover by O&M.

1.2 This process ends with the notification that a facility is demobilised and that it is ready to be handed over to Client from Operations.

Article XX.

DISPOSAL OF ASSETS

Section 20.01 General

1.1 The decision to dispose of an asset is taken at strategic and portfolio level but based on input given by the asset management team. The asset management team will be responsible to plan for the demobilisation of services but the Project team will be responsible for the specification and contracting for the final demolishing of the asset and reinstating the land (if required) to environmental minimum standards.

1.2 Although a final stage/phase in the product (asset) life cycle, an asset manager needs to take the following into consideration when planning for the disposal of an asset and providing advice to other functions:

- i. Plan the disposal process of assets identified in the disposal plan.
- ii. Cause minimum disposal value to be determined and approved in accordance with relevant laws
- iii. Develop the disposal brief (all disposals) and the specification for bid process, except in the case of inter-governmental transfer.
- iv. Ensure accurate update of the infrastructure asset register.

Article XXI.

ASSET HIERARCHY

Section 21.01 General

1.1 It is important to categorise assets into an asset hierarchy according to which information can be captured in an infrastructure asset register and also according to which records could be kept on operations and maintenance aspects.

Article XXII.

RISKS

Section 22.01 General

- 1.1** This chapter identifies the risks associated with Operations and Maintenance for the Reader to assess and to mitigate.
- 1.2** The following is a list of major risks (but not limited to) that need to be mitigated:
- i. The proposed O&M processes could lead to unsatisfactory service delivery if not properly established and followed within the user and custodian departments.
 - ii. The late start and finish of all-important activities could lead to the non-readiness of facilities for user occupation or custodian re-occupation in order to proceed with major upgrade/refurbishment projects, e.g., the timely placing of contracts for facilities management and maintenance
 - iii. The lack of record keeping with regards to facilities could lead to repetitive or similar mistakes in the future
 - iv. The lack of knowing and managing the complete hierarchy of assets insofar as preventative maintenance is concerned
 - v. The under-estimating or over-estimating the remaining life-cycle cost that could have a negative impact on the budget
 - vi. The employment of not suitably qualified people to manage the asset management process
 - vii. If the asset register is not maintained properly, wrong or outdated information might be used in crucial decision-making exercises.

Article XXIII.

O&M PERFORMANCE MANAGEMENT

Section 23.01 General

- 1.1** Performance management of operations and maintenance differs from that of projects in that it is mostly an ongoing function. Whilst some of the inputs, activities and outputs may differ, the concepts however remain the same. Some of the key differences will be found in the concept of the customer

- 1.2** . In a project environment the project often has a single customer represented by the project sponsor, whereas in the maintain asset processes, for example, it is necessary to deal with multiple customers across the organisation, internally and externally. This will result in performance metrics such as indicators to measure service levels, response times etc per customer, sometimes with indirect indicators.
- 1.3** Conversely, performance indicators for the bulk of the work required to plan and manage the O&M function will not differ from the indicators required by managers in programme management functions to manage their functions.

Article XXIV.

INPUT INDICATORS

Section 24.01 General

- 1.1** O&M inputs are financial, human and technology resources and the input performance indicators will therefore measure:
- i. % of staff available as a percentage of planned staff (input indicator)
 - ii. Cost Performance Indicator of PSP appointed to provide support at this level (input indicator)
 - iii. Cost variance through a form of cost performance index of for example material used in maintenance. Remember that these indicators explore value for money and should be designed as such.
 - iv. Vacancy and other resource production indicators (actual hours worked versus total hours available) measuring the availability of O&M staff versus planned is required.

Article XXV.

ACTIVITY INDICATORS

Section 25.01 General

- 1.1** The following are activity indicators:
- i. % of issues elevated for Management Action closed (activity indicator)

- ii. Budget performance indicator of the Programme unit's own budget (activity indicator) Budget variance indicators explore the performance in terms of spending the budget.
- iii. Variance from service level requirements, for example time to respond to a call.
- iv. Productivity measures – number of calls responded to, especially if these are coupled to a long-distance trip.
- v. Quality performance indicators are essential activity indicators and measuring for example the number of inspection failures, or customer come-backs will provide these.
- vi. Indicators measuring metadata from the customer call log provides useful early warning of failures.

Article XXVI.

OUTPUT INDICATORS

Section 26.01 General

- 1.1** Outputs need to be measured across the O&M value chain and will include measuring on-time submission of business plans, budgets, periodic reports etc.
- 1.2** Management action is an important output and indicators to track these can be obtained from measuring the number of calls closed after having been elevated to management, for example.
- 1.3** Output indicators at an O&M level could also be measured for example by tracking the trends per facility to determine whether the planned maintenance activities have reduced the number of callouts. This type of indicator might however best reside at the O&M programme level.
- 1.4** Each roadmap process and sub-process will require indicators designed around the specific process step applicable to this process step.
- 1.5** Conduct Property Management, would typically address the performance of formulating, updating and submitting documents required by that process, namely:

- i. Land acquisition plans - % plans updated for example.
- ii. Analysis reports on utility bills and consumption trends
- iii. Leasing records and reports
- iv. Asset registers reports
- v. Asset registers non-compliance reports.

- 1.6** In instances where the outputs are defined in plans, the indicators will naturally be developed as part of the planning process.
- 1.7** Conduct preventative maintenance is defined in the approved budget.
- 1.8** Performance of these activities can therefore be measured in terms of one or more dimensions of delivery, namely:
 - i. Comprehensiveness of the deliverables
 - ii. Quality of the deliverables
 - iii. Timeliness of the deliverables

Article XXVII.

PERFORMANCE OF THE INDIVIDUAL

Section 27.01 General

- 1.1** There has to be review of performance of the Officer responsible for implementing O&M based on the agreed Key Performance Indicators (KPIs). This is the fourth performance roadmap step and it is important for the successful management system.
- 1.2** Organizations should develop clear KPIs that are tailor made to the specific individual responsible for O&M and can easily be measured to ensure that the inputs and outputs are reflective of the desired outcome. In addition to the performance appraisal done once per annum, it is important that the performance of the officer is continuously monitored.

SUPPLY CHAIN MANAGEMENT SYSTEM

Article IV.

ORGANIZATIONAL ARRANGEMENTS

Section 4.01 General

- 1.1** Organizations that would like to deliver or are responsible for infrastructure delivery shall establish a suitable infrastructure procurement and delivery supply chain management policy to implement this subsystem or any other infrastructure related project. Such a policy shall as a minimum:
- a) assign responsibilities for approving or accepting deliverables associated with a gate in the control framework or authorizing a procurement process or procedure;
 - b) establish committees or equivalent quality management and governance arrangements;
 - c) ensure that such committee have qualified technical personnel who are registered as:
 - 3) a Graduate or Professional Architect in terms of the BOAQS Act;
 - 4) a Graduate, Associate or Professional Engineer in terms of MEI Act;
 - or
 - 5) a Graduate or Professional quantity surveyor in terms of the BOAQS Act.
 - d) establish delegations for the awarding of a contract or the issuing of an order; and
 - e) establish ethical standards for those involved in the procurement and delivery of infrastructure.
- 1.2** The implementer's supply chain management system shall be used to procure works and services for infrastructure projects

Article V.

CONTROL FRAMEWORKS FOR INFRASTRUCTURE DELIVERY MANAGEMENT

Section 5.01 General

- 1.1** The control framework for the management of infrastructure delivery shall comprise the applicable stages and gates as set out in Figure 1 and the key deliverables described in Table 1; Stages 3 to 9 may be omitted where the required work does not involve the provision of new infrastructure or the rehabilitation, refurbishment or alteration of existing infrastructure.
- 1.2** Stages and 6 may be omitted if sufficient information to proceed to stage 7 is contained in the stage deliverable. Decisions to proceed to the next stage shall at each gate, subject to the provisions of 1.3, be based on the acceptability or approval of the end-of-stage deliverable.
- 1.3** A stage shall only be complete when the deliverable has been approved or accepted by the Management or the Board. Activities associated with stages 5 to 9 may be undertaken in parallel or series, provided that each stage is completed in sequence.
- 1.4** The level of detail contained in a deliverable associated with the end of each stage shall be sufficient to enable informed decisions to be made to proceed to the next stage. In the case of stages 3 to 6, such detail shall, in addition, be sufficient to form the basis of the scope of work for taking the package forward in terms of the selected contracting strategy.
- 1.5** Prefeasibility and feasibility reports shall be required as end-of-stage deliverables for stages 3 and 4
- 1.6** Stages 3 and 4 shall be repeated for each package (work) if the acceptance at stage 4 is for the acceptance of a project comprising a number of packages which are to be delivered over time.

