Crossrail Planning and Scheduling Handbook

The Planning and Scheduling handbook describes how Planning is undertaken at Crossrail. It is an intranet based tool that pulls together the various guidance notes and desktop instructions into one page through a series of linked documents as shown below. This handbook is shared on the learning legacy for reference by other major projects considering their planning strategy and systems.

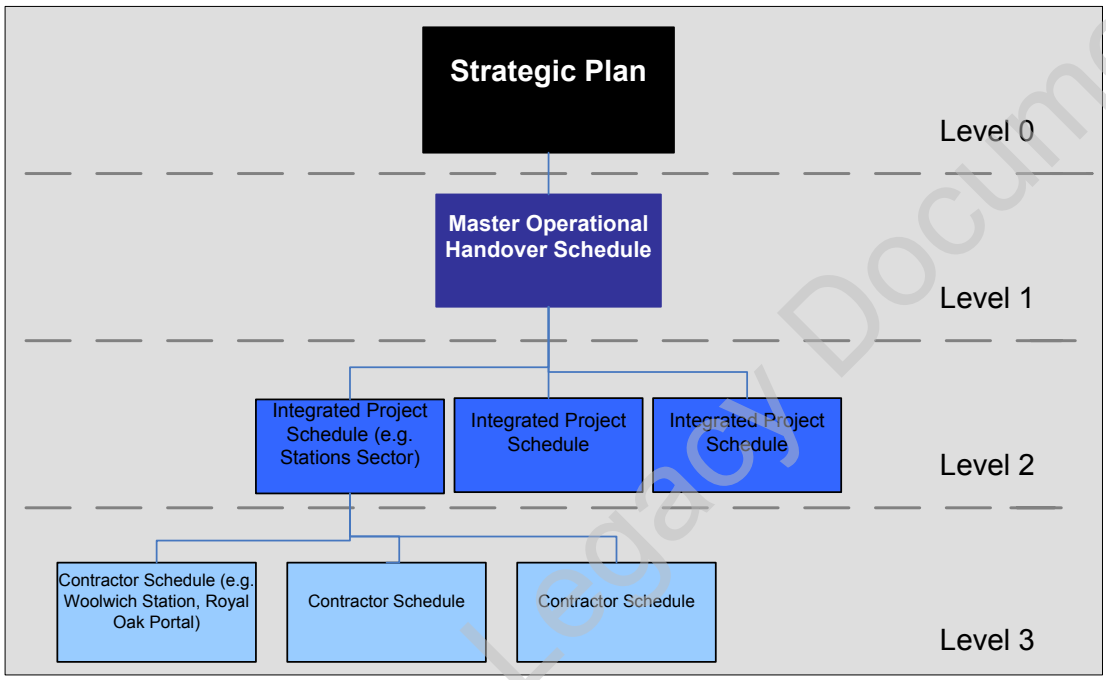
The handbook can be downloaded **here** or click on the links below for individual sections. (section 1 not included)

2. Planning and Scheduling Desk Top Instruction

Instruction	**007**
Revision	**24 August 2015**
2.1 Schedule Hierarchy	

Overview:
Crossrail schedules are structured in a three level Primavera hierarchical structure (levels 1-2 and 3) plus a graphical overall summary "Strategic Plan" (level 0).

Schedule Hierarchy Level Description:
The schedule hierarchy levels are shown in the following diagram:



Level 0 Strategic Plan:
The Strategic Plan is a one page schedule graphic that encompasses the entire scope of the Crossrail Programme. The Strategic Plan displays the start and completion of major activities. The graphic is based on information contained in the baseline level 1 Master Operational Handover Schedule.

The Level 0 schedule is updated with a status bar periodically.

Level 1 Master Operational Handover Schedule:
The Master Operational Handover Schedule is the formal schedule analysis and reporting critical path schedule. The Master Operational Handover Schedule comprises a summary of the detail and logic from the Level 2 Integrated Project Schedule.

The Level 1 Master Operational Handover Schedule is updated with progress, logic changes and other information periodically. The Level 1 Schedule is also the source of Anchor and Key Event Milestones.

Level 2 Integrated Project Schedule:

The Integrated Project Schedule comprises project level schedules and forms the detailed critical path schedule. The Level 2 schedule is informed by Level 3 schedules and Crossrail Project Team analysis.

Level 3 Tier 1 Contractor Schedule:
The Level 3 Tier 1 schedules are Contractor and Industry Partner schedules. These schedules are developed and maintained by the respective contractors and are submitted in accordance with contractual requirements.

Planning and Scheduling Desk Top Instruction

Instruction	**011**
Revision	**24 August 2015**
2.2 - End of Period Timescales	

Overview:

In order to support timely periodic updates of the various levels of the Master Operational Handover Schedules it is necessary to have a standardised and agreed calendar across the CRL planning function.

This periodic cycle identifies:

- When schedules are received
- Periods to reject or accept Contractor's Programmes
- Review Periods
- Reporting cut-off times
- Review Meetings
- Archiving of schedules

Periodic Timescales

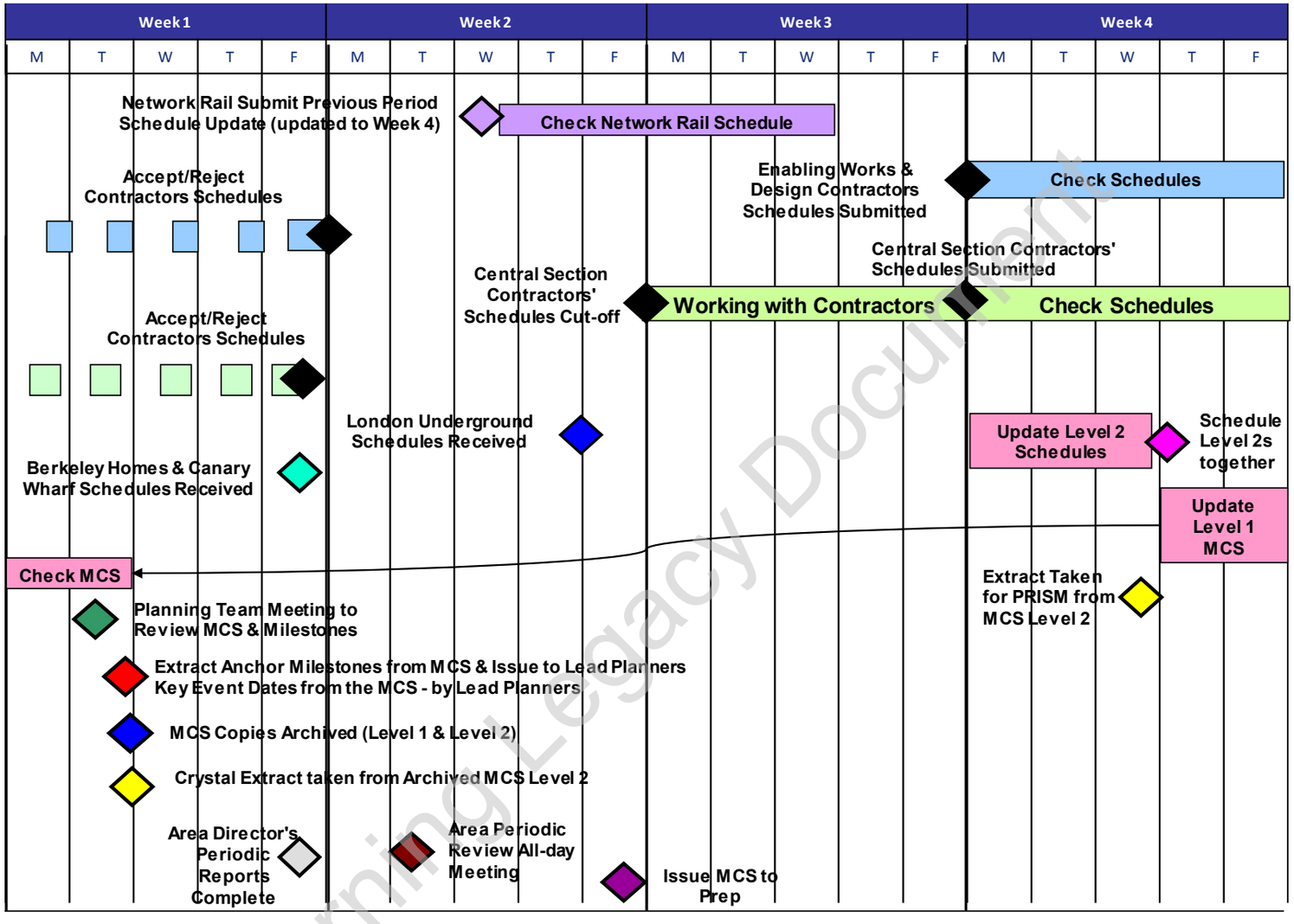
The data dates for MOHS schedules are required to be set at the end of Week 2 in the period.

Timescales have been allowed to update the MOHS hierarchy sequentially to enable consistency to be achieved at all levels.

PRISM (for Cost Management) and CRYSTAL (for Reporting) are two systems that receive planning data from P6, the dates of these extracts are shown below.

The periodic timescales are provided in the cycle provided on page 2 and a flow chart of the Quality Assurance within the schedule updating process is also provided as an attachment to this instruction.

MOHS Schedule Update Cycle



Notes:
1. Data Dates for MOHS Level 1 & Level 2 Schedules to be set at the end of Week 2
2. Lead Planners to update Data Dates in the MOHS Level 1 Constituent Schedules

Quality Assurance in Planning Reporting – Printed 13/07/2011

KEY:
Quality Assurance Point

Strategic - Level 0

Key Schedule Artefacts

Level 0 - MCS

Overall Strategic Plan is a summary level schedule graphic. Produced by Central Planning Team in MS Visio.

Central Planning Team reports on the Programme-wide Anchor Milestones and reports on the rolling set of Anchor Milestones for Crossrail Dashboard.

Flow of schedule / planning data in Reports

Board Report

Transfers directly from ADRs (no additional input from Central Planning Team):
1. Key Accomplishments
2. Schedule Progress
3. Key Activities Planned

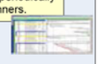
Crossrail Dashboard

From Central Planning Team: Programme-wide Anchor Milestones and rolling set of Anchor Milestones

Programme - Level 1

Level 1 - MCS

Master Control Schedule is integrated and logic linked. It forms Programme Schedule Baseline and Critical Path Network. Constructed from summaries of L2 Integrated Project Schedules. Produced in Primavera P6, updated periodically by Area Lead Planners.



Individual 'focus topic' planning reports e.g. Procurement

Schedule Quality and Integrity Reports

MCS Integration Manager combines Area Level commentary from ADRs to produce Programme Narrative. PDR is updated with 1. Programme Narrative; 2. L0 Strategic Plan; and 3. Period Anchor Milestones.

MCS Integration Manager produces L0 Strategic Plan and agrees with Functional Head of Planning and reviews with Area Lead Planners.

1. Area Commentary (includes identification of significant variances to baseline), 2. Anchor Milestones and 3. 1 year Key Events are submitted in Area Director's Report (F, W1) for discussion at Area Periodic Review meeting (Tu, W2)

Programme Director's Report (in Word)

From Central Planning Team:
1. Programme Narrative;
2. L0 Strategic Plan; and
3. Period Anchor Milestones.

Area Director's Report (in Word)

From Central Planning Team: 1. Area Commentary, 2. Anchor Milestones and 3. 1 year Key Events

Area Level MCS

Schedule cut off for reports (T, W1)

Periodic Anchor and Key Event Milestone Review (Tu, W1) with Functional Head of Planning, Area Lead Planners and Central Planning Team to review Anchor Milestones and Programme MCS

Central Planning Team "Schedules" Area Level MCS together to get overall Programme view

Following Periodic Anchor and Key Event Milestone Review, Area Lead Planner may be required to update Area Level MCS

Functional team review and adjust schedule

Area Lead Planner updates Area Level MCS and Area Commentary.

Project and Area - Level 2

Level 2 – MCS

Integrated Project Schedule provides integrated, critical path view of individual CRL & Industry Partner Schedules (managed by Area). Constructed from summaries of L3 Contractor Schedules. Stored in CRL P6.

Interface project schedule is reviewed by Area Lead Planner to identify consequences of updates to L2 integrated project schedules and identifies mitigation plans if required.

Schedule cut off for Prism (W, W4)

Project Report (in Excel TBC)

TBC

L2 Integrated Project Schedule

Following review of Interface project schedule, Project Planner may be required to update Project Schedules

Project Planner / Project Manager joint review of integrated project schedule.

Following review with Project Manager, Project Planner may be required to update Project Schedules

Project Planner updates Integrated Project Schedules based on analysis of progress / other data

Challenge or feedback from Area / Project Planner to Industry Partner (incorporated next period)

Area / Project Planner compares L2 Schedule to previous submission and produces Slippage Report

Industry Partner submits L2 Schedule to Project Manager (submission date varies by Agreement)

Yes

Contract - Level 3

Accept/Reject: Is criteria met for Acceptance? (14 day review period to assure programme as per NEC contract)

No

Project Planner reviews L3 Schedule using checklist in L4 form. Review looks at programme integrity and assurance (not specifically dates)

Tier 1 Contractor / FDC submits to Project Manager via eB:
1. L3 Contractor Schedule in pdf
2. L3 Contractor Schedule in .Xer format
3. Schedule narrative (up to 6 pages)
4. L3 form (T1 Contractors) or L1 form (FDC) 'Revised programme and programme acceptance submittal form' (submission date is F, W3)

Project Manager returns L3/L1 form including reason for rejection (4 options on form). Further details on the reason for rejection can be attached separately. Contractor addresses all comments raised, revises programme, L3/L1 form and schedule narrative and resubmits to Project Manager.

Managed by Contractor

FDC and Tier 1 Contractor / Contract team assess and update the L3 Contractor Schedule periodically. Cut off date for Contractor information is (end of W2 (Saturday 23:59)

Level 3

Produced by:
1. Framework Design Consultants (FDC) or 2. Tier 1 Contractors. Stored in CRL Primavera Staging database.

Contractor Dashboard (Tier 1 Contractors only)

Agreed milestones between Contractor & CRL

L3 Schedule

Planning and Scheduling Desk Top Instruction

Instruction	**028**
Revision	**24 August 2015**
2.3 - Intranet Planning Page	

In order to make Planning reports and data more widely available to the programme a 'Planning Page' has been created on the intranet.

Location

The Planning Page can be accessed via this link or via the intranet by going to the bottom left of the homepage and locating the icon "The Planning Page" which has a pyramid of schedule hierarchies in its background.

Type of Reports

The page contains a number of different report types:

- Primavera P6 'Layouts': reports that use codes (flags) to identify different types of activity
- 'Libraries': links to a place where a number of related documents are stored, e.g. The Planning Manual or Anchor Milestone Change Control
- Excel Reports: e.g. One Page Programme Summaries or Anchor Milestone RAG Report
- Programme-wide interface and operations diagrams: e.g. Interface Tracker or Stage Diagrams

Schedule Pyramid Hierarchy

The reports are grouped into Levels 0 to Level 2 which are different levels of schedule summary, Level 0 being the most summarised, Level 2 being the most detailed. All reports are produced each period, with the exception of the quantity curves that are updated weekly.

All reporting is based on the content of the Level 2 programmes as produced by each Project Planner, hence the need to maintain a robust schedule with accurate activity coding. The Level 2 Schedule provides the detail that is summarised into the Level 1 and Level 0 Schedules.

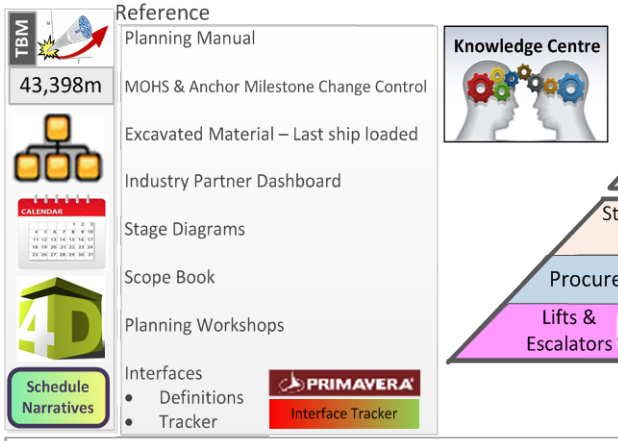
Within the Level 0 MOHS section of the pyramid, high level reports are presented summarizing the entire Programme. Anchor milestone forecast reports, an overall Programme schedule, and a time-chainage graph for Systemwide Track progress are available to view.

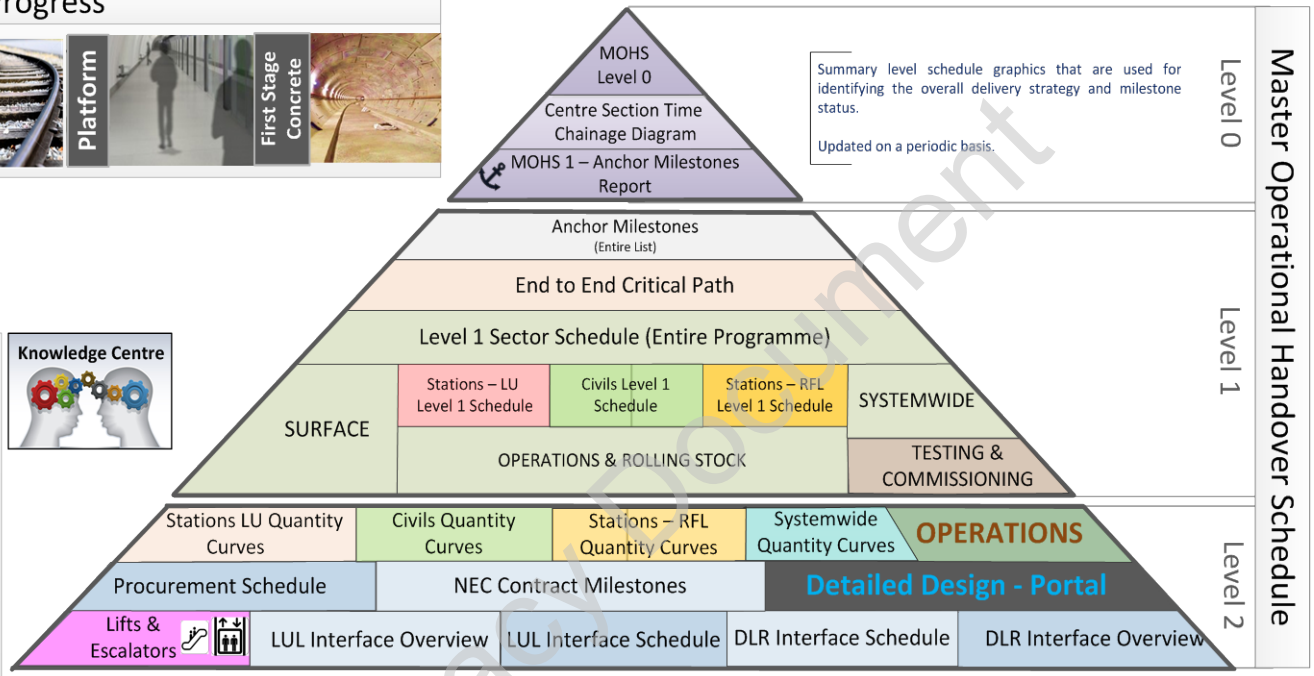
In the Level 1 MOHS section, more detailed reports are presented including summary schedules of each Sector in the Programme, in addition to the Programme critical paths.

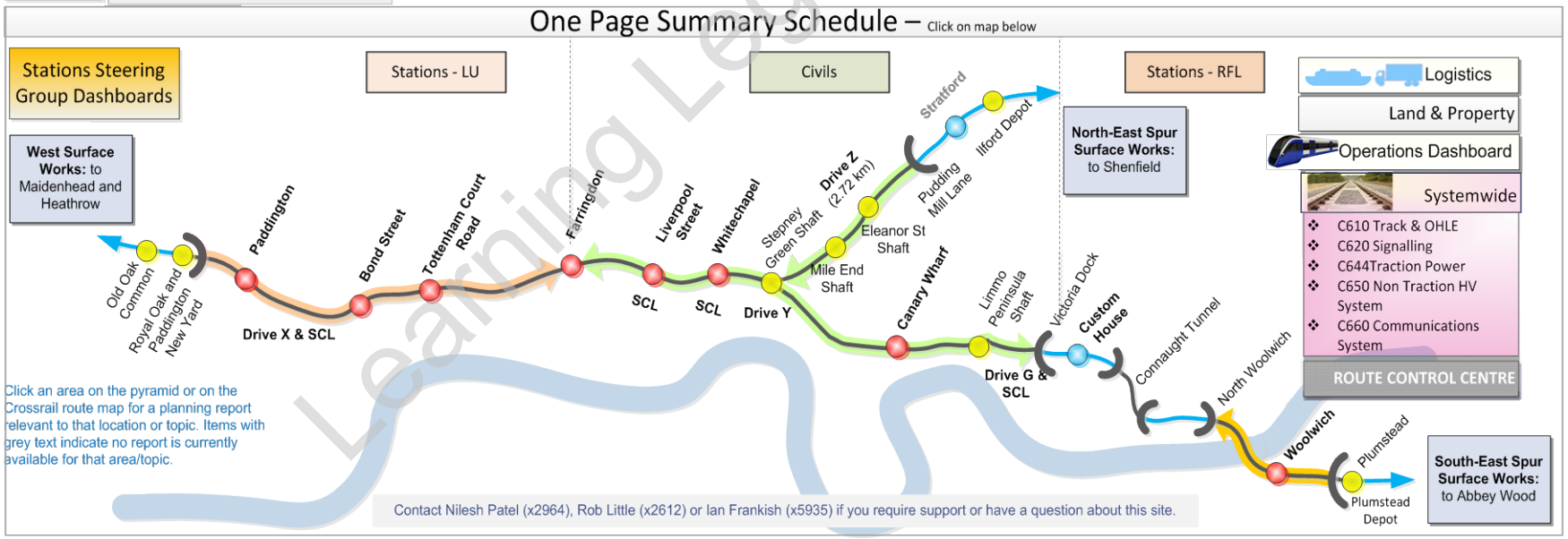
Within the Level 2 MOHS, Sector Quantity Curves at a project level are presented in addition to the Programme Procurement Schedule and NEC contract milestones report. The Project Planner supplies a revised actual figure for the Sector Quantity Curves to indicate progress and ensures that baseline/forecast dates are accurate, reflective of current progress, and confirmed with the Project Manager.

Programme Network Schematic – One Page Programme Summary reports

One Page Programme Summary reports are required to be updated periodically by the Project Planner and submitted to the Sector Planner – these are produced in Excel







3. Planning and Scheduling Desk Top Instruction

Instruction	**024**
Revision	**25 August 2015**
3.1 - Weekly Quantity Flash Reports	

In order to communicate and track progress of key physical construction activities, the Sector Planning teams are responsible for producing the Weekly Quantity Flash Report. The data for the report however comes from the site based project teams via the respective Project Planner.

The intention of this report is to give a quick insight into the progress of the activity relative to the MOHS Baseline Refresh and relative to a 'Project Manager's Forecast' standard S-Curve distribution.

In order to produce the profile for the Project Manager's Forecast and Baseline Refresh curves, a standard 'S-Curve' formula is used to spread the quantity over the duration provided according to this standard distribution. Experience and empirical studies confirm this is a good approximation for the progress of many project activities.

Should a project need to refine the standard 'S-Curve' to more accurately reflect a specific and unique work plan this can be accommodated with agreement of the respective Sector Planning Manager; however adoption of the standard 'S-Curve' is encouraged for simplicity and consistency.

The Quantity Flash report contains a progress chart for a number of hand picked physical construction activities, there are typically 2 – 4 for each worksite.

The data required to produce each chart is as follows:

- Project Managers Forecast: Start, Duration and Quantity (as forecasted by the Project Manager)
- Baseline Refresh: Start Date, Duration and Quantity (as taken from the MOHS Baseline Refresh programme, this will held as a baseline until it is revised or refreshed)

The report is distributed to the Crossrail Directors on a weekly basis. Prompt supply (deadline as agreed with your Sector Planning Manager) of actual performance is required on a weekly basis in order to support the production of this report.

Quantity Selection Guidelines:

- 'Bulk' quantities should be chosen that are significant activities that are easy to quantify (in terms of a target volume / area / meterage), monitor and track. Examples of 'bulk' quantities include piling, concreting, piping, cables, excavation etc.

- Quantities should be chosen if they are critical to the delivery of the project e.g. items that need to be completed to maintain the critical path or achieve beneficial use for example

- Aim to choose quantities that are a minimum of 6-8 weeks and a maximum of 12 months. However this is a guide, not a rule as there are likely to be exceptions for short term critical activities.

- Activities that are spread across a number of sites and starting at different times or with different durations should be split out into separate charts; this creates greater accuracy when tracking against the standard s-curve

- Where there is significant 'down time' on the activity e.g. if works must stop during the Olympics, consider splitting the activity into pre-Olympics and post-Olympics works so the standard 'S – curve' can model this more accurately

Weekly Update

- Provide a revised cumulative actual quantity (from Sunday – Saturday each week) that can be input into the report by the Sector Planning Team
- Place a concise comment to explain delays to the progress of the activity. The comment should be reviewed each week to ensure it remains relevant

Periodic Update

- In week 1 of the period, the Project Manager's forecasted duration, start and finish date should be reviewed to ensure it remains accurate and reflective of the current forecasted performance. If the forecast needs to be revised, please supply the relevant dates and durations to your Sector Planning Team.

Planning and Scheduling Desk Top Instruction

Instruction	**016**
Revision	**25 August 2015**
3.2 - Sector & Project Summary One Page Programme	

Overview:

1.1. Introduction to the Sector & Project Summary Schedule (SPSS)

The Purpose of the SPSS is to provide the reviewer with a single page overview of the Project Schedule. Upon reviewing the SPSS the reviewer will be able to gauge the overall scope, procurement and contract plan and the key interfaces and critical areas of the project.

When developing the SPSS, the project location, scope, interfaces, strategies and critical path(s) should be considered as a whole in order for an assessment to be made of the required level of detail. Excessive detail and the SPSS will become cluttered and unable to delineate a coherent message. Insufficient detail and the message will not be made. It is therefore problematical to specify the exact content, however listed are the mandatory inclusions;

1.2 Mandatory Inclusion

a. All scope within the project location including third parties.
b. All Contracts should be included
c. Sufficiently detailed to identify Interfaces between Contracts
d. Procurement Milestones, ITT & Award
e. Design gate Milestones
f. Critical Path
g. Critical Milestones these may change and will be different from project to project e.g. property access date, consent approved, school holiday period, blockade. etc

When producing the SPSS the input of the project team is vital, especially since the PM's approval is required prior to issue.

1.3 Periodic Updates

The SPSS should be updated in accordance with the CC update cut off periods.

Updating the SPSS should be considered a basic planning process.

a. Update revision number, period dates, titles etc
b. Move the Data Date
c. Reforecast the dates in accordance with the detail schedule information
d. Update progress to the data date
e. Update text box to capture key points.

2. Restructuring

Throughout the life of the project differing elements of work will become critical or areas of specific interest. This may require the SPSS to be restructured. The SPSS can be updated and reformatted as necessary. This will ensure at all times the SPSS is up to-date and pertinent. This should not be considered re-baselining as in fact the scope dates remain the same just resorted.

The restructuring of the SPSS will be version controlled as detailed:

a.Project location YYYY
b.Year NNNN
c.Period No NN
d.Version number NN
e.PAD-2010-04-01

2.1 Key data Items

Mandatory Colours

a. Current Bar ■
b. Baseline Bar ■
c. Critical Bar ■
d. Progress Bar ■
e. External Third parties ■
f. Internal Third parties ■

2.2 Baseline dates

It is the intent to represent baselines for activity bars only. It should be noted that the duration of the baseline bars may need changing throughout the life of the project as the 'scope' of the activity bars are changed to better represent the current message. This should not be considered as re-baselining and hence does not require formal approval

As the purpose of the SPSS is to provide the current status, the baseline should also represent the best view of the current baseline. The current baseline is defined as MOHS - any agreed changes via the schedule change process (TBD). (The schedule baseline MOHS encompasses: Level 1 Schedule MOHS and Level 2 Schedule PCS)

2.3 Data-date

The Data-date is illustrated by a vertical sight line moved across the SPSS in accordance with the Period Cut off.

2.4 Current Status

The current Status depicted by overlaying the progress bar onto the current bar. The progress bar should align with the status Data Date as it is not the intent to represent scope that is behind progress. See Forecast Dates

2.5 Forecast dates

Forecast dates should equal the current Start and Finish Dates taken from the period update Level 1 schedule. Earlier when defining the current status is was stated that an attempt should not be made to reflect behind progress. If however, progress is such that it is revising the forecast date this will be reflected within the forecast date.

2.6 Logic Links

Logic links should be used to illustrate key interfaces between contracts.

3 References

3.1 Key Dates – will need to be identified for each project, these key project dates and their drivers should be identified in the schedule

3.2 Hierarchy of schedule – A procedure will support a hierarchy of schedule where the SPSS will be at the top level project schedule summarising the detail level schedules.

Planning and Scheduling Desk Top Instruction

Instruction	**014**
Revision	**24 August 2015**
3.3 - PRep Reporting Requirements	

Overview:

Periodic submissions are made to the Project Representative (PRep) of the Level 1 Master Operational Handover Schedule.

The submissions are made in accordance with the timeline in Planning and Scheduling Desk Top Instruction No.011.

Consisting of an Adobe Acrobat (.pdf) of the Level 1 Master Operational Handover Schedule made from the Primavera P6 file and a Microsoft Excel spreadsheet the information submitted provides:

- Activity ID
- Activity Name
- Original duration
- Start Date (current forecast)
- Finish Date (current forecast)
- Baseline start date
- Baseline finish date
- Total Float
- Predecessors and successors
- Anchor Milestones
- Key Events

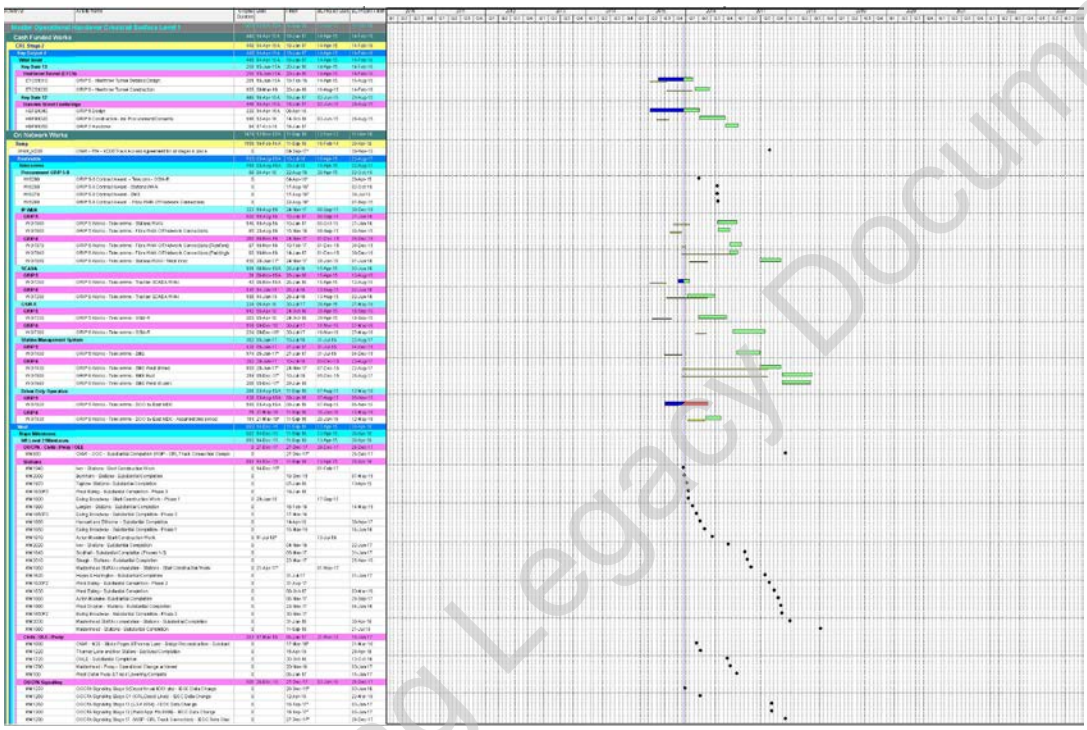
From spreadsheet submission

From time to time these requirements may change as agreed with the PRep.

Planning and Scheduling Desk Top Instruction
For On Network Works

Instruction	**020**
Revision	**25 August 2015**
3.4 - End of Period Timescales - Surface Works (Network Rail)	

Overview:
Network Rail (Industry Partner), currently submit their period submissions to Crossrail on the Wednesday of Week 2. This comprises of approx 25 programmes broken into different projects (see below)



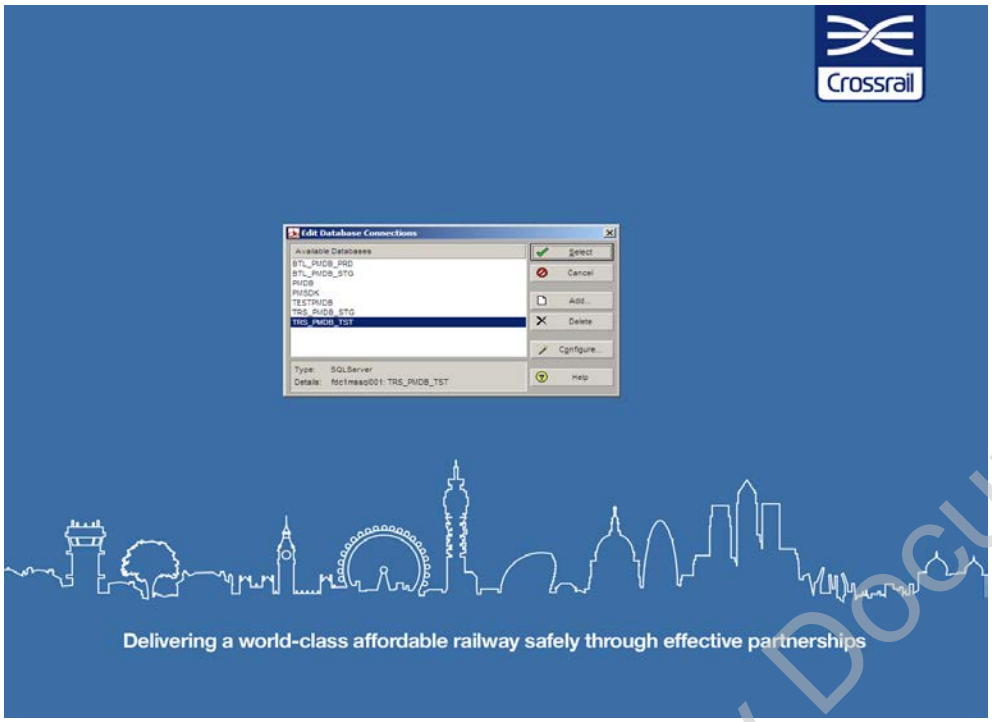
The intent is that Network Rail will produce fully logic linked, integrated schedules for North East Spur, South East Spur, West Inner & West Outer. At writing only the east has been integrated fully with all the proposed works, the West remain a collection of stand alone schedules.

As Network Rail is an Industry Partner and not a contractor we are not in a position to reject their monthly submissions, we comment and support their internal governance.

The programmes from Network Rail are not forecasts but actual cut off data from the end of the period; this causes a month mis-match with the rest of Crossrail reporting. E.g. Period 3 Crossrail data includes Period 2 Network rail data.

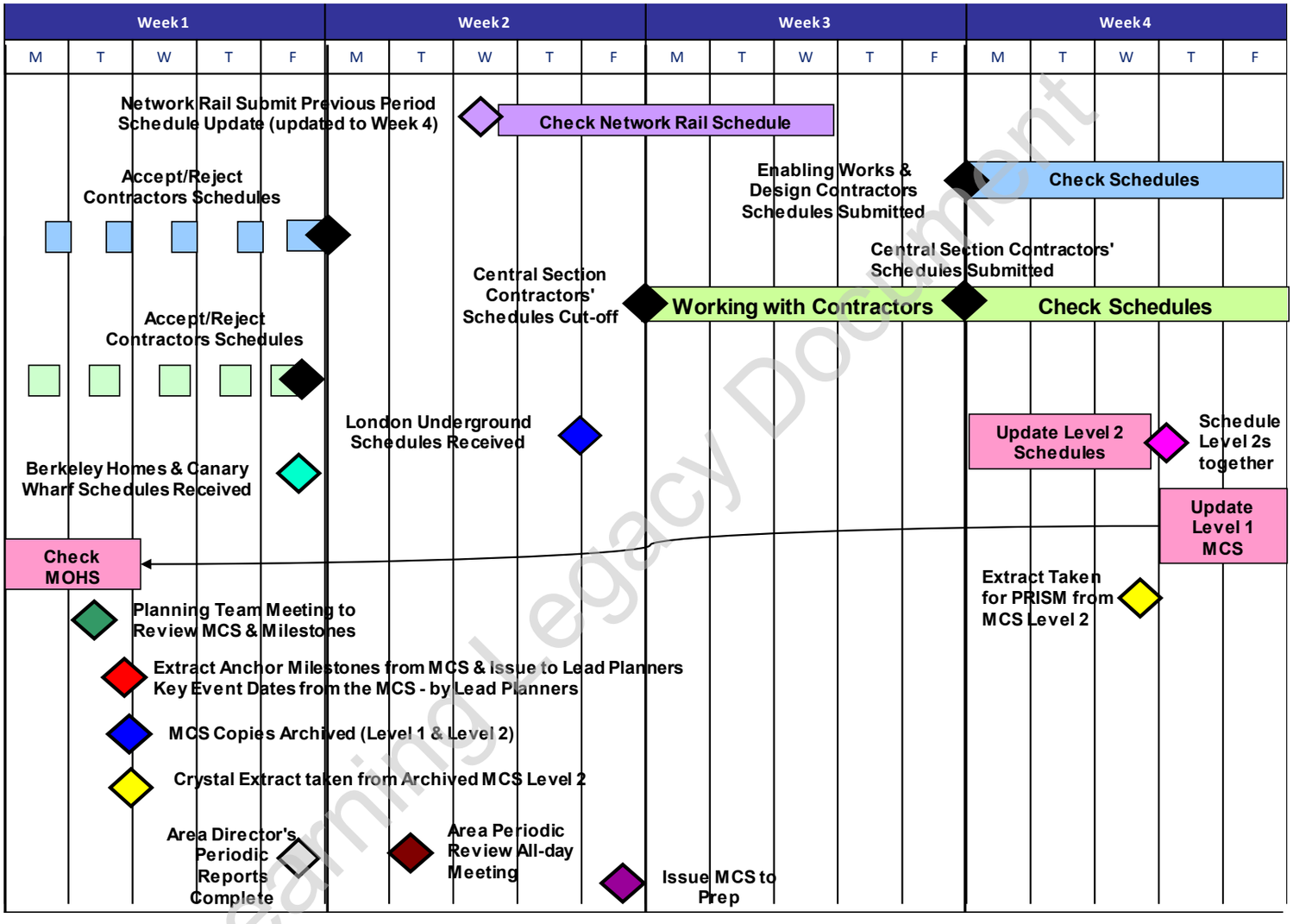
The programmes come through at Crossrail level 2 in the schedule hierarchy, this is then analysed and a representation is formed and integrated into the Crossrail level 1 MOHS

At present NR's schedules are stored in the BTL_PMDB_STG database and the Level 1 in the BTL_PMDB_PRD



Schedule Review meetings are held between the Crossrail Surface Sector Planner and Senior Planning teams respectively at the end of week 3 each period.

MOHS Schedule Update Cycle - From Period 2



Notes:
1. Data Dates for MOHS Level 1 & Level 2 Schedules to be set at the end of Week 2
2. Lead Planners to update Data Dates in the MOHS Level 1 Constituent Schedules

Planning and Scheduling Desk Top Instruction

Instruction	**012**
Revision	**17 September 2015**
3.5 - Periodic Reports Produced by Central Planning Team	

Overview:
This instruction lists each of the periodic standardised reports that are produced by the Central Planning team from the level 1 and 2 P6 schedules.

It is important to be aware of these reports and the P6 coding / conventions upon which they rely.

The Primavera layouts for some standardised reports can be found in the Global Layout Area in Primavera (see instruction 009 Level 1 and Level 2 P6 Layouts for further details)

Periodic Standardised Reports:

Global Code	MOHS Level	Associated Report	Distribution	Note
G – Anchor Milestone, G – Key Events	Level 1	Anchor & Key Event Milestones	Crystal Reporting, Planning Website	
		Anchor KPIs	Programme Controls Reporting Team	A corporate metric that measures the variance between Baseline Early date and Forecast date.
G – End to End Critical Path	Level 1	End to End Critical Path	Website	Used to identify the various critical paths of the programme.
G – NEC Contract Milestones (See instruction 'Planned and Contract Completion Milestones')	Level 2	NEC Contract Milestones	Website	Only milestones for awarded contracts are displayed.
		Commercial Assurance Report	Commercial Assurance Team	For selected contracts the variance between contracts dates and forecast dates are monitored.
G – Procurement Milestones	Level 2	Procurement Report	Planning Website	G - Procurement Milestones global code is used to identify seven stages of procurement.
G – Work Type	Level 2	Planning & Consents Submissions	Land & Property	
G – Engineering Design Task	Level 2	Stations, Portals & Shafts Detailed Design Tracker & Systemwide Design Tracker	Design Engineers/CEG/ Assurance Team	Captures IDR, SDR & GATE dates for the purpose of providing the wider business with look ahead & tracking information.
N/A	Level 2	Interface Tracker	Website	To capture all interfaces between programmes.
G – Work Type	Level 2	Lifts & Escalators	Website	Provides the Stations Hub & wider business a overview between Tier 1 programmes and OTIS/KONE dates.
N/A	Level 2	MOHS Key Dates	Website	Provide a graphical representation of Key Handover dates to Systemwide across the network.

Planning and Scheduling Desk Top Instruction

Instruction	**006**
Revision	**25 August 2015**
3.6 - Level 2 Schedule Narrative (Schedule Basis and Assumptions)	

Overview:
It is essential that an up to date Schedule Basis and Assumptions document be put in place to support each baseline level 1 or 2 schedule.

This document should be maintained periodically to include additional sections as identified below (items 12 - 15)

Intent of the Document:

The intent of the document is two fold:
1. To explain the execution methodology that underpins the schedule logic and durations
2. To record assumptions and exclusions

Document Content:

The Schedule Basis and Assumptions document will comprise the following sections:

1 Executive Overview:
A summary overview of the document content highlighting significant schedule items.

2 Project Description:
a. A narrative description of the scope of work covered by the schedule. Supplemented with diagrams as required.
b. Identification of key interfaces with other projects.
c. Tabulation of key quantities.

3 Execution Strategy:
Overview of project execution strategy topics that influence the schedule, i.e. Move utilities and demolition prior to construction. To enable early start split worksite into two. Design deliverables have been structured accordingly etc.

4 Contracting Strategy:
Outline the procurement strategy, including any PMI's, WIF's, PO's etc
Identify the interfaces between contracts and also other projects such as tunnels and SCL contracts.

5 Construction Strategy:
Describe the basis of construction - e.g. specifics due to site constraints, Bottom up or top down, staged construction due to design complexities. Tabulation of key unit rates used in the schedule.

6 Critical Path(s):
Describe the critical path and the next near-critical paths. Include printouts as appendices

7 Shift Patterns:

Include Non work periods e.g. Identify holidays and other non work periods e.g. standard UK holidays + e.g. Engineering hours/ closures, school holidays, Olympics etc

8 Assumptions:

List assumptions made and source documents such as which version of the CFSR has been used, consents register, property programme etc

9 Exclusions:

Identify anything that has been specifically excluded e.g. design changes due to revised pedestrian modelling

10 Risk & Mitigation:

List the main risks to schedule and potential mitigation options and decision points.

11 Changes from Previous Baseline:

Highlight the schedule changes (significant) form the previous baseline. The purpose of this is to provide as quick reference to changes, the details of which will be covered in the body of the document.

Additional Sections to be included for periodic update:

12 General period update description

Describe the PCS period update, Major accomplishments, issues highlight issues with contractors issued schedules, key events e.g. major progress impacts e.g. weather – if effecting programme. Critical slippages, missed deliverables, major impacts archaeology/ asbestos etc

Identify reasons for impacting, Anchor Milestones, Key Events Interface Milestones

- Bullet key achievements this period

13 Changes incorporated into this periods update

Include by contract background and description of scope for any additions or removal from the schedule highlight impacts

14 Key Activities Planned For Next Period

- Bullet key Activities planned to be completed next Period

15 Consultant/ Contractor Schedule Information

a. Design Consultant

Include annexes for dashboard, schedules, critical paths- etc

b. Cxxx – Contract Description (Kier)

- Include contractors dashboards as hyperlink or as part of document
- Include contractors programme submittal register as hyperlink or as part of document
- Include register of ICE and date changes as hyperlink or as part of document

Planning and Scheduling Desk Top Instruction

Instruction	**029**
Revision	**25 August 2015**
3.7 - London Underground Interfaces	

Overview:

The purpose of this instruction is to define the requirements for planning the interfaces of Crossrail with London Underground's existing and new assets within the Master Operational Handover Schedule (MOHS).

Reference Documents

There are a number of documents that are relevant to the planning of the works:

- London Underground / Crossrail Development Agreement
- Works Package Plans
- Technical Assurance Plan
- CRL/LU Tracker (document submission/approval tracker)
- Infrastructure Manager (IM) Tracker

General

For each project it is necessary to fulfil the requirement of the Development Agreement and demonstrate the is an integrated programme of works for Crossrail that includes interface works with existing London Underground assets and the construction of IM Works ie. works that London Underground will become the Infrastructure Manager for.

The stations that Crossrail is building where LU will become the Infrastructure Manager are:

- Bond Street
- Tottenham Court Road
- Farringdon
- Liverpool Street
- Whitechapel

The assurance process set out in the Technical Assurance Plan needs to be followed in all cases including the assurance of designs.

Works Package Plans and Trackers

Works Package Plans:

A Works Package Plan (WPP) defines a discrete package of Interface Works that have been identified under a contract or project. Typically for interfacing works that have been identified a Letter of No Objection (LONO) will be required from LU for the works to proceed e.g. Crossrail Tunnelling under a London Underground line. Individual WPPs together with the CRL/LU tracker will define the interface works activities and LONO requirements.

Refer to Figure 1 for the LU Assurance Process

LU/CRL Tracker

To achieve a LONO, supporting documentation will need to be submitted to LU for approval prior to the LONO. These documents are logged and status tracked in the LU/CRL Tracker. Only the LONO immediately prior to the commencement of the interface works activity needs to be shown in the MCS.

Refer to Figure 2 for MCS requirements.

IM Tracker

The IM Tracker sets out the design approvals required for the IM works and tracks their status. This will typically involve design approvals including Final Design Statement(s) (FDS) approvals for the new assets that LU will manage when Crossrail commences service.

MCS Coding Requirements

A specific code with multiple values within the Primavera P6 database has been used to identify the LU interface activities:

G – LU interface Ref

Final Design Statements (FDSs)

There are three types of FDSs:

- FDS - Civils RIBA F e.g. SCL & Piling prepared by the Framework Design Consultant (FDC)
- FDS(A) - RIBA E for M&E & Architectural Works prepared by the (FDC)
- FDS(B) - Follows RIBA F design for M&E & Architectural Works prepared by Main Stations Contractor

There are clear dependencies within the design process between FDC design and Main Station Contractor's RIBA F design that shall be captured in the MCS Level 2 Interface Milestone Schedule. Figure 2 refers.

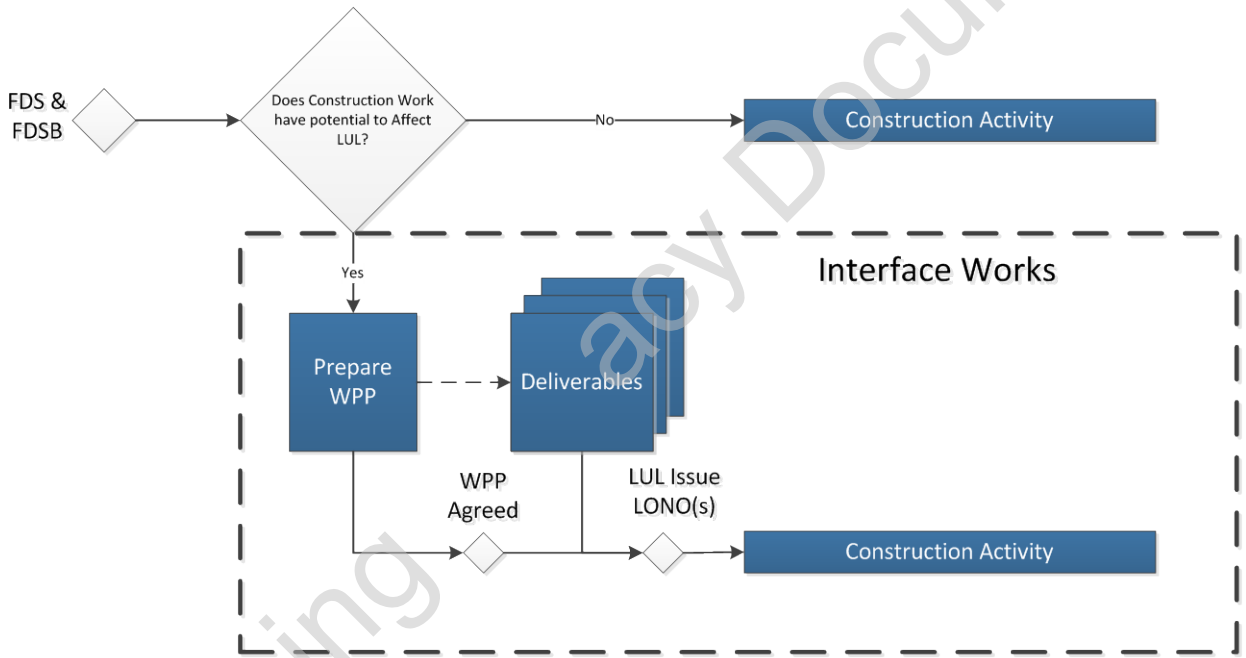
All FDS's shall be reflected in the MCS Level 2 schedules. The typical timescales for approval and the issue of a 'Letter of Acceptance' by London Underground are given in Figure 3.

Reports & Layout

Periodic Reports of interface activities will be published and issued to LU and published on CRL's Planning Page intranet site using the Primavera Layout 'London Underground Interfaces'.

All Works - LUL Assurance Process

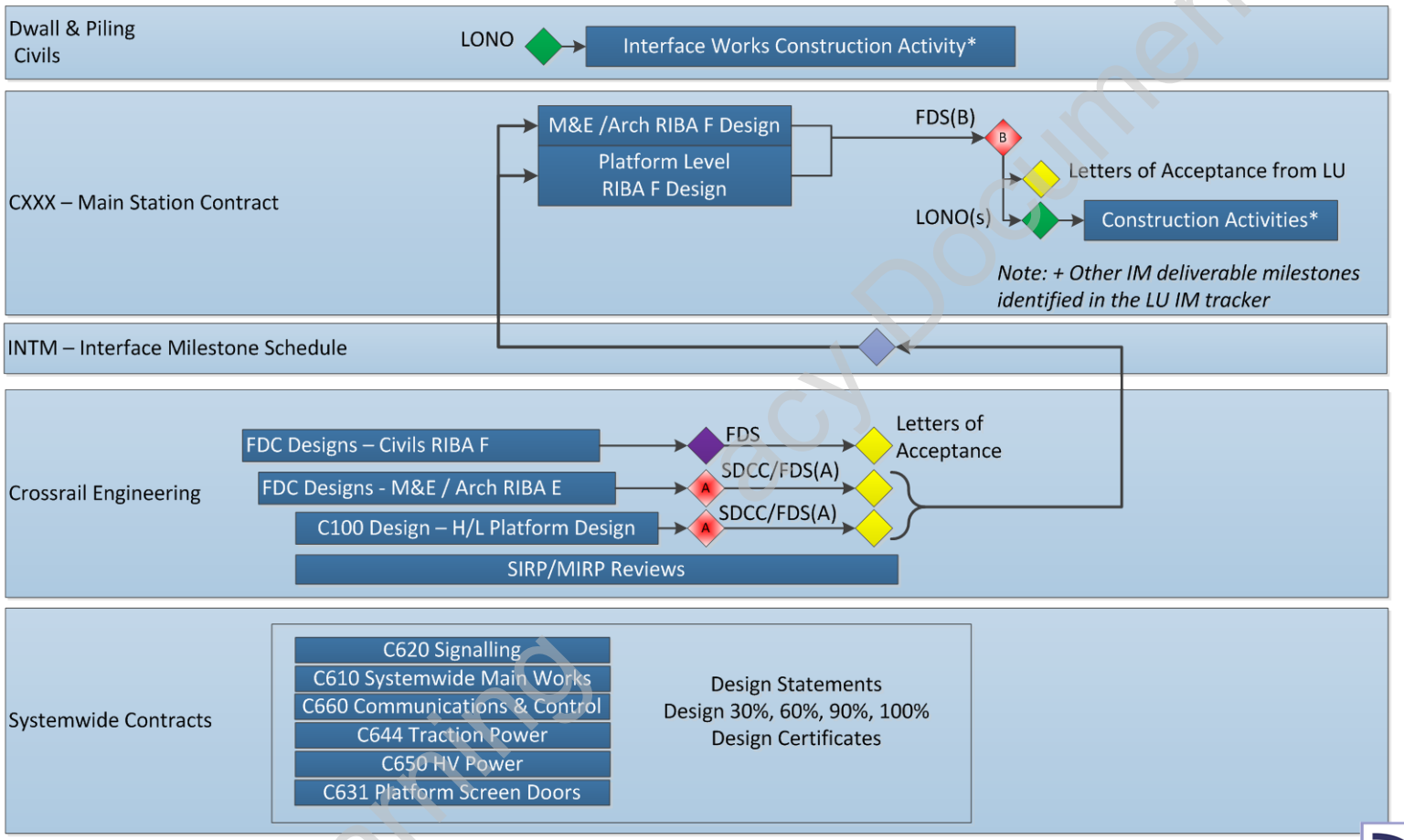
Civils – Piling & Dwall
Civils – SCL
Main Stations work – Fit Out



Note: FDSA does not apply here as it is the RIBA E design and will be followed by FDSB which follows the RIBA F Design.

Figure 1

MOHS Level 2 Logic/Detail



* Construction Activities that Interface with LUL must relate to the Agreed LU Works Package Plan & any agreed changes. Full details will be recorded in the LUL Interface Works Tracker.

Figure 2

FDS Design Approval Process - Notes from meeting held 20/07/12

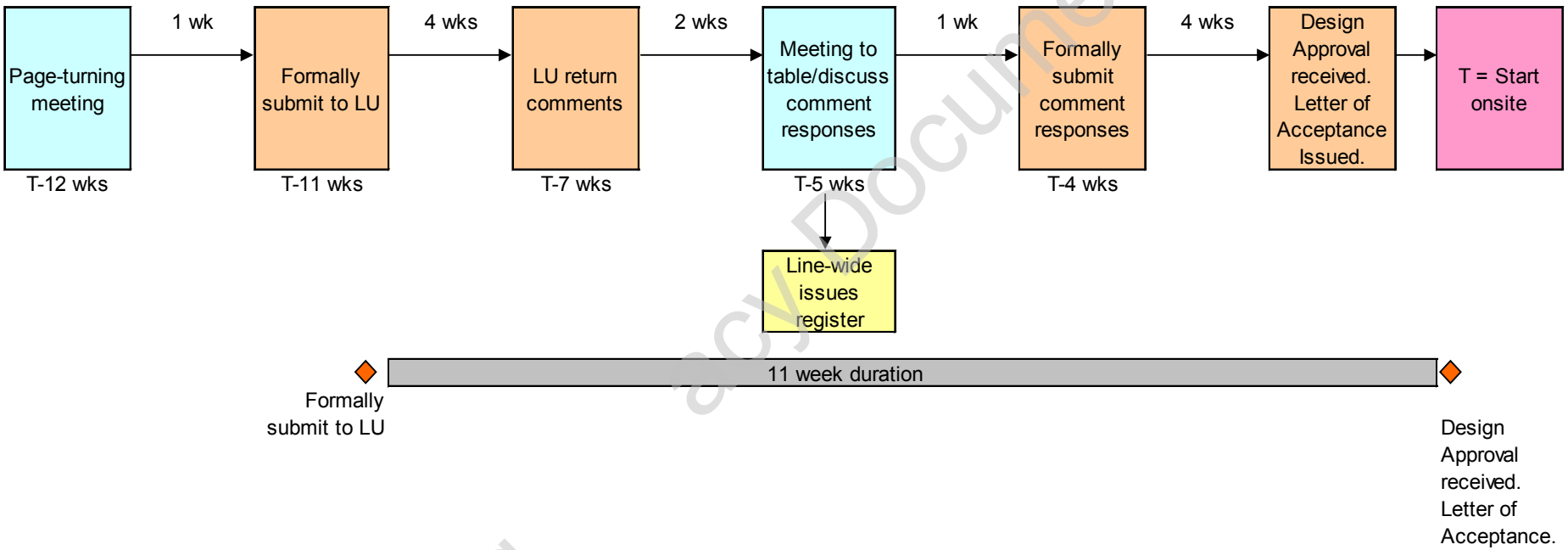


Figure 3

Typical Timescales for FDS Design Approval by LU

Planning and Scheduling Desk Top Instruction

Instruction	031
Revision	25 August 2015
3.8 - Detailed Design – Stations Portals and Shafts (MEP & Arch)	

Overview:

The purpose of this instruction is to define the requirements for planning of Mechanical & Electrical and Architectural detailed design including:

- Design Reviews
- Assurance Gates
- And submission to and approvals by Infrastructure Mangers

for Central Section Stations, Portals and Shafts.

This instruction covers requirements for the Master Operational Handover Schedule (MOHS) Level 2 schedules and Tier 1 Contractors. It has been updated to include the Interim and Final Design Overview Assurance Gates (IDO and FDO) that are to be carried out by Crossrail Technical Assurance Team (Note: IDOs and FDOs are not part of the Contractor's scope).

Background

Crossrail requires clear visibility of the detailed design process (RIBA Stages E to F), approvals and Assurance Gates required for the portals, shafts and stations in Crossrail's Central Section. The locations that this applies to are:

West	Central	East
1. Paddington New Yard/ Royal Oak Portal	7. Liverpool Street	15. Custom House
2. Paddington	8. Whitechapel	16. Connaught Tunnel
3. Bond Street	9. Stepney Green	17. North Woolwich Portal
4. Tottenham Court Road	10. Mile End Shaft	18. Woolwich
5. Fisher Street	11. Eleanor Street Shaft	19. Plumstead
6. Farringdon	12. Pudding Mill Lane (Portal)	
	13. Limmo	
	14. Victoria Dock Portal	

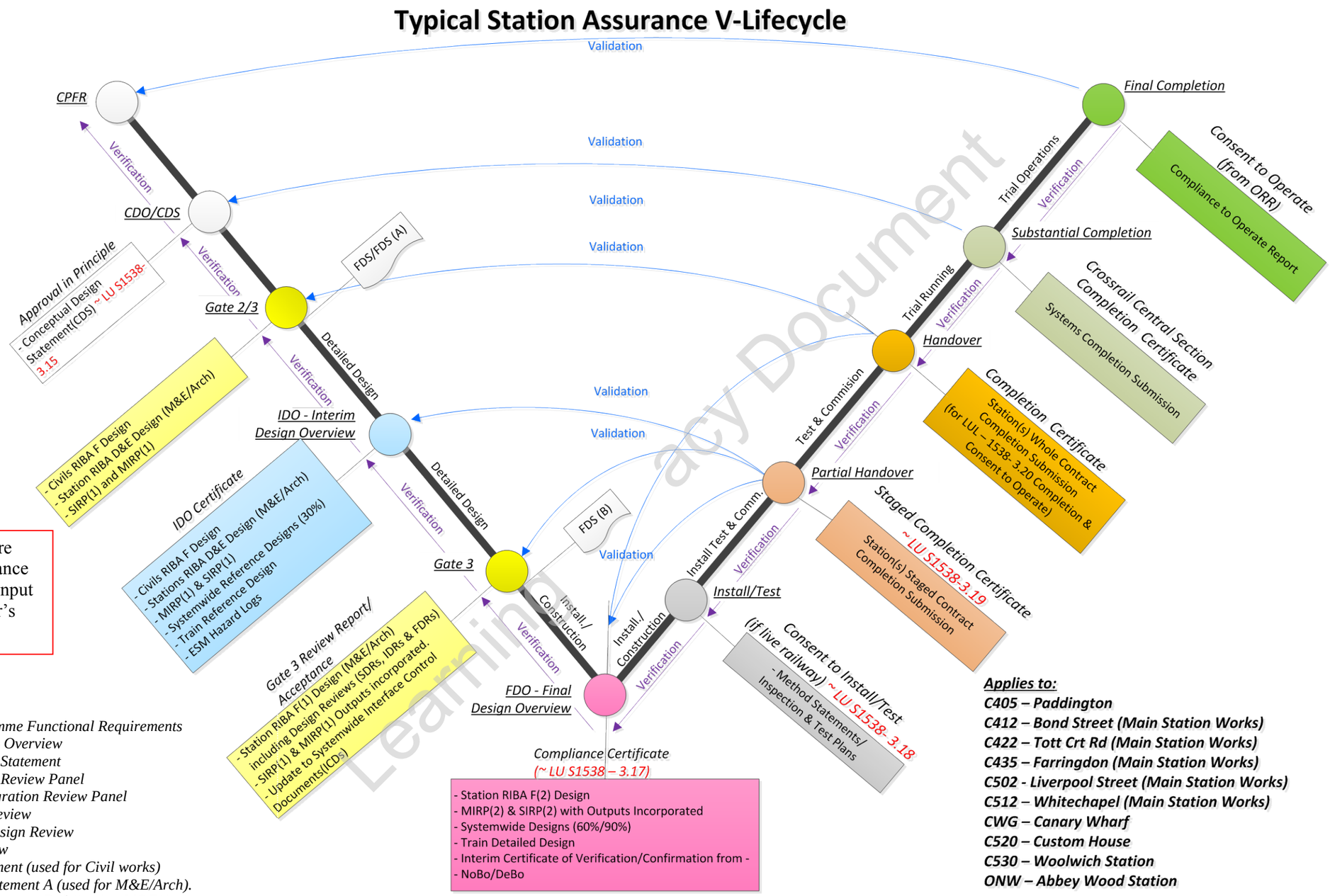
Reference Documents

- Works Information Volume 2B Part 7 Doc. Number: CRL1-XRL-V3-XWI-CR001-50035
- Technical Assurance Plan Doc. Number: CRL1-XRL-04-GPD-CR001-5005
- Detailed Design Tracker for Station Portals & Shafts – As published on The Planning Page

This instruction also builds on DTI No. 29 ‘London Underground Interfaces’ which provided requirements for London Underground Interfaces including visibility of detailed design activities and the assurance process.

Assurance V-Lifecycle

The basic principles of the Technical Assurance Plan (TAP) are represented in the V-Lifecycle diagram provided below in Figure 1. The purpose of the diagram is to simplify the requirements of the TAP into a format that can be followed in the schedule templates provided with this instruction. Full definitions of all of the assurance process and acronyms can be found in the TAP.



Note: IDO and FDO are CRL Technical Assurance activities with design input from Tier 1 Contractor's designs.

Acronyms:

CPFR – Crossrail Programme Functional Requirements
CDO – Conceptual Design Overview
CDS – Conceptual Design Statement
SIRP – System Integration Review Panel
MIRP – Maintenance Integration Review Panel
SDR – Single Discipline Review
IDR – Interdisciplinary Design Review
FDR – Final Design Review
FDS – Final Design Statement (used for Civil works)
FDS(A) - Final Design Statement A (used for M&E/Arch).
FDS(B) - Final Design Statement B (following M&E/Arch
FDO – Final Design Overview
RIRP – Railway Integration Review Point
ESM – Engineering Safety Management
NoBo – Notified Body
AsBo – Assessment Body
DeBo – Designated Body

Refer to the TAP for full details.

Figure 1 – Typical Station Assurance V-Lifecycle

Requirements for MOHS Level 2 Schedules

The typical sequence of activities that is to be provided in the MCS Level 2 project schedule are provided in Figure 2. The objective is to provide visibility of the complete design process in the Level 2 schedules which *may require multiple applications of the template* depending on the number of design packages required to the design e.g. Western Ticket Hall, Eastern Ticket Hall & Platform Tunnels.

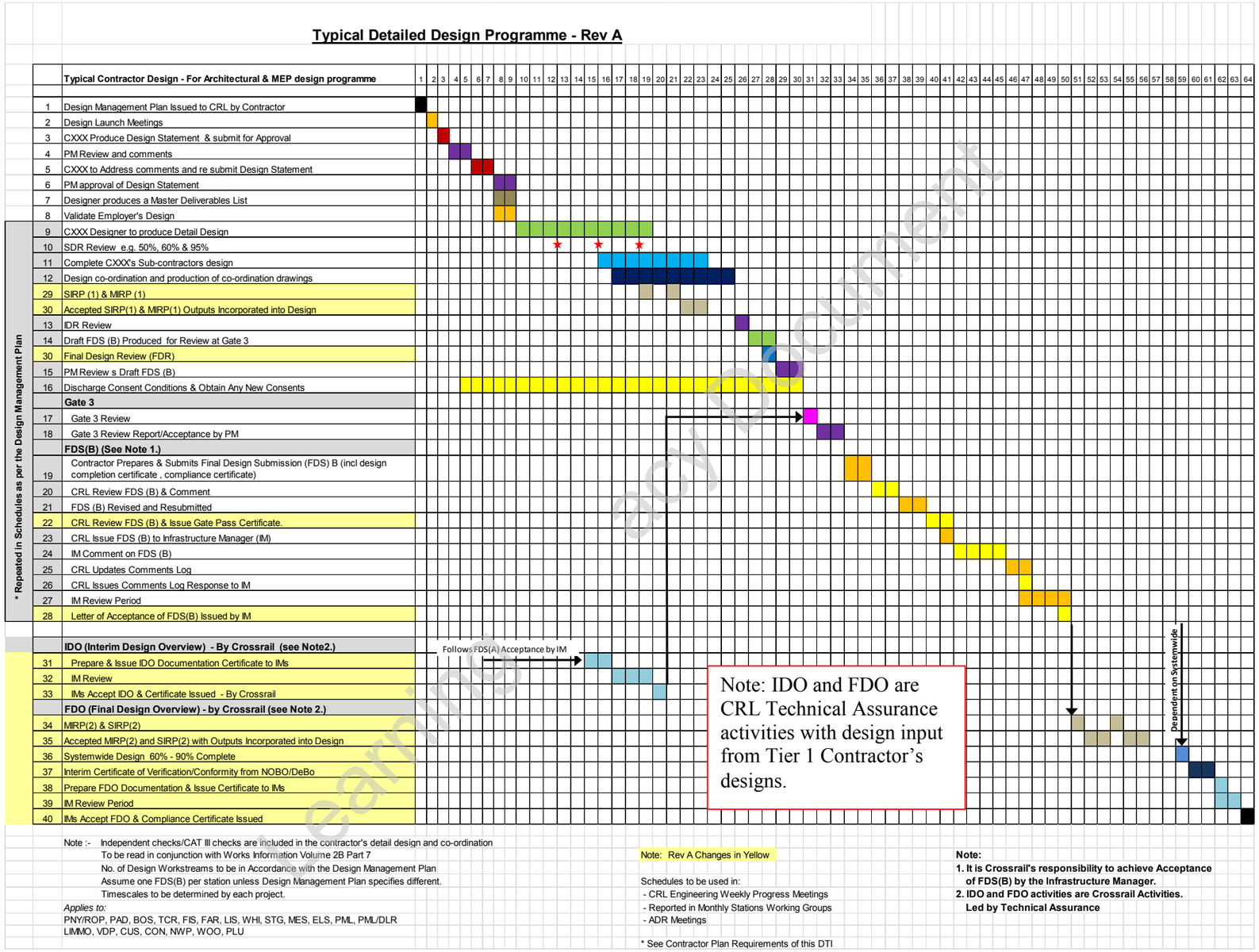


Figure 1 'Typical Detailed Design Activities in MCS Level 2

Requirements for IDO/FDO

Reference shall be made to the TAP for requirements – however an extract from is provided below for guidance on requirements:

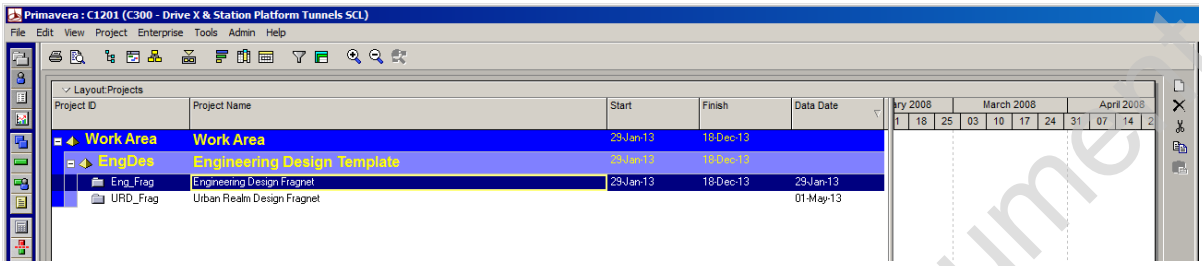
Element	IDO	FDO
Stations Design		
• Civils	FDS	FDS
• MEP	FDS (A)	FDS (B)
• Architecture	FDS (A)	FDS (B)
• Systems Design specifications	DS1	DS2
• Compliance with requirements	Doors report	Doors report
• Co-ordination (Interfaces +)	ICD's, IDR's, IRS's, DIR's	ICD's, IDR's, IRS's, DIR's
• Residual risks / issues	Flag the risks/issues	Flag the risks/issues
• Standards compliance	Non-Compliances, Concessions & Derogations	Non-Compliances, Concessions & Derogations
Systemwide contracts		
• Each Systemwide Contract • LU11 SORs	30% design	90% design
Safety		
• Fire safety (within FDSa)	Yes	Yes
• PRM compliance (within FDSa)	Yes	Yes
• Safety Issues File	Yes	Yes
• Project-wide Hazard Register	Yes	Yes
• Engineering Safety Justifications	Yes	Yes
• Station Safety Justifications	No	Yes (interim)
• CDM health and safety file	Yes	Yes
Performance		
• Passenger movements modelling	Legion model outputs	Legion model outputs
• RAM	RAM demonstration report	RAM demonstration report
• PPM	Trail Model Output	Trail Model Output
Operable		
• SIRP outputs	SIRP 1 review and any open issues	SIRP 2 review and any open issues
Maintainable		
• MIRP outputs	Confirmation of MIRP 1 review and any open issues	Confirmation of MIRP 2 review and any open issues
• Maintenance Boundaries	IM Boundaries Document	IM Boundaries Document
Assurance		
• Evidence for handover	CARE – structure and content	CARE assessment
• Undertakings and assurances	Summary report	Summary report
Whole Life Costing		
• Compliance to CPFR requirements	Evidence of WLC assessment	Evidence of WLC assessment
Quality		
• Construction quality	Certification of works	Certification of works
Rolling Stock & Depots		
• Design	Reference Design	Detailed design

Timing for IDO/FDO/MIRPs/SIRPs

Timing of IDOs, FDOs, MIRP(2) and (SIRP(2) can or will be found in the Detailed Design Tracker on the Planning Page

MOHS Level 2 Detailed Design P6 Fragnet

A Primavera P6 fragnet has been developed to enable a standard sequence of activities to be prepared for each project schedule. The fragnet can be found in the Work Area of the EPS in the Production Database:



Alternatively the fragnet can be also be found under **Project Architect** under the 'File' command in P6 – further details are provided in the final section of this DTI below. *You may need to contact the P6 Systems Administrator to enable this function.(Note: CRL IT is currently working on a fix for Citrix Users to enable this functionality).*

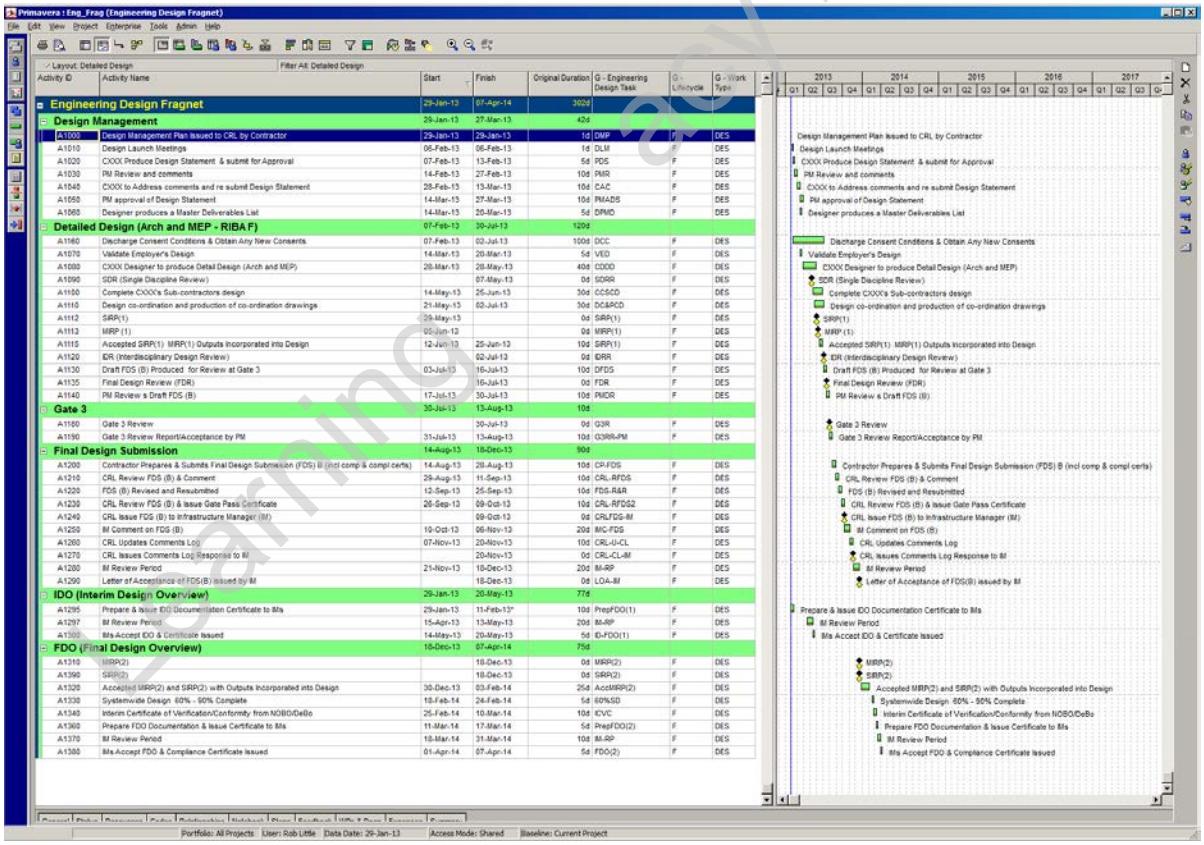


Figure 3 – Detailed Design Fragnet in P6
Global Layout = 'Detailed Design'

Note:

Schedules shall allow for one 'Final Design Submission' set of activities in the MCS Level 2 unless alternatively defined in the Design Management Plan, in which case these activities shall be repeated to match the plan.

MOHS Coding Requirements

All activities in the MOHS Level 2 must be coded with the Mandatory Codes (See Desk Top Instruction No.15). In addition each Engineering Design Activity shall be coded with:

- G – Engineering Design Task

Note if the fragnet is used this code will already be populated.

Contractors' Plan Requirements

Contractors' programmes shall have a clear and consistent approach to planning of design activities.

Contractors shall follow the templates provided in Figures 1 & 2 however design activities will be repeated in Contractor's schedules depending on the number of design packages that have been identified in the Design Management Plan. E.g. MEP design for Western Ticket Hall or MEP design for Eastern Ticket Hall

The Contractors programmes need to be able to be filtered on design activities and therefore it is proposed that a standard code(s) is adopted by each Contractor:

- G – Lifecycle
- G – Engineering Design Task

This will enable the standardised production and publication of design planning information.

Contractors schedules' will be identified in the Primavera Staging Database using:

- Status Code: 'For Acceptance' or 'Latest Accepted'.

Each project planner shall work with their respective Contractor to issue the P6 Xer file as the template to be adopted.

Reports

Each period, standard reports will be published from the Level 2 MOHS and the Contractors submitted programmes. These reports will be made available in the 'Detailed Design – Portal' of The Planning Page of Crossrail's intranet.

Project Architect - P6 Template

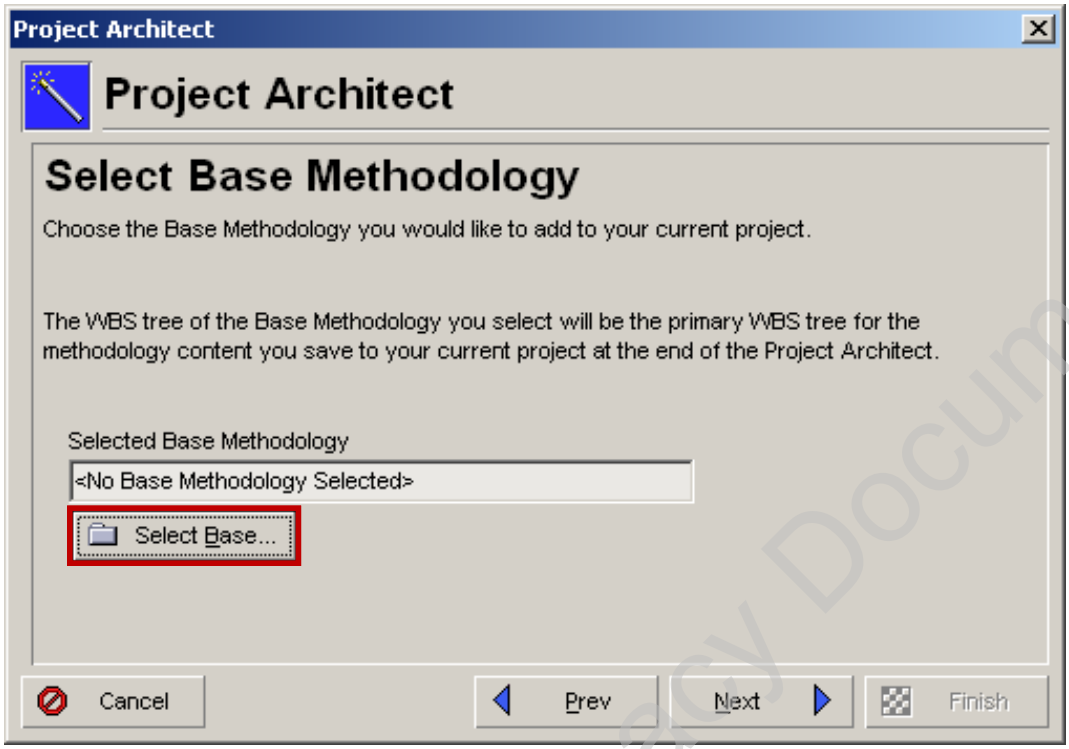
A standard P6 template/fragnet has been set up under the Project Architect function of Primavera P6.

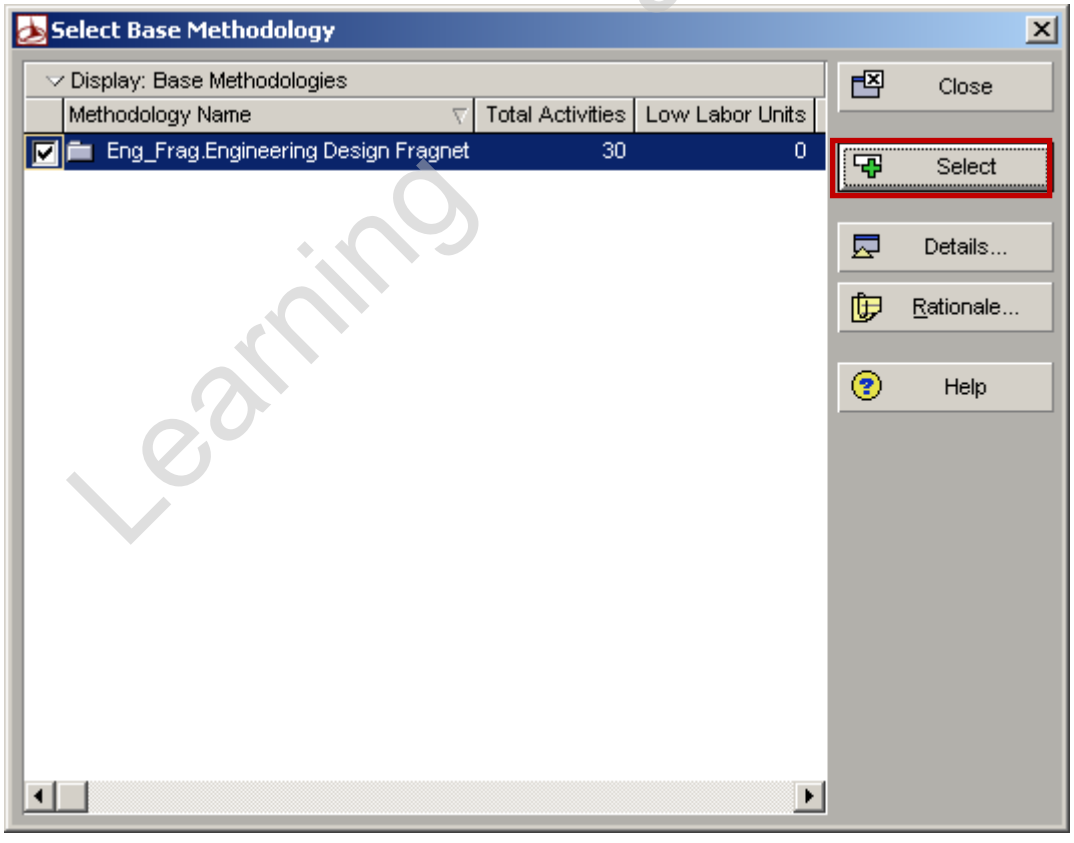
A Service Request has been logged to support the use of this function with the steps required to import into a project schedule as follows:

1) Open Project
2) File > Project Architect > *Next*>Until Select Base Methodology: Select Base > Select >* Next* > Finish

Next through each window

3) F9





Planning and Scheduling Desk Top Instruction

Instruction	032
Revision	DEC 15
3.9 - Detailed Design – Urban Realm	

Overview:

The purpose of this instruction is to define the interface requirements for planning detailed design and planning consent approval that are required to be carried out by Crossrail's Contractors for the Central Section's Urban Realm.

This instruction covers requirements for the Master Operational Handover Schedule (MOHS).

Background

Crossrail's Land and Property team require clear and consistent visibility of the detailed design; (RIBA Stages E & F) assurance and approvals process for the Urban Realm in Crossrail's Central Section.

The locations that this applies to are:

20. Paddington
21. Bond Street
22. Tottenham Court Road
23. Farringdon
24. Liverpool Street
25. Whitechapel
26. Custom House
27. Woolwich

Reference Documents

Works Information Volume 2B Part 7 Doc. Number: CRL1-XRL-V3-XWI-CR001-50035

This instruction also builds on DTI No. 31 'Detailed Design – Stations Portals and Shafts' which focuses on detailed design by the contractor for Stations Portal and Shafts.

Requirements for MOHS Level 2 Schedules

The typical sequence of activities that is to be included in the MOHS Level 2 project schedule is provided in Figure 1. The objective is:

- To track the planning application submissions which can only be made once SDR/IDR for Gate 2 have been completed. Equally, Gate 2 cannot be finalised till planning consent has been granted.
- The Final Design Submission (FDS) will also require a review and approval by Local Authority. 8 week period will be required.

Typical Contractor Design for Urban Realm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Design Start-Up Meeting																																																																																																											
CXXX to Produce Stage E Design																																																																																																											
SDR Review / IDR Review																																																																																																											
CXXX to submit Planning Application to Local Authority																																																																																																											
Local Authority Approval Period																																																																																																											
Gate 2 Acceptance / Report by PM																																																																																																											
CXXX Produce Stage F Design																																																																																																											
Discharge Consents Conditions and further design work																																																																																																											
Gate 3 Assurance Process																																																																																																											
Contractor submits Final Design Submission & certificates																																																																																																											
CRL Review of FDS																																																																																																											
CRL issue FDS to Local Authority																																																																																																											
Local Authority Review Period																																																																																																											
Letter of acceptance from Local Authority issued																																																																																																											

Note: durations in the table above are in weeks

Figure 1 'Typical Detailed Design Activities in MOHS Level 2

MOHS Level 2 Detailed Design P6 Fragnet

A Primavera P6 fragnet has been developed to enable a standard sequence of activities to be applied for each project schedule. The fragnet can be found in the Work Area of the EPS in the Production Database:

Layout: Projects EPS

Project ID	Project Name	Total Activities	Data Date
FRAG	Fragnets	758	
URD_Frag	Urban Realm Design Fragnet	18	05-Jan-15
T&C_Frag	Level 2 Testing and Commissioning Fragnet	712	24-Sep-14
Eng_Frag	Engineering Design Fragnet	28	29-Jan-13
C&C-Frag	Comms & Controls Install Fragnet	0	17-Nov-14
AFC_Frag	Automated Fare Collection	0	09-Mar-15

Alternatively the fragnet can be also be found under **Project Architect** under the 'File' command in P6 – further details are provided in the final section of this DTI below. *You may need to contact the P6 Systems Administrator to enable this function.*

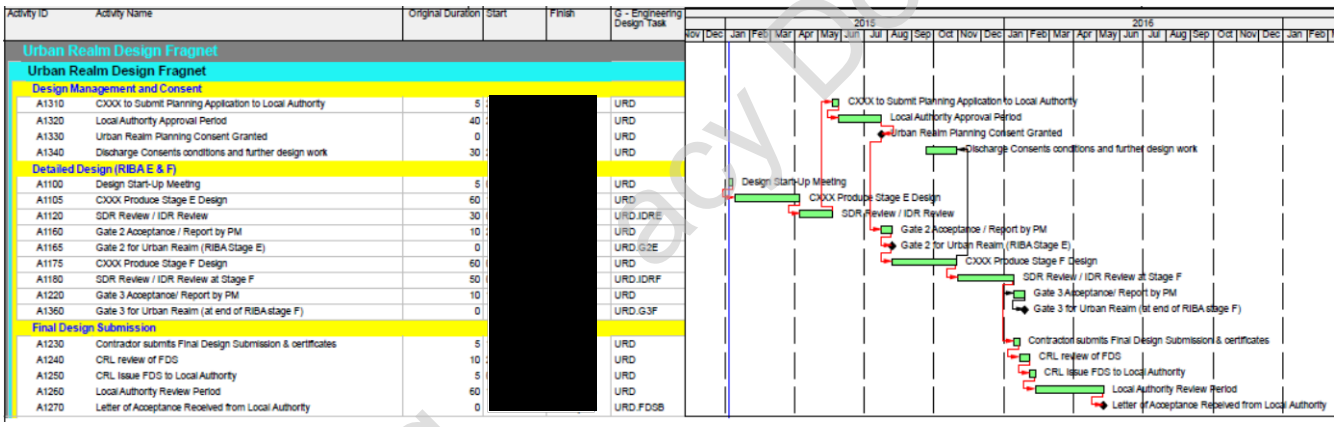


Figure 2 – Detailed Design Fragnet in P6
Global Layout = 'Engineering Design Fragnet'

Note:
Schedules shall allow for one 'Final Design Submission' set of activities in the MOHS Level 2 unless alternatively defined in the Design Management Plan, in which case these activities shall be repeated to match the plan.

MOHS Coding Requirements

All activities in the MOHS Level 2 must be coded with the Mandatory Codes (See Desk Top Instruction No.15). In addition each Engineering Design Activity shall be coded with:

- G – Engineering Design Task
  - URD – Urban Realm Design
    - URD.G2E - Gate 2 RIBA E
    - URD.IDRE - IDR RIBA E
    - URD.G3F – Gate 3 RIBA F
    - URD.FDSB – FDS(B)

Note if the fragnet is used this code will already be populated.

Reports

Planning consent dates are being monitored and published on periodic basis.

Project Architect - P6 Template

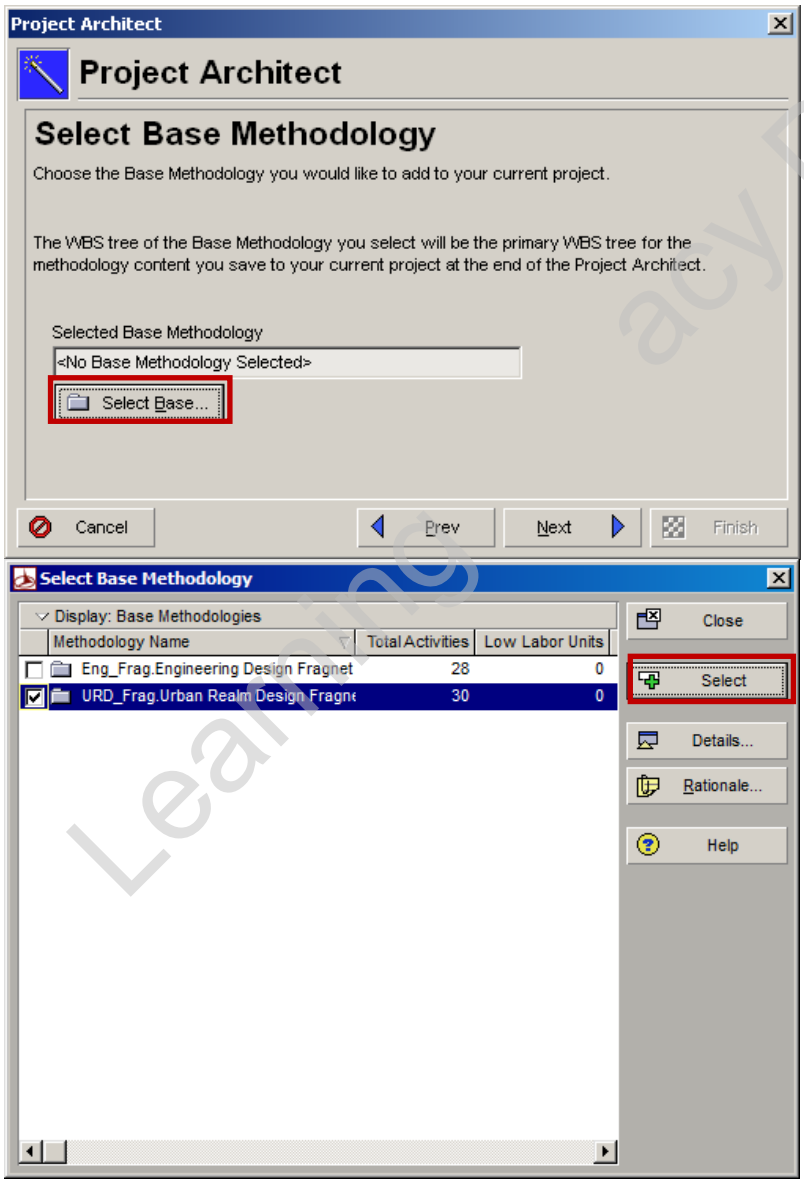
A standard P6 template/fragnet has been set up under the Project Architect function of Primavera P6.

The steps required to import into a project schedule are as follows:

4) Open Project
5) File > Project Architect > *Next*>Until Select Base Methodology: Select Base > Select >* Next* > Finish

Next through each window

6) F9



Planning and Scheduling Desk Top Instruction

Instruction	034
Revision	26 August 2015
3.10 - Lifts and Escalators	

Overview:

The purpose of this instruction is to define the requirements for planning the Lift & Escalator activities.

This instruction covers requirements for the Master Operational Handover Schedule (MOHS) Level 2 schedules and the interface milestone schedule. It also provides the current lifts and escalator numbering to be adopted across the Crossrail Programme

Background

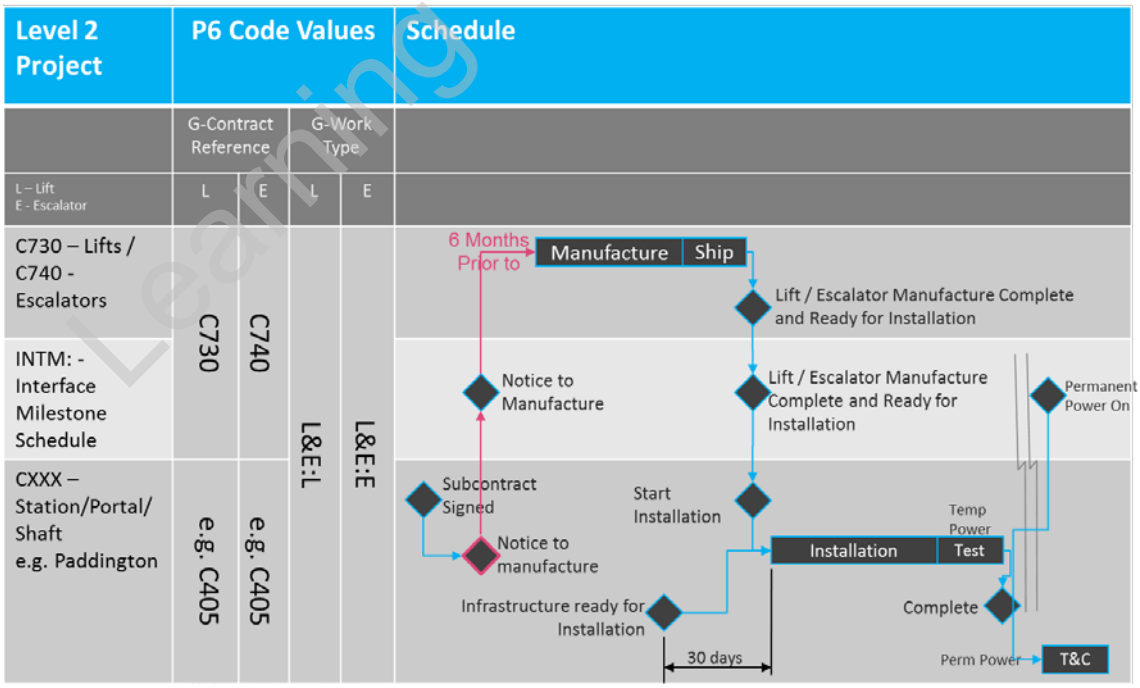
Crossrail and Transport for London (TfL) have awarded two separate contracts to Kone and Otis to install lifts (C730) and escalators (C740) at Crossrail stations. Each of the stations, portals or shafts contractors must then enter into subcontract with Kone and Otis to deliver the lifts and escalators programme.

All contracts between the C730 and C740 and the main contractors should be signed by the summer of 2014; the lifts and escalators programmes needs to be reflected in the stations, portals and shafts programmes.

MOHS Level 2 Schedule Requirements

Crossrail requires clear and consistent visibility of the lifts and escalators programme in Crossrail's Central Section.

The sequence of the activities and coding for the C730/C740 contracts through the interface milestone schedule and into the stations, portals and shafts programme is represented in the table below:



Activities	
1	Subcontract Signed
2	Notice to Manufacture
3	Infrastructure Ready for Installation
4	Start Installation
5	Installation (Nomenclature below)
6	Test on Temporary Power
7	Test & Commission on Permanent Power

Typical Durations:
The typical durations, as advised by C730/C740, for reference and consideration are as follows:

Activity	Lifts Weeks	Escalators Weeks
Design	26	26
Manufacture	26	36~~26~~
Shipping	2	2
Lead-in Time (total)	54	64
Installation	15	13
Test on temporary power	4	2
Test & Commission on permanent power	3	1
TOTAL:	76 wks	80wks

P6 Activity Nomenclature:

Sub-Location, Lift/Escalator and #, Installation/T&C on Temp Power, (Escalator Description or Lift Designation & Floor Stops)

Example Escalator:

Farringdon:

WTH Escalator **E2** Installation (Ticket Hall to Thameslink Platform)

Example Lift:

Liverpool Street:

WTH PRM Passenger Lift **L1** Installation (Met & Circle Line Westbound Platform - CRL Basement - Moorgate Ticket Hall)

Each lift and escalator activity must be represented individually in the MCS Level 2 Schedules.

The numbering of the lifts and escalators are shown in the tables in Pages 4 – 7 of this desk top instruction

MOHS Coding Requirements:

The mandatory code **G-Work Type** must have the code values L&E:L or L&E:E assigned for lift and escalator activities respectively.

G-Contract Reference must have the main contractors code assigned (e.g. C405 for PAD) and **NOT** C730/C740 within the stations, portals and shafts programmes – as these contracts are considered sub-contracts to the Tier 1 Contracts.

Reporting:

Upon implementation of this DTI, a central report / tracker will be created and updated periodically in line with reporting timescales and published on the planning page.

Crossrail Escalator Schedule		
Location	Revised Numbers	Description
Paddington Station Escalator Schedule		
THW	E1	Departures Road to Ticket Hall (W)
THW	E2	Departures Road to Ticket Hall (W)
THE	E3	Departures Road to Ticket Hall (E)
THE	E4	Departures Road to Ticket Hall (E)
THE	E5	Departures Road to Ticket Hall (E)
THCW	E6	Ticket Hall to Platform (Centre West)
THCW	E7	Ticket Hall to Platform (Centre West)
THW	E8	Ticket Hall to Platform (W)
THW	E9	Ticket Hall to Platform (W)
THCE	E10	Ticket Hall to Platform (Centre East)
THCE	E11	Ticket Hall to Platform (Centre East)
THE	E12	Ticket Hall to Platform (E)
THE	E13	Ticket Hall to Platform (E)
BLL	E14	CRL Bakerloo Link
BLL	E15	CRL Bakerloo Link
BLL	E16	CRL Bakerloo Link
BLL	E3	LU Bakerloo Link
BLL	E4	LU Bakerloo Link
BLL	E5	LU Bakerloo Link
Bond Street Station Escalator Schedule		
Eastern TH	E11	Ticket Hall to Platform
Eastern TH	E12	Ticket Hall to Platform
Eastern TH	E13	Ticket Hall to Platform
Western TH	E14	Ticket Hall to Interchange Link
Western TH	E15	Ticket Hall to Interchange Link
Western TH	E16	Ticket Hall to Interchange Link
Western TH	E17	Interchange Link to Platform
Western TH	E18	Interchange Link to Platform
Western TH	E19	Interchange Link to Platform
Tottenham Court Road Station Escalator Schedule		
Eastern TH	E15	LU Ticket Hall to Lower Concourse.
Eastern TH	E16	LU Ticket Hall to Lower Concourse.
Eastern TH	E17	LU Ticket Hall to Lower Concourse.
Western TH	E18	Western Entrance to Platform.
Western TH	E19	Western Entrance to Platform.
Western TH	E20	Western Entrance to Platform.

Table 1 - Escalators

Location	Revised Numbers	Description
Farringdon Station Escalator Schedule		
ETH	E10	Intermediate Level to Crossrail Platform
ETH	E11	Intermediate Level to Crossrail Platform
ETH	E7	Ticket Hall to Intermediate Level
ETH	E8	Ticket Hall to Intermediate Level
ETH	E9	Ticket Hall to Intermediate Level
WTH	E1	Ticket Hall to Thameslink Platform
WTH	E2	Ticket Hall to Thameslink Platform
WTH	E3	Ticket Hall to Thameslink Platform
WTH	E4	Thameslink Platform to Crossrail Platform
WTH	E5	Thameslink Platform to Crossrail Platform
WTH	E6	Thameslink Platform to Crossrail Platform
Liverpool Street Station Escalator Schedule		
West End	E19	Platform to AP9
West End	E20	Platform to AP9
West End	E21	Platform to AP9
West End	E22	AP9 to Moorgate street ticket hall
West End	E23	AP9 to Moorgate street ticket hall
West End	E24	AP9 to Moorgate street ticket hall
East End	E13	AP2 to Broadgate Ticket Hall
East End	E14	AP2 to Broadgate Ticket Hall
East End	E15	AP2 to Broadgate Ticket Hall
East End	E16	Platform to AP2
East End	E17	Platform to AP2
East End	E18	Platform to AP2
East End	E10	Broadgate Ticket Hall to Street Level
East End	E11	Broadgate Ticket Hall to Street Level
East End	E12	Broadgate Ticket Hall to Street Level
Whitechapel Station Escalator Schedule		
Durward St.	E1	Lower Concourse to Platform
Durward St.	E2	Lower Concourse to Platform
Durward St.	E3	Lower Concourse to Platform
Custom House		
	E1	Platform to Concourse level
	E2	Platform to Concourse level
Woolwich		
	E1	Platform to Ticket hall
	E2	Platform to Ticket hall
	E3	Platform to Ticket hall

Table 1 – Escalators (contd.)

OLD Crossrail Drawing Lift Reference	**New** LU/RFL Re number	Type	Location	Designation and Floor Stopping
C 130 - Paddington Station Lift Schedule				
~~LETI-136~~	L6	PRM	Centre	Passenger Lift: Eastbourne Terrace- Departures Road - Ticket Hall
~~LETII-137~~	L7	PRM	Centre	Passenger Lift: Eastbourne Terrace- Departures Road - Ticket Hall
~~LETIII-138~~	L8	PRM	East	Passenger Lift: Intermediate - Ticket Hall - Platform
~~LETIV-139~~	L9	PRM	East	Passenger Lift: Intermediate - Ticket Hall - Platform
~~LETV-140~~	L10	FF/M	West	Fire Fighting & Maintenance Lift: Departures Road - Intermediate - Ticket Hall - Platform
~~LETVI-141~~	L11	FF/M	East	Fire Fighting & Maintenance Lift: Departures Road - Intermediate - Ticket Hall - Platform
	L5			Passenger Lift: LU Bakerloo link
	L12			Passenger Lift: CRL Bakerloo link
C 132 - Bond Street Station Lift Schedule				
~~Lift1~~	L5	PRM	Eastern TH	Passenger Lift - Ticket Hall to Platform
~~Lift2~~	L6	FF/M	Eastern TH	Fire Fighting & Maintenance Lift - Ticket Hall to Platform (4 Stops at intermediate levels)
~~Lift3~~	L7	PRM	Western TH	Passenger Lift - Ticket Hall to Platform + Stop at AP1 Interchange Level
~~Lift4~~	L8	FF/M	Western TH	Fire Fighting & Maintenance Lift - Ticket Hall to Platform (4 Stops at intermediate levels)
C 134 - Tottenham Court Road Station Lift Schedule				
~~L1~~	L7	PRM	West	Passenger Lift: Dean Street Level to Level -2 (3 Stops)
~~L2~~	L8	PRM	West	Passenger Lift: Level -2 to CRL Platform (3 Stops)
~~L3~~	L9	FF/M	West	Fire Fighting & Maintenance Lift: Dean Street Level to Platform Level (5 Stops)
~~L5~~	L10	PRM	East	Passenger Lift: LU Ticket Hall to CRL Platform (3 Stops)
~~L6~~	L11	FF/M	East	Fire Fighting & Maintenance Lift: LU Street Level to CRL Platform (5 Stops)
~~L7~~	L12	PRM	East	Passenger Lift: Lower Concourse to Northern Line Platform
C 136 - Farringdon Station Lift Schedule				
~~ETH LFT 2~~	L9	FF	ETH	Fire Fighting Lift:Street to Crossrail Platform (6 Stops)
~~ETH LFT 3~~	L10	PRM	ETH	Passenger Lift: Basement -1 to Intermediate -3
~~ETH LFT 4~~	Barbican L1	FF/M	Barbican Station	Fire Fighting & Maintenance Lift: Barbican Station Platform 1
~~ETH LFT 5~~	Barbican L2	FF/M	Barbican Station	Fire Fighting & Maintenance Lift: Barbican Station Platform 3
~~WTH LFT 1~~	L6	FF	WTH	Fire Fighting Lift: Farringdon Road to Shaft Level -7 (7 Stops)
C 136 - Farringdon. Incline Lift Schedule				
~~ESC1~~	L7	INC	East End	ETH - Street to Intermediate Concourse
~~ESC11~~	L8	INC	East End	ETH - Crossrail Platform to Intermediate Concourse
C 138 Liverpool Street Station Lift Schedule				
~~Lift 1~~	L1	PRM	West	Passenger Lift: Met & Circle Line Westbound Platform - CRL Basement - Moorgate Ticket Hall
~~Lift 2~~	L2	PRM	West	Passenger Lift: CRL Basement - Northern Line Link Level - CRL Platform
~~Lift 3~~	L3	FF	West	Fire Fighting Lift: Moorgate Street Level - CRL Platform
~~Lift 5~~	L5	PRM	West	Passenger Lift: Northern Line Link level (AP6) - Northern Line platform
~~Lift 6~~	L6	FF/M	East	Fire Fighting & Maintenance Lift: Street Level to CRL Platform
~~Lift 7~~	L7	PRM	East	Passenger Lift: CRL Platform to Access Passage AP2
C 138 - Liverpool St. Incline Lift Schedule				
~~L8~~	L8	INC	Adjacent ES1	Inclined Lift: AP2 to Broadgate Ticket Hall.
~~L9~~	L9	INC	Adjacent ES6	Inclined Lift: Broadgate Ticket Hall to Street

Table 2 - Lifts

OLD Crossrail Drawing Lift Reference	New LU/RFL Re number	Type	Location	Designation and Floor Stopping
Whitechapel Station Lift Schedule				
~~L1~~	L1	FF/M	Durward St	Fire Fighting & Maintenance Lift: Street Level to CRL Platform (6 Stops)
~~L2~~	L2	PRM	Durward St	Passenger Lift: Street Level to CRL Platform
~~L3~~	L3	PRM	Ticket Hall	Passenger Lift: Lower Concourse to ELL NB Platform
~~L4~~	L4	PRM	Ticket Hall	Passenger Lift: Upper Concourse to Lower Concourse
~~L5~~	L5	PRM	Ticket Hall	Passenger Lift: Upper Concourse to Distrct Line & ELL Platforms (3 Stops)
~~L6~~	L6	PRM	Ticket Hall	Passenger Lift: District Line to ELL SB Platform
~~L7~~	L7	PRM	Ticket Hall	Passenger Lift: Main Entrance to Upper Concourse
~~L8~~	L8	FF	Cambridge Heath	Fire Fighting Lift: Street to CRL Platforms (6 Stops)
	L9			Upper concourse to DL AND ELL platforms
	GSM		GSM Building	GSM building back of house lift
Pudding Mill Lane DLR Station and Emergency Intervention Portal - Lift Schedule				
~~PML EIP~~	L1	I/E	EIP Portal Shaft	Surface Level to Crossrail Track
Intermediate Shafts				
~~Eleanor Street~~	L1	I/E	Eleanor Street	First Floor to Crossrail track (Floor 1 to B5)
~~Fisher Street~~	L1	I/E	Fisher Street	Surface to Crossrail track (Floor 00 to B4)
~~Mile End~~	L1	I/E	Mile End	Surface to Crossrail track (Floor 00 to B9)
~~Limo~~	L1	I/E	Limo	Surface to Crossrail track (Floor 00 to B6)
~~Stepney Green~~	L1	I/E	Stepney Green	Surface to Crossrail track (Floor 00 to B5)
Custom House				
~~Lift 01~~	L1	PRM /M	Custom House	Concourse to Street
~~Lift 03~~	L3	PRM /M	Custom House	Concourse to Platform
Plumstead Emergency Intervention Portal - Lift Schedule				
~~Plumstead EIP~~	L1	I/E	Plumstead EIP	Surface Level to Running Tunnel (3 Stops)
Woolwich Station - Lift Schedule				
~~ETH Lift 1~~	L1	FF/M	ETH	Fire Fighting & Maintenance Lift (3 Stops)
~~WTH Lift 1~~	L2	PRM	WTH	Passenger Lift (3 Stops)
~~WTH Lift 2~~	L3	FF/M	WTH	Fire Fighting & Maintenance Lift (3 Stops)

Table 2 – Lifts (Contd.)

Key:

PRM	Persons of Reduced Mobility Lift
FF	Fire Fighters Lift
FF/M	Fire Fighters and Maintenance Lift
I/E	Intervention or Evacuation Lift
INC	Inclined Lift

4. Planning and Scheduling Desk Top Instruction

Instruction	**004**
Revision	**Oct 2015**
4.1 - Anchor and Key Event Milestone Definition	

Overview:

A series of schedule milestones were identified as part of the development of the Crossrail Baseline schedule MOHS. These milestone activities were designated as either “Anchor Milestones” or “Key Event” milestones.

The Anchor and Key Event milestones are used as part of the formal schedule progress reporting processes to provide indication of schedule performance measured against the schedule baseline.

Anchor and Key Event Milestone definition:

Key Event Milestones: these activities span the entire scope and duration of the programme and number around 550 in total. The key event milestones have been selected based on the criteria noted below. It should be noted that not all key events tick all of the criteria boxes, but in overall terms they provide a representative view of the programme's significant and important dates. The selection criteria considered the following:

- Contract milestones (awarded and yet to be awarded contracts)
- Contract interface / handover points
- Schedule critical events
- High profile events
- Events that span all parts of the programme
- Events that provide a good spread of dates across the entire duration of the programme

Anchor Milestones: The Anchor Milestones are a sub-set of the Key Event Milestones. Anchor Milestones form the basis for schedule milestone reporting and as such are used in the formal reporting work streams. Around 200 Anchor Milestones were established. In selecting this sub-set the following criteria was considered:

- Activities that provide a span of all parts of the programme
- Provide a good spread of dates across the entire programme
- Activities that are potentially the more significant “Key Events”.

Anchor and Key Event Milestone administration:

The following administration guidelines deal with administration of Anchor and Key Event milestones in the current version of the MOHS not changes to the MOHS baseline, changes to the MOHS baseline milestones is dealt with in a separate instruction.

Key Event Milestones: new Key Event Milestones can be added at any time with agreement and approval of the respective Area Planner. Deletion of existing Key Event Milestones will be subject to review and agreement with Area Planners and Central Planning Team

Anchor Milestones: new Anchor Milestones cannot be added or existing Anchor Milestones deleted without formal sanction via the Anchor Milestone change process.

Anchor and Key Event "Dates": baseline, forecast and actual dates related to Anchor and Key Event Milestones for use in various formal reporting work streams are taken form the MOHS schedule exclusively.

Planning and Scheduling Desk Top Instruction

Instruction	**005**
Revision	**Oct 2015**
4.2 - Anchor Milestone Progress Reporting	

Overview:
Anchor Milestones are used in various periodic and other formal Crossrail reporting work streams. Additionally Anchor Milestones form one part of the Crossrail annual KPI objectives.

Period Reporting:
The period reports contain Anchor Milestones that are schedule to be achieved in the next twelve months (rolling calendar encompassing all anchor Milestones within the next twelve month time frame:
Actual and Forecast Dates: this information is taken from the period update of the MCS schedule.
Early and Late Start Dates: this information is taken from the baseline MCS schedule.
RAG Status: in the first instance the RAG status is calculated on the following basis:

- 0% – 30% of Milestone float is forecast to be used = Green Status
- 31% - 70% of Milestone float is forecast to be used = Amber Status
- 71% - 100% of Milestone float is forecast to be used = Red Status

(The first instance RAG categorisation may be modified during the report review process)

SAMPLE

MOHS Baseline Early Date	MOHS Baseline Late Date	Actual / Forecast	Variance [BL Early - Forecast	RAG	Change from Last Period
18-Jun-15	28-Aug-15	04-Aug-15	-47		↔
24-Aug-15	24-Oct-15	26-Oct-15	-63		↔
13-Sep-15	30-Sep-15	22-Nov-15	-70		↔
01-Oct-15	15-Dec-15	11-Jan-16	-102		↔
12-Oct-15	23-Dec-15	31-May-16	-232		↓
12-Oct-15	30-Nov-15	28-Oct-15	-16		↔
31-Oct-15	13-Dec-15	02-Dec-15	-32		↑
09-Nov-15	23-Dec-15	11-Apr-16	-154		↓
23-Dec-15	31-Jan-16	25-Jan-16	-33		↓
25-Nov-15	23-Dec-15	02-Nov-15	23		↑
30-Nov-15	23-Dec-15	30-Nov-15	0		↔
03-Dec-15	31-Dec-15	04-Dec-15	-1		↑
23-Dec-15	16-Feb-16	04-Mar-16	-72		↑
18-Jan-16	31-Jan-16	14-Feb-16	-77		↓
21-Jan-16	29-Feb-16	14-Feb-16	-24		↓

*RAG Key:
Less than 30% of float[1] remaining
Less than 70% of float[1] remaining
Greater than or equal to 70% of float[1] remaining

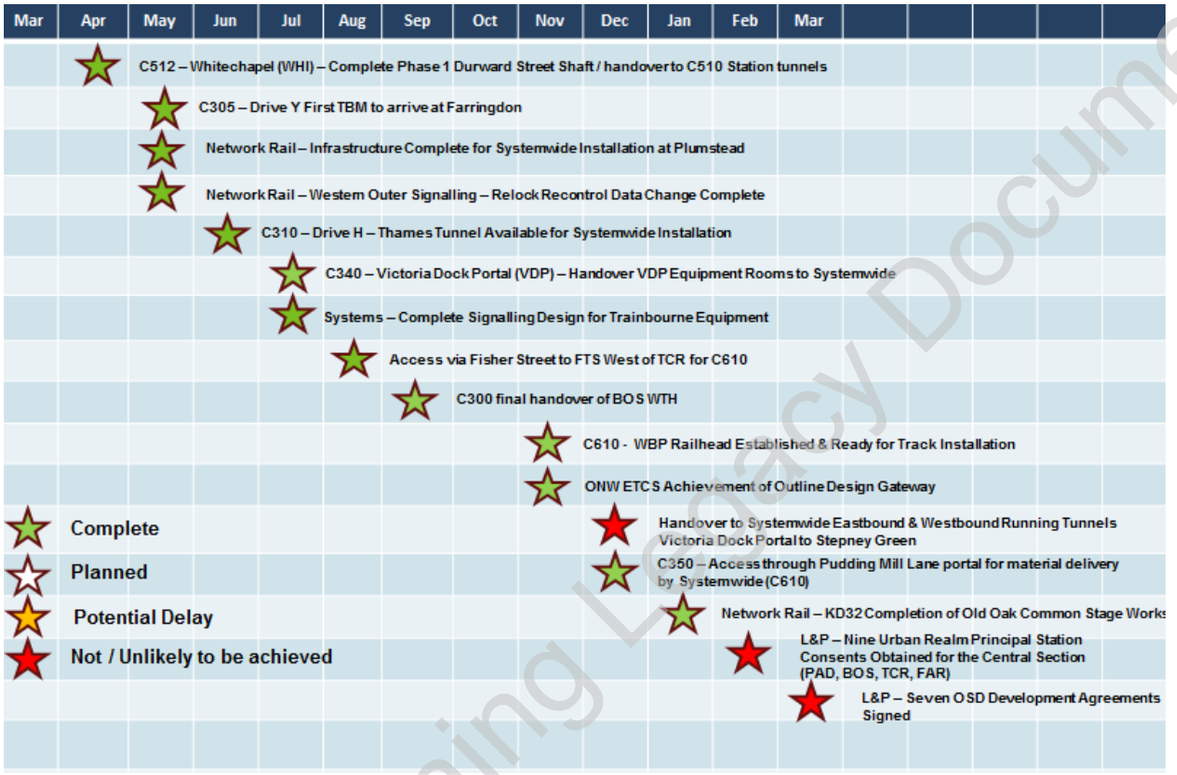
[1]float is calculated as the difference between the Baseline Early Date and Baseline Late Date.

[2]Forecast / Actual Change from Last Period:
- Forecast is earlier than the previous period
« Forecast is the same as the previous period
" Forecast is later than the previous period

Actual / Forecast
Grey shading indicates the milestone has been achieved and this is an actual date

Key Anchors:

Key Anchors are a sub set of the Anchor Milestones and contribute to the Crossrail Annual KPI objectives. They are the major Milestones that demonstrate to the business that Crossrail is on target to deliver. They are chosen together by the project delivery teams and central planning team to ensure a representative proportion across the business is presented.



Planning and Scheduling Desk Top Instruction

Instruction	**001**
Revision	**Oct 2015**
4.3 - Anchor Milestone & MOHS Key Handover Dates Change Process	

Overview:
The following change process will be used to document, agree and approve changes to Anchor Milestones & MOHS Key Handover Dates where the changes have no impact to the Baseline Stage Completion Dates. Where changes impact Baseline Stage Completion Dates or where the impact of changing the schedule may result in a material increased cost the change process will follow the formal change control process as defined in Trend and Change Control Procedure CRL1-XRL-Z9-GPR-CR001-00002 and is likely to result in the development and subsequent adoption of a revised schedule baseline.

Intent of Process:
The intent of the Anchor Milestone & MOHS Key Dates change process is to provide a method to facilitate changes to baseline planned dates where sound rationale (i.e. cost effective, more efficient delivery) exists. The change process is not intended to change baseline dates that are not achievable as a result of performance not meeting the plan.

Cost impacts, savings or increase costs including budget re-phasing and inflation impact, as a result of the schedule change will be administered separately using the current trend and change process.

Administration of Change:
A one page Anchor Milestones & MOHS Key Handover Dates change form (see attachment A) will be used to document the change. The change form will document the following:
- Milestone and Responsible Area Director
- Current baseline date(s) and proposed baseline dates
- Explanation of the reason for change
- Identification and explanation of any knock on impact to other Areas

Change form approvals:
- Responsible Area Director / Director
- Other Impacted Area Director(s) / Director(s)
- Head of Planning
- Head of Project Controls
- Central Section Delivery Director
- Programme Director

Communication and Timing:
It is envisaged that proposed changes to milestones will be discussed at the Area Directors periodic meeting and that the change forms will be processed during week two of the period.

Schedule Milestone Change Form

N.B. This form is to be used for Anchors & MOHS Key Handover Dates:

Milestone Number/Hand Over Priority: ……

Milestone Description/Location: ……

Responsible Area Director: ……..

Anchors:

M/S ID	Baseline Early Date	Baseline Late Date	Proposed Early Date	Proposed Late Date

MOHS Key Handover Dates:

Priority/Tunnel/Vent Handover Location	Current MOHS	Revised Proposed MOHS

Reason for Change:

Knock On Effect to Other Areas:

Responsible Area Director / Director: Add Name _____

Impacted Area Director / Director: Add Name _____

Head of Planning: [redacted] _____

Head of Project Controls: [redacted] _____

Central Section Del. Dir.: [redacted] _____

Programme Director: [redacted] _____

Planning and Scheduling Desk Top Instruction

Instruction	030
Revision	**Oct 2015**
4.4 - PDA Schedule 3 Milestones	

Overview:

The purpose of this instruction is to define the requirements for planning of the milestones as defined in the Programme Development Agreement (PDA) Schedule 3.

The significance of this set of milestones is they trigger the release of funds from third parties such as the City of London, BAA and property developers. As such **All PDA Milestones are to be considered Anchor Milestones**. The one exception is the Minor Sites which are still subject to definition.

Background

The milestones were established in 2008, and to date have not been reviewed with Sponsors to reflect the one year extension to the Target Final Delivery Date for the Crossrail Project that was agreed following the 2010 Comprehensive Spending Review (CSR).

CRL will be working with Sponsors representatives to establish revised Schedule 3 milestone dates that reflect the new delivery profile for Crossrail, with due consideration to how such revised milestone dates will affect other agreements with third parties that either CRL or Sponsors are party to.

Reference Documents

The main reference document is the Programme Development Agreement (PDA). This agreement is the main agreement between Sponsors and Crossrail and sets out Crossrail's role, responsibilities and other requirements for the delivery of the project.

PDA document reference: CR-XRL-Z8-AAG-CR001-50178

General

4 PDA milestones have already been completed and one de-scoped:

No.	PDA Schedule 3 Milestone	PDA Schedule 3 Date	Baseline - MOHS Version 4.0
20	Site available to commence Paddington Station Platform 1A Work Site OSD - descoped	04-May-10	De-scoped
1	Royal Assent	22-Jul-08 A	Complete
2	Appointment of Nominated Undertakers	24-Jul-08 A	Complete
3	Appointment of Qualifying Authorities	24-Jul-08 A	Complete
7	Commence Construction of Stockley Viaduct Structures	21-Feb-11	21-Mar-12A*

The remaining PDA milestones fall into three categories:

- Surface Works
- Stations Civils works completion
- Oversite Development (OSD) commencement

Each project that is responsible for the delivery of the remaining PDA milestones it is necessary to clearly identify the milestone, its forecast completion date **and any contingency** that has been allowed for its delivery.

MOHS Coding Requirements

A specific code with multiple values within the Primavera P6 database has been used to identify the PDA Schedule 3 milestones:

Activity Code: PDA Schedule 3 Milestone

Additionally, Anchor Milestones code G – Anchor Milestones shall be applied.

Milestones shall be coded in both Level 1 and Level 2 MOHS Programmes; however dates should be consistent between them. For the purpose of reporting forecast dates will be taken from the Level 1 MOHS.

Reports & Layout

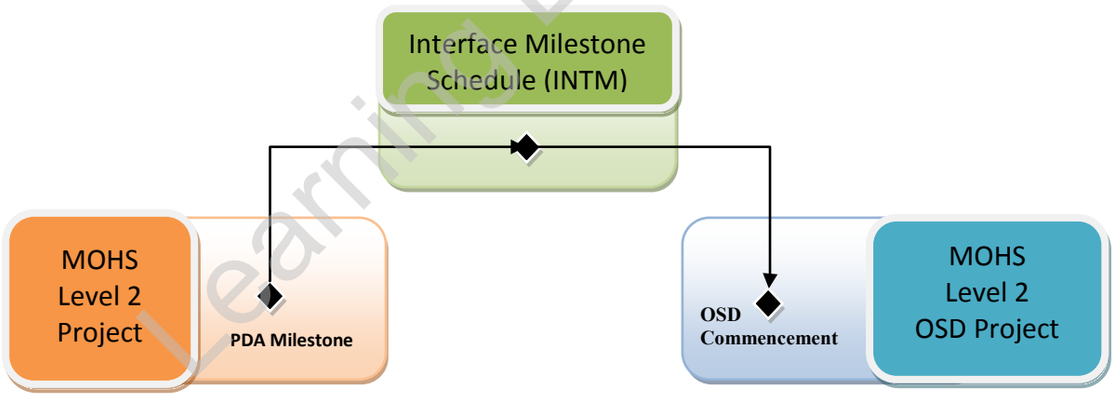
Periodic Reports of PDA Schedule 3 Milestones will be produced and published on the planning website using the P6 layout **'PDA Schedule 3 Milestones'.** The MOHS Current forecast dates, for future issues of the SACR, will be taken from the Level 1 MOHS.

Logic Requirements

The PDA milestones relating to the commencement of an OSDs within the Level 2 project programmes should be logically linked with the agreed successors via the Interface Milestone Schedule. Dialogue should be open between project planners and the Land & Property planner so that there is no confusion over the definition of the milestone.

The interface milestones should then drive the relevant milestones within the OSD: Oversite Development Plans.

Refer to: PSDTI 026 – Level 2 Interface Milestones Tracking, for further information.



5. Planning and Scheduling Desk Top Instruction

Instruction	**015**
Revision	**18 May 2015**
5.1- P6 Mandatory Global Project and Activity codes for MOHS Level 1 & 2 Plans	

Overview:

The purpose of this instruction is to set out the requirements for project and activity coding of P6 schedules. The scope of this includes the level 1 and the level 2 MOHS and the Tier 1 Contractors.

The whole of the programme at levels 1 and 2 should be consistent in their coding whoever is delivering the works that is the Central Section projects at level 2 e.g. Paddington should have the same coding as On Network Works project Maidenhead.

Intent of Coding:
The intent is to try and bring a greater degree of consistency and compatibility for reporting within any project across the programme at any given level.

In order to achieve this some codes have been mandated for all schedules at a given level. Furthermore as a safe guard against misunderstandings where a code does not apply the Not Applicable code value shall be applied (in some cases this value needs to be added)

1. MOHS Level 1 – Control Schedule.
These include the Central Section level 1 plans, the On Network Works plans and the Operations & Rolling Stock level 1.

1.1 Mandatory Global Project Codes

- None

1.2 Mandatory Global Activity Codes

- CR_Level_0_IP (to be renamed G – Industry Partner)
- CR_Level_0_Route (to be renamed G – Route)
- CR_Level_0_Stage (to be renamed G – Stage)
- G – Anchor Milestones (assigned by Area Planners – Blanks allowed)
- G – Area Reference
- G – Asset Location
- G – Asset Sub-Location
- G – Contract Reference
- G – Deleted (to be renamed G – Retired Activities)
- G – End to End Critical Path (assigned by Planning central team, blanks allowed)
- G – Key Events
- G – Lifecycle
- G – Project Manager
- G – Sector

2. MOHS Level 2 Control Schedule.
These include the Central Section plans, the On Network Works level 2 and the Operations & Rolling Stock.

2.1 Mandatory Global Project Codes

- Planners
- Project Status

2.2 Mandatory Global Activity Codes

- G – Anchor Milestones (assigned by Area Planners, blanks acceptable)
- G – Sector
- G – Area Reference
- G – Asset Location
- G – Asset Sub-Location
- G – Contract Reference
- G – Deleted (to be renamed G – Retired Activities)
- G – Key Events (assigned by Area Planners, blanks acceptable)
- G – Lifecycle
- G – NEC Contract (to be renamed G – NEC Contract Milestones)
- G – Project Reference
- G – Project Manager
- G – Procurement Milestone
- G – Work Type
- PRISM ID (to be renamed G – Prism ID)

Global Project Code Library

Project Code	Level 1 Control Schedule	Level 2 control Schedule	Tier 1 Mandatory
ClientP	No	No	
P3e Planner	No	No	
LUL	No	No	
Project Office	No	No	
Project Type	No	No	
Project Engineer	No	No	
Project Planner	No	No	
Project Manager	No	No	
Status	No	No	
Project Location	No	No	
Planners	No	Yes	
Planner	No	No	
Reason	No	No	
Industry	No	No	
Division	No	No	
Plan Prepared By	No	No	
Key Contact	No	No	
Archiving	No	No	
Priority	No	No	
Currency	No	No	
Project Status	No	Yes	
Project Industry	No	No	
Project Scope (Type)	No	No	

Global Activity Code Library

Activity Code	Level 1 Control Schedule	Level 2 Control Schedule	Lvl 3 Mandatory
CNTR - Principal Contractor	No	No	
Contractor - Work Package (NR-P07)	No	No	
CR_Additional Lifecycle	No	No	
CR_Contract	No	No	
CR_Level_0_IP	Yes	No	
CR_Level_0_Route	Yes	No	
CR_Level_0_Stage	Yes	No	
CR_Level_0_Stage_NEW	No	No	
CR_Level_0_Stage_New Do not Use	No	No	
CR_Level_0_Stage_OLD Do Not Use	No	No	
CR_Level_0_Task	No	No	
CR_Level_1_Task	No	No	
CR_Lifecycle	No	No	
CR_Location	No	No	
CR_NR/LU_Work_Package	No	No	
CR_NR_Client's_Requirements	No	No	
CR_NR_Delivery_Phase	No	No	
CR_NR_Interface	No	No	
CR_NR_Milestone	No	No	
CR_NR_Milestone_Type	No	No	
CR_NR_Source_Project_iD	No	No	
CR_Organisation (WBS level 5)	No	No	
CR_OSD Developer	No	No	
CR_PDA_Milestones	No	No	
CR_Period_Added	No	No	
CR_Planner	No	No	
CR_Project_Milestones (Exec/Prog/Proj)	No	No	
CR_QEI_2nd_Finish_Date	No	No	
CR_QEI_2nd_Start_Date	No	No	
CR_QEI_Activity_Type	No	No	
CR_QEI_Colour_UDF	No	No	
CR_QEI_Display_Description	No	No	
CR_QEI_End_Chainage	No	No	
CR_QEI_Layer	No	No	
CR_QEI_Layout	No	No	
CR_QEI_Line_Style	No	No	
CR_QEI_Start_Chainage	No	No	
CR_Responsibility (Within CRL)	No	No	
CR_U&A	No	No	
CR_WBS	No	No	
CR_Work_Type	No	No	
Crossrail Milestones	No	No	
CXR-Crossrail Interface Milestones	No	No	
Del - Section of Work	No	No	
Del - Structure type (Do Not Use)	No	No	
Del - stuart c Test	No	No	
Del -Planner	No	No	
Del -Work Sub Item	No	No	
G - Sector	Yes	Yes	
G - Anchor Milestones	No	No	
G - Area Directorate (EPS)	Yes	Yes	
G - Area reference	Yes	Yes	
G - Asset Location	Yes	Yes	
G - Asset Sub location	No	No	
G - Change Notice	Yes	Yes	
G - Contract Reference	Yes	Yes	
G - Deleted	Yes	No	
G - End to End Critical Path	Yes	Yes	
G - Key Events	Yes	Yes	
G - Lifecycle	No	No	
G - LU Interface Ref	No	No	
G - MCS Id	No	No	
G - Milestone	No	Yes	
G - NEC Contract	No	No	
G - OOC Depot	No	No	
G - PRISM WBS Code	No	No	
G - Programme Milestone	No	No	
G - Project ID	Yes	Yes	
G - Project Manager	No	No	
G - Project Reference	No	No	
G - Responsibility	No	Yes	
G - Service Stage	No	Yes	
G - Work Type	No	No	
G - Works Access	No	No	
GRIP	No	No	
JE Discipline	No	No	
MILE - Milestone	No	No	
Phasing	No	Yes	
PRISM ID	No	No	
Strategic Route Code	No	No	
Strategic Route Number	No	No	
Territory Code	No	No	
Work - Package (NR-P07)	No	No	
Work - Phase	No	No	
WORK - Work Category	No	No	
Work Stream			

Planning and Scheduling Desk Top Instruction

Instruction	**021**
Revision	**Nov 2015**
5.2 - P6 Schedule Conventions and Settings	

Overview:
This instruction will give general guidance of the planning conventions adopted in the CRL approach to building schedules for the control of the entire works. It will also address the P6 settings to be used as the norm where they cannot be locked down by the database administrator.

Intent of Conventions and Settings:
The intent of this guidance is to foster consistency of approach and results through the setting and following of a standard planning approach . It is expected that every P6 user will follow these norms in their approach to the level 1 and 2 plans for CRL, users who wish to deviate from this guidance should discuss the rationale for this with their respective Area Planner.

It is expected that some of these norms will apply to the Tier 1 contractors but not all.

Conventions:

1. P6 Level 1 & 2 Project Scope - Contract vs Location.
    a. The approach adopted is that each P6 schedule represents a location and that location is equivalent to a project.
    b. Within each P6 plan will be the entire scope of works to be delivered at that location irrespective of which Contract is delivering the works.
    c. Therefore to view all the works in one location, the user would open that project.
    d. To view the scope of one contract open all projects and filter by contract. (G - Contract Reference)
    e. There are instances where one contract is confined to a single project but if you are unsure open all the Level 1 or 2 projects and check.
    f. The CRL Planning approach is that there is a Project Manager responsible for each project. They are responsible for ensuring that the scope of their project is complete. (In the main this approach is quite clear, however ambiguity can creep in where “Project Wide” components of the “Project” scope have to be planned and integrated with delivery of the entire project scope). The planners role in this is the identification of gaps and it’s critical to the success of the programme that this happens.
    g. Duplication is a lesser crime than omission. We would rather have works duplicated (and managed) than have a scope gap.
    h. The CRL Programme is to deliver a functioning railway to the operator and maintainer (they are separate bodies). The planners approach has to be one of intelligent enquiry, does my project plan have everything in it I would expect to be there in order for it to form a functioning railway.

2. Level 2 Project Plan Interfaces
    a. The approach is that there is an Interface Project.
    b. This project consists of only milestones.
    c. The Interface Project forms the links between Projects.
    d. The interface Project has a milestone to represent every inter project interface (link).
    e. Hence the provision of access from Contractor 1 in project A to Contractor 2 in project B is represented by a milestone coded to belong to Contractor 1.
    f. The links are made by the respective responsible planner. Thus the planner for project A makes the link from the Project A plan into the Interface Project. The planner responsible for Project B picks up the milestone as a predecessor of contractor 2 starting work in project B.

g. The management of the Interface Project is undertaken by the Central Planning function .

3. Matching Level 2 plans to Contractors Agreed Plans
    a. There is no direct software link driving the connection between the Tier 1 contract schedules and the Level 2 schedules (The Tier 1 and Level 2 schedules are contained in separate P6 files and the relationship between the a Tier 2 activity(s) and its/their corresponding Tier 1 activities is maintained manually).
    b. The project manager must determine the project view of progress and issues and reflect this in the level 2 schedule. It is important that the Level 2 schedule reflects the view of the project manager, this view may not necessarily agree with the Tier 1 contractor assessment.
    c. The Level 2 schedule is used to update and inform the Level 1 schedule. The Level 1 schedule is the primary source for formal schedule reporting on the Crossrail Programme.
    d. Differences between the Tier 1 contract schedule and the level 2 schedule must be logged and explained in the Project Plan Narrative.
    e. Project Plan Narrative – This is the word document that is maintained by the Project Planner, a definition and template are being developed.

4. Retired Activities
    a. It is required that activities from the Level 1 and 2 plans are not deleted but retired.
    b. Each schedule should have a WBS node (99 in most cases) at the bottom of the WBS tree.
    c. Retired activities should be moved to this WBS
    d. Set to be 100% complete
    e. Set Actual start and finish to be the same day (the last working day prior to the data date, retired activities are always in the past.
    f. All logic links have to be deleted.
    g. All activity codes should be set to Not Applicable.
    h. All resources should be removed from the activity.
    i. All budgets and costs should be removed from the activity.
    j. The G – Retired activity code should be applied as D.

5. Anchor Milestones – Covered by DTI 004

6. Key Events – Covered by DTI 005

7. Contract Milestones – (G- NEC Contract)
    a. It is mandatory to code up the NEC milestones in the level 2 schedules.
    b. This should be done prior to contract award as well as once in contract.

8. Calendars – to be developed

9. Use of Constraint Dates – Level 1 Plans
    a. To be developed

10. Use of Constraint Dates – Level 2 Plans
    a. To be developed

11. Scope Book
    a. The Scope book is the definitive description of what is being constructed/installed where.
    b. The scope book is on the CMS, 06.10.01.Appendix B
    c. The scope book is maintained by Change Control and is the baseline against which change is monitored.
    d. Budgets and Schedules must reflect what is shown in the Scope Book.
    e. Gaps/errors must be identified to your Project Manager and corrected as directed by the Change Control team.

12. Resource Assignments
    a. To be developed

13. Budget and Cost Loading
    a. To be developed

14. Handling Time Contingency
    a. To be developed

15. Lags on Links
    a. These are discouraged and considered poor practice.
    b. If a planner is using these the activities need to be broken down so that better practice finish to start logic can be used.
    c. The use of milestone only planning is discouraged, activities of work should be represented by activities.
    d.

Settings:

- Progress Override set to allow in Scheduling.

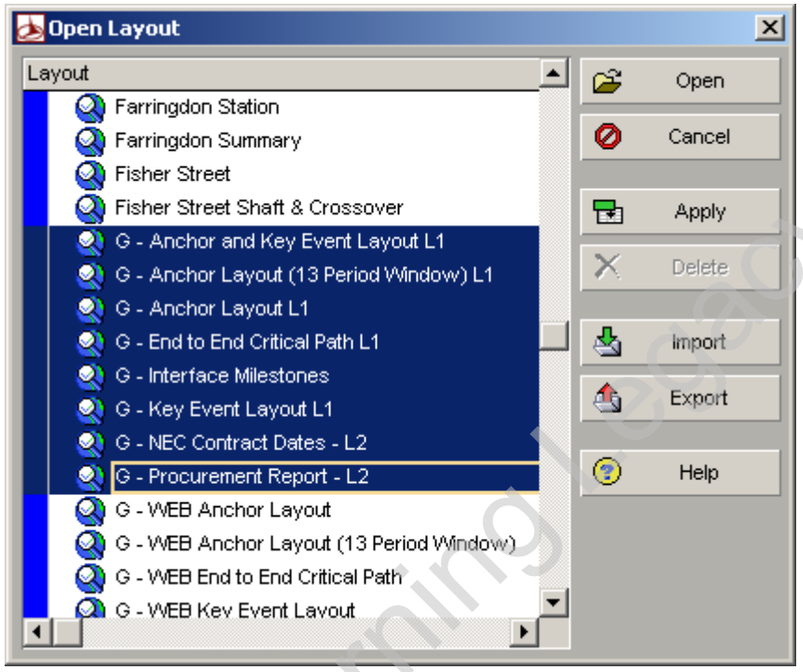
5.3 - MOHS Level 1 and Level 2 (Integrated Project Schedule) P6 Layouts

Overview:
A number of standard global layouts have been created in Primavera to allow viewing of specific Crossrail planning data items, such as:

- Anchor Milestones
- Key Events
- Procurement Milestones
- NEC Key Date Milestones
- End to End Critical Path(s)

Location of Layouts

All layouts have been made available in the Global Layout Area and are prefixed with 'G – '. An 'L1' or 'L2' is used at the end of each global layout to indicate on which level of the MOHS the layout is best used.



Layout Descriptions

- **G – Anchor and Key Event Layout L1**
  - Designed to display all Anchor and Key Event Milestones, with current forecasts and Baseline Early / Late Dates
  - Grouped by Area
  - Best used on the L1 MOHS Schedules
  - Uses the 'G – Anchor' and 'G – Key Events' global code

- **G – Anchor Layout (13 Period Window) L1**

- Designed to display Anchor Milestones within the 13 period windows as per the Area Directors Report. Shows current forecasts and Baseline Early / Late Dates.
- Grouped by Area
- Best used on the L1 MOHS Schedules
- Uses the 'G – Anchor Milestones' global code

- **G – Anchor Layout L1**
  - Designed to display all Anchor Milestones, with current forecasts and Baseline Early / Late Dates
  - Grouped by Area
  - Best used on the Level 1 MOHS Schedules
  - Uses the 'G – Anchor Milestones' global code

- **G – Key Event Layout L1**
  - Designed to display all Key Event Milestones, with current forecasts and Baseline Early / Late Dates
  - Grouped by Area
  - Indicates which milestones are also 'Programme Milestones' that appear on the sponsor dashboard
  - Best used on the L1 MOHS Schedules
  - Uses the 'G – Key Events' global code

- **G – End to End Critical Path L1**
  - Designed to display all critical paths (Path 1 – 5 or 'Enables Critical')
  - Uses the 'G – End to End Critical Path' code
  - Can be used on the Master Control Schedule or Level 2 (Integrated Project Schedule)

- **G - NEC Contract Date Milestones L2**
  - Uses the 'G – NEC Contract' global code which is used to identify NEC contract Key Dates and standard milestones such as Access Date, Completion Date etc.
  - Displays the Original Contract Date (NEC-OCD-Finish) and the Current Contract Date (NEC-CCD-Finish). See Desktop Instruction 022 – *NEC Milestone Dates* under 'Section 5 – Contract Requirements' for further information on these.
  - Should be used on the Level 2 Integrated Project Schedules

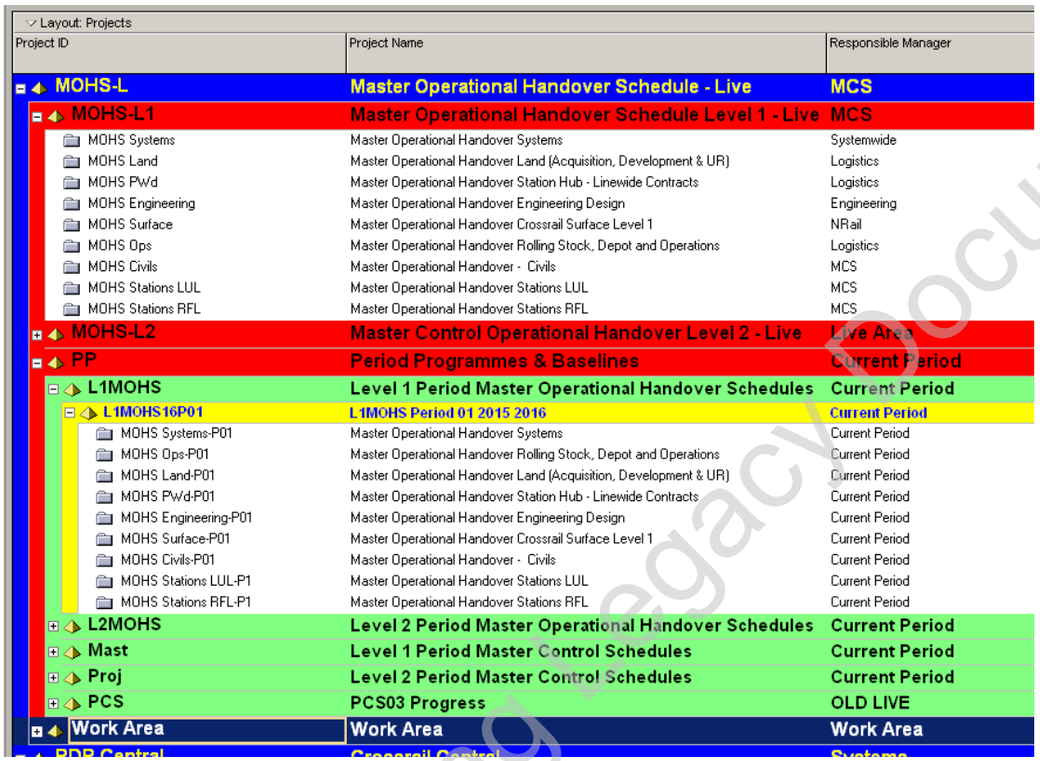
- **G - Procurement Report – L2**
  - Uses the 'G – Procurement Milestones' code to identify seven major procurement events that lead to contract award
  - Should be used on the Level 2 Integrated Project Schedules

Revision	18 May 2015
5.4 - MOHS Level 1 and Level 2 (Integrated Project Schedule) Schedule Management	

Overview:
The Level 1 and Level 2 MOHS (Master Operational Handover Schedules) are progressed and updated periodically; with progress monitored against an agreed baseline.

Level 1 (MOHS)

- Stored in the EPS of the P6 'Production' database:
-



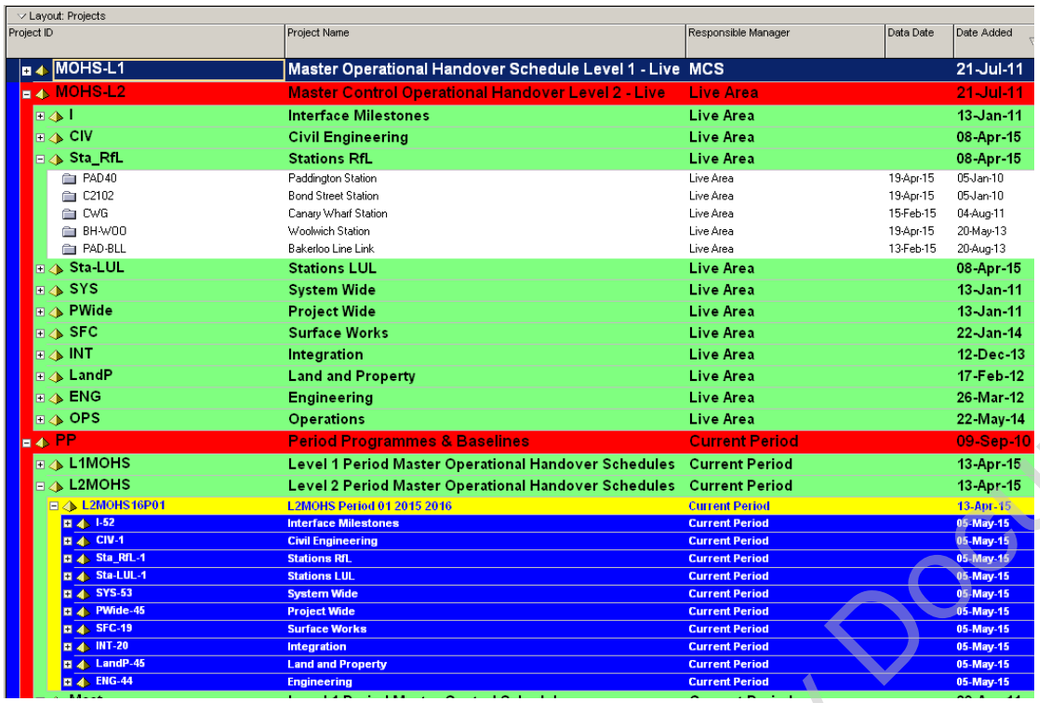
- Updated after the Level 2 Integrated Project Schedule has been updated on Thursday and Friday of Week 1. Once the updated has been completed, all projects are 'scheduled' together to update inter-project relationships

- Once the periodic update has been completed, a copy of each MOHS schedule is taken and copied into the relevant period node under the 'Current Period Programmes' node

- Changes to the baseline (necessitated by an agreed Anchor milestone change for example) will cause a revision to the version number of the baseline e.g. from V3.00 to V3.01. This revised baseline will be attached as the 'Project Baseline' to the Live MOHS schedule and subsequent Periodic copies of the programme

Level 2 (Integrated Project Schedule)

- Stored in the EPS of the P6 ‘Production’ database:



Layout: Projects

Project ID	Project Name	Responsible Manager	Data Date	Date Added
MOHS-L1	Master Operational Handover Schedule Level 1 - Live	MCS		21-Jul-11
MOHS-L2	Master Control Operational Handover Level 2 - Live	Live Area		21-Jul-11
I	Interface Milestones	Live Area		13-Jan-11
CIV	Civil Engineering	Live Area		08-Apr-15
Sta_RfL	Stations RfL	Live Area		08-Apr-15
PAD40	Paddington Station	Live Area	19-Apr-15	05-Jan-10
C2102	Bond Street Station	Live Area	19-Apr-15	05-Jan-10
CWG	Canary Wharf Station	Live Area	15-Feb-15	04-Aug-11
BH-WOO	Woolwich Station	Live Area	19-Apr-15	20-May-13
PAD-BLL	Bakerloo Line Link	Live Area	13-Feb-15	20-Aug-13
Sta-LUL	Stations LUL	Live Area		08-Apr-15
SYS	System Wide	Live Area		13-Jan-11
PWide	Project Wide	Live Area		13-Jan-11
SFC	Surface Works	Live Area		22-Jan-14
INT	Integration	Live Area		12-Dec-13
LandP	Land and Property	Live Area		17-Feb-12
ENG	Engineering	Live Area		26-Mar-12
OPS	Operations	Live Area		22-May-14
PP	Period Programmes & Baselines	Current Period		09-Sep-10
L1MOHS	Level 1 Period Master Operational Handover Schedules	Current Period		13-Apr-15
L2MOHS	Level 2 Period Master Operational Handover Schedules	Current Period		13-Apr-15
L2MOHS 16P01	L2MOHS Period 01 2015 2016	Current Period		13-Apr-15
I-52	Interface Milestones	Current Period		05-May-15
CIV-1	Civil Engineering	Current Period		05-May-15
Sta_RfL-1	Stations RfL	Current Period		05-May-15
Sta-LUL-1	Stations LUL	Current Period		05-May-15
SYS-53	System Wide	Current Period		05-May-15
PWide-45	Project Wide	Current Period		05-May-15
SFC-19	Surface Works	Current Period		05-May-15
INT-20	Integration	Current Period		05-May-15
LandP-45	Land and Property	Current Period		05-May-15
ENG-44	Engineering	Current Period		05-May-15

- Updated Monday – Wednesday of Week 4 after receipt of contractor schedules. Once the update has been completed, all projects are ‘scheduled’ together to update inter-project relationships (although inter-project links are managed by the Interface Schedule)

- Once the periodic update has been completed, a copy of each Level 2 schedule is taken and copied into the relevant period node under the ‘Current Period Programmes’ node

- The baseline will be revised only when the Programme baseline is revised and as such version control for minor revisions will not be operated

Planning and Scheduling Desk Top Instruction

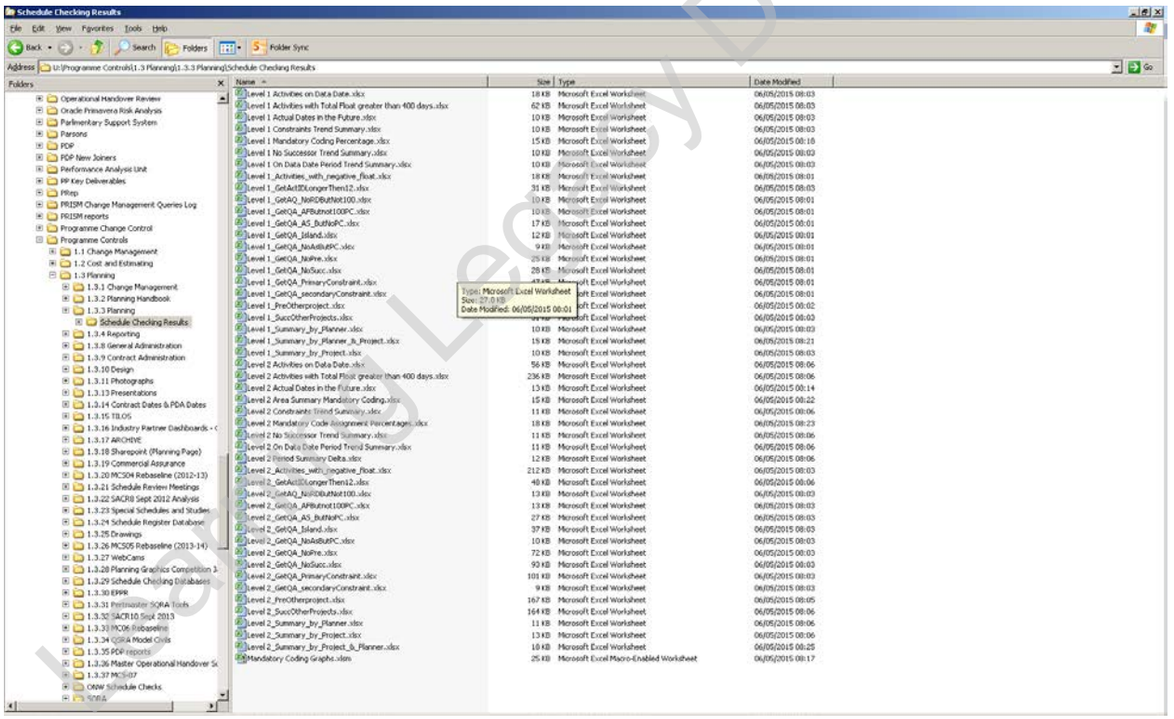
Instruction	**013**
Revision	**18 May 2015**
5.6 - Schedule Integrity Checking	

Overview:

Aids to maintain schedule integrity have been created from within Primavera in the form of global checking filters and also as spreadsheets created from the Primavera database.
An MS Access database has been provided to check tier 1 contractors submissions.

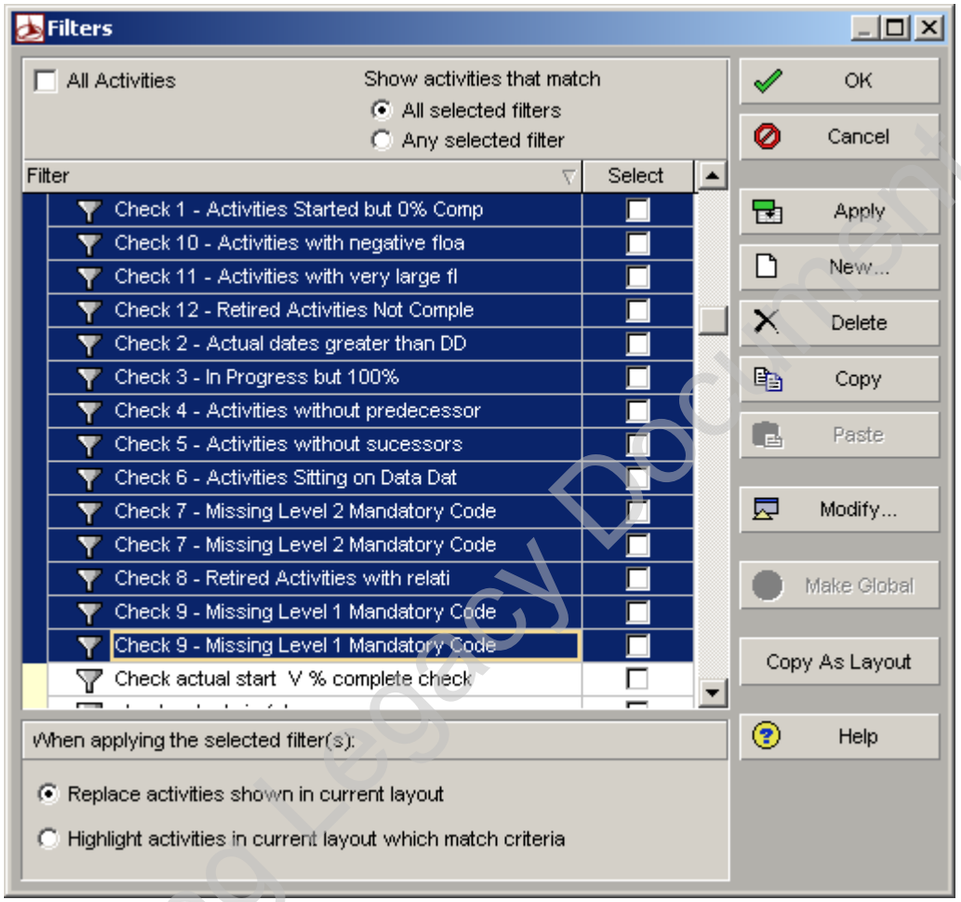
MOHS Level1 & Level 2 Schedule Checking Spreadsheets:

These spreadsheets are created each period and are located in the common directory detailed below. These spreadsheets should be used for general housekeeping.
U:\Programme Controls\1.3 Planning\1.3.3 Planning\Schedule Checking Results



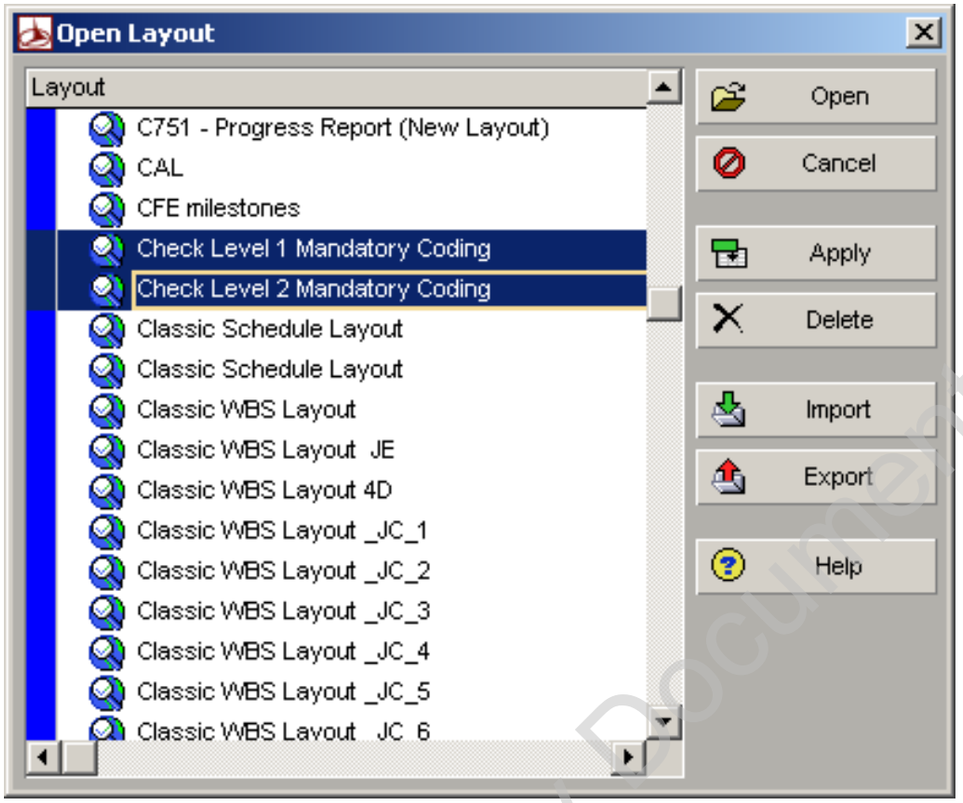
Internal Schedule Checking Filters:

A number of global filters have been set up within P3e to help with schedule integrity. These filters work by exception which means that any activities left when the filter has been set has a problem which needs to be addressed. These filters are shown below and will be added to in future.



Internal Schedule Checking Layouts

There are two schedule checking layouts which are used to check mandatory coding.
When these layouts are opened any activities appearing in the layout will have one or more missing mandatory code. (see below)



Staging Database Schedule Checking & Compare Instructions

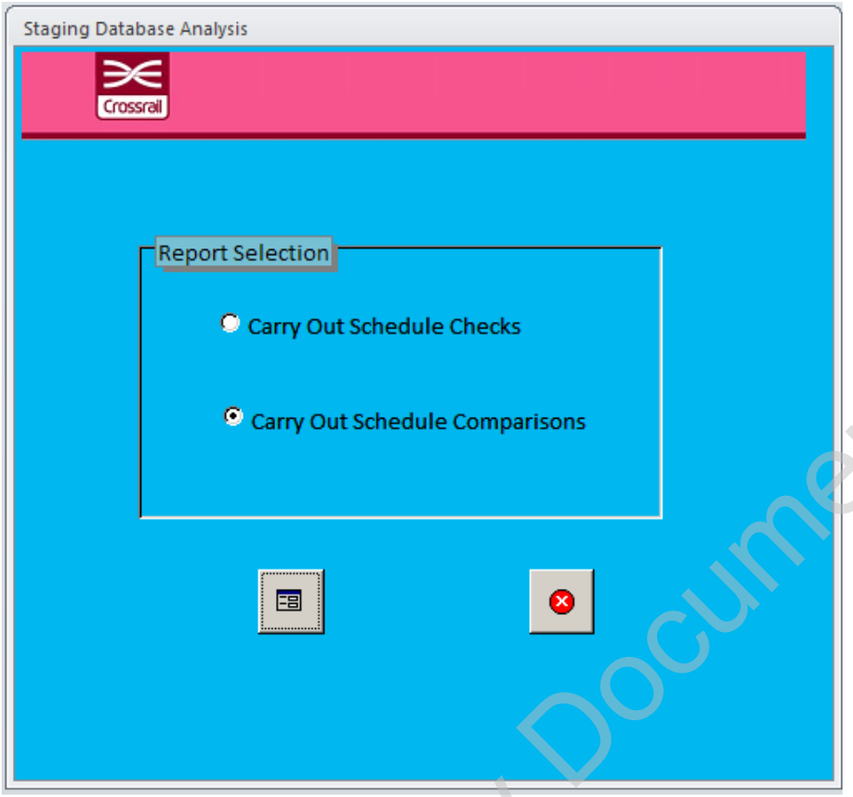
1. To use the database you must have MS Access included in your Citrix profile or installed locally on your computer if you don't connect via Citrix.

2. If you do not have MS Access you need to submit an online service request to have it added to your Citrix profile or installed.

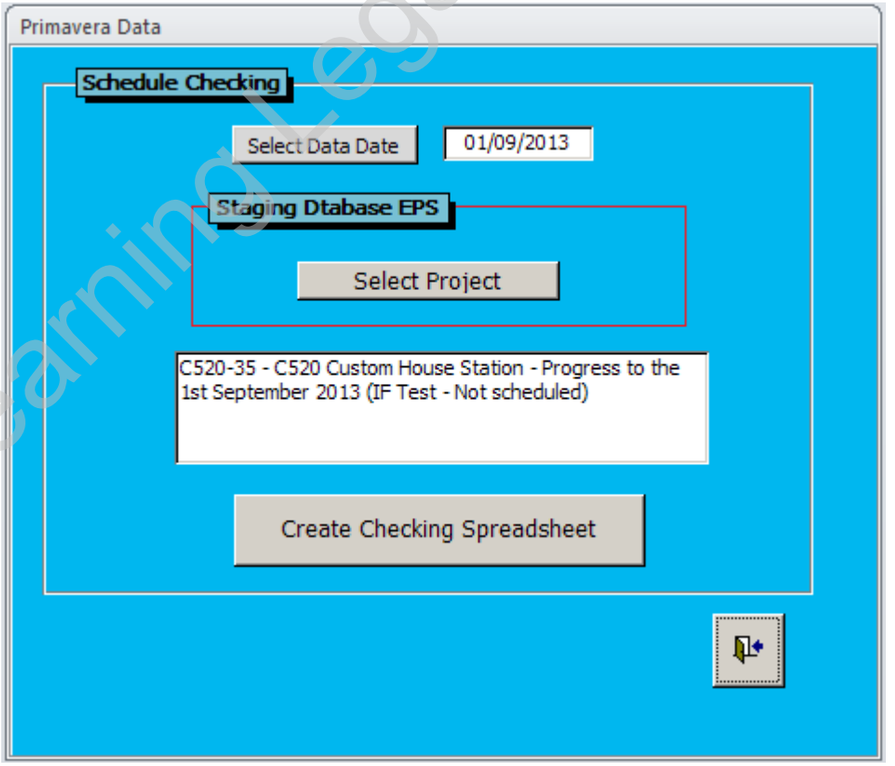
3. With MS Access installed the database can be copied from the following location. It is recommended that you copy the database to your H:\ drive

   U:\Programme Controls\1.3 Planning\1.3.29 Schedule Checking Database

Double click on the "Citrix Staging Prog and Coding Analyse & Compare" database. Note this database takes a while to load as it gathers the latest Staging database EPS data. Progress can be viewed at the bottom right hand corner of your screen.
Once opened you should see this:-



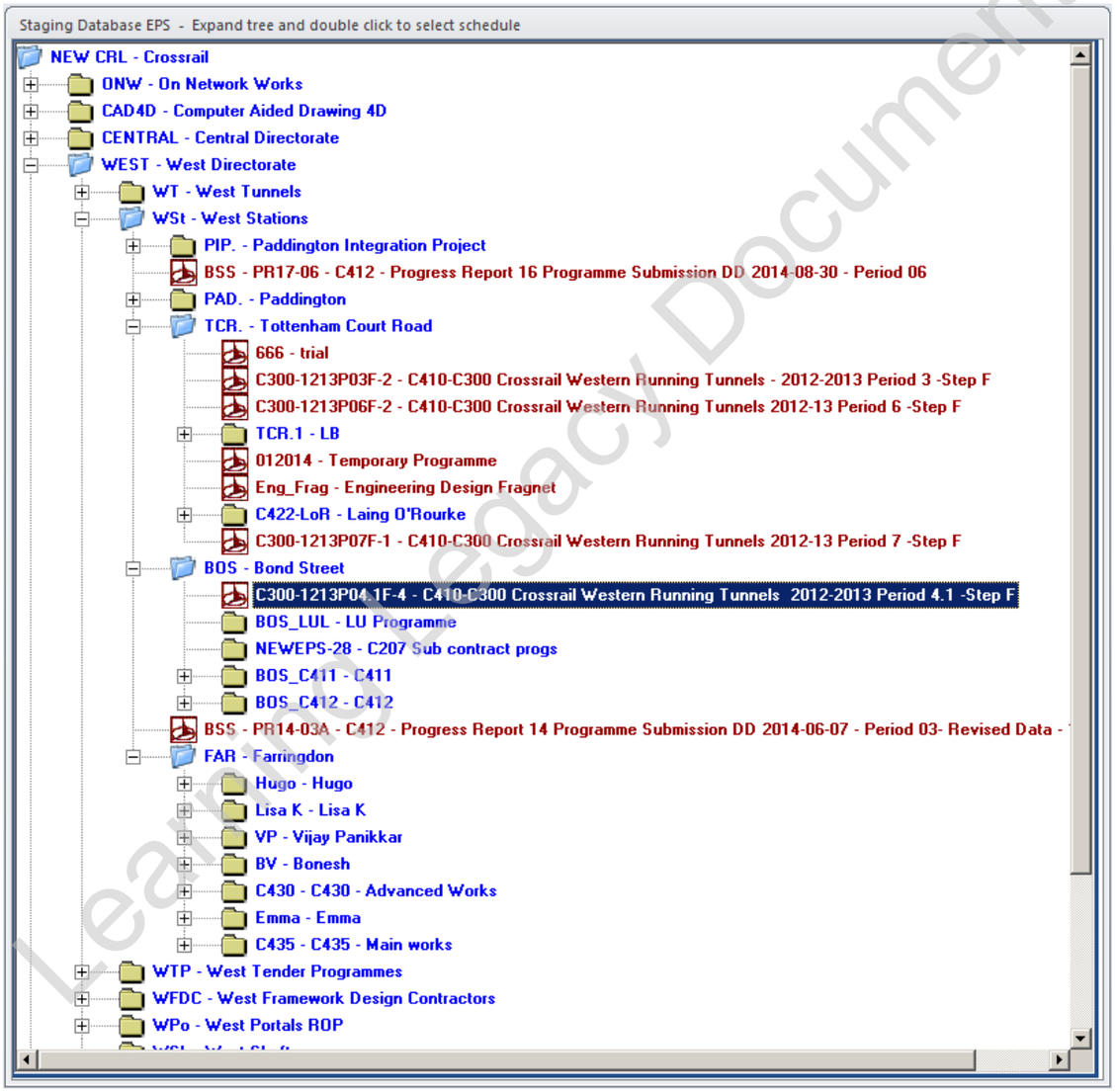
4. To carry out schedule checks you click on the radio button and then on the form button at the bottom left of the main form. This will open the schedule checking form shown below.



5. To select the project required press the <Select Project> button to open the staging database EPS, navigate to the project you require and double click on it to select. This will return you to the main form with the selected project displayed.

6. Note the data date that appears at the top of the form is the current data date of the selected schedule. This date can be changed manually for checking purposes but it is best left alone.

7. Note if nothing is displayed you have probably clicked on an empty EPS node rather than a project.



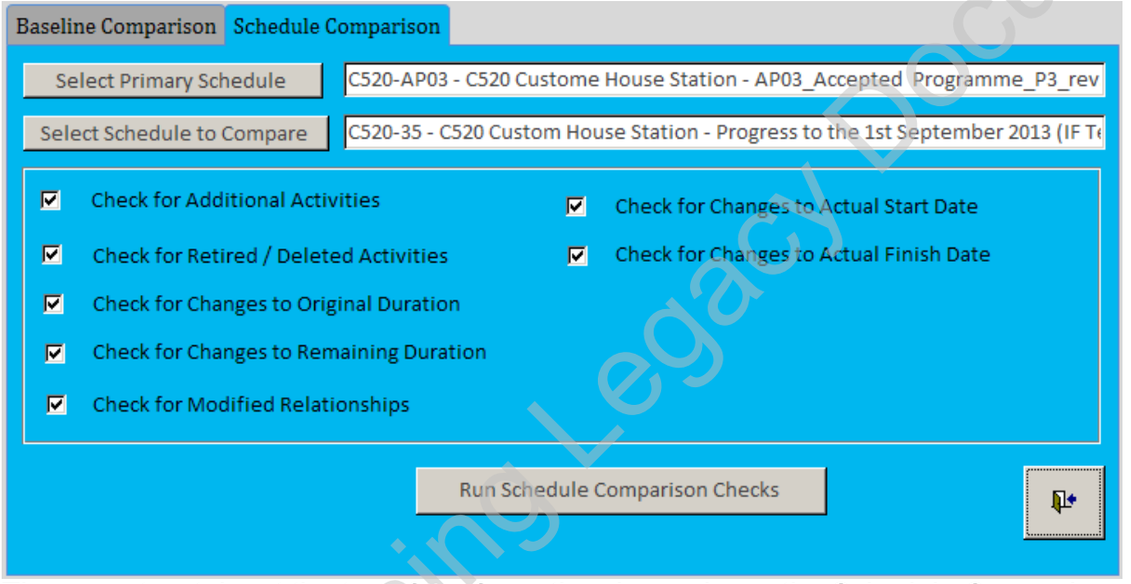
8. Finally click on the “Create Checking Spreadsheet” button. A spreadsheet will be created with fourteen worksheets. If a worksheet has no data in it this is because there is not a problem with the item you are checking.

Note there may be valid reasons for items appearing for instance activities on the data date. The information is for your guidance particularly the worksheet showing external predecessors which is helpful if your dates are being pushed out by another project's activities.

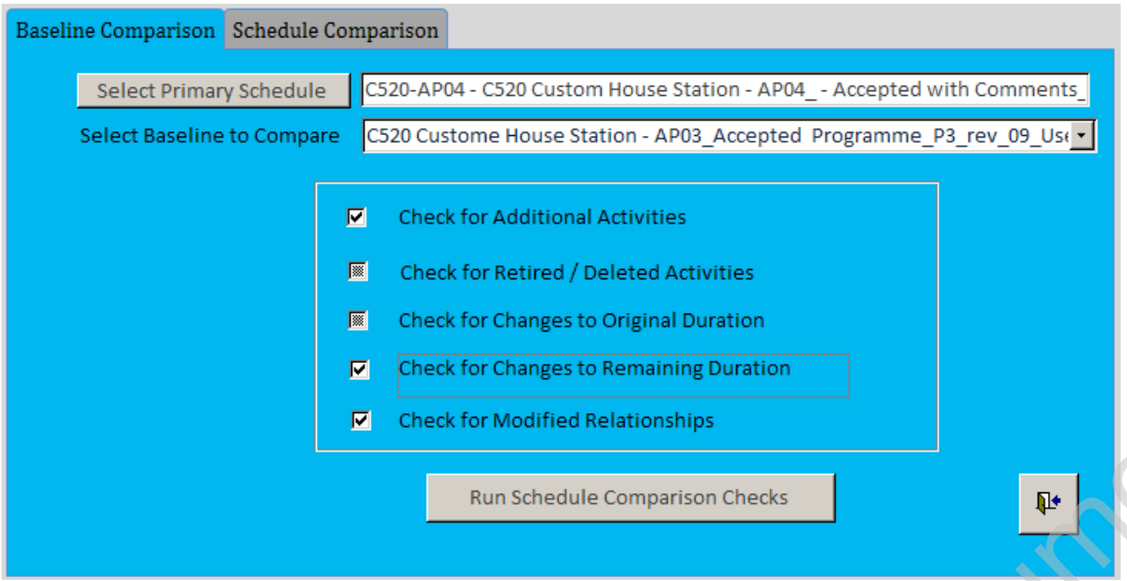
Note: If you have recently imported a schedule into the database and it appears as a node in the above EPS structure then you need to summarise it in Primavera and close and re-open the database. <Tools> + <Summarize> + <Open Projects>

Schedule and Baseline Comparison

From the main form select the "Carry out Schedule Comparisons" radio button and click on the form button at the bottom left. You should now see the form below.



There are two tabs at the top of the form, the above shows the Schedule Comparison feature and the one below the Baseline Comparison feature.



Selection of the schedules to compare is the same as for checking. The only difference is the baseline comparison searches for any baselines once the primary schedule has been selected and these can be picked from the drop down box below the selected schedule.

You can select which comparisons you wish to run by ticking the relevant check box. Once you have completed your selection press the “Run Schedule Comparison Checks” button. After a while a spreadsheet will be created with the results.

This can take up to 20 minutes for large schedules on the Staging Database during which time it may appear the database is not responding but bear with it and have lunch!!

Note: On the spreadsheet worksheet showing relationship changes you will find it easier to see the changes at a glance by comparing columns ‘R’ and ‘S’. The unique IDs are a concatenation of:-

<Predecessor ID> + <Relationship Type> + <Lag> + <Successor ID>

The change will be either the relationship type or the lag duration. Note the lag duration is based on 8hrs per day so results may differ to Primavera depending on the predecessor activity’s calendar.

If, after using the database a number of times you get an error message saying “Too many fields”, this is caused by a known bug in excel using ODBC to connect to MS Access. This problem can be solved by deleting the ‘Schedule Compare.xlsm’ file or ‘Schedule Checks.xlsm’ file from your H:\ drive. The database will automatically create new files the next time you run it. The files can be deleted without closing the database.

Planning and Scheduling Desk Top Instruction

Instruction	**026**
Revision	**18 May 2015**
5.7 - Level 2 Interface Milestones Tracking	

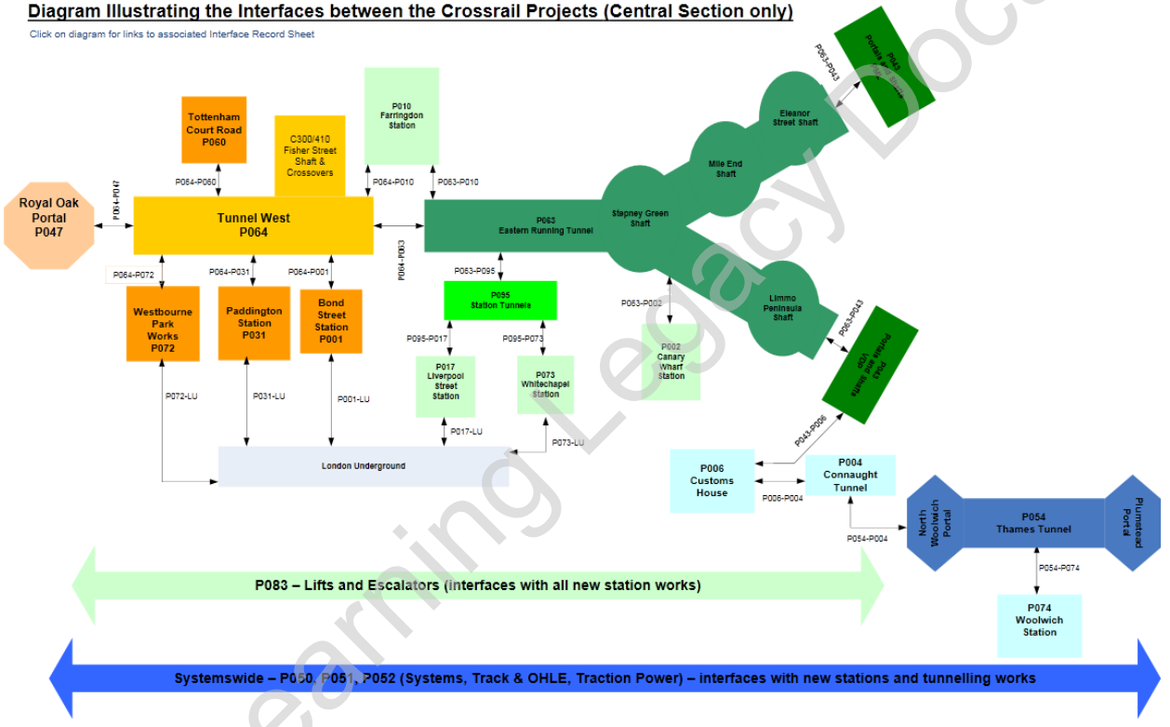
Overview:

This instruction discusses how interface milestones/activities are tracked and managed on the project.

Data representing each interface is presented in the Interface Milestone Schedule on P6 (MOHS Level 2). Two documents are available on the Planning Page that provides further insight on the interfaces: Interface Definitions and the Interface Tracker reports.

Interface Definitions

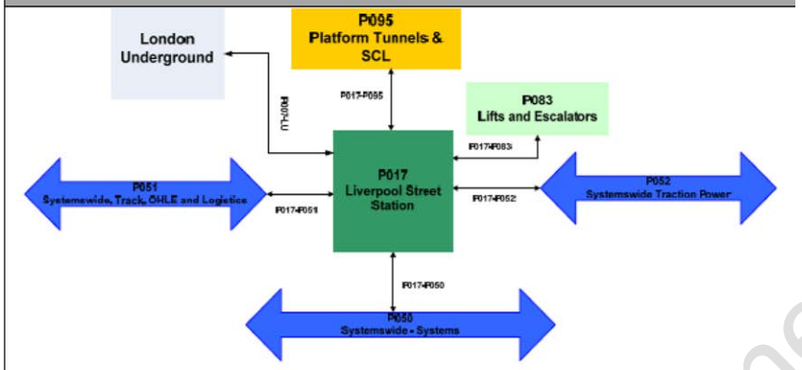
Interfaces are collectively presented in a graphical format, displaying how the various projects/ contracts interface with each other, as shown below:



Each of the projects/contracts is clickable and opens a narrative document. Each narrative document presents a scope summary of the project/contract and a list, with descriptions, of its general interfaces.

Example excerpt from Liverpool Street Station:

Projects interfacing with P017



Summary Scope – P017

The project P017 is defined by the following contracts:

- C501 - Liverpool Street Station (station piling and diaphragm wall)
- C502 - Liverpool Street Main Station Works/ Fit Out/ M&E
- C503 - Liverpool Street Civils Advance Works (Package 1) and C243 - Liverpool Street (Civils Advance Works, Utilities and Services) combined.

General Description of the works under the C502 Contract at Liverpool Street include:

Blomfield Box all works required to construct the box including demolition, civil, structural, envelope, internal walls and partitions, all fit-out, finishes, MEP, interfaces with Others, external works, testing and commissioning, hand-over to the IM and the OSD and reinstatement of all public and private areas affected by the works;

Broadgate Ticket Hall all works required to construct the ticket hall and escalator box (with the exception of some deep piles which will be constructed by Others) including demolition, civil, structural, envelope, internal walls and partitions, fit-out, finishes, MEP, interfaces with Others, external works, testing and commissioning, hand-over to the IM and reinstatement of all public and private areas affected by the works;

Moorgate Integrated Ticket Hall all works required to construct the ticket hall including demolition, civil, structural, envelope, internal walls and partitions, all fit-out, finishes, MEP, some interfaces with the public and LUL operational station environment and existing systems, interfaces with Others, testing and commissioning and hand-over to the IM and LUL and reinstatement of all public and private areas affected by the works

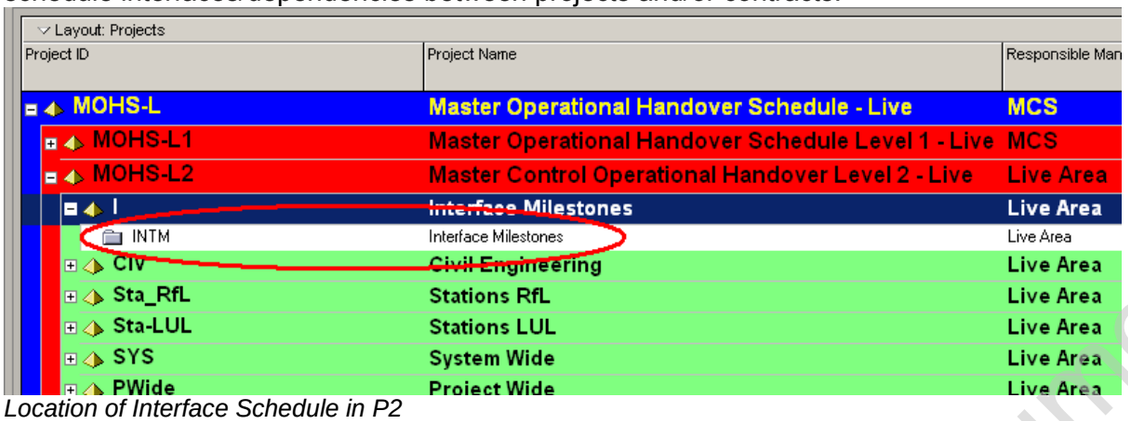
Construction of a Barbican Estate Highwalk access at Moorfields integrated into the new ticket hall structure including escalators, staircase, canopy, all associated finishes, MEP, interfaces with Others, testing and commissioning, hand-over to the CoLC and reinstatement of all public and private areas affected by the

General Description of Interfaces	
Project P095 SCL Station Tunnel East	**Contracts:** C510[1] – Whitechapel and Liverpool Street (Early Shafts and SCL Works).

Project Interface Ref:			P017-P095
Scope of Contractual Interface:	**Interface Reference (Level 2)**	**Schedule Activity Reference**	**ARM Risk Reference**
On or before **Key Date 1** the C502 Contractor completes the Blomfield Box Grouting Basement piled walls, floor slab and roof slab; and from Key Date 1 until Constraints 1C the C502 contractor provides access to the C510 contractor to carry out compensation grouting within the basement shaft. **C502 – Contract Data Part 1**	P017-P095-01	To be included in tracker	
On or before **Key Date 2** the C502 Contractor completes all the piles at the north of the Blomfield Box worksite to allow the C510 sprayed concrete lined tunnelling contractor to construct the adjacent tunnel without temporary propping. **C502 – Contract Data Part 1**	P017-P095-02	C502 - AC1210	

Interface Milestones Schedule, Coding, and Logic

The objective of the P6 Interface Milestone Schedule is to identify and use individual milestones to manage and control schedule interfaces/dependencies between projects and/or contracts.



Location of Interface Schedule in P2

Coding and logic requirements:

- Interface milestones created should link to the appropriate contracts / projects/ area
- There should be no logic between milestones within the Interface Milestone Schedule
- Interface milestones shall be Finish Milestones. The date of the finish milestone should represent the agreed date between contracts/ projects/ areas
- Interface Milestones shall be constrained in order to reflect schedule impacts within individual MOHS Level 2's. The constraint type shall be "Mandatory Finish**".**
- Preceding and succeeding activities/milestones to the Interface Milestone shall not be constrained
- Relationships will be finish to start with no lags

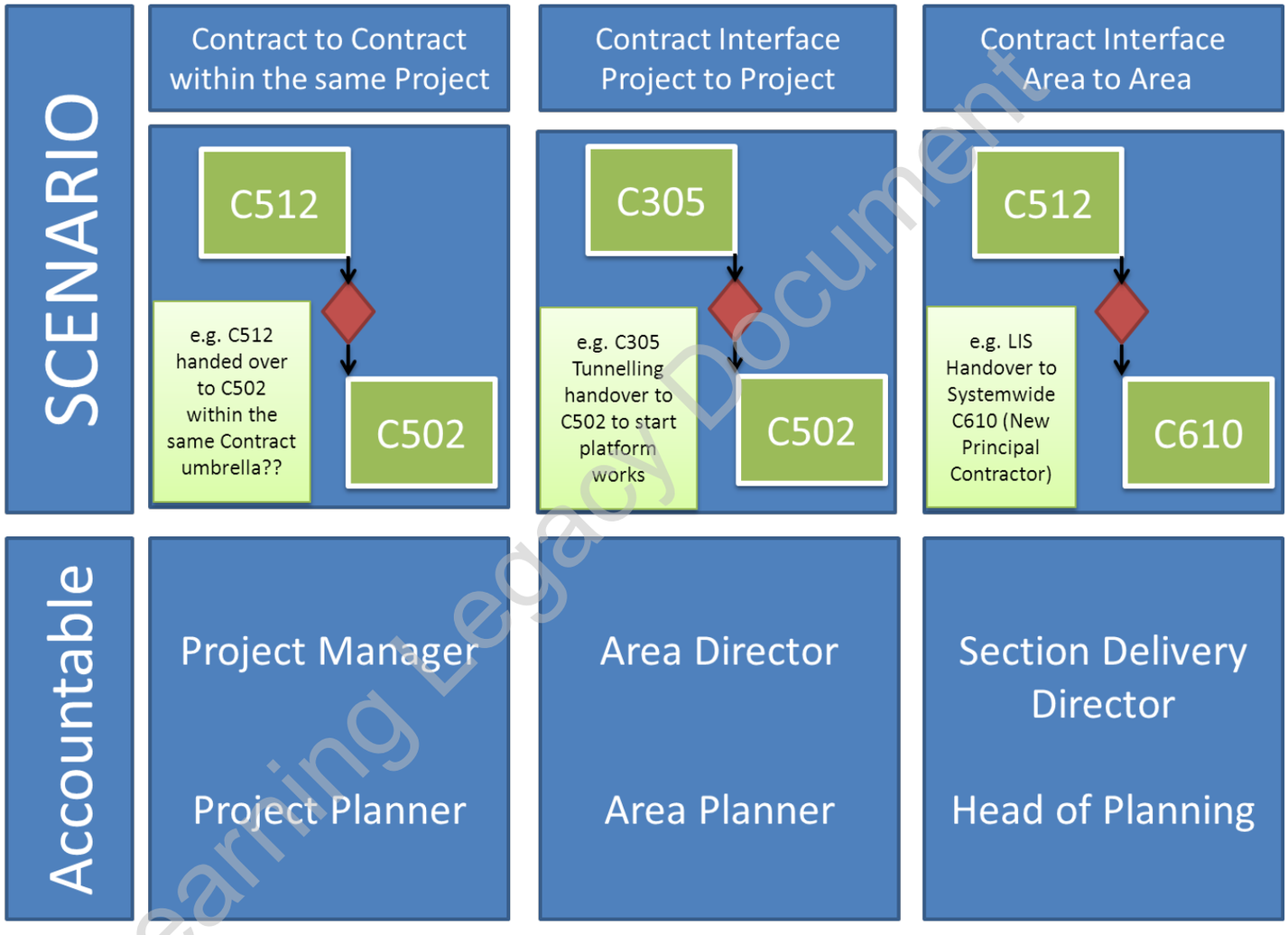
Interface Tracker

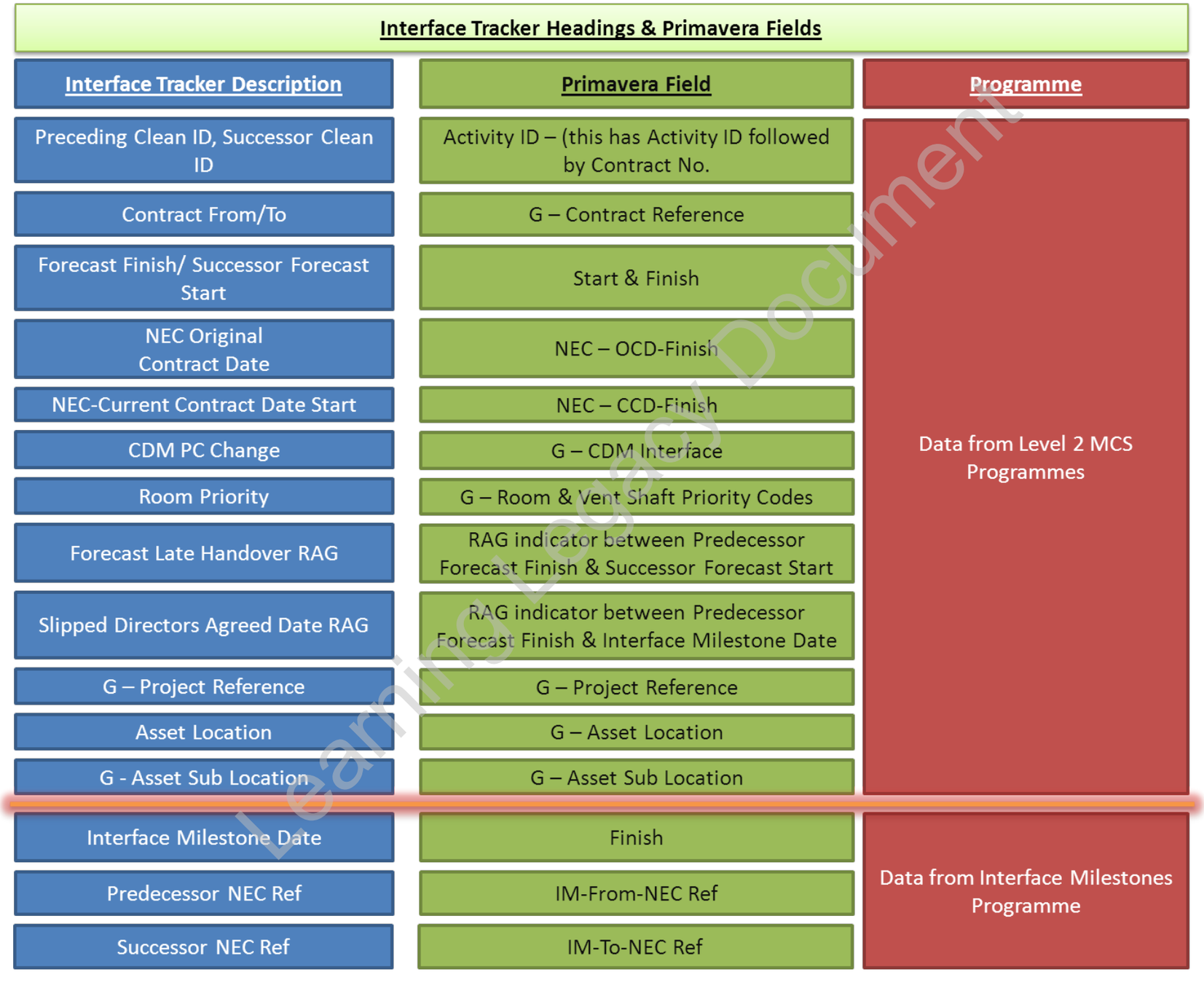
The objective of the Interface Tracker is to list in detail the predecessors and successors of each interface milestone, noting information belonging to the following fields: activity ID's, descriptions, Contract/NEC/Project references, NEC dates, and location. The Directors' Agreed Date for the interface is also noted.

The purpose of the Interface tracker is also to improve the data quality of our plans and logic. The planner can use this information to identify issues of late handovers so that mitigation can be implemented & communicated across the programme.

Crossrail's Commercial teams will also use this information to review Original Contract Date & Current Contract Dates where any slippage is occurring. This will enable commercial to understand any issues that are arising from the programme so that they are better equipped with any future Compensation Events & claims.

Different Contract Interface scenarios & accountability of the data is described below:





6. Planning & Scheduling Desk Top Instruction

Instruction	**022**
Revision	**2 Feb 2016**
6.1 - NEC Milestone Dates Definition	

Overview:

The Tier 1 contracts are administered using the NEC contract suit. Within NEC, milestones are used to define, formalise and agree precise points in time and NEC requires that the Milestones are included in the Contractors schedule. To aid contract specific definition each will fall under the following NEC milestone definition.

Contract Award
Contract Start Date
Access Date
Constraint Date
Key date
Sectional Completion Date
Completion Date

The Contractors Contractual Milestones are to be replicated within the MOHS Level 2 Control Schedule. This will provide a tool that will identify the commercial agreed basis and current forecast of the NEC milestones, and enable interfaces between contracts to be modelled.

NEC Milestone Codes:

Code Value	Description
AD	Access Date
CA	Award/ Execute Contract
CSD	Constraint Date
CST	Contract Start Date (if different from CA)
KD	Key Date
PCD	Planned Completion Date
SCD	Sectional Completion Date
CD	Completion Date

NEC Milestone User Defined Dates:

Title	Data Type	Description
NEC-OCD-Start	Start Date	Original Contract Start Date
NEC-OCD-Finish	Finish Date	Original Contract Finish Date
NEC-CCD-Start	Start Date	Current Contract Start Date
NEC-CCD-Finish	Finish Date	Current Contract Finish Date

Note; It is understood that both the OCD & CCD refer to a single milestones and single dates. However, in order to support P6 functionality, both Milestones Start and Finish Dates are required in order that the milestone can be displayed in the gantt chart view.

NEC Milestone Process:

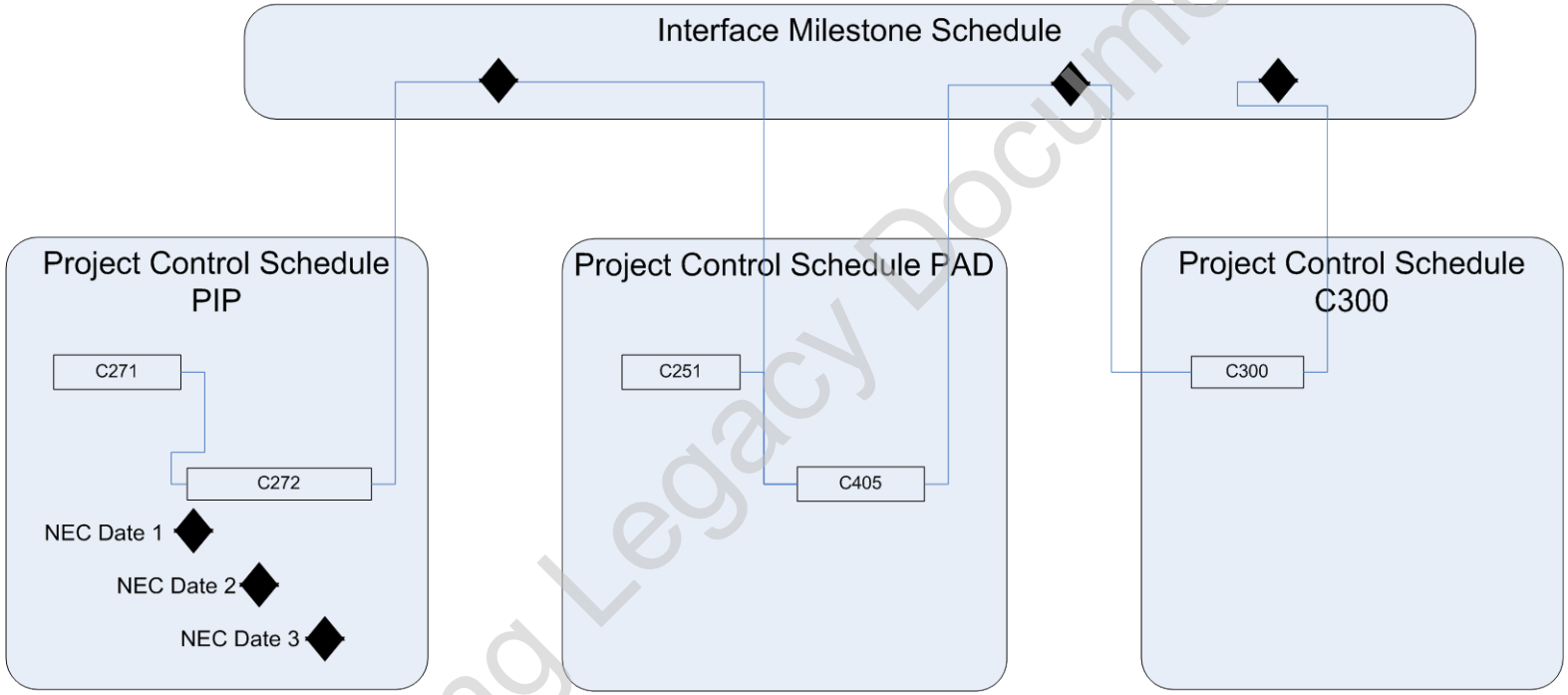
Prior to Award
When developing the initial schedule the Planner should give thought to the required contract interfaces and deliverables. These should be reflected as potential contract milestones and coded using the Global Code; G – NEC Contract. These milestones will aid the project and interface Project(s) when developing the Tender(s).

On Awarding the Contract, the Planner should review the contract document and identify the contractual milestones. The Contractual Milestones are to be replicated into the Level 2 Control Schedule and appropriately linked. The descriptions should reflect exactly the description in the contract including any references.

On input the following values should be assigned

Each Milestone should be assigned the appropriate G – NEC Contract code value.
Each Milestone should be assigned an Original & Current Contract dates.

Throughout the contract duration, the current contract dates should be maintained to reflect the current contract status. The process for changing and agreeing dates with the Contractor is a function of the NEC contract and therefore is not covered within this desk top instruction.



- A Single individual Milestone is held for each NEC contract and constraint Date within the Contract
- Each Milestone will hold the following Dates;
  - Original Contract Date = User Defined Field NEC-OCD
  - Current Contract Date = User Defined Field NEC-CCD
  - Forecast Date = Start/ Finish Dates
- Variance can be displayed by calculated P6 Field and within the Gannt Chart View
- Data Can be extracted for reports
- Changes to Contract dates are (as now) within Project Team responsibility Via the NEC contract and evident in dashboard reports.

G - NEC Contract Code Values

- AD - Access Date
- CA - Award/ Execute Contract
- CSD - Constraint Date
- CST – Contract Start Date
- KD - Key Date
- PCD – Planned Completion Date
- SCD - Sectional Completion Date
- CD - Completion Date

Planning and Scheduling Desk Top Instruction

Instruction	**025**
Revision	**9 January 2016**
6.2 - Planned and Contract Completion Milestones	

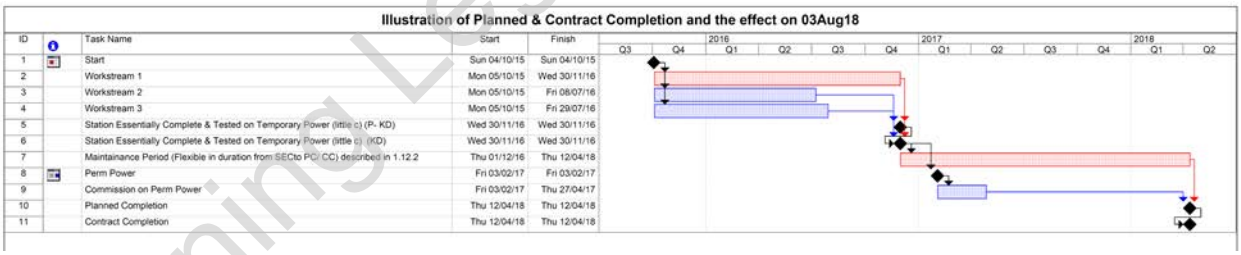
Overview:
This desk top instruction is to provide a consistent view of the preferred Crossrail logic associated with planned and contract completion milestones and their relationship with "**variable** duration maintenance" activity.

Intent of Preferred Logic:
The intent of the preferred logic is to provide a consistent approach to how the relationship between planned and contract completion milestones should be treated and in particular their relationship with the variable maintenance duration.

It is important that a critical path that has been created by the linkage between the variable maintenance duration and sectional completion and planned completion milestones is not allowed to drive the planned completion date.

Example of Preferred Logic:

The Gantt chart below provides and illustration of preferred logic relating to planned and contract completion milestones and their relationship with the **"variable duration maintenance activity".**



7. Planning and Scheduling Desk Top Instruction

Instruction	**002**
Revision	**5 February 2016**
7.1 - PRISM Planning and Schedule Interface Requirements	

In order to support Crossrail Cost and Performance measurement a requirement exists to supply start and finish dates for each component of the cost breakdown structure (CBS) from the Level 2 Control Schedule into PRISM. The data within the level 2 Control Schedules is assured as in accordance with Part 14; the Tier 1 contractors also hold and maintain these codes within their level 3 schedules. This data should be used to assure and validate the Level 2 control schedule Start and Finish Dates

1.1 *PRISM Terminology*

Term	Description
WBS Account	A component of the cost breakdown structure (CBS) of the contract as per the activity schedule in the NEC contract e.g. 1WE-P060-C422-010-001 (Tottenham Court Road Station – Main Station Works, Fit-out + M&E)

The WBS Account will comprise of 21 characters, automatically concatenated from three Global Activity Codes as described below:

WBS Account Components	Example	Translation	Source	WBS Account - Full String
Area	1WE	West Area	'G – Area Reference'	1WE-P060-C422-010-001
Project	P060	TCR Station	'G – Project Reference'	
Contract	C422	Main Station Wrks, Fit-out + M&E	'G – PRISM ID'	
PRISM Activity Level 1	010	Main Station Wrks, Fit-out + M&E (Level 1)	'G – PRISM ID'	
PRISM Activity Level 2	001	Main Station Wrks, Fit-out + M&E (Level 2)	'G – PRISM ID'	

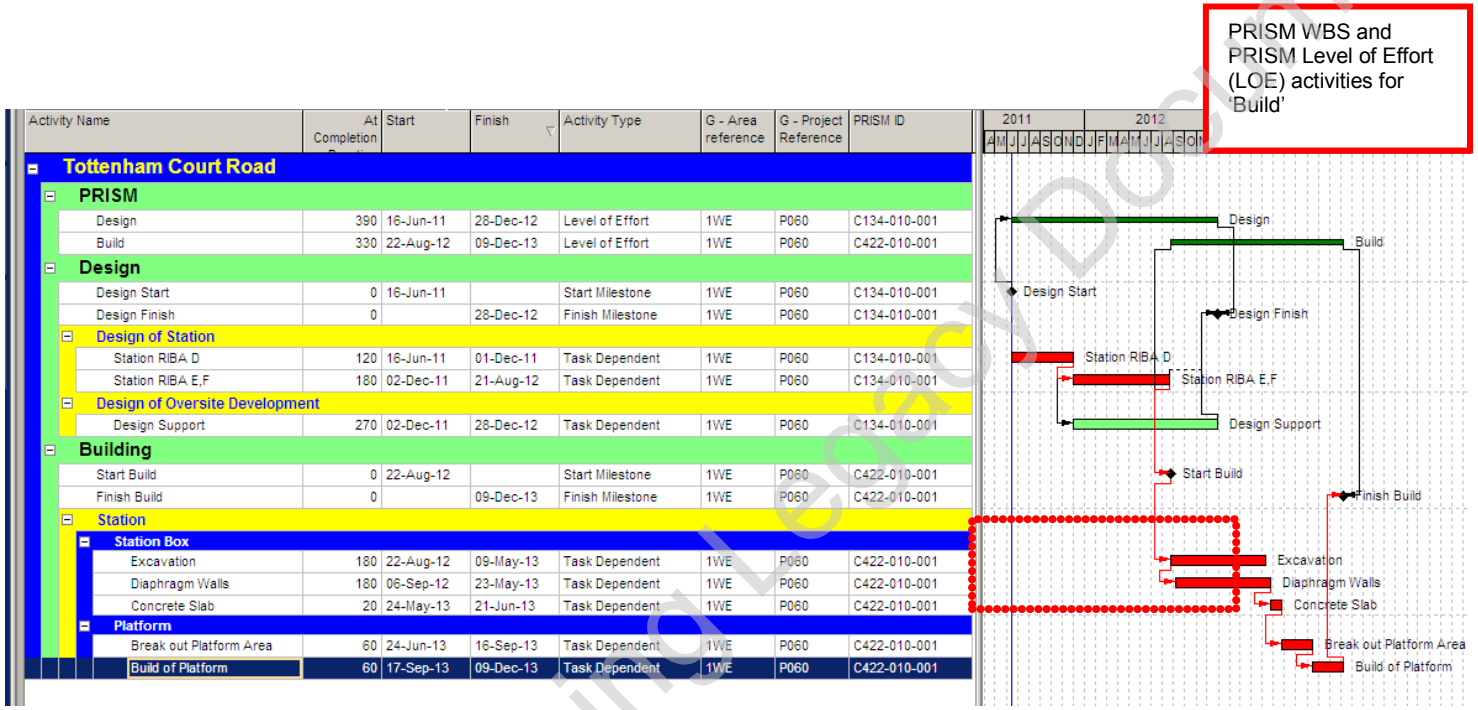
For each WBS account the following Start and Finish Dates are required to support PRISM:

- Baseline Start & Finish Dates
- Current Control Start and Finish Dates
- Forecast Start and Finish Dates

1.2 *Primavera Terminology*

Term	Description
Primavera PRISM Activity	The Level of Effort activity in Primavera used to supply start / end dates to PRISM. There should be a 1-to-1 relationship between the WBS Account and the Primavera PRISM Activity
Primavera Sub-Activity	A lower level deliverable or activity that forms part of the Primavera PRISM Activity, i.e. *'Bond Street Station - RIBA E Design'* is an example of a sub-activity that would form part of the overall *'Bond Street Station – Design'* activity

Below is an example of the application of the above codes and Level of Effort Activities



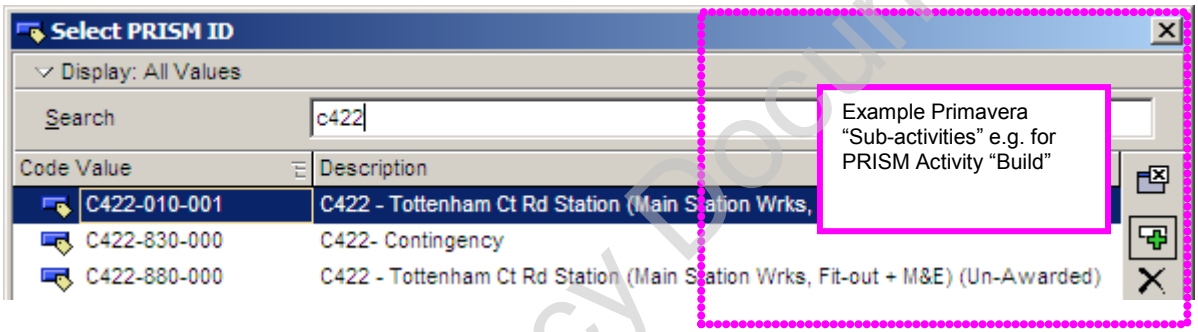
Activity Name	At Completion	Start	Finish	Activity Type	G - Area reference	G - Project Reference	PRISM ID
Tottenham Court Road							
PRISM							
Design	390	16-Jun-11	28-Dec-12	Level of Effort	1WE	P060	C134-010-001
Build	330	22-Aug-12	09-Dec-13	Level of Effort	1WE	P060	C422-010-001
Design							
Design Start	0	16-Jun-11		Start Milestone	1WE	P060	C134-010-001
Design Finish	0		28-Dec-12	Finish Milestone	1WE	P060	C134-010-001
Design of Station							
Station RIBA D	120	16-Jun-11	01-Dec-11	Task Dependent	1WE	P060	C134-010-001
Station RIBA E,F	180	02-Dec-11	21-Aug-12	Task Dependent	1WE	P060	C134-010-001
Design of Oversite Development							
Design Support	270	02-Dec-11	28-Dec-12	Task Dependent	1WE	P060	C134-010-001
Building							
Start Build	0	22-Aug-12		Start Milestone	1WE	P060	C422-010-001
Finish Build	0		09-Dec-13	Finish Milestone	1WE	P060	C422-010-001
Station							
Station Box							
Excavation	180	22-Aug-12	09-May-13	Task Dependent	1WE	P060	C422-010-001
Diaphragm Walls	180	06-Sep-12	23-May-13	Task Dependent	1WE	P060	C422-010-001
Concrete Slab	20	24-May-13	21-Jun-13	Task Dependent	1WE	P060	C422-010-001
Platform							
Break out Platform Area	60	24-Jun-13	16-Sep-13	Task Dependent	1WE	P060	C422-010-001
Build of Platform	60	17-Sep-13	09-Dec-13	Task Dependent	1WE	P060	C422-010-001

Required Steps

1. In each project control schedule (PCS), create a specific WBS area that will hold the Primavera PRISM Activity that relates to the PRISM WBS Account. This section should be called 'PRISM' and should be at the first level of the WBS.

2. The Level of Effort activity in the PRISM WBS area (in P6) will summarise the Primavera Sub-Activities relevant to the PRISM ID.

3. The PCS activities relevant to PRISM will be flagged with the global activity code 'PRISM ID'. The Primavera Level of effort PRISM Activity and the Sub-Activities should be coded so the relationship can be easily understood and validated.



4. For contracts not let, a single Level of Effort activity for the entire project will be used and a particular code 'Code 88)' will be placed against these until the CBS from the contract is known.

5. The following Date Fields Should be maintained and confirmed Correct

- Baseline Start and Finish Dates
  - The baseline Start and Finish Dates will be equal to the current baseline, the current baseline is held in the Project Baseline of P6
- Current Control Start and Finish Date.
  - The Current Control Start and End Dates (available as user defined date fields in P6) should reflect the current contractual basis, defined as: Baseline Date plus approved changes (including change controls and ICE's). Therefore, on Acceptance of the contractors programme the Level 2 Control Schedule should be updated and the Current Control dates populated. These dates will be maintained and amended in line with the NEC process.

  Note as these date summarise the detail they will not necessarily align with the NEC milestones

- Forecast Start and Finish Dates
  - The forecast Start & Finish Date are held in the Start Date and Finish Date of P6

6. Sector Lead Planners will produce on a periodic basis the export file from P6 to PRISM. The file will contain updated Current Control and Forecast dates.

Planning and Scheduling Desk Top Instruction

Instruction	**027**
Revision	**05 Feb. 16**
7.2 - Crystal Data Requirements	

Overview:

This instruction describes the requirements for data quality in order for the Programme Controls reporting tool 'Crystal' to automate some Anchor and Key Event reporting.

This instruction only applies to Level 1 MOHS Schedules.

What is Crystal?

Crystal is a 'data warehouse' that extracts data each period from a number of systems such as Primavera, PRISM and RIVO to automate the production of some periodic reports. This is done through a series of Excel templates that have built in macros to present the data in the required format.

The data in Crystal is also available for users to generate ad hoc queries and reports.

What data is taken from Primavera?

- Only Anchor and Key Event data is currently taken into Crystal
- The list of Anchor/Key Event codes are extracted, along with the code description (this means a changed activity description will not be reflected in Crystal as a change to milestone description)
- Baseline Early / Late dates as taken from the User Defined Fields (UDFs) *Baseline Early Date* and *Baseline Late Date*

When is the data taken?

- After the period archive has been taken in Primavera and the schedules have been copied into the relevant period folder – 4pm on Tuesday, Week 1
- 4pm on a Tuesday, Week 1 is a strict deadline to allow the Central Team to run some final data checks and prepare the data for extraction by Crystal

A few things to remember

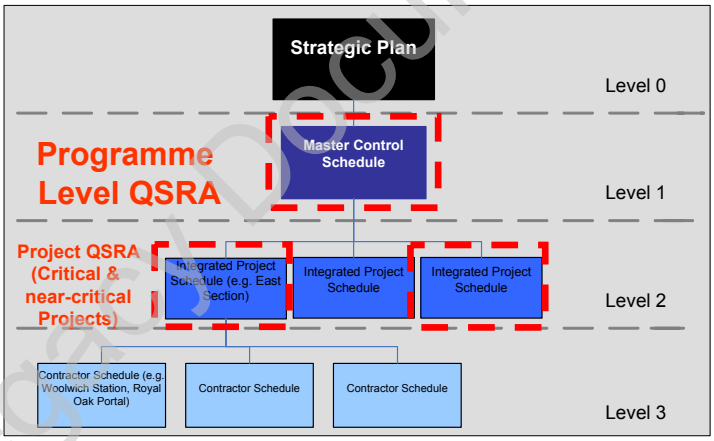
- Don't apply an Anchor or Key Event code to an activity – it must only be applied to a Start Milestone or Finish Milestone
- Do not move an Anchor or Key Event code from one activity to another without discussing with the P6 Administrator or Reporting Planner
- Activities that have a forecast date before the period end date will be counted as actual – regardless of whether they have been actualised in Primavera or not

Instruction	003
Revision	24 June 2011
8.1 Quantitative Schedule Risk Analysis	

The project schedule sets out the tasks and logic that have to be completed to achieve the project works. Each project also has a risk register to identify risks that could threaten the project, including risks that would delay the schedule.

A Quantitative Schedule Risk Analysis (QSRA) investigates the effect of these project risks against the schedule to assess the confidence level of achieving it and investigates how sensitive the plan is to each risk. It does this by examining all of the possible scenarios that could occur with the project.

Crossrail maintain a programme-level QSRA to analyse the confidence of achieving the Opening Strategy dates and to assess the programme-level prolongation cost exposure. The programme-level QSRA is updated to support the Programme QRA.



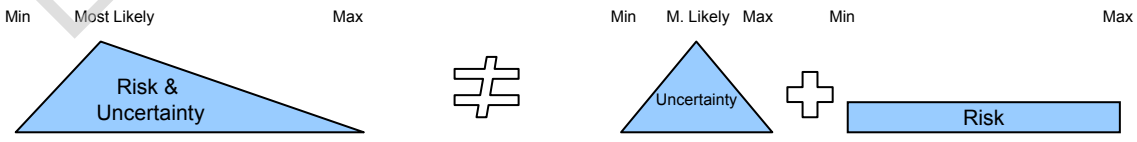
Project-level QSRAs are to be carried out on critical and near-critical projects on the Level 2 schedule to support the timing of the programme-level QSRA. Critical and near-critical status will be assessed using the programme-level QSRA.

QSRA models will be produced by the project teams supported by the Crossrail Risk Management department. For information or assistance please contact Rob Littlefair (ext 4433).

Risk vs Uncertainty vs "Spreads"

Risks are events that may, or may not occur. They have a probability of occurring.
Uncertainty is the inherent uncertainty, risks aside, of the duration that the task will take.

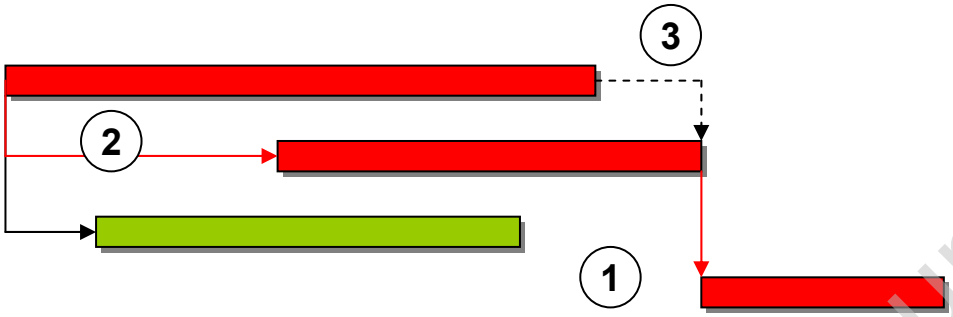
When assessing the minimum, most likely and maximum duration of tasks, careful consideration should be given as to whether the effects of risk should be included in the "spreads". This can be highlighted in the diagram below which shows the "spread" in duration on a task. This is especially important where there are low-probability-high-impact risks.



Where a QSRA is carried out at a strategic level, it can be appropriate to sum risk and uncertainty into one "spread", whereas at a more detailed level, the risk and uncertainty should be separated. Advice will be provided on the most appropriate level of risk information for the various levels of QSRA model.

Where the aggregate effect of risks is to be included within the "spreads", this should be highlighted and the amount allowed for the key risks should be declared.

Guidelines to consider when creating a schedule to ensure proper QSRA results:



