SCIRT Rebuilding Infrastructure

LEARNING LEGACY

Lessons learned from one of New Zealand's most challenging civil engineering projects: rebuilding the earthquake damaged pipes, roads, bridges and retaining walls in the city of Christchurch 2011 - 2016.

Extract from the Construction Management Plan

Story: Early Constructor Involvement (ECI)

Theme: Programme Management

A document which outlines the purpose and processes associated with ECI at SCIRT.

This document has been provided as an example of a tool that might be useful for other organisations undertaking complex disaster recovery or infrastructure rebuild programmes.

For more information about this document, visit www.scirtlearninglegacy.org.nz

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ATTACHMENT 3:

ECI REQUIREMENTS

CONTENTS

A1. INTRODUCTION

This document outlines the purpose and processes associated with Early Contractor Involvement (ECI) through concept and detailed design of the SCIRT rebuild projects. Furthermore, this document also identifies the expected deliverables as part of this process with examples of recommended tools to ensure that the maximum value is extracted from ECI.

A2. DESCRIPTION

The purpose of ECI is to provide a structured process with dedicated forums designed to facilitate interaction between delivery and design teams to ensure that constructability opportunities, issues and risks are identified and taken into consideration throughout the design process. In order to satisfy this requirement, the Design Lead and the Delivery Team ECI Lead will work closely together to ensure transparency and accuracy around key milestone dates and deliverables for each project.

There are a number of pre-construction processes that rely on information provided through the design process. This information can affect the construction critical path. In working with the designers, the delivery team can minimise the time lag between design completion and construction commencing. In order to track these pre-construction processes and critical dates, it is necessary to ensure adequate documentation is maintained and agreement is reached between design and delivery teams on key ECI milestone targets during the design process.

Another key outcomes of the ECI process is the development of a construction methodology, construction schedule and other deliverables that will inform the Estimating Team, to enable the development of an accurate target outturn cost (TOC).

The flowchart attached as Appendix A summarises the key ECI processes, milestones and deliverables.

A3. ECI TEAM - RESPONSIBILITIES AND SCOPE

a. The ECI Manager

This role will be filled by a member of the Delivery Team. This person will lead and 'chair' the ECI team interactions and be responsible for ensuring that key dates and deliverable requirements are met.

b. ECI team

Design Lead: The key role for this individual in the ECI process is to competently identify and communicate the design parameters and issues. Evaluating input from the delivery team and integrating modifications accordingly will also form a key

component of this role.

Delivery Lead / Project Manager: The key role for this individual is to competently identify and communicate the construction methodology and any associated issues. Additionally, this person is required to listen to, and evaluate input from the designer and make any required modifications accordingly. This person may also be the ECI Manager.

Additional Specialist Input: There will be a number of additional specialist inputs required through the ECI process possibly including:

- Environmental Specialist;
- Traffic Management;
- Utilities Coordinators;
- CCC Property;
- Health and Safety;
- Procurement; and
- Planning.

The timeframes associated with these inputs will be adequately identified, agreed and managed to ensure accountability and timing around Project Design and Delivery.

A4. CONCEPT DESIGN

a. Introduction

Upon allocation of a project to a Delivery Team the ECI Manager/Lead will initiate the ECI process and collate the necessary information prior to the Concept Design initiation Workshop.

b. Milestones

The relevant milestones through the Concept Design process are as follows:

1. Design Initiation Workshop
2. Risk Workshop
3. Design / Delivery Interface as required

c. Required Outputs / Deliverables

The required deliverables through the Concept Design process are as follows:

1. Outline Construction Schedule – To be provided to the Scheduling Team
2. Outline Construction Methodology
3. Resource Assessment

4. Interface Assessment – Utilities providers / other NOPs / Stakeholders engaged where necessary
5. Preliminary Traffic Staging Plan – To IST Traffic Management Teams
6. Environmental Assessment – Specialist engaged where necessary

d. Tools

The tools to be utilised through the Concept Design process include the Project Lifecycle checklist and Part A of the *ECI Milestone Management Document.*

The checklist (attached as Appendix A) seeks to ensure that due attention has been given to all relevant considerations through the process.

Part A of the Milestone Management Document works to ensure that actions and accountabilities are documented and tracked through the concept design process with a view to delivering required outputs.

A5. DETAILED DESIGN

a. Introduction

The ECI process during Detailed Design will be an extension of the Concept Design process, developing in more detail the outline construction planning and risk and constructability assessment and input provided during Concept Design

b. Milestones

The relevant milestones through the Detailed Design process are as follows:

1. Design Risk Workshop
2. Constructability Workshop
3. Design / Delivery Interface as required
4. Handover Meeting

c. Outputs / Deliverables

The required deliverables to be provided at the end of the Detailed Design process are as follows:

1. Integrated Construction Methodology including consideration of:
    a. Site Specific Health & Safety management
    b. Environmental Protection
    c. Community & Stakeholder Communications
    d. Resource & Procurement requirements
    e. Temporary Works required
2. Detailed Construction Schedule – To be provided to the Scheduling Team

3. Traffic Staging Plan – To IST Traffic Management Teams
4. Inspection & Test Plan (ITP) – To be agreed with Designer
5. Review and incorporation of construction risks into Project Risk Register
6. Review and proposed temporary works items for Project Bill of Quantities

All of the above required deliverables will be uploaded onto Project Centre as and when required by the TOC estimating team.

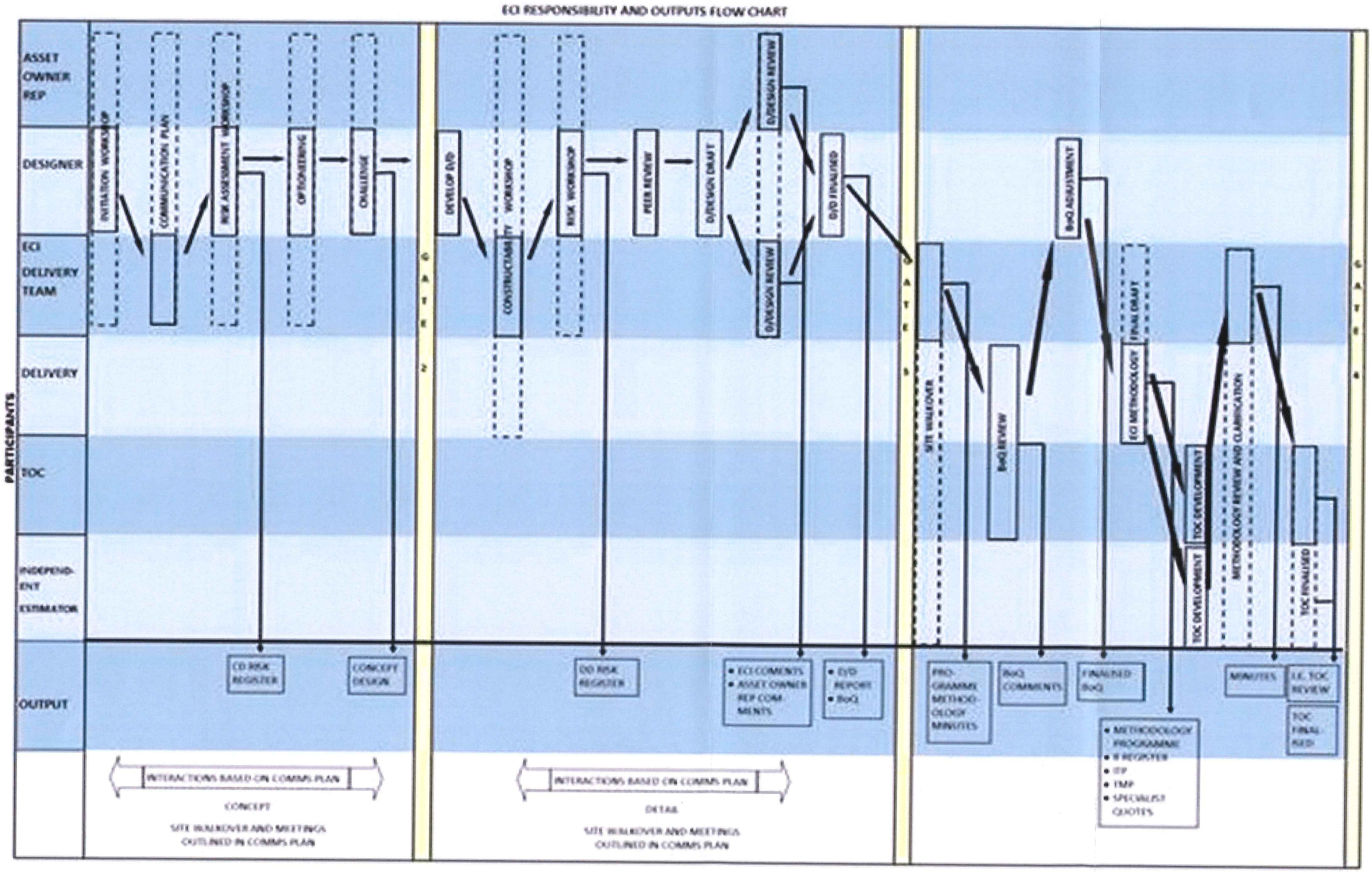
Depending on the complexity of the project, other required outputs could include:

- Consent Application(s);
- Environmental Specialist assessment, testing and monitoring programme;
- Easements / Access Agreements;
- Temporary works design;
- Pre-condition surveys;
- Specialist plant / materials acquisition;
- Interface and coordination programme.

A6. TOOLS

Each Delivery Team is required to put processes and procedures in place to enable them to meet these ECI requirements. Appendices B and C provide examples of an ECI Checklist and an ECI Milestone Management Plan that could be employed to manage and control Delivery Team ECI efforts.

APPENDIX A – ECI PROCESS CHART



APPENDIX B – ECI CHECKLIST

ECI Check List One - Scoping Documents prior to Concept Design initiation workshop

Project:	**SCIRT Number:**
Location:	
Stage: Concept Design /start up:	**Date:**

Task	Detail	Status
Scope of work	Indicate as in table below	
Very rough order Cost	$,000	
Approximate Completion dates	▪ Concept ▪ Design	
Expected Construction start date		
Construction Duration	Estimated - Months	

Waste Water	
Length of pipe in metres	
Diameter x	
Diameter y	
Diameter z	
Structures (pump stations)	

Storm Water	
Length of pipe – metres	
Diameter x	
Diameter y	
Other	

Roading	
Length metres	
Area square metres	
Other	
Structures	
Temporary Works	
Utilities	
Traffic	
Environmental	

APPENDIX C - ECI MILESTONES MANAGEMENT DOCUMENT

Project Steering ECI Milestone Management

Project: _____

SCIRT Project No. 10XXX

Controlled Live Document

Owner: Project Delivery Manager

Revision Control			
Rev	**Date**	**By**	**Comments**

ECI Key Staff

Delivery Team -	

Design Team -	

Christchurch City Council	

Integrated Services Team	

ACTIONS & CONSIDERATIONS			MILESTONES			
No.	**Item**	**Comment**	**Action Who**	**Start**	**Complete By**	**Critical Path Y/N**
CONCEPT DESIGN DEVELOPMENT – PART A						
1.0 Programme						
1.1	**Concept Design Programme**	*Indicating agreed milestones, key dates etc,*				
1.1a	**Concept Design Critical Path Items**	*Required to complete items under '2.0 General Considerations'*				
1.2	**Outline Construction Timeframe and Schedule**					
2.0 General Considerations						
2.1	**GIS and Master Schedule Assessment**	*Identification of potential interface issues*				
2.2	**Traffic Management Assessment**	*Dialogue established with internal FH TM Coordinator and IST TM resource if required*				

2.3	**Environmental Assessment**	*Dialogue with FH Environmental Advisor - Identification of all potential issues*				
2.4	**Resource Assessment**	*Consideration given to any potential resourcing and procurement issues; Subcontractor / Materials / Special Plant etc...*				
2.5	**Outline Methodology**	*Half-page likely work sequence brief...*				
2.6	**Risk Register**	*Risk register generated, initial risks identified*				

Concept Design Outcomes

Concept Design Completion Date:	**XX XXXX 2012**	**Expected Detailed Design Completion Date:**	**XX 2012**
Expected Construction Start Date:	**XX 2012**	**Expected Construction Completion Date:**	**XX 2013**
Concept Design Cost Estimate:	**$XXXX**		

Deliverables

Outline Construction Schedule		**Resource Assessment**		**Preliminary TMP**			
Outline Methodology		**Interface Assessment**		**Environmental Assessment**			

ACTIONS & CONSIDERATIONS			MILESTONES			
No.	**Item**	**Comment**	**Action Who**	**Start**	**Complete By**	**Critical Path Y/N**
DETAILED DESIGN DEVELOPMENT – Part B						
1.0 Programme						
1.1	**Detailed Design Programme**	*Indicating agreed milestones, key dates etc,*				
1.1a	**Detailed Design Critical Path Items**					
1.2	**Construction Programme**					
1.3	**Temporary Works**	*Is this required? What is involved?*				

2.0 Property Issues						
2.1	**Building Consent**	*Info required to assist this process, timeframes etc,*				
2.2	**Easements**	*Info required to assist this process, timeframes etc,*				
2.3	**Access Agreements**	*Info required to assist this process, timeframes etc,*				
2.4	**Land Designation**	*Info required to assist this process, timeframes etc,*				
2.5	**Ground Remediation**	*Info required to assist this process, timeframes etc,*				
2.6	**Other**					
3.0 Procurement						
3.1	**Long Lead Items *(Design Dependent Items)***	*Large diameter pipe, pumps, generators, etc, - Items unable to be ordered until design specification determined*				
4.0 Traffic Management						
4.1	**Traffic for Christchurch Review (Website)**	*To gain an understanding of other work likely to be in the area*				

4.2	**TMP Submission**					
5.0	**Quality**					
5.1	**ITP Generation (Generic / Custom)**					
5.2	**Additional Monitoring Required**	*Monitoring determined in order to satisfy Designer for PS3 / PS4*				
6.0	**Environmental Considerations**					
6.1	**Dewatering**	*High / Med / Low Risk area?*				
6.2	**Contaminated Land**	*Evidence of...??*				
6.3	**Archaeological**	*High / Med / Low Risk area?*				
6.4	**Coal Tar**	*Evidence of...??*				
6.5	**Asbestos**	*Evidence of...??*				
6.6	**Trees**	*Construction likely to impact on surrounding trees?*				
6.7	**Other**					

7.0	**Utilities Considerations / Coordination**					
7.1	**Identification of Utilities Plans**					
7.2	**Coordination Offer**					
8.0	**Health & Safety Considerations**					
8.1	**Risk Minimisation**	*'Engineering out' of Health & Safety Considerations*				
9.0	**Communications**					
9.1	**Key information for Consultation**	*Information necessary to facilitate consultation / communication with key stakeholders*				
10.0	**Risk Management**					
10.1	**Completed Risk Register**					

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Project Handover Documentation Requirements – Project Coordinator Checklist