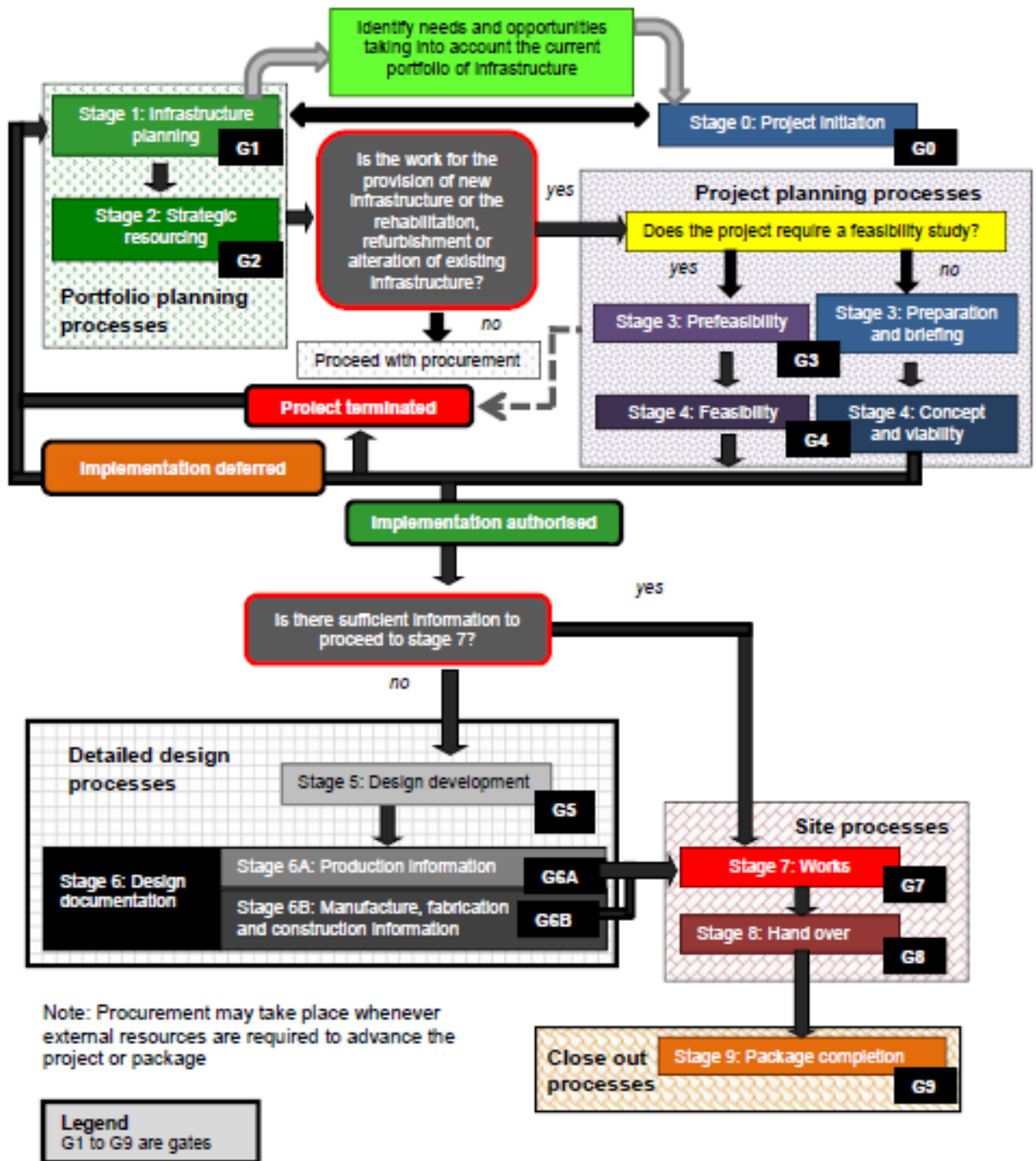


Figure 13: Stages and gates associated with the control framework for infrastructure delivery management

Table 22: End-of-stage deliverables

No	Name	END STAGE DELIVERABLE	
0	Project initiation	An initiation report which outlines the high-level business case together with the estimated project cost and proposed schedule for a single project or a group of projects having a similar high-level scope	
1	Infrastructure planning	An infrastructure plan which identifies and prioritizes projects and packages against a forecasted budget over a period of at least five years	
2	Strategic resourcing	A delivery and/or procurement strategy which, for a portfolio of projects, identifies the delivery strategy in respect of each project or package and, where needs are met through own procurement system, a procurement strategy	
3	Prefeasibility	A prefeasibility report which determines whether or not it is worthwhile to proceed to the feasibility stage Preparation and briefing A strategic brief which defines project objectives, needs, acceptance criteria and client priorities and Aspirations, and which sets out the basis for the development of the concept report for one or more packages	
4	Feasibility	A feasibility report which presents sufficient information to determine whether or not the project should be implemented Concept and viability A concept report which establishes the detailed brief, scope, scale, form and control budget, and sets out the integrated concept for one or more packages	
5	Design development	A design development report which develops in detail the approved concept to finalized the design and definition criteria, sets out the integrated developed design, and contains the cost plan and schedule for one or more packages	
6	Design documentation	6A Production information	Production information which provides the detailing, performance definition, specification, sizing and positioning of all systems and components enabling either construction (where the constructor is able to build directly from the information prepared) or the production of manufacturing and installation information for construction
		6B Manufacture, fabrication and construction information	Manufacture, fabrication and construction information produced by or on behalf of the constructor, based on the production information provided for a package which enables manufacture, fabrication or construction to take place
7	Works	Completed works which are capable of being occupied or used	

8	Handover	Works which have been taken over by the user or owner complete with record information
9	Package completion	Works with notified defects corrected, final account settled and the close out report issued

- 1.7** The infrastructure plan (stage 1), which is informed by demand management requirements as set out in 6.2, initiation reports (stage 0), decisions made during stages 3 and 4 and work in progress in stages 5 to 9, and the procurement strategy (stage 2) shall be reviewed and updated at least once a year.
- 1.8** Client Organization may, if it deems it necessary, add additional gates to the control framework presented in Figure 1.
- 1.9** The approval of the infrastructure plan and the securing of the necessary budget shall be obtained prior to advancing to stage 3. All subsequent stages shall only be proceeded with if the necessary budget is in place.
- 1.10** The approvals or acceptances at each gate shall be retained for record purposes for a period of not less than five years of such acceptance or approval in a secured environment.

Section 5.02 Stage 0: Project initiation

- 2.1** Projects, or groups of projects having a similar high-level scope, which are appraised, shall address particular strategic needs or business opportunities which fall within the organization vision, goals or mandate.
- 2.2** Objective decision- making criteria based on factors such as those relating to strategic objectives, national priorities, the level of stakeholder support, legislative compliance, risk considerations and financial justification shall be used to motivate the acceptance of a project into the infrastructure plan.
- 2.3** The initiation report for a project shall as a minimum:
- a) provide a project description and high-level scope of work;
 - b) outline key issues and solution options that were interrogated;
 - c) outline options that were evaluated;
 - d) indicate the high-level business case; and
 - e) provide the estimated project cost and indicative high-level schedule.

2.4 The decision- making criteria, findings, assumptions and recommendations shall be documented in the initiation report.

2.5 Stage 0 is complete when the initiation report is accepted.

Section 5.03 Stage 1: Infrastructure planning

3.1 The infrastructure plan for a portfolio of projects or packages which require implementation shall cover a period of not less than five years. Such a plan shall be:

- a) described by the high-level scope of work for each project, the proposed time schedule, the estimated total project cost and annual budget requirement, the geographical location, any known encumbrances and estimated timeframes for removing these encumbrances; and
- b) aligned with all prescribed planning, budgeting, monitoring and reporting requirements.

3.2 Stage 1 is complete when the infrastructure plan is approved.

3.4 A delivery management strategy shall be developed following the conducting of a spend, organizational and market analysis. Such a strategy shall indicate how needs are to be met for each category of financing through one or more of the following:

- a) a partnership;
- b) external resources;
- c) another framework agreement;
- d) own resources; or
- e) own procurement system

3.5 A procurement strategy shall, based on the spend, organizational and market analysis, document the selected packaging, contracting, pricing and targeting strategy and procurement procedure for all required goods or services or any combination thereof including professional services.

3.6 The procurement strategy shall include the rationale for adopting a particular option.

3.7 A Government MDA who engage another Government MDA to provide agency services shall develop a delivery management and procurement strategy covering the projects which will be managed by a duly signed contract. The contract shall outline how the project shall be managed including payment of consultancy fees and personnel to be involved on the contract.

3.6 Stage 2 is complete when the delivery and procurement strategy is approved.

Section 5.04 Stage 3: Preparation and briefing or prefeasibility

3.1 The strategic brief shall as necessary:

- c) confirm the scope of the package and identify any constraints, including those relating to occupational health and safety;
- d) establish the project criteria, including the performance and reliability requirements, design life, service life of components, function, maintenance and replacement requirements, mix of uses, scale, location, quality, value, time, safety, health, environment and sustainability;
- e) identify procedures, organizational structure, key constraints, statutory permissions (e.g. environmental, heritage, social, planning, building control), and utility approvals, policies (e.g. environmental, developmental, social, maintenance or facilities management) and strategies to take the package forward;
- f) identify risks that need to be mitigated;
- g) identify interfaces between packages as necessary; and
- h) establish the control budget for the package, ownership costs and schedule for the package or series of packages.

