CENTRAL SECTION DELIVERY

Project Technical Requests (RFI, FCD, NCR) Procedure

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6.0	23/09/2016	[redacted]	[redacted]	[redacted]	New Engineering Model

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Revision Changes:

Revision	Status / Description of Changes
6.0	1. Modified section 4.2 - Supervisor Rep (PFE) 2. Added section 4.8 - Lead Field Assurance Engineer (LFAE) 3. Added section 4.9 – Project Manager (PM) 4. Added section 5.10 - New Engineering Model 5. Added reference to Accredited Field Assurance Engineers Matrix (Ref 17) 6. Modified section 4.1 - Replaced Construction and Field Engineering Manager with Chief Engineer 7. Removed reference to As Built classification from table in Appendix 2
5.0	1. Inclusion of Spot-On Root Cause Analysis 2. Added reference to Post IFC (Issued for Construction) Changes Guidance Note (GIR) 3. Deleted section 5.6.1 - Distribution and Retention of Completed Documents 4. Added reference to eB PTR QRG – PTRs to Assets eB Relationship Creation 5. Appendix 3: Non Conformance Report Classifications modified to reflect NCR Classification dropdown field in eB PTR 6. Clarified Engineering Manager's responsibilities

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1 Purpose

This procedure outlines the controlled identification, notification and resolution of:

- Project initiated technical questions, Request for Information, between parties under the control or interface management of the Delivery Team (DT).
- Field Change Documents (FCDs), relating to alterations to the assured design documents issued for permanent and temporary project systems and facilities. This procedure applies when the design is performed by Framework Design Consultants (FDCs) or others.
- Non-conformances found in the works including those that arose through inspections, audits and surveillances conducted by the Contractor, DT, Quality team or third parties.

This procedure applies to the start-up, construction and testing phases of the project.

The Crossrail DT management of all Contractors (including Principal Contractors) carrying out advanced and main construction works to support the implementation of assured Gate 3 design which is compliant with the requirements of LU Assurance Standard S1-538 for the Crossrail Project.

2 Scope

This document is part of the Quality Management System of the DT and supplements the Construction Quality Plan (Ref 1).

This procedure is applicable to all Crossrail projects and contracts including design, survey, advance works and main works packages.

This procedure does not replace the Engineering Interface Control Documents between FDCs, DT and Third Parties, but provides a traceable, auditable tool for the recording of:

- Technical questions and their responses across contractual boundaries;
- Recording, control, analysis and approval of changes to design documents during construction;
- Recording, disposition, control, analysis and close out of non-conformance reports.

This procedure is owned and shall be updated by the Construction & Field Engineering Manager.

Project Technical Requests (PTRs) shall be used to control the technical communications between the Delivery, Technical Team and Contractors, sub tier suppliers, designers and vendors. Refer to eB PTR Administration User Guide (Ref 7).

Project Technical Requests (PTRs) shall not be used to control contractual communications between any parties, but PTR records may form supplementary information to contractual communications.

PTRs shall not be used to perform contractual change control. Provisions in the relevant contract for change control (Project Manager Instructions, PMIs and Compensation Events) are to be used with the support of PTR records where appropriate.

It is incumbent upon the *Supervisor Rep (PFE)* to ensure that the PTRs affecting project cost and/or schedule, Notification of Defect required or change to the Works Information are identified to ensure that the contractual mechanism can be instigated by the Contract Administrator (refer to Section 5.4).

The *Supervisor Rep (PFE)* is responsible for ensuring that the Site Teams and Contractors actively use PTR and respond within a timely manner.

