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# QUALITY

## Quality Management Principles, Policies & Requirements for Central Section Works

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## 1. Purpose

The purpose of this document is to formally set out and communicate the quality management principles, policies and requirements to be deployed by CRL in managing the Central Section Works (CSW) project.

## 2. Scope

This document is applicable to procurement, manufacturing, design and construction field based activities of the Central Section Project included within the Crossrail Programme managed by the Crossrail Delivery Team.

This document also covers Systemwide installation activities. Design, pre-installation, post installation and other Systemwide activities are addressed in the Systemwide Execution Plan [Ref 1]

The arrangements for Rolling Stock and Depot shall be addressed in the Management Plan Volume 4 - Operations [Ref 2] and Surface works shall be dealt with in Management Plan Volume 3 - Surface Delivery [Ref 3].

Effective deployment of this document shall enable the project to continually demonstrate to stakeholder organisations that CRL is delivering the Central Section Works to agreed requirements.

## 3. Principles

Quality is defined as meeting imposed and adopted requirements. This includes both internal and external stakeholders. The Sponsors Requirements establish the external high level requirements and the Visions and Values represent the internal requirements.

## 4. Policies

The Quality Policy [Ref 4] is available on the Crossrail Management System (CMS).

CRL have a number of other policies that establish requirements to be complied with. These can be found in the **Crossrail Management System > Corporate Governance**.

These are shown in the List of Corporate Policy Statements [Ref 5] which is maintained by the Corporate Governance team.

## 5. Programme-Wide Requirements

The executive committee is ultimately accountable for quality during the design, construction and handover stages of the project; however through this document, responsibility is devolved to the most appropriate party.

Detailed below are some fundamental requirements to be implemented by the Crossrail Team and contractors/suppliers.

- **Quality Management System (QMS)** – the Crossrail Team and the main contractors/suppliers shall operate an approved QMS based on BS EN ISO 9001 [Ref 10]. Each organisation shall ensure their quality plans and procedures align with the quality requirements set by Crossrail.
- **Management system records** - all certificates, reports, measurements, methodologies etc. shall be maintained in eB the Crossrail electronic document management system. All significant project documentation shall be held in eB. Records shall comply with requirements

defined in document control procedures. Records shall be sufficiently detailed to provide assurance of compliance with all requirements.

- A number of programme-wide processes and procedures are defined in the CMS for example, cost management, programme management, risk management & business planning. It is mandatory that all Crossrail Team personnel comply with these and other business wide arrangements that are applicable to their work.

The nature and extent of the Crossrail management system documentation shall be to a level appropriate to the risk and significance of the activity to the programme / project.

The Crossrail Team is responsible for ensuring that appropriate interfacing and coordination arrangements are established across their supply chain organisations.

## **6. Contractors and Suppliers**

### **6.1. Quality Arrangements**

Details of the following quality arrangements shall be mandated upon contractors and suppliers.

As a minimum the contractor shall:

- have a Quality Management System (QMS), which meets the requirements of ISO 9001 [Ref 10] and is certified by a UKAS accredited certification body (or equivalent);
- within four weeks of the starting date of the contract provide a 'Quality Plan' which is compliant with the quality arrangements in the contract;
- appoint a quality manager, who will act as the principal point of contact for quality management issues. Details of key contacts shall be forwarded by the Project Manager to the Quality team. The contractor shall submit the curriculum vitae of all proposed quality personnel to the Project Manager for acceptance. Personnel shall not take up their position until the Project Manager's acceptance has been obtained;
- develop and implement 'Inspection & Test Plans' appropriate to the work-package and reflecting all specified requirements. The Plans shall when implemented provide evidence that the specified requirements have been met;
- develop and conduct a programme of internal audits appropriate for the works;
- ensure that all sub-contractors comply with the contractual quality requirements that are relevant to their scope of works;
- cooperate with Crossrail team in the planning and execution of audits relating to all aspects of the contractors scope of work and proactively rectify non-conformances however identified;
- plan and undertake surveillance assessments and audits of their supply chain organisations; and
- implement a schedule of performance review meetings internally and with their contractors and suppliers to ensure that requirements are clearly understood and achieved and that adequate records of compliance are maintained.

The contractor shall develop and implement a procedure for the procurement of sub-contractors and suppliers. This procedure shall include detail of the planned arrangements to be used to evaluate and select sub-contractors and to manage the procurement process. The contractor shall submit this procedure for acceptance to

the Project Manager within 4 weeks of the starting date. The contractor shall not commence selection of sub-contractors and suppliers until the Project Manager's acceptance has been obtained. No appointment of sub-contractors or suppliers shall be made without the Project Manager's prior acceptance.