3.2 The prefeasibility study shall as necessary:

- a) document the owner or user requirements specification;
- b) shortlist the options that were considered;
- c) provide a preliminary design for study options;
- d) provide preliminary capital estimate and the proposed schedule; and
- e) present the study outcomes.

3.3 Stage 3 is complete when the prefeasibility report or the strategic brief, as required, is accepted.

Section 5.05 Stage 4: Concept and viability or feasibility

4.1 The concept report shall as necessary:

- e) document the initial design criteria and design options or the methods and procedures required to maintain the condition of infrastructure for the package;
- f) establish the detailed brief, scope, scale, form and cost plan for the package;
- g) provide an indicative schedule for documentation and construction or maintenance services associated with the package;
- h) contain a site development plan or other suitable schematic layouts of the works;

- i) describe the statutory permissions, funding approvals or utility approvals required to proceed with the works associated with the package;
- c) include a baseline risk assessment for the package, and a health and safety plan which is required in terms of the requirements of the Construction Industry;
- d) contain a risk report linked to the need for further surveys, tests, other investigations and consents and approvals, if any, during subsequent stages and identified health, safety and environmental risk;
- e) contain an operations and maintenance support plan which establishes the organizational structure required for the operation and maintenance of the works resulting from the package or series of packages over its service life, and the office, stores, furniture, equipment, Information and Communications Technology (ICT), engineering infrastructure and staff training requirements;
- f) confirm the financial sustainability of the project; and
- g) establish the feasibility of satisfying the strategic brief for the package or series of packages within the control budget established during stage 3 and, if not, motivate a revised control budget.

4.2 A feasibility report shall as a minimum provide the following:

- a) details regarding the preparatory work covering:
 - 1) a needs and demand analysis with output specifications; and
 - 2) an options analysis;
- b) a viability evaluation covering:
 - 1) a financial analysis; and
 - 2) an economic analysis, if necessary;
- c) a risk assessment and sensitivity analysis;
- d) a professional analysis covering:
 - 1) a technology options assessment;
 - 2) an environmental impact assessment; and
 - 3) a regulatory due diligence; and
- e) implementation readiness assessment covering:
 - 1) institutional capacity; and
 - 2) a procurement plan

4.3 Stage 4 is complete when the feasibility report or the concept report, as required, is accepted.

Section 5.06 Stage 5: Design development

5.1 The design development report shall as necessary:

- a) develop in detail the accepted concept to finalize the design and definition criteria;
- b) establish the detailed form, character, function and costings;
- c) define all components in terms of overall size, typical detail, performance and outline specification;
- d) describe how infrastructure, or elements or components thereof, are to function, how they are to be safely constructed, how they are to be maintained and how they are to be commissioned; and
- e) confirm that the package or series of packages can be completed within the control budget or propose a revision to the control budget.

5.2 Outline specifications shall be in sufficient detail to enable a view to be taken on the operation and maintenance implications of the design and the compatibility with existing plant and equipment.

5.3 Stage 5 is complete when the design development report is accepted.

Section 5.07 Stage 6: Design documentation

6.1 Stage 6A (Production information) is complete when all the production information that is required to be accepted prior to being issued for construction, manufacturing or fabrication purposes has been accepted.

6.2 Stage 6B (Manufacture, fabrication and construction information) is complete when the manufacture, fabrication and construction information is accepted as being in accordance with the production information.

Section 5.08 Stage 7: Works

Stage 7 is complete when:

- a) completion of the works is certified in accordance with the provisions of the contract; or
- b) the goods and associated services are certified as being delivered in accordance with the provisions of the contract.

Section 5.09 Stage 8: Handover

8.1 The handover stage shall include as necessary the training of the end user's or the owner's staff in the operation of the delivered infrastructure.

8.2 The record information shall as relevant:

- a) accurately document the condition of the completed works associated with a package;
- b) accurately document the works as constructed or completed;
- c) contain information on the care and servicing requirements for the works or a portion thereof;
- d) contain information or instructions on the use of plant and equipment;
- e) confirm the performance requirements of the design development report and production information;
- f) contain certificates confirming compliance with legislation, statutory permissions and the like; and
- g) contain guarantees that extend beyond the defects liability period provided for in the package.

8.3 Record information shall, as relevant, provide those tasked with the operation and maintenance of infrastructure with the information necessary to:

- a) understand how the designers intended the works, systems, subsystems, assemblies and components to function;
- b) effectively operate, care for and maintain the works, systems, subsystems, assemblies and components to function;
- c) check, test or replace systems, subsystems, assemblies or components to ensure the satisfactory performance of works, systems, subsystems, assemblies and components over time;
- d) develop maintenance plans;
- e) determine stock levels for components and assemblies that need to be regularly replaced; and
- f) budget for the operation and maintenance of the works, systems, subsystems and components over time.

8.4 Arrangements shall be put in place to secure and safeguard the works from the time that the contractor's liabilities for damage to the works end until such time that the works are handed over to the end user or owner who shall accept such liabilities.

8.5 Stage 8 is complete when the end user or owner accepts liability for the works.

Section 5.10 Stage 9: Close out

9.1 The close out report for the package shall outline what was achieved in terms of at least the following:

- a) the performance parameters outlined in 12;
- b) unit costs of completed work or major components thereof; and

- c) key performance indicators relating to developmental objectives.
- 9.2** The close out report shall make suggestions for improvements on future packages of a similar nature. Such a report should also comment on the performance of the contractor and, if relevant, include building tuning or similar reports.
- 9.3** Stage 9 is complete when, as relevant, defects certificates or certificates of final completion are issued in terms of the contract, the final amount due to the contractor in terms of the contract is certified and the close out report is accepted.

Article VI.

PROCUREMENT MANAGEMENT

Section 6.01 General

- 1.1** Procurement is the acquisition of goods, works and services at the best possible total cost of ownership, in the right quality and quantity, at the right time, in the right place and from a right source.
- 1.2** Infrastructure procurement management system is the process which creates, manages and fulfils contracts in infrastructure delivery. In infrastructure delivery it is important to have the right contract documentation in order to ensure that the right contractor and/ or consultant has been engaged on a project. Infrastructure Procurement Management System consists of the following processes and elements.

Section 6.02 Preparation of tender dossier/documents

- 2.1** At this stage, after a project has been approved by Senior Management or Corporate Board, the client should start planning for the procurement process. Some specific activities at this stage should include:
- a) Compile the broad scope and description of services and works to be procured including drawing, Engineers estimate, Technical Specification, schedule of materials, workmanship
 - b) Define evaluation criteria which should be consist with the works and service but not limited to:
 - 1. Preliminary screening *e.g. bidder's registration status with NCIC, Tax compliance, validity of the bid etc.*
 - 2. Technical screening *e.g. availability of key personnel, availability of equipment, firm experience in works of similar nature and volume, arithmetic error etc.*
 - 3. Financial screening *comparison of the evaluated tender prices*
 - c) Ensure compliance to relevant laws such as NCIC Joint Venture regulations, NCIC Registration Regulation etc.

- d) Establish opportunities for using procurement to promote Government developmental policies, such as job creation, capacity building, economic empowerment, and promotion of citizen participation
- e) Decide on procurement method (e.g. open tendering, selective tendering, restricted tendering etc.) that provides value for money (*See appendix 1 for procurement methods*)
- f) Decide on the procurement procedure to be used such as National Competitive Bidding (NCB), International Competitive Bidding (ICB) etc. (*See appendix 2 for procurement methods*)
- g) Decide on contract type e.g. Engineering Procurement Contract (EPC), Admeasured Contract, Build Operate and Transfer, Design Build Own Operate and Transfer (DBOOT) etc. (*See appendix 3 for procurement methods*)
- h) Compile the Tender dossier and submit to Senior Management or Corporate Board for approval.

Section 6.03 SOLICIT TENDERS

3.1 At this stage, after the approval by Senior Management or Corporate Board, the Client should undertake the following steps before tenders can be solicited as follows:

- a) Confirm the availability of budgets and cash flow for the execution of the contract
- b) Confirm appointment of the chairperson and secretary for the bid opening function. The secretary should be a procurement specialist who will write minutes of the meeting.
- c) Advertise for tenders and/or expressions of interest as the case may be, dependent on the procurement procedure selected.
- d) Prepare for and host Prebid meetings for eligible bidders
- e) Conduct a mandatory site visit for eligible bidders with specified period
- f) Receive Submissions on a designated time, date, place and in a prescribed form
- g) Open and read-out the names of bidders and tender prices including any discounts offered by the bidders if any.
- h) Record submissions

Section 6.04 EVALUATE TENDER OFFERS

4.1 At this stage, the Client, through the internal procurement committee, should undertake the following steps:

- a) Propose an ad-hoc evaluation team that will ensure suitably qualified personnel to review components that are consistent with their specialization depending on the nature and scope of the project. Such personnel may be Architects, Engineers and Quantity Surveyors.

- b) Evaluate tender offers according to set evaluation criteria
- c) Compare the tender cost with the estimated cost and undertake an analysis of unit rates and reject outliers.
- d) Conduct post qualification evaluation of preferred bidder(s)
- e) Prepare evaluation report on submissions received and confirm recommendations contained in the tender evaluation report.
- f) Submit the report to Senior Management or Corpora

Section 6.05 CONTRACT AWARD

5.1 At this stage, the Client should undertake the following steps

- a) Notify successful and unsuccessful bidders of outcome of the tendering process
- b) Conduct a debriefing session for unsuccessful bidders who want clarification on their bidding document
- c) Compile draft contract document
- d) With the assistance of a Technical personnel and/or consultant, conduct Negotiation meeting with the preferred bidder. If the negotiation fails, the client should request for further direction from the Senior Management and Corporate Board.
- e) Award Contract- The client should ensure that the contract is properly signed and initialed on every page by all parties to the contract.
- f) Capture contract award data on management systems, if any.
- g) Upload data in financial management and payment system, if any.
- h) Submit copies of the duly signed contracts to Senior Management or Corporate Board.

Article VII.

DEMAND MANAGEMENT

Section 7.01 General

1.1 The demand management system shall be aimed at ensuring that works and services, and any combination thereof required to support strategic and operational commitments, are delivered at the right price, time and place, and that the quality and quantity of such goods or services satisfy needs.

1.2 The demand for infrastructure delivery shall be managed through:

- a) the service life plans which;
 - 1) are based on:

- an assessment of current performance against desired levels of service or functionality; and
 - a needs analysis informed by factors such as policies, norms and standards, condition assessments, functional performance, demographic trends, current and forecasted levels of optimization; and
- 2) reflect a cost estimate for the life cycle activities comprising acquisition, operations, maintenance, refurbishment, rehabilitation or alteration as relevant, over a minimum period of five years; and
- b) infrastructure plans which, as a minimum, summaries the service life plans and provide a credible forecast of current and net demand for services or requirements for functionality over a period of not less than ten years.
- 2.3** Consideration shall, where appropriate, be given to:
- a) alternative service delivery methods or means of satisfying needs which do not require infrastructure to implement or reduce the demand for infrastructure; and
 - b) the disposal of infrastructure that is surplus to requirements.
- 2.4** Projects shall, wherever possible, be delivered in accordance with established norms and standards which are designed to yield value for money.
- 2.5** Identified projects shall be prioritized and budgeted for in an infrastructure plan.
- 2.6** Costs shall be proactively managed through the setting and proactive monitoring of control budgets for projects through the project planning, detailed design and site processes.

Article VIII.

ACQUISITION MANAGEMENT

Section 8.01 Procurement of new infrastructure and the rehabilitation, refurbishment or alteration of existing infrastructure

- 1.1** Budgets submission for budget approval to advance a project or package relating to the delivery or planned maintenance of infrastructure in a financial year shall be broken down into the stages (see Figure 1) which have been completed.
- 1.2** Implementation plans relating to new infrastructure or the rehabilitation, refurbishment or alteration of existing infrastructure which are aligned with the accepted delivery and procurement strategy, shall be developed for each project or package which is to be delivered in a financial year. Such a plan shall as necessary:
- a) identify the objectives of each project or programme of projects;
 - b) identify the scope, budget and schedule for each project or package;

- c) outline the procurement strategy in respect of each project or package;
- d) provide a time management plan for each project, i.e. the baseline against which progress towards the attainment of milestone (key deliverables) target dates can be measured;
- e) provide the projected budget and cash flows which will enable planned and actual expenditure to be compared and revisions to the budget to be approved, and multiple project budgets to be managed;
- f) document the key success factors and the key performance indicators which need to be measured, monitored and evaluated;
- g) contain a procurement plan which indicates the timeline for advertising and closing of tenders, and the obtaining of gate approvals leading up to the award of the contract or the issuing of an order;
- h) identify the major risks and how such risks are to be mitigated or managed;
- i) indicate how quality requirements and expectations are to be met and managed;
- j) outline the controls and measures which will address health, safety, socio-economic or environmental risks;
- k) provide a communication plan which determines the lines of communication and the key activities associated therewith; and
- l) indicate the assigned internal and external resources with implementation responsibilities.

1.3 Financial data shall be gathered to enable a financial report to be generated at regular intervals which:

- a) lists the packages which have completed stage 7 (works) together with actual expenditure;
- b) indicates the following for packages which have advanced beyond stage 4 (concept and viability or feasibility) but have not yet completed stage 7 (works):
 - 1) budget for the financial year;
 - 2) actual expenditure to date;
 - 3) remaining budget for the year;
 - 4) forecast expenditure for the remainder of the year; and
 - 5) forecast over/under expenditure for the year;
- c) indicates professional fees associated with a project or package; and
- d) enables "actual" versus "planned" expenditure to be compared.

Section 8.02 Procurement other than new infrastructure or the rehabilitation, refurbishment or alteration of existing infrastructure

1.1 Annual procurement plans shall be prepared to cover the procurement of goods or services, or any combination other than that relating to new infrastructure or the

rehabilitation, refurbishment or alteration of existing infrastructure which exceed the threshold for quotations.

1.2 Annual procurement plans required in accordance with 7.2.1 shall contain the following information for all proposed tenders for a financial year where the proposed procurement is estimated to equal or exceed the threshold for quotations.

- a) a description of the goods, services or works;
- b) the estimated value of such goods, services or works, including all applicable taxes;
- c) the envisaged date of advertisement;
- d) the envisaged closing date for tenders; and
- e) the envisaged date of award.

Article IX.

CONTRACT MANAGEMENT

Section 9.01 General

1.1 The Procuring entity (client or employer), shall appoint a duly qualified person to be responsible for contract administration who may be titled as the Contract Administrator or the Contract Manager.

1.2 The Contract Manager shall be registered as:

- (a) a Graduate or Professional Architect registered in terms of the BOAQS Act,
- (b) a Graduate or Professional Engineer in terms of MEI Act;

or

- (c) a Graduate or Professional Quantity Surveyor in terms of the BOAQS Act.

1.3 The person responsible for the administration of the contract or an order on behalf of the employer shall:

- a) act as stated in the contract that is entered into, subject to any constraints that may be imposed by the employer or the employer's supply chain management policy for infrastructure procurement and delivery management, using any standard templates that are provided for communications required in terms of the contract;
- b) provide at least the following data within two weeks of the award of a contract or an order for capture on a contract management system:
 - 1) name and contract particulars;
 - 2) the programme or project number, as relevant;
 - 3) the contractual dates associated with the contract or order;
 - 4) except in the case of very low value goods or services contracts, a cash flow forecast;
 - 5) the agreed total of prices or forecasted total of prices; and

- 6) where applicable, whether or not provision is made for price adjustment for inflation, delay damages, performance bond and retention, and if so, what the quantum or estimated quantum of such provisions is;
- c) retain on a contract file, copies of certificates of insurances, bonds and the like;
- d) make an assessment of the amount due to the contractor where required in terms of the contract, or review the contractor's assessment of the amount due and timeously certify payment;
- e) revise the estimates for price adjustment for inflation where provided for, prepare an updated cash flow for the remainder of the contract based on the contractor's schedule, and capture these amounts together with the amounts due to the contractor and the retention amounts, if relevant, on a monthly basis;
- f) provide the revised total of the prices or completion date or delivery date for the contract, or an order, within one week of a contractor revising a forecast of the total of prices, or an event being implemented, which in terms of the contract increases the total of prices or delays delivery or completion, for capture on a contract management system;
- g) manage, if relevant, the interface between the contractor and those responsible for providing client inputs where a management, design and construct or develop and construct contracting strategy is utilised;
- h) develop and maintain a contract risk register;
- i) provide a monthly report on events which, in terms of the contract, cause the total of prices to increase or the contract completion date to be changed;
- j) report all insurance claims made within one week of the claim being lodged; and
- k) make inputs, if applicable, to the close out report in stage 9, including those relating to cost norms, contractor performance and the attainment, or not, of projective objectives.

1.3 The person responsible for administering the contract shall as necessary report on a monthly basis on the following:

- a) the attainment of key performance indicators, if any, provided for in the contract or required by the sponsor of the project or in terms of legislation;
- b) the number of improvement, contravention and prohibition notices issued by the health and safety agent; and
- c) incidents reportable in terms of the Construction Regulations issued in terms of the Occupational Health and Safety Act, briefly indicating the nature of the incident.