3 Definitions & Abbreviations

Item	Description
CA	Contract Administrator
Category 1 NCR (CAT 1 NCR)	NCR with an estimated cost of Rework over £60,000 and/or an NCR which could have safety implications.
CE	Chief Engineer
CEG	Chief Engineers Group
CND	Contractor's Notification of Defect
COWL	Consolidated Outstanding Works List
CRL	Crossrail Limited
Cross-Train	Crossrail's Online Learning Centre, access via Connect Online Home Page
Defect	A part of the *works* which is not in accordance with the *Works Information* or a part of the *works* designed by the *Contractor* which is not in accordance with the Contract or Applicable Law or the *Contractor's* design which the *Project Manager* has accepted.
Delivery Team (DT)	Project entity appointed to manage the engineering, procurement and construction of the Crossrail Project.
DLR	Docklands Light Railway
eB - EDMS	Bentley eB: Crossrail's Electronic Document Management System (EDMS)
EM	Engineering Manager
Field Change Documents (FCD)	A document used to document a change to an issued design document. Once approved by DT and FDC, it is a valid design document when accompanied with an appropriate Project Manager's Instruction.
Framework Design Consultant (FDC)	Design consultants appointed by the DT to perform the detailed design.
FE	Field Engineer
KPI	Key Performance Indicator
LFAE	Lead Field Assurance Engineer
LU	London Underground
Non Conformance	A Defect as defined in Core Clause 11.2 of the CRL *conditions of contract*.
Non Conformance Reports (NCR)	A report that defines and documents a non conformance, and provides a disposition and documentation of the resolution.
NR	Network Rail
MCR	Material Compliance Record
PM	Project Manager

Item	Description
PMI	Project Management Instruction
Project Technical Request (PTR)	An automation tool used to initiate, route, track, and approve Requests for Information (RFI), Field Change Document (FCDs), and Non Conformance Reports (NCRs).
Request for Information (RFI)	A document used to request formal clarification of contract documents, design documents or design intentions. An RFI may not be used to change design, schedule or cost.
SND	Supervisor's Notification of Defect
Supervisor (italicised)	The role as described in the NEC3 ECC contract
Supervisor Rep (PFE)	*Supervisor Representative (Project Field Engineer)* The role as described in the NEC3 ECC contract
Third Party	A party who may be affected by the Crossrail Works but is not a principal party to a contract, for example LU, NR, DLR, EH, City of Westminster, Utility Companies etc.

4 Responsibilities

4.1 Chief Engineer

The CE is responsible for:

- Owning and updating this procedure and the templates it contains;
- Monitoring compliance of all DT Site Teams with this procedure.

4.2 Supervisor Rep (PFE)

The *Supervisor Rep (PFE)* is responsible for:

- Implementing the requirements of this procedure
- Participating in RFI, FCD and NCR workflow
- Monitor the Contractor's compliance with the requirements of this procedure
- The *Supervisor Rep (PFE)* shall hold weekly PTR review meetings, for details see paragraph 5.7

4.3 Engineering Manager (EM)

The EM is responsible for:

- Managing the FDCs/Contractors designers to meet the requirements of this procedure
- Participating in RFI, FCD and NCR workflow
- Insures that all design changes proposed by PTRs are assessed in accordance with the Design Change Management Process (Ref 5), Post IFC (Issued for Construction) Changes Guidance Note (GIR) (Ref 14) and Engineering Design Assurance Gates Procedure (Ref 11).

4.4 Contract Administrator (CA)

The CA is responsible for:

- Initiating Supervisor's Notification of Defect (SND) if NCR was identified as a defect by DT
- Review closed out PTR's for potential cost/schedule impact to the contracts under their control.

4.5 Construction Automation Manager

The Construction Automation Manager is responsible for:

- Administration of PTR module within eB
- Support of all PTR users and liaison with Crossrail IT in resolution of eB PTR technical issues

4.6 Framework Design Consultant (FDC)

The FDC is responsible for:

- Complying with the requirements of this procedure
- Participating in RFI, FCD and NCR workflow

4.7 Contractor

Contractors are responsible for:

- Complying with the requirements of this procedure
- Participating in RFI, FCD and NCR workflow
- Initiating Contractor's Notification of Defect (CND) if a NCR was identified as a defect by a Contractor and
- Initiating a CND if a NCR was identified as a defect by both DT and Contractor

4.8 Lead Field Assurance Engineer (LFAE)

- Where appointed, carry out EM duties for relevant discipline – see paragraph 5.10

4.9 Project Manager (PM)

- The PM shall hold monthly PTR review meetings, for details see paragraph 5.7

4.10 CEG Head of Station

- Owns and updates Accredited Field Assurance Engineers Matrix (Ref 17)

5 Procedure

5.1 Requests for Information (RFI)

RFIs should be used for the clarification of technical specifications, scopes and responsibilities and/or further information related to the successful completion of the works under the contract. The standard work process for initiating, routing, responding to and closing out RFIs is included in **Appendix 1: PTR Process**.

5.1.1 Examples of RFIs:

- Clarification of design intent.
- Clarification that affects the operation or safety of equipment, controls or components.
- Dimensional interference clarifications.
- Acquisitions of specifications or other information from third party interfaces.
- Clarification where design documents are in contradiction of each other. (The incorrect design document should be marked up as per the Management of Red Lines and As Builts Procedure (Ref 12). It is not necessary to raise an FCD in this instance).

5.1.2 Examples of non-RFIs:

- Act as a contractual change document.
- Document design changes, if they are Issued (document at an IFC Stage) this should be raised as an FCD.
- Document non-conformances. These should be raised as an NCR.
- Should not take the place of a phone call or general interaction between groups; it should be used to initiate a question (technical or otherwise) that cannot be easily described over the phone, or when a formal disposition is desired.
- Materials Compliance Records (MCRs) submission.

5.1.3 Notes:

- Include only one specific subject per RFI.
- Ensure RFIs are legible and contain all necessary information required for evaluation.
- Ensure referenced documentation is accessible by all parties to the project and eB relationships are created
- RFIs related to supplier design documents should be processed via Eng. Routing, Eng. Answer and Eng. Approval (see Appendix 1)
- Should a form ever require being routed backwards in the workflow, send the form to the appropriate stage and include a reason for the rework.
- Attach any additional information in the form of sketches, photos etc. that may help clarify.

5.2 Field Change Documents (FCD)

An FCD is a document used to process a change to an assured Engineering design document. Once the FCD is approved by CRL and the Project Manager has instructed the change through a Project Managers Instruction (PMI), it is a valid design document. The standard work process for an FCD is included in **Appendix 1: PTR Process**.

5.2.1 Examples of FCDs

- An FCD is typically issued by field personnel (*Supervisor Rep (PFE)* / FE or Contractor) to request an approval to change an assured design documents. FCDs may be issued to address design defects, resolve interferences, or improve a design's constructability.
- Materials Compliance Records (MCRs) for non-compliant materials (as these are design changes).

5.2.2 Examples of non-FCDs:

- Document change to non-Issued Design Documents.
- Document non-conformance. These should be raised as an NCR.
- Incorporate Client requests unless a proper written request for scope change has been received from the Client under the terms of the prime contract.
- Anything that allows violations to project specifications or to regulatory, code, or legal requirements.

5.2.3 Notes:

- Include only one specific subject per FCD.
- Ensure FCDs are legible and contain all necessary information required for evaluation.
- Ensure referenced documentation is accessible by all parties to the project and eB relationships are created.

5.3 Non Conformance Reports (NCR)

An NCR is a reporting mechanism for a non-conformance in a part of the works, activity or process that does not conform to the Works Information.

The standard work process for initiating, routing, responding to and closing out NCRs is included in **Appendix 1**.

Refer to **Appendix 4: Non Conformance Report Classifications** and **Appendix 5: Non Conformance Report Dispositions** listing required selections in the NCR workflow.

5.3.1 Examples of NCRs

- Permanent works items that are nonconforming or indeterminate and cannot be completed or reworked prior to final acceptance.
- Documentation (or lack thereof) that renders a permanent works item to be nonconforming.
- Procedure violations that render a permanent works item to be nonconforming and indeterminate.
- Material compliance or traceability issues including material type, identification or quality.

5.3.2 Examples of non-NCRs:

- MCRs of any kind.

5.3.3 Notes:

- Include only one specific subject per NCR.
- Ensure NCRs are legible and contain all necessary information required for evaluation; Ensure referenced documentation is accessible by all parties to the project and eB relationships are created
- Should a form ever require being routed backwards in the workflow, send the form to the appropriate stage and include a reason for the rework;
- The Contractor is responsible to ensure that any work/material located at manufacturers'/suppliers' works or at construction site, that is found not to conform to specified requirements, is identified and segregated with a NCR Hold tag to prevent use, installation, despatch or mixing with conforming products;
- Where a project/contract nears completion (90 days before contract closeout) and there are NCRs which remain open within PTR, these will be tracked in Consolidated Outstanding Works List (COWL) to ensure that all outstanding and snagging works are encompassed within one list. See Control of Snagging and Outstanding Works (Punchworks) Procedure, (Ref 3);
- *The Contractor* will evaluate the cause of each NCR and determine whether the non-conformance is a unique occurrence (non-trendable) or has the potential for recurrence (trendable). *The Contractor* shall then initiate appropriate corrective action to prevent recurrence on the NCR as applicable;
- *The Contractor* shall review the project's trendable NCRs to determine whether previous corrective actions have been effective. The frequency of this review shall be determined by the *Contractor* but shall be performed at least annually and prior to contract completion.
- For deficiencies that occur repetitively, the *Contractor* shall generate a Non Audit Corrective Action Report (Ref 13) as specified in the Non-Conformity Corrective & Preventive Action Procedure (Ref 4) to summarise the cause(s) of the trend(s) and initiate with the *Contractor* the necessary action to prevent recurrence;
- *The Supervisor Rep (PFE)* shall ensure a report is completed for NCRs with an estimated cost of rework over £60,000 using the template in Appendix 5: Category 1 Non Conformance Report;
- *Supervisor Rep (PFE*) shall notify Supervisor and CE (within 2 working days) of any NCRs raised with regard to the following to determine if further action or investigation is required:
    - NCRs with an estimated cost of rework over £60,000;
    - NCRs which could impact on safety (ie. collapse of permanent or temporary works) advising whether a safety incident report has been raised;
    - NCRs raised due to repeat failures by the Contractor to manage self-certification;
- The PM shall decide if the cost of rectification shall be allowable under the terms of the Contract;
- When disposition of NCR was Rework or Repair *Supervisor Rep (PFE*) shall not close out NCR if there is no evidence of successful resolution attached to that NCR;
- On certain NCRs specified in the table below Spot-On Root Cause Analysis tools should be utilised by the *Contractor* to identify the Root Causes and develop action plans to prevent reoccurrence;

NCR Category	Category Definition	Solution Methodology	Resource	Responsibility	Example
1	> £60k and/ or Major Safety Risk Potential and Recurring Cat 2 NCRs	Full SPOT-on process	Team	Contractor Individual Responsible for element of works (e.g. Construction Manager) or other Nominated Competent Person	Failure of a main structural member that causes significant programme delays and/or potential to cause harm.
2	£6k - £60k and Recurring Cat 3 NCRs	RCA Tools (e.g. 5 Ys, fishbone)	Team	Contractor Individual Responsible for element of works (e.g. Construction Manager) or other Nominated Competent Person	Installed Structural steelwork members without welding procedure specification and NDT testing results.
3	£3k - £6k and Recurring Cat 4 NCRs	RCA Tools (e.g. 5Ys)	Individual	Contractor Nominated Competent Person (e.g. Section Engineer)	Couplers out of position due to incorrect setting out / measurement and is a recurring issue.
4	£500 - £3k	RCA Tools (e.g. 5Ys)	Individual	Contractor Nominated Competent Person (e.g. Section Engineer)	Minor concrete finish defects such as blow holes.

5.4 Cost/Schedule/Works Information Impacts and Notification of Defect

PTR allows authorised users at certain stages in associated workflows to indicate if a PTR could affect a project cost and/or schedule, a Notification of Defect is required or a change to the Works Information is required to ensure that the contractual mechanism can be instigated by the Contract Administrator in accordance with the Contract Administration Manual (Ref 2).

Refer to Quick Reference Guides: eB PTR QRG 10 - Supervisor's Notification of Defects (SND) and Contractor's Notification of Defects (CND) (Ref 8); eB PTR QRG 14.13 - Contract Adminstration - Notification of Defects (SND/CND) (Ref 9); eB PTR QRG 14.12 - eB PTR for Contract Administration (Ref 10).

5.5 PTR Turnaround

Time is of the essence when responding to PTR documents. The target response times, from initiation to close out, for PTR documents are:

Responsible party	Target Response time
Crossrail PTRs	10 working days
PTRs to Network Rail	20 working days
PTRs to London Underground	20 working days
PTRs to Dockland Light Railway	20 working days
PTRs to Third party interfaces	20 working days

- Time period responses from Third party interfaces are from date sent to the third party to receipt.
- Specifics of the engineering work scope involved as well as construction schedule priorities influence the specific turnaround targets adopted on the project.

5.6 Document Management

PTRs shall be recorded in the EDMS, which is maintained by Crossrail. Document relationships shall be created between the PTR and all affected and referenced design documents, such as drawings and specifications. These relationships are then built upon and used in the Management of Red Lines and As Builts Procedure (Ref 12). Special attention should be given to creation of relationships between asset objects and PTRs as per eB PTR QRG – PTRs to Assets eB Relationship Creation (Ref 16).

5.7 PTR Review Meetings

The *Supervisor Rep (PFE)* shall hold weekly PTR review meetings with the respective Contractors, whilst the EM/LFEA shall hold weekly PTR review meetings with the respective FDCs/Contractor design teams, both of which shall as a minimum include details of:

- Raised, open, closed and overdue RFIs, FCDs and NCRs.
- To review NCRs to identify trends and causes so that it can be brought to the attention of the contractor. CRL and the contractor are to identity preventative action which is to mitigate re-occurrences.

The PM shall hold monthly PTR review meetings that shall as a minimum include details of:

- Raised, open, closed and overdue RFIs, FCDs and NCRs.
- Agreed DT/Contractor Key Performance Indicators (KPIs).
- Number of DT Engineering decisions requested as a result of NCRs.

- To review NCRs to identify trends and causes so that it can be brought to the attention of the contractor. CRL and the contractor are to identity preventative action which is to mitigate re-occurrences.

The Contractor shall ensure PTRs relevant to the specific completion packages are on course for resolution and closure and ensure record packages are being accurately and regularly updated to reflect the existence of the PTRs.

The Contractors Quality Manager shall report on PTR issues at Quality Focus Meetings.

5.8 PTR Requirements

5.8.1 Training

PTR training is available on Cross-Train as an on-line training course.

5.8.2 Access to PTR

Individuals will be granted access to contracts based on assigned work location. Individuals will have access to perform specific tasks in the PTR workflows based on their job role. Requests to change access (due to a role or site change) are to be forwarded to the Construction Automation Manager.

5.8.3 Delegation of RFI Construction Approval Rights

The *Supervisor Rep (PFE)* can delegate *Supervisor Rep (PFE)* roles in PTR to members of Field Engineering team. An e-mail from the *Supervisor Rep (PFE)* to the Construction Automation Manager will be required to provide a record of the respective delegation and *Supervisor Rep (PFE)* permissions.

Note that delegation can be removed at a later date, if required by following the same process.

5.8.4 Change of NCR Required Close Out date

Occasionally it might be necessary to change the Required Close Out Date for an existing NCR that cannot be closed for a specific reason. To do so, the *Supervisor Rep (PFE)* must send a request to the Construction Automation Manager. Requests should contain the NCR number, the new Required Close Out Date and a detailed reason for the change. Each Friday morning the Construction Automation Manager will collate all of the requests and submit them to Quality team for approval. Approved NCR date extension requests will then be processed.

5.9 Access to PTR from mobile devices

PTR records are accessible in read-only format via ProjectWise WorkSite app which is available for iPad and Windows tablets. For guidance on installation and use of WorkSite please see WorkSite App QRG (Ref 15).

5.10 New Engineering Model

From April 2016 Crossrail Station Contracts are transitioning from the tradition engineering model which separates engineering design and field engineering to a New Engineering Model which combines the roles. The role of EM will disappear over 2016 but the duties will remain. The LFAE will be responsible for EM duties for their discipline speciality however the totality of the design will be the PFE's responsibility. In executing this responsibility the PFE will need to consider the following:

- Does the PFE have any CEG appointed Lead Field Assurance Engineers in their organisation to carry out any EM duties (e.g. the LFAE Electrical will deal with all design related electrical PTRs).
- Where no LFAE is in place, the PFE is to seek advice from CEG.
- The PFE needs to assure themselves the designer has confirmed the solution is compatible with the assured design.
- The PFE will need to consider any impacts on other Crossrail projects, and if there are any, liaise with that project (PFE or EM) to confirm acceptability.
- The PFE will need to consider if the IM is affected in their operating and maintenance of the asset, and if so seek advice.

6 Reference Documents

Ref:	Document Title	Document Number:
1.	Construction Quality Plan	CRL1-XRL-N2-STP-CRG03-50004
2.	Contract Administration Manual Works (CAM)	CRL1-XRL-W-GML-CR001-50001
3.	Snagging and Outstanding Works (Punchworks) Procedure	CRL1-XRL-O4-GPD-CR001-50010
4.	Non-Conformity, Corrective & Preventive Action Procedure	CRL1-XRL-O4-GPD-CR001-50026
5.	Design Change Management Process	CRL1-XRL-O7-GPS-CR001-50002
6.	Document Management Procedure	CRL1-XRL-Z3-GPD-CR001-50001
7.	eB PTR Administration User Guide	CR-XRL-Z3-GUI-CR001-50393
8.	eB PTR QRG 10 - Supervisor's Notification of Defects (SND) and Contractor's Notification of Defects (CND)	CR-XRL-Z3-GUI-CR001-50451
9.	eB PTR QRG 14.13 - Contract Administration - Notification of Defects (SND/CND)	CR-XRL-Z3-AAG-CR001-50006
10.	eB PTR QRG 14.12 - eB PTR for Contract Administration	CR-XRL-Z3-GUI-CR001-50386
11.	Engineering Design Assurance Gates Procedure	CRL1-XRL-O7-GPD-CR001-50015
12.	Management of Red Lines and As Builts Procedure	CRL1-XRL-Z-GPD-CR001-50010
13.	Non Audit Corrective Action Report	CR-XRL-O-ZFM-CR001-50001
14.	Post IFC (Issued for Construction) Changes Internal Crossrail Guidance Note (GIR)	CRL1-XRL-O7-GUI-CR001-50001
15.	WorkSite App QRG	CR-XRL-Z3-GUI-CR001-50465
16.	eB PTR QRG – PTRs to Assets eB Relationship Creation	CR-XRL-Z3-GUI-CR001-50482
17.	Accredited Field Assurance Engineers Matrix (Confidential document – For access please contact Construction & Field Engineering Manager)	CRL1-XRL-O-LST-CRG03-50001

7 Standard Forms / Templates

Ref:	Document Title	Document Number:
A.	Category 1 Non Conformance Report	CRL1-XRL-O4-ZTM-CR001-50038

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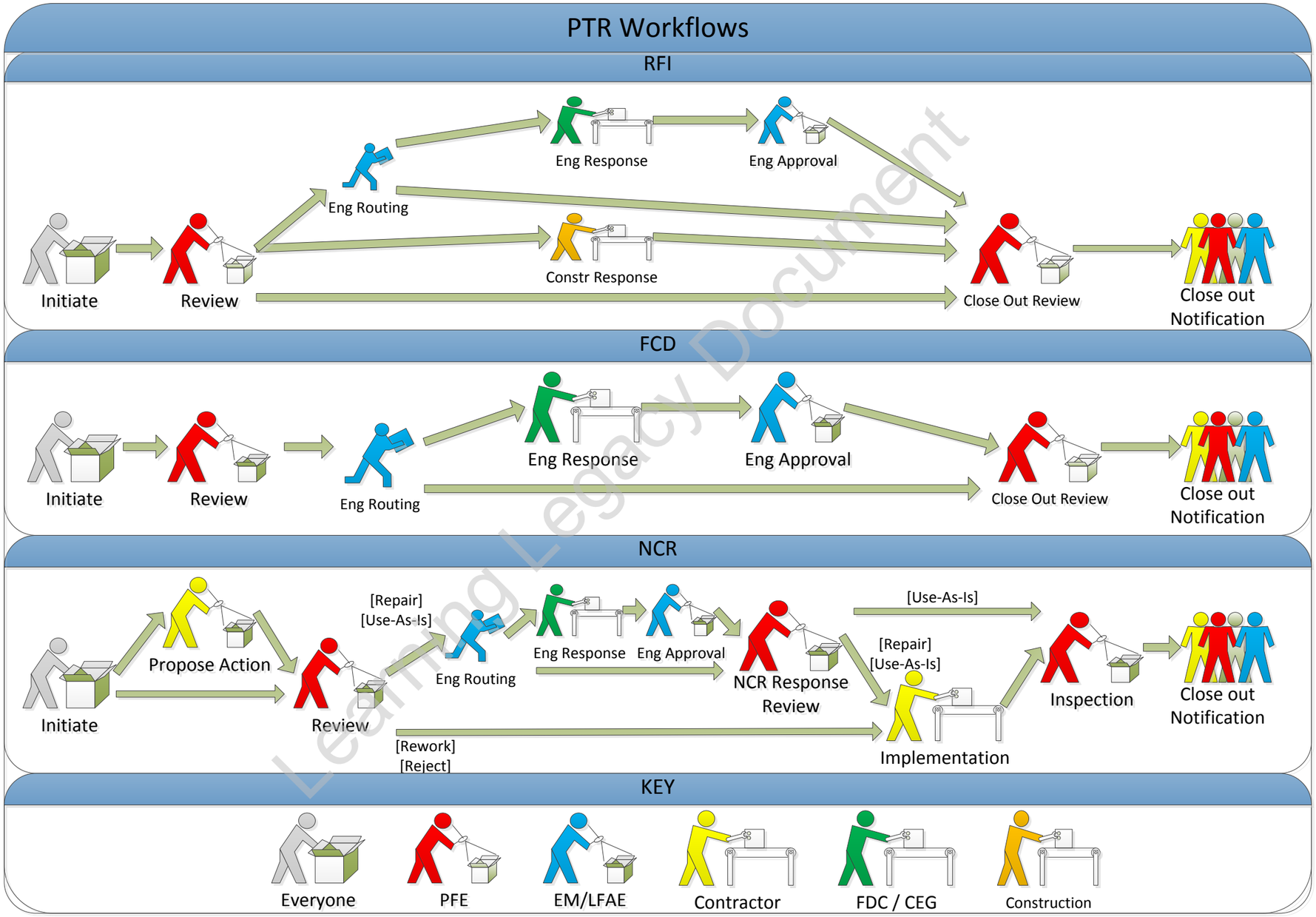
8 Appendices

8.1 Appendix 1: PTR Processes



8.2 Appendix 2: Field Change Document Classification Codes

Each FCD is to be categorized into one of the following classification codes. Each classification code should be considered before selecting the one that applies best. These classification codes are used as performance indicators, to identify recurring issues, directed toward long-term improvement.

Classification Code	Title	Description
A	As-Found Condition	Actual field conditions different than anticipated, client-supplied documentation was incorrect, could not previously have been accessed, or limited access was available. This includes interference with embedded commodities.
B	Betterment	Issued design is constructible. However, the proposed alternative is less expensive, improves schedule, improves constructability, or improves client's ability to operate and maintain the facility. The basis for cost/schedule savings to be documented.
C	Not Constructible	Design is not adequate, cannot be installed, or cannot be made operational. Design is incomplete or does not provide sufficient detail.
D	Alternate Installation	Schematic design is adequate and correct; however, changes were requested because of physical limitations, schedule constraints, and/or material unavailability not defined when the original design was issued.
E	Installation Deviation	Hardware, equipment, or system configuration is not installed in accordance with the design requirements but is judged to be functionally and operationally acceptable. If the actual condition reflects a non-conformance or deficiency in accordance with the applicable NCR procedure, then an FCD should not be used to document the condition.
F	Supplier/(sub) contractor Issues	Facilitate modification of supplier/sub-contractor-provided material or components to address unavailable material or components, late shipments, supplier/vendor documentation deficiencies, bill-of-material discrepancies, or other similar supplier/(sub)contractor issues. If the actual condition reflects a non-conformance or deficiency in accordance with the applicable NCR or Unsatisfactory, Over, Short, and Damaged material procedure, then an FCD should not be used to document the condition.
G	Client Requests	Design information must be added or changed because of client request. (Note: Use only where changes are not covered by a scope or a contract change.)
I	Disapproved / Rejected	Disapproved FCDs or Rejected Preauthorized FCDs.

Notes:

If more than one code is applicable for a given situation, select the one judged most applicable. No more than one classification code shall be assigned per FCD.

The *Supervisor Rep (PFE)* assigns the code at the time the FCD is received, and the PE/EM/LFAE concurs with the assignment prior to approving the final FCD disposition.

8.3 Appendix 3: Non Conformance Report Classifications

Classification	Description
Damaged	Product damage (e.g. chipped tunnel rings)
Design	Design error (e.g. design nonconforming with design standards)
Documentation and Records	Missing, incomplete, obsolete, superseded or not accepted documentation (e.g. works started without accepted Inspection and Test Plan).
Equipment Breakdown	Equipment malfunction (e.g. damage caused due to broken plant, snapping or supporting chains)
Incomplete Works	Works that started but were not completed.
Incorrect Installation	Product was incorrectly installed.
Manufacturing Defect	Defect occurred during manufacturing process.
Material	Supplied material which does not comply with specification (e.g. concrete cube strength below specified)
Planning	Planning error (e.g. where inadequate resources/insufficient material could have been prevented)
Software	Software related system issues (e.g. failure of station CCTV management system because of software bug or incorrect software configuration).
Supervision/Management	Management failure (e.g. failure to control process/method)
System Defect	Failure to implement agreed processes or no documented process (e.g. Failure in ITP, method statement, failure to submit technical documents or missing procedure/process)
Testing and Commissioning	All non-conformances discovered during Testing and Commissioning process.
Workmanship	Lack of skill in the activity, carelessness in execution of the task (e.g. honey combing in concrete due to insufficient vibration)

8.4 Appendix 4: Non Conformance Report Dispositions

Repair	The process of restoring a nonconforming characteristic to function in a safe and reliable condition, even though that item still does not conform to the original requirement.
Rework	The process by which an item is made to conform to original requirements by completion or correction.
Reject	The process of eliminating a nonconforming item from its intended use. Rejected items may be discarded, destroyed or downgraded when the downgraded item can be clearly identified and controlled.
Use-As-Is	A disposition permitted for a nonconforming item when it has been established that the item is satisfactory for its intended use.