## **6.2. Quality Manager**

For the main contracts the contractor shall appoint a Quality Manager who shall be independent of the design and construction functions and meet with the Project Manager's approval, The Quality Manager may not be removed or replaced without the agreement of the Project Manager. The Quality Manager shall be dedicated to quality matters and shall be full-time for the duration of the contract and responsibilities shall be to:

- Develop and implement a project specific quality plan as required by the contract;
- Develop and provide quality training for all personnel to include induction and training for staff with specific quality responsibilities;
- Manage all quality personnel;
- Approve the quality elements of the contractor's method statements;
- Ensure compliance with legal and contractual requirements;
- Provide advice and instruction to construction teams to deal rapidly and effectively with quality non-conformities and complaints;
- Analyse individual quality non-conformities and complaints to identify trends, root causes and the corrective and preventive actions needed;
- Ensure the provision of and review inspection & test plans;
- Undertake audits of the contractor and sub-contractors including compliance with legal and contractual requirements; and
- Produce information for the Management Review with top management and attend the Management Review meeting to ensure that the Quality Management System remains suitable, adequate and effective;
- Report to the Project Manager on all quality issues.

The Quality Manager shall have the following competencies:

- Appropriate experience of quality management and the delivery functions of the contractor/supplier;
- Good knowledge and practical experience of developing, implementing and improving quality management systems;
- Be a Member of the Chartered Quality Institute (or an equivalent recognised quality body) or an appropriate engineering institute;
- To be or have access to competent auditors (see Section 14).

## **7. Quality Plans**

Quality plans shall set out how the quality management system shall be implemented for the Works in addition to the requirements below.

Such plans shall be developed using the guidance provided in BS ISO 10005 'Quality management systems – Guidelines for quality plans' [Ref 11].

Quality plans shall comply with the quality arrangements in the Contract but typically contain the following:

- Quality objectives and a policy confirming commitment to the management of quality;
- Evidence of how performance against the policy and requirements for the works will be measured and reported;
- The roles, responsibilities and obligations within the organisation;
- Detailed descriptions of the processes required for managing quality;
- Criteria and methods to monitor and measure the effectiveness and efficiency of these processes, with competent resource to undertake these;
- A description of the resources required to effectively manage quality; and
- Continual improvement activities.

Quality plans shall be reviewed and accepted by the Project Manager prior to any work commencing and records of review and acceptance shall be maintained.

## **8. Design**

Designers will be required to use CRL agreed proformas for design statements, design and check certificates. The checking, approvals and assurance process including certification, which will be dependent on the works, will be agreed with the Project Manager.

Material quality and traceability requirements shall be indicated on applicable drawings or specifications or in appropriate codes of practice. The Design management Process [Ref 6] outlines this in more detail.

## **9. Construction**

Manufacturer certification requirements will be established in an instruction to be used in the preparation of material requisitions.

Unless otherwise agreed by the Project Manager material shall be procured from sources that hold appropriate certification from a UKAS accredited certification body (or one that has mutual recognition with UKAS). However, this does not relieve the contractor from ensuring the quality of the products. The construction contractor will make available certification to demonstrate that materials used comply with the relevant legal requirements e.g. the Construction Products Directive.

Acceptance criteria shall be clearly stated so that the contractor can self-certify compliance.

Verification of the quality and material traceability of each element of the works will be the responsibility of the contractor. This will be achieved through checks, tests, inspections, audits and reviews, all planned and implemented in accordance with the Quality Plans and Inspection & Test Plans issued by the contractor.

The scope for each construction certificate will align with that of the design certificate.

## **10. Inspection & Test Plans (ITPs)**

The contractor shall submit the ITP to the Project Manager for approval 4 weeks prior to the start of the relevant works. The contractor shall not commence the relevant works until the Project Manager approves it, with a record of the review and approval maintained.

Test plans will use the agreed proforma and refer to the documentation used to control in-process and completed works.

The quality plan shall make clear who is responsible for implementing the planned arrangements, as well as who is responsible for certifying that compliance with requirements has been achieved in practice.

Staff nominated for undertaking sampling, inspection and testing activities shall be competent to carry out the particular activities they have been assigned. Records of training and competence shall be maintained and be readily available.

Whilst 'self-certification' represents a fundamental principle that shall be used, the Project Manager shall identify on contractors' ITPs those activities that are required to be checked and / or witnessed by the Project Manager or CRL. Mandatory interventions shall be defined as 'Hold Points', other interventions may include activities such as 'Witness Points' and 'Notification Points'.

A minimum of 5 working days notice shall be given to the Project Manager for 'Hold Point' inspections in the UK, and 10 working days notice for an overseas supplier, unless otherwise agreed. A minimum of 24 hours notice will be required for on-site inspections.

The Crossrail Team reserve the right to witness any inspection / test activity during any stage of the works.

Further details relating to testing, including routine tests, type tests, factory acceptance testing and certification requirements shall be included in the contract specifications.

## **11. Records**

Records and other deliverables generated as part of the inspection and test process, shall be identified within the quality plan.

The results of all tests, inspections and other verification activities shall be recorded and the resulting records retained in a manner to be agreed with the Project Manager. Where appropriate, contractor generated quality records shall be captured in Crossrail's electronic document management system. The period of record retention shall be agreed with the Project Manager.

Construction contractors shall be required to use Crossrail's agreed proformas for test plans, key inspection record forms and construction certificates.