- 1.4** The person responsible for the administration of a contract or order relating to the provision of new infrastructure or the rehabilitation, refurbishment or alteration of existing infrastructure, shall be registered in a professional category of registration in terms of the Architectural Profession (BOAQS Act), the Engineering Profession (MEI Act), or Quantity Surveying Profession (BOAQS Act).

Article X.

DISPOSAL MANAGEMENT

Section 10.01 General

- 1.1** A disposal committee shall decide how best to undertake disposals relating to the demolition or dismantling of infrastructure or parts thereof, and the disposal of unwanted, redundant or surplus materials, plant and equipment.
- 1.2** Disposals shall be proceeded with only after the feasibility and desirability of using one or more of the following alternative disposal strategies have been considered:
- a) in case of government MDAs, transfer to another MDA, or for any other organization, transfer to another business unit or a charitable organization at market-related value or free of charge;
 - b) recycling or re-use of component materials; or
 - c) disposal by means of dumping at an authorized dump site, burning or demolition.
- 1.3** The reasons for adopting a disposal strategy shall be recorded prior to proceeding with such disposal.

Article XI.

REPORTING OF SUPPLY CHAIN MANAGEMENT INFORMATION

Section 11.01 General

- 1.1** The implementer shall report to the authority within 21 days of the award of a contract or the issuing of an order, all engineering and construction, supply, service and professional service contracts that are awarded, or orders that are issued, to the NCIC through Project Registration. Such a report shall indicate the following:
- a) the title and number of the contract or order;
 - b) a brief outline of the scope;
 - c) the total of the prices at the time that a contract is concluded or an order issued;
 - d) the time for completion or delivery; and
 - e) the procurement procedure that was used to put the contract in place, or in the case of a framework agreement, whether or not competition amongst framework contractors was reopened.
- 1.2** The implementer shall prepare a report which contains the following:

- a) General performance of Contractor and Consultants;
- b) a brief progress report which reflects progress in terms of time and cost in relation to the time for completion or delivery and the total of prices at the award of the contract or the issuing of an order and the actual costs,
- c) particulars relating to:
 - 2) the cancellation or termination of contracts, together with the reasons therefore
 - d) disputes arising from contracts which have been referred to arbitration or a court of law for settlement; and
- e) contracts where the approval has been granted to increase the total of the prices or the time for completion at Procurement Gate

INFRASTRUCTURE PROJECT TECHNICAL ADUIT

INFRASTRUCTURE PROJECTS TECHNICAL AUDIT (IPTA)

SCOPE

This subsystem requires that IPTA are incorporated and done in all infrastructure projects to ensure adherence to compliance to contract and project requirements as well as provide an opportunity for continuous improvement through implementation of corrective measures as well as the documented lessons.

Article I.

PREAMBLE

Section 1.01 General

- 1.1** Infrastructure Project Technical Audit is an evaluation of various aspects of a construction project by the Consultant, especially the quality, cost and contractual aspects, to ensure that they align with what was stipulated in the contract. Further, the IPTA also compares project management processes and schedule controls with industry best practices.
- 1.2** The purpose of technical audits is to enhance the quality of the infrastructure in the Construction industry. The team to conduct Technical Audits should be comprised of:
- (i) Team leader who shall be registered as:
 - (a) a Professional Architect registered in terms of the BOAQS Act,
 - (b) a Professional Engineer in terms of MEI Act;
 - (c) Professional Quantity Surveyor in terms of the BOAQS Act.

 - (ii) 2 Key experts who shall be registered as:
 - (a) a Professional Architect registered in terms of the BOAQS Act,
 - (b) a Professional Engineer in terms of MEI Act;
 - (c) a Professional Quantity Surveyor in terms of the BOAQS Act.
- 1.3** The Team Leader – shall have at least 10 years’ experience post professional registration of experience covering among other things, design and construction and contract management.
- 1.4** The key experts who shall have at least 10 years of experience in their respective fields.

- 1.5** Where applicable, a minimum of 1 accountant with a public practice certificate and any other professionals as may be required
- 1.6** Construction audits can be initiated by the construction firm, client, project stakeholders or government officials on public projects
- 1.7** All Technical Audits shall be carried out in a professional and objective manner. The Technical Auditor shall audit activities of the three main players:
 - Client/Owner
 - Consultant (Architect, Engineer etc.)
 - Contractor

Article II.
ROLE AND RESPONSIBILITIES OF THE TECHNICAL AUDITOR

Section 2.01 General

1.1 The Technical Audit for a typical construction project should be carried out in three stages as presented in flowchart in Figure 1. These stages are spaced through the duration of construction of a project in order to build in an early warning system.

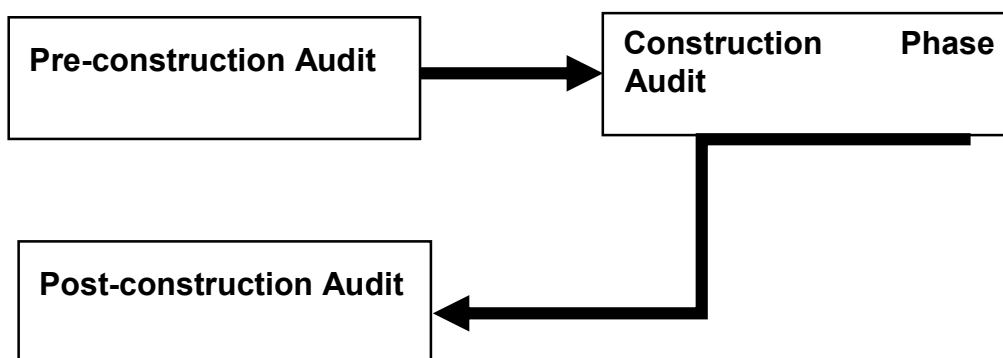


Figure 14: Auditing stages flowchart

- 1.2** The Technical Auditor should be appointed as early as possible after appointment of the Supervising Consultant and immediately (preferably) before the start of the tender process and appointment of the Contractor. This would allow the Auditor the opportunity to assess the following:
- evolution of the project to its current stage.
 - Gross deficiencies in design

- Bills of Quantities or tender documents that have shortfalls identified by the Auditor and reported to the Client, may necessitate revisions.
- 1.3** The Technical Auditor may, in addition to his specified duties, be called on to act as an advisor to the Client on matters pertaining to the project.
- 1.4** At the conclusion of each phase of an audit, the Auditor should present his findings in a report to the Client in an agreed format. The Auditor shall conduct a debriefing session with the project management team to highlight significant findings.
- 1.5** The Auditor shall notify the Client on immediate risks identified during the Audit process (e.g., the use of inappropriate materials, absence of supervising consultant) for early intervention. The notification to the client shall be in a defined format.
- 1.6** The Auditor shall recommend for a post construction technical audit where construction requirements have not been fully fulfilled during the project.
- 1.7** The Auditor shall present the findings in a prescribed manner such as an exit conference to discuss the conclusions of the Technical Audit. The following parties should attend:
- the Client
 - Auditor
 - Contractor
 - Consultant
 - other relevant parties invited by the Client.
 - the Auditor shall be responsible to document proceedings of the exit conference.
- 1.8** The Technical Auditor shall be accountable for his duties to the Client, and must fulfil all the obligations specified in the Terms of Reference for his appointment.

Article III. RELATIONSHIP OF THE AUDITOR WITH THE CLIENT, CONSULTANT AND CONTRACTOR

Section 3.01 General

- 1.1** The Technical Auditor shall be appointed by the Client; to whom he shall report directly. The Technical Auditor shall not advise or issue instructions to the Contractor or Supervising Consultant.

- 1.2** Communication shall be focussed on seeking clarification or information regarding the project. The Technical Auditor shall avoid any interference with smooth implementation of the project.
- 1.3** The Consultant, Contractor and Client shall make available to the Auditor any document, as and when required by auditor as stipulated in the relevant clauses in the tender documentation and/or letters of appointment.
- 1.4** The relationship between the Auditor and the Client shall be documented in his agreement with the Client.
- 1.5** The Auditor shall review actions of the Client during the project and any deficiencies or lack of performance shall be included in the report. This shall make the process transparent, improve on internal practices and avoid problematic projects

Article IV. PRE-CONSTRUCTION AUDITS

Section 4.01 General

- 1.1** The Auditor shall clearly understand the scope and complexities of the project by reviewing the following:
 - all contract documentation including drawings, Quality Assurance, Quality Control
 - specifications
 - materials reports
 - conditions of contract.
 - price submitted by the Contractor
 - the tender evaluation report
 - all correspondence between parties such as minutes, letters, Instructions
- 1.2** All the above documents shall be carefully studied and related to the Contractors proposed programme as well as his resources. This shall probably require consultation between the Auditor and the Client.
- 1.3** This shall be carried out immediately after the Auditor has been appointed and within two weeks of award of the construction contract.
- 1.4** The Auditor shall visit the project site during this phase to acquaint himself with the ground conditions.

1.5 A report shall be submitted to the Client highlighting the outcome of this phase in order to clarify details before the works proceed.

Article V.

CONSTRUCTION PHASE AUDITS

Section 5.01 Initial Audit

1.1 This phase shall be carried out as soon as the contractor is properly established but within the first three months or 20 per cent of the contract period, whichever comes first.

1.2 This phase shall be carried out after construction has commenced so that all of the correct procedures can be established from the beginning of the project.

1.3 In the first on-site audit attention should focus on project management issues and construction methodologies. This will incorporate:

- A review of the Consultants proactivity, control and approval procedures;
- Adequacy of the materials laboratory;
- Qualifications of staff;
- Site communications;
- Knowledge of the contract;
- Construction quality of work completed; •
- General attitude towards the project.

1.4 The Auditor shall also ensure/verify that the assessment of the Contractor has been done satisfactorily by the Consultant, regarding the following issues and aspects:

- Quality and appropriateness of the plant and equipment;
- Methods of working;
- Materials supply;
- Site organization and site management;
- Quality and detail of the construction programme;
- Site safety;
- Adherence to cost control
- Quality assurance procedures;
- Quality control procedures;

- The Contractors project management processes and procedures.
- And general contract administration

1.5 The format and content of Monthly Progress Reports and Monthly Meeting Minutes shall be reviewed to ensure that all the important matters are raised and reported.

1.6 Proceedings of technical meetings should be assessed to ensure that no serious issues are being suppressed from public scrutiny.

1.7 At the end of this stage; the Auditor shall submit a report in a prescribed format and the report shall include the following:

- facts on any deviations from the stipulated contract.
- auditor's opinion on the construction supervision and the ability of the contractor to deliver on time and to meet all of his obligations.
- recommendations to the client on any actions that are considered necessary and should include all issues assessed and not only the critical ones.

Section 5.02 Intermediate Audit

2.1 The Auditor shall carry out an Intermediate Audit that concentrates on conformance with the specification and matters of effectiveness and ensures that the procedures set up initially are running correctly.

2.2 The Auditor shall carry out the intermediate Audit approximately halfway through the project.

2.3 On large projects it shall be necessary to carry out more than one Intermediate Audit and the timing and frequency of these should be specified in the Terms of Reference for appointment of the Technical Auditor.

2.4 The following shall be addressed during the Intermediate Audit/Audits:

(a)Initial Audit

Review the Initial Audit and the subsequent actions

(b) Specification

- i Review of as-built records, relevant correspondence and minutes of meetings;
- ii Inspect and check both the completed work and work in progress. Completed work should conform to the typical plans;
- iii Assess the Consultant's quality assurance procedures,
- iv Assess the laboratory equipment, test methods and general procedures;
- v Assess the construction methods and the care and diligence employed by the contractor.

(c) Progress

Review progress against the programme and review the history of programme changes (reasons and responsibility for delays shall also be assessed).

(d) Cost

- i Check the current estimate against the tendered price using both the Consultant and the Contractors management systems
- ii Check measurement records and the latest payment certificates
- iii ascertain whether disputes and claims are being dealt with in terms of the contract;
- iv Check materials on site by sampling and testing and inspection of materials and records;
- v Check that all payments to the Contractor are as per the contract conditions.
- vi Assess the variations to the contract and cost implications

2.5 The above assessments/information shall be presented to the Client as a Summary Report highlighting any actions necessary to ensure successful completion of the project.

Section 5.03 Final Audit

3.1 This shall commence at least four weeks before issuance of the substantial completion certificate and shall be completed before the site staff is completely demobilised from site.

3.2 If an earlier starting time for the Final Audit is possible without causing disruptions to the project, then it should be encouraged. The purpose of the Final Audit is to determine conformance with all aspects of the Contract. The principal sources of information will be:

- as-built drawings
- test records
- measurement and payment data
- site correspondence and minutes.

3.3 Both the actions of the Consultant and the Contractor shall be assessed. A principal output of the Final Audit shall be a recommendation for any further testing that is required to assess the quality of the works (Post Construction Audit).

3.4 The required field and laboratory investigation identified in Section 6 would follow this immediately and shall be concluded within the defects liability period. This is necessary so that deficiencies identified by the Post-construction Audit can be taken up with the Contractor prior to expiry of the defects liability period.

3.5 A full report on the project shall be presented to the Client summarising any further testing considered necessary and indicating any contractual obligations or any other outstanding matters that have not been fulfilled by either the Consultant or the Contractor.

Article VI.

POST CONSTRUCTION AUDIT

Section 6.01 Data Requirements

1.1 The Post construction audit can be carried out even where there has been no pre-construction and construction phase audit.

1.2 The three phases of a Technical Audit as discussed above shall define the extent of any possible Post-Construction Technical Audit, following the Final Audit

1.3 The Technical Auditor shall collect all available information for evaluation.

1.4 A full post construction phase Technical Audit may require laboratory and fieldwork. The input in the three phases (Pre-construction, Construction audit and Final) comprises predominantly a performance review and discussions with limited time spent on site. This would include visits to the site offices and a brief visual evaluation of the project in progress.

Section 6.02 Project Familiarization

2.1 The Technical Auditor shall obtain all information from the project preconstruction phase of a technical audit, regarding the design and progress of the project. This shall include:

- Consultant's design and drawings;
- Materials reports;
- Tender documentation including Tender Evaluation report;
- Bills of quantities;
- Ownership of plant;
- Contractors resources, program and cash flow

Section 6.03 Consultant's Design and Drawings

3.1 The Technical Auditor shall assess all the drawings and design documents pertaining to the project.

3.2 The Technical Auditor may determine whether the design is appropriate for the specific situation. The appropriateness of the project includes diverse considerations such as:

- Planning;
- Political;
- Social;
- Environmental;
- Cost-benefit prioritisation issues

3.3 However, the appropriateness of the project would normally have been assessed in-house by the Technical team prior to tender and it can be assumed that they were considered to be appropriate.

3.4 The Technical Auditor shall, however, familiarise himself fully with the background to the project, qualities and quantities (from materials reports) and specific issues relevant to the project.

Section 6.04 Tender Documentation

4.1 The Technical Auditor shall assess tender documentation and unusually high or low unit rates shall be noted. Specific note shall be made of any alternatives proposed and whether these were accepted.

4.2 The Technical Auditor shall take note of the Special conditions of contract particularly as they apply to quality control/assurance testing.

4.3 The Technical Auditor may evaluate the Tender prices or process, and aspects that might influence project management or quality of construction shall be highlighted during assessment of the tender documentation. Any examples of apparent negligence should also be noted.

4.4 The Technical Auditor shall take note of the proposals to use unconventional construction plant or techniques. Special conditions such as the use of proof rolling should also be identified to ensure that the results of compaction trials are obtained, assessed and properly recorded.

Section 6.05 Bills of Quantities

5.1 The Technical Auditor shall assess the Bills of Quantities to identify unusual quantities, spurious prices and to generally familiarise himself with the pricing of the project and aspects likely to result in claims should be noted.

Section 6.06 Initial Audit

6.1 The TA shall visit the site where establishment and methodology issues are generally audited. During this visit the following aspects should be assessed through observation and discussions with site staff:

- Management issues (e.g., work schedule, documentation, construction programme, etc);
- Construction methodologies;
- Site laboratories;
- Plant;
- Key personnel;

- Safety;
- Quality assurance;
- Site instructions
- Environmental protection

6.2 The TA shall evaluate the availability and quality of documentation (e.g., work programme, laboratory methods, control and approval procedures, etc) and communication among the respective parties.

Section 6.07 Intermediate Audit

7.1 The TA shall identify inconsistencies and deviations from conformance with the specifications. It is essential that the following data be obtained, through the Client. It shall be specified in the Tender documentation that all information will be made available to the Auditor for Auditing purposes.

- Laboratory test results;
- Daily/weekly/monthly construction records;
- Quality assurance data;
- Site correspondence, site instructions and minutes of meetings, engineer's orders, etc.;
- Variation orders and contractor's claims;
- Measurement and payment certificates;
- Project management issues;
- Efficiency of contractor's plant and machinery.

7.2 In addition, any other documentation originating from the project shall be reviewed.

Section 6.08 Laboratory Test Results

8.1 The TA shall inspect routine laboratory test results to ensure that the correct materials are being utilised, the materials are generally within specification and the laboratory testing is of the expected frequency and quality.

8.2 The TA shall inspect the laboratory equipment for calibration and check test procedures methodology for compliance with the project specifications.

Section 6.09 Construction Records

- 9.1** The TA shall inspect Daily/weekly/monthly construction progress records to identify problems resulting in slow progress as well as periods with greater than expected progress.
- 9.2** Unless additional resources were employed, very rapid progress may be indicative of short cuts being taken. Material quantities, stabiliser application rates, bituminous spray rates and quantities and water usage shall all be assessed in terms of the completed works for road project.

Section 6.10 Quality Assurance

- 10.1** The TA shall inspect quality control/assurance measurements to ensure that the correct quality was achieved. Calibration and control records of nuclear density testing equipment shall be inspected.
- 10.2** The TA shall take samples or carry out testing to check construction quality if so dictated by his assessment.

Section 6.11 Site Correspondence

- 11.1** The TA shall assess all relevant site correspondence, Instructions, variation orders and minutes of monthly meetings. Construction problems will usually be identified at these meetings, and disputes between the Client, Consultant and the Contractor shall often be indicative of potential problems.
- 11.2** Delays due to material shortages, compaction problems or other construction issues could all lead to potential "shortcuts" that are not easily identified when construction is complete.
- 11.3** The TA shall review all correspondence associated with progress of the project to identify how smoothly the project is progressing. A full set of site instructions shall be obtained.
- 11.4** A high degree of rejection of work by the consultant could indicate that the Contractor experienced difficulties meeting the specification giving warning of potential problems.

Section 6.12 Variation Orders and Contractors Claims

- 12.1** The TA shall assess variation orders against the original design, the effect on cost, time and whether they were implemented correctly. Variation orders are almost always associated with claims.

Section 6.13 Measurement and Payment Certificates

- Measurement and payment certificates should be compared with the tendered bills of quantities for confirmation of work done;
- It is essential to ensure that all of the specified layers are properly accounted for, especially when stabilisation of materials is involved in case of a road project;
- Sample payment certificates shall be checked and related to the supporting documentation;
- Calculations for rain and other unforeseen delays and contract price adjustment should be in accordance with the conditions of contract. The rates used to calculate amounts must be either the tendered rates or agreed rates with supporting documentation;
- Payments for extensions of time and unforeseen conditions must agree with the Approval given by the Consultant;
- Payments for day works should be according to the certificates signed by the Contractor and the Consultant. The need for day-works can also be evaluated;
- All quantities shall be measured in accordance with the pay items. Each certificate should be cross-referenced with the Consultant's and the Contractor's measurements;
- Dimensions from typical plans shall be checked;
- Measurements based on the Consultant's judgement, such as for excavation of hard, intermediate or soft material and other ground conditions shall be carefully assessed to establish the parameters used;
- Where a current certificate is evaluated, the materials on site shall be verified. Spot measurement checks may also be required.

Section 6.14 Project Management Problems and Issues

14.1 The TA shall assess the application of good project management principles can be assessed in a number of areas. The Contractor's programme is a key project management tool.

- 14.2** The TA shall assess the quality and detail of the programme, and progress according to the programme. Consistency between planned activities and those actually undertaken shall be noted as well as resources and time spent.
- 14.3** The on-site labour force and plant resources shall be pertinent to current activities and adequate for meeting project deadlines.
- 14.4** The TA shall question any excessive delays due to adverse weather. Conformance with the requirements of the General Conditions of Contract as to submission and response dates, certificates of insurance, compliance with statutory submissions for labour, etc. shall be reviewed and compliance verified.
- 14.5** Both the Contractor and the Consultant shall have suitably qualified site personnel to ensure that the project is properly managed.

Section 6.15 Final Audit

- 15.1** The TA shall make use of the final audit carried out when construction was nearing completion use, all the information collected during the earlier phases to justify and identify the need for additional investigations.
- 15.2** Problems identified and rectified during the Initial and Intermediate Audits shall minimise problems likely to be revealed in the Final Audit. In addition to the information already available from the earlier Audits, it shall be necessary that the following also be evaluated:
- Consultant's construction/completion report;
 - Performance of the structure to date;
 - Safety of the structure
- 15.3** The completion report is usually not available immediately after completion of construction. Attempts should, however, be made to have it submitted as soon as possible.

Section 6.16 Construction/Completion Report

- 16.1** The TA shall evaluate the Consultant full completion report This should contain all the relevant information regarding progress of the project including all quality control

records and test results. There should be a particular focus on the frequency of testing and completeness of test results, i.e. no areas with missing data.

16.2 The Client can engage the auditor on every stage of the project or on specific stages of the project. The duration of the Audit at every construction stage shall not exceed 10days. However, the duration for Post contract audit shall be not less than 3 months

APPENDICES

APPENDIX 1- FORMAT OF THE AUDIT REPORT

EXECUTIVE SUMMARY

1 INTRODUCTION

1.1 Project Background

1.2 Technical Audit Assignment details

1.3 Scope of Technical Audit Assignment

1.4 Expected Outcomes from Technical Audit

2 TECHNICAL AUDIT TEAM ORGANISATION & METHODOLOGY

2.1 Technical Audit organization

2.2 Methodology

2.3 Quality Management

3 TECHNICAL AUDIT FINDINGS

3.1 Construction work status

3.2 Project Evaluation

4 DISCUSSION AND RECOMMENDATIONS

4.1 Discussions

4.2 Lessons Learnt

4.3 Recommendations

5 CONCLUSION

APPENDICES

APPENDIX 2- SAMPLE TERMS OF REFERENCE FOR INFRASTRUCTURE TECHNICAL AUDIT

Terms of Reference for Engagement of Infrastructure Projects Technical Audit (IPTA) Services for the Construction Industry

ASSIGNMENT NAME:

Proc. Ref. No. :

Date of Issue :

Preamble.

1.0 Background

Infrastructure/construction projects generally involve large budgets; simple to complex processes; large volumes of tender/contracts documents; and long delivery periods to create the country's physical assets. The nature and delivery processes of infrastructure projects is prone to many challenges and risks which could easily result into delays, escalation of prices, quality issues, failed projects and loss of valuable resources.

2.0 Rationale for Introduction of Infrastructure Technical Audits

The XXXX has noted that there is an increasing demand for Infrastructure Technical Audit Services for both public as well as private sector projects. In some cases, Technical Audits are a requirement by the funding agencies to serve their needs, while in many locally funded projects, there is no requirement, leaving projects with little or no controls at all which is prone to mismanagement and inefficiencies in project delivery.

The introduction of infrastructure technical audits/assurance studies for designated and interest projects will ensure review of compliance to contract and project requirements as well as provide an opportunity for continuous improvement through implementation of corrective measures as well as the documented lessons.

3.0 Objectives of the audit

The main objectives of the technical audits are to verify independently whether (i) the works were constructed in accordance with the relevant works contracts, the relevant standards and specifications and good international practice, and (ii) the documentation, timeliness and overall quality of project management, supervision and construction is appropriate. The technical audit assignment is part of the due diligence activities for the selected public projects include those:

- (i) To ascertain whether the project was professionally and ethically conceived, procured, executed and managed.
- (ii) To generally ascertain whether the project implementation complied with provisions of the relevant laws and regulations.
- (iii) To verify compliance to contractual provisions, conditions of contract and specifications

4.0 Scope of work

Under the direction of the xxxxx, the Consultant shall be responsible:

4.1 To verify whether construction as per contract

The technical audits should verify whether the works comply with the technical specifications and standards described in the Contract documents. The examination will be based on visual inspections and on:

- a. the laboratory analysis of core samples, to verify, among other elements, layer thicknesses, gradings, bitumen content, cement content, quality of aggregates, compaction, voids-in-the-mix, substructure and superstructure materials and the general quality of materials used.
- b. Verifying if the construction methods are in accordance with the design documentation and Technical Specification

4.2 To verify quality of processes

The technical audits to ensure works are implemented in an efficient way will focus on an analysis of the entire implementation process of the construction and supervision works. This will include an examination of the general management and contract management and an examination of works execution.

The Consultant will carry out the activities described below under the various headings:

a. Audit of General Management:

- i. Examine the division of tasks among the various actors involved in the Project execution and assess their coordination of activities.

- ii. Evaluate the system for Contract management, including: the quality of information shared by the system and ways of cost savings
 - iii. Examine the filing system and documentation, particularly in respect of Contract documents management.
- b. Audit of Execution of Works:**
- i. Verify the conformance of the work and their costs with the planned program, settled in the Contracts.
 - ii. Verify that the Contractor executes the works in accordance to various legal requirements e.g., city bylaws, environmental requirement etc.
 - iii. Verify the new unit prices (if any), in comparison with the Contracts, as well as the actual works implemented.
 - iv. Verify good record keeping Supervision Engineer and Contractors, for example: work site notebooks, work site reports, work orders, justification of eventual amendments, as well as minutes of preliminary and final works acceptance, etc.
 - v. Verify the necessary expertise have been sought and utilized in good time to resolve problems of technical issues.
 - vi. Verify the timing of works execution of completed and ongoing works, in relation to the Contract timing. Prepare a summary table for each Contract analysed indicating the type of works, the total cost and the delays, if any. In the case of delays observed at the work site, analyse the measures taken to make up time. Analyse, if necessary, any cost overruns, by type of work, amount of Contract.
 - vii. Verify that the goods and materials required for construction works execution were procured in conformance with quantities and norms established in the technical specification and requirements specified in the Contracts.
- c. Audit of Works Supervision:**
- i. Confirm that the supervision process implemented by the Supervision Engineer is in conformance with the terms of the Contract.
 - ii. Examine the supervision Engineer's contract and ascertain its appropriateness to the contract
 - iii. Confirm that all invoices, authorizations, justifications and variation orders, payment, etc., are available and properly filed. Confirm that payments are made in conformance with the terms of the Contract and within the agreed limits.
 - iv. Confirm that the supervision process covers also crosscutting issues e.g., safety and welfare of employees
- d. Audit of Quality of Road Works:**

- i. Assess the quality of the works and their conformance with the specifications indicated in the bidding documents and works contracts, and whether the contract terms were respected by the parties.
- ii. Review/audit of the bridges, structures including drainage structures as part of the road construction contracts.
- iii. Provide detailed digital photographs of audit findings together with GPS coordinates.
- iv. Drill and analyse core samples where necessary.
- v. Carry out all testing and analysis of sample cores taken from completed works to meet the objectives of the assignment
- vi. For road projects: testing of material from the layer of unbound mineral aggregate and / or soil from the subgrade/capping layer shall be carried out. Furthermore, the laboratory testing will have to include at least the thickness of sub-base course, grading, fine content and quality, "in situ" compaction. Sample tests of concrete samples from bridges, retaining walls and other concrete structures.
- vii. For building project: test the strength of the foundation, whether or the sublayer of the soil under the foundation was compacted to required maximum dry density, test the strength of the slab and the hardcore layer
- viii. The technical auditor will be directly responsible for identifying the precise locations where samples are to be drilled and for the actual drilling and taking of the samples. He/ She will also be responsible for the reinstatement of the drilled holes (filling and compacting).
- ix. The laboratory testing of the core samples will have to include as a minimum the following: the thickness of the various layers, grading of aggregates, bitumen content and quality, compaction, voids-in-the-mix and the general quality of materials used.
- x. The technical auditor may subcontract the actual drilling of the samples, the reinstatement of the drilled holes and the laboratory testing of the samples to an appropriate, qualified and independent firm or institution. He/She will however be directly responsible for supervising any subcontractor to ensure the quality and accuracy of all subcontracted work, and especially to ensure the accuracy of the laboratory tests.

5.0 Qualifications and Responsibilities

5.1 Qualification and Experience:

The Consultants team should have the following personnel:

- a. Key Expert (1) or Team Leader, who should be a holder of a Bachelor's degree in Civil Engineering/Architecture/Quantity Surveying from a recognized University and a Registered professional; with at least 10 years post qualification experience in the industry. The candidate should have experience in infrastructure construction, supervision or project management and should be fully conversant with construction practices and management of contracts.

- b. Key Expert 2: or co team leader who should be a holder of a Bachelor's degree in Architecture from a recognized university and a Registered Architect with experience in building work. The candidate should be conversant with construction practices and management of construction contracts.
- c. Key Expert 3 Highway Engineer - He/she should be a holder of a Bachelor's degree in Civil Engineering with at least 10 years of experience, of which at least 6 years in road construction, supervision or project management
- d. Key Expert 4 Structures Engineer - He/she should be a holder of a Bachelor's degree in Civil Engineering with at least 10 years of experience in structures construction, supervision or project management. S/He should have at least 5-year experience in project supervision of road structures and 5 years of buildings.
- e. Key Expert 5 Contract management and procurement specialist. He/she should be a holder of a Bachelor's degree in Civil Engineering with at least 10 years of experience, of which at least 7 in the procurement and contract management of projects.
- f. Key Expert 6 Quality control specialist. He/she should have a holder of a Bachelor's degree in Civil Engineering with at least 10 years of experience, of which at least 7 as materials engineers in road sector projects.

6.0 Reporting

6.1 The Consultant shall report to the Council through the Regulatory and Enforcement Director.

6.2 Report Submission

General

All draft reports will be submitted to the Council through the office of the Regulatory and Enforcement Directory. Management will comment on the document and return it to the Consultants within 10 working days for finalization.

Inception report

To be submitted within 2 weeks from the commencement of the assignment, presenting the methodology and work organization, reporting format and checklists, proposed rating system, and detailed work schedule for the first audit.

Audit reports

- (i) Prior to the conclusion of each audit visit, a brief summary of the preliminary conclusions of the visit will be presented to Management. If possible, this should be during a debriefing session, or otherwise in the form of a very short report or PowerPoint presentation.
- (ii) For each assignment, a Preliminary Technical Audit Report will be submitted electronically to Management no later than 10 days working days following the end of the mission. The comments will be shared by Management to the Consultant no later than 10 working after the date of submission of the Preliminary Report.
- (iii) The auditor will incorporate the comments and send the Final Report for the mission to Management not later than 10 working days after receiving the comments. All reports will be

shared electronically through E-Mail. The reports will use standard software (WORD, EXCEL, etc.).

6.3 Report Contents

6.3.1 Each Technical Audit Report will include as a minimum:

- a. A Summary of Principal Results of the Audit (observations and recommendations)
- b. Number and location of the core samples taken of asphalt and concrete.
- c. Comments on the quality of construction, including a table showing the detailed results of the laboratory testing Samples.
- d. Also, will include colour photographs of all core samples.
- e. Principal weaknesses observed during the course of the audit, their roots and the proposed measures to rectify them. A plan of action for the implementation and monitoring of the proposed remedial measures should be prepared in tabular format.
- f. Any exogenous factors that impinge whatsoever on the implementation of the works, e.g., qualifications of contractors and consultants, IFI procedures, funding, etc.
- g. Any other issue judged pertinent by the auditor. The Technical Auditor is especially requested to flag any situation which would indicate the likelihood of fraudulent or corrupt practices being present anywhere in the execution of the Road Upgrading and Development Project.

The audit will, on average, consist of:

- (a) field visits and meetings, and
- (b) office work for completion of analyses and preparation of preliminary and final reports.

7.0 Selection and Evaluation of Proposals

The evaluation of proposals will use the Quality & Cost Based Selection procedure as detailed below:

- A. Preliminary examination to confirm that all documents required have been provided, to confirm the eligibility of bidders and to confirm that the supplier has accepted all terms and conditions without material deviation or reservation;
- B. Technical evaluation: 80%
- C. Financial evaluation: 20%

Proposals failing any stage will be eliminated and not considered in subsequent stages.

	Proposal evaluation criteria			Max Points
(a)	Qualifications and competence of the key staff for the Assignment			65
	sub criteria for (a):			
	Academic qualification	25	<i>Key Expert 1 total score is 20%</i>	
	Professional registration	50		
At least 10 years' experience in the Construction Industry	25			

			<i>Key Expert 2 total score is 20%</i> <i>Other Experts score 15%</i>
	Total	100 of 65	
(b)	Methodology: Adequacy of the proposed work plan and methodology		30
(c)	Participation of Nationals (as reflected by nationals among key staff)		5
(d)	Total		100

Eligibility

- Valid Tax Certificate from Malawi Revenue Authority.

None complying proposals will be rejected

8.0 Submission Guidelines

Interested consultants shall submit all proposal documents at least 5 copies using the specification listed below:

- Technical Approach:* Including a detailed schedule/work plan required for carrying out the assignment in order to meet the scope of work and timeline.
- Cost Proposal:* Ensure that the budget is aligned to the proposed scope of work and includes all costs required to carry out the work. The budget should be submitted per the following guidelines:
 - Budget must use activity-based costing, which allows XXXX to clearly see costs, expenses and level of effort being proposed per activity, including;
 - Daily/hourly fees and number of days broken down per consultant and not lumped together as consultant fees.
 - Any other costs (i.e. accommodation, mileage, etc.), presented as a unit cost and quantity for each item. These costs should be supported by a quote, or based on previous actual costs.
 - Submitted in Malawian Kwachas and include necessary taxes;

Provide budget notes/justification for each cost item included in the budget.

9.0 Duration of the Consultancy

The Consultancy is expected to take a period of six (6) weeks include reporting from xxxx20XX.

10.0 Lines of Communication

The consultant will report to the Regulatory and Enforcement Director.

11.0 Ownership of outputs

The outputs of this contract as stipulated in the Terms of Reference belong to XXXX.

12.0 Budget and Resources Required

The total consultancy fees will be in accordance to the consultant budget proposal and as agreed between XXXX and the consultant and is liable to government tax (es).

13.0 How to apply:

Interested bidders are requested to obtain bid documents from XXXX through the following email addresses

14.0 Bids should be submitted by XXX 20XX at XXXXHRS at the XXXX. Bid opening shall take place soon after closing at the same venue in Class room 1. Bids should be submitted to

:

The Chairman

Internal Procurement and Disposal Committee

National Construction Industry Council

Off M1, Old works Training Center

Private Bag A146

Lilongwe

For inquiries: write to

The Chief Executive Officer

National Construction Industry Council

Private Bag xxx

Lilongwe