SCIRT PROJECT NUMBER: PROJECT TITLE: Version 3 Issued 21 May 2014

Responsibility (DT/IST)	Document	Preparation Stage	SCIRT Phase	Document Type	CCC Required File Naming Convention (example) (MUST BE UNIQUE)	Further Notes	
DT00	Handover Checklist	End of Construction	HD	RP	_____-HD-WW-RP-1001[1]Handover Checklist	To be uploaded when the project header form H1 box is ticked, by either the Project Coordinator or the Dlivery Team Document Controller.	
DT01	Project Inspection and Test Plan	During Construction	CN	RP	_____-CN-WW-RP-000X[1]Inspection and Test Plans	PDF file format. Fully completed with signatures and dates.	
DT02	Engineering Test Reults (Pipes) • Proving pressure test for catchment element (pressure systems, not for gravity) • Proving vacuum test for catchment element (vacuum systems) • Water leakage reduction report • Asbuilt CCTV logsheets	During Construction	CN	RP	_____-CN-WW-RP-000X[1]Engineering *Type of test* _____-CN-WW-RP-000X[1]CCTV Logsheets	PDF file format. Only listed engineering pipe test required. All other test records to be archived and stored as per standard QA requirements. All tests for a specific pipe (ID xxxxxx) or street, manhole to manhole, to be grouped together.Further specific test results may be requested if required for specialist projects or for audit purposes. Asbuilt CCTV will require full redline markups for processing, with asset IDs as per SAT .	
DT03	Engineering Test Results (Other Assets) • Benkleman beam test • NAASRA Roughness • Pump station pipework pressure test • Pump station pump tests • Water well log and quality tests	During Construction	CN	RP	_____-CN-WW-RP-000X[1]Engineering: *Type of test*	PDF file format. Only listed engineering pipe test required. All other test records to be archived and stored as per standard CCC requirements. Further specific test results may be requested if required for specialist projects or for audit purposes.	
DT04	Statements of Warranty	Commissioning	HD	RP	_____-HD-WW-RP-000X[1]Warranties	PDF file format. Warranty separated for individual assets but scanned all into one file for project centre. Note that for pump/lift stations these will also be included in Section 7 of the Operations & Maintenance Manual.	
DT05	Product Manuals	Commissioning	HD	RP	_____-HD-WW-RP-0005[1]Product Manual	PDF file format. Only one product manual per model per project. Product Manuals to be separately bound as Section 9 of the O&M Manual, but scanned all into one file for project centre.	
DT06	CCC Asset Pick Up Sheets	Commissioning	HD	AB	_____-HD-WW-AB-000X[1]SAP As Built Asset Data	Microsoft Excel format. Refer to NoR73 for current templates.	
DT07	• Draft Operations and Maintenance Manual, and • Final Operations and Maintenance Manual • Asset Owner's Manual for applicable structures, e.g. for PS with demountable roofs and new NZTA bridges require the Bridge Data System (BDS) to be updated.	Commissioning	HD	RP	_____-HD-WW-RP-000X[1]Draft Operations and Maintenance Manual _____-HD-WW-RP-000X[1]Final Operations and Maintenance Manual _____-HD-WW-RP-000X[1] Asset Owners Manual	PDF file format. Note that CCC also require ONE hard copy of the draft and then ONE hard copy of the final O&M Manual to be located in the pump/lift station control cabinet itself. The Draft O&M Manual will contain the redline marked up drawings. The Final O&M Manual will contain the final as built drawings. Note that an Asset Owners Manual may be needed for applicable structures, e.g. pumping stations and reservoirs with demountable roofs. New NZTA bridges require the Bridge Data System (BDS) to be updated.	
DT08	Post Construction Road Safety Audit Report	End of Construction	HD	RP	_____-HD-WW-RP-000X[1]Post Construction Road Safety Audit	PDF file format. Only required if a design safety audit was conducted, typically where kerb, road use or alignment changes. Project must pass final audit.	

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DT09	• PS3 Built to Plan Certificate • PS4 Built to Plan Certificate	End of Construction	HD	CE	_____-HD-WW-CE-000X[1]PS3 _____-HD-WW-CE-000X[1] PS4	PDF file format. Producer Statement 4 signed by Engineers (from IST or otherwise).	
DT10	IDS Contractor's Completion Certificate	End of Construction	HD	CE	_____-HD-WW-CE-000X[1]Infrastructure Design Standard Contractor's Certificate	PDF file format. Standard IDS Appendix 8 format.	
DT11	RAMM Data Using current CCC or NZTA templates. CCC need retaining walls and roading captured in RAMM.	End of Construction	HD	RP	_____-HD-WW-RP-000X[1]RAMM Inventory	RAMM Inventory to be uploaded to project centre in Excel format. Refer to NOR47 for the RAMM flowchart for clarification on thresholds for requiring inventory update sheets. Typically inventories will be accepted by CCC/NZTA RAMM representatives before end of handover. All CCC RAMM data is to be uploaded to RAMM Contractor as usual, whether or not RAMM inventory update sheets are required.	
DT12	• Street Light Certificate of Compliance • Electrical Certificate of Compliance • Installation Control Point Number (ICP#) for new electrical installations	End of Construction	HD	CE	_____-HD-WW-CE-000X[1] Street Light Certificate of Compliance _____-HD-WW-CE-000X[1] Electrical Installation Certificate _____-HD-WW-CE-000X[1]Installation Control Point Number	PDF file format. Street lighting certificate is required only if a new lighting standard is installed.	
DT13	• The current SAT format is required per asset type (combined survey and metadata for 12D processing). • GIS Abandoned/ removed tool for decommissioned assets. • Older format was to provide metadata: and separate survey data, including reduced levels. Format of survey data can be a CSV file, or DWG (or similar) file.	During Construction	HD	RP	_____-HD-WW-RP-000X[1]SAT As Built Asset Data _____-HD-WW-RP-000X[1]Final SAT As Built Asset Data _____-HD-WW-RP-000X[1]As Built Survey Data _____-HD-WW-RP-000X[1]As Built Survey DWG (or similar file type) _____-HD-WW-RP-000X[1]Metadata	Required format is the current Survey As-built Template (SAT). Please refer to the current Survey As-built Guidelines (SAG) for details. For each revision of the SAT format provided, a 12D validation report will be generated by IST 12D Team for the DT, unless a Final SAT is provided. Metadata to be supplied to IST by Delivery Teams in standard SCIRT Excel metadata template (WW, WS or SW).GIS data then supplied from SCIRT GIS to CCC GIS. GIS Metadata is not required for projects that have no pipeworks (i.e. purely: structural or roading).	
DT14	Red Line Marked up Drawings of the construction issue drawings set.	During Construction	HD	RP	_____-HD-WW-RP-000X[1]Marked Up Drawings	Needs to contain the full drawing set as latest revisions, including any agreed design changes. All changes, including as-built survey levels, are to be marked up in red pen for drafters to produce as built drawings. Each page shall be signed and dated, even in case of 'no changes'. Red pen markups also to be included in Draft O&M Manuals. A quality colour scan is to be provided.	
DT15	Construction photos (IDS requirement)	During Construction	-	-	Not to be uploaded to Project Centre unless as pat of a PDF'd word document. Construction photos sets are to go onto the GIS photo database via Handover Coordinator.	Photos to be either emailed in a zipped folder or supplied via USB/CD to Handover Coordinator. Need to be rotated correctly and unnecessary photos removed. Will be automatically resized and renamed.	
DT/IST	Final As Built Drawings	End of Construction	HD	DG	_____-HD-GE-DG-1000[1]Final As Built Drawings	PDF file format. PDF to be in vector form not raster. After hardcopy checkprints are approved by delivery teams, the design team will finalise the drawings. Handover Coordinator to upload finalised as built drawing PDFs to project centre on behalf of the delivery teams. Checkprints are not to be uploaded on project centre. Final as built drawings also to be included in Draft O&M Manuals.	

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Project Handover Documentation Requirements – Project Coordinator Checklist

SCIRT PROJECT NUMBER: PROJECT TITLE: Version 3 Issued 21 May 2014

Responsibility (DT/IST)	Document	Preparation Stage	SCIRT Phase	Document Type	CCC Required File Naming Convention (example) (MUST BE UNIQUE)	Further Notes	
IST01	IDS Design Certificate Design Review Certificate PS2 Building Design Peer Review Certificate Design Report (Concept and/or Detailled)	Design Phase	DE	CE	_____-DE-WW-CE-000X[1] Design Certificates _____-DE-WW-CE-000X[1] Concept Design Report and/or _____-DE-WW-CE-000X[1] Detailled Design Report	PDF file format.	
IST02	Environment Canterbury (Ecan) Consent Details	End of Construction	CO	CO	_____-CO-WW-CE-000X[1] Environment Canterbury Consent	PDF file format. Only if different from SCIRT Global Consents. Includes water wells.	
IST03	Cost of Works	Completion of project	HD	RP	_____-HD-WW-RP-000X[1]Cost of Works	Microsoft Excel and PDF file format. Cost of works broken down to asset capitalisation level.	
IST04	Practical Completion Certificate	Completion of Project	HD	CE	_____-HD-WW-CE-000X[1] Practical Completion Certificate	PDF file format.	