## **12. Testing Laboratories & Testing Services**

Unless otherwise specified or agreed in writing by the Project Manager, all laboratories and testing service providers shall be accredited by the United Kingdom Accreditation Service (UKAS) (or one that has mutual recognition with UKAS).

Testing and sampling methodologies shall be in accordance with appropriate national or international standards, unless otherwise agreed in writing by the Project Manager.



In all instances inspection, measuring, and test equipment shall be included within a calibration system and shall be traceable to nationally recognised standards.

Staff nominated for undertaking sampling, inspection and testing activities shall be trained and competent to carry out the particular activities they have been assigned and for key inspection activities shall be independent of production. Records of training and competence shall be maintained and be readily available.

### **13. Certificates of Conformance / Quality Release Documents**

For key components a 'handover certificate' indicating that all requirements have been met, shall accompany materials and manufactured products. The format for certificates of conformance / quality release documents is to be defined in the contract documentation or otherwise approved by CRL.

The contractor shall retain certificates of compliance / quality release, maintaining records of these in a manner to be agreed with the Project Manager. The contractor shall establish and cascade an appropriate strategy that will enable work to be certified on a progressive basis. The contractor shall monitor and maintain records of the planned certification and record and track the certificates actually issued.

Responsibility for undertaking final review, inspection, test, product release and certification of conformance activities shall be identified within the Project Execution Plan (PEP) or ITPs. Competency requirements for such activities shall be defined and records of competence maintained for authorised signatories.

Construction certification and completion certification will be produced by the contractors and certified by the Project Manager in line with the following procedure Construction Certification for Structures and Civil Engineering Works Procedure [Ref 7]. Further documentation shall be developed to cover certification requirements for MEP and System Testing & Commissioning requirements and Systemwide works.

### **14. Audits**

The contractor shall be aware that the Crossrail Team will undertake audits of the contractors, sub-contractors and suppliers, who will assist with the audits by making staff and records available. This shall be in line with the CRL Audit Procedure [Ref 8]

In certain cases, e.g. typically for contractors undertaking intrusive works, audits will be conducted to establish confidence in the arrangements in place, prior to the authorisation for work to commence being given. Major issues identified shall be resolved prior to any work commencing.

The contractor shall establish an audit schedule for their Crossrail activities, which includes the monitoring of their supply chain organisations. The schedule shall be planned using a risk based approach and ensure that all key activities are audited at a time and frequency appropriate to the significance of the activity under review. The schedule shall be submitted to the Project Manager for acceptance within 4 weeks of the starting date and be revised and re-submitted to the Project Manager at a frequency to be agreed with the Project Manager. Records of the review and acceptance shall be maintained.

The contractors and suppliers shall record, track and manage the timely close out of any audit non-conformities, by implementing the necessary corrective action to eliminate the detected non-conformity and its cause.

Failure to address non-conformities effectively and within agreed timescales may result in sanctions being taken against the contractor.

Audit findings shall be analysed and communicated to the interested parties to enable system and process improvements and where appropriate management actions. Audits shall be carried out by appropriately trained and qualified staff, using the guidelines of BS EN ISO 19011 [Ref 12].

## **15. Contractor & Supplier Monitoring and Reporting**

The contractor shall include the following in their period progress reports:

- Management system status;
- Audit progress results and outstanding issues;
- Status of site queries and non-conformities and summary of actions taken to close out;
- Progress on certification and records
- Quality issues identified and / or anticipated;
- Improvement activities; and
- Performance against the agreed KPIs.

## **16. Quality Review Meetings**

The Project Manager and the contractor shall jointly hold a meeting each period, inviting the Crossrail Team Area Project Manager CRL, to discuss quality matters.

The meeting shall be based upon the period report supplemented by information on forthcoming audits, surveillance and significant inspection activities against the programme of works.

## 17. Reference Documents

Ref:	Document Title	Document Number:
1.	Systemwide Execution Plan	CRL1-XRL-R-STP-CRG03-50001
2.	Management Plan Volume 4 : Operations	CR-XRL-K2-STP-CR001-50001
3.	Management Plan Volume 3 - Surface Delivery	CR-XRL-O4-GPG-CR001-00005
4.	Quality Policy	CR-XRL-O4-UPP-CR001-00002
5.	List of Corporate Policy Statements	CR-XRL-Z6-LST-CR001_Z-50001
6.	Design Management Process	CRL1-XRL-O7-GPS-CR001-50005
7.	Construction Certification for Structures and Civil Engineering Works Procedure	CRL1-XRL-O4-GPD-CR001-50006
8.	CRL Audit Procedure	CR-XRL-O-GPD-CR001-50002
9.	Not Used	

## 18. Reference Documents

Ref:	Document Title	Document Number:
10.	Quality management systems – Requirements	BS EN ISO 9001
11.	Quality management systems – Guidelines for quality plans'	BS ISO 10005
12.	Guidelines for auditing management systems	BS EN ISO 19011

## 19. Standard Forms / Templates

Ref:	Document Title	Document Number:
A.	None	
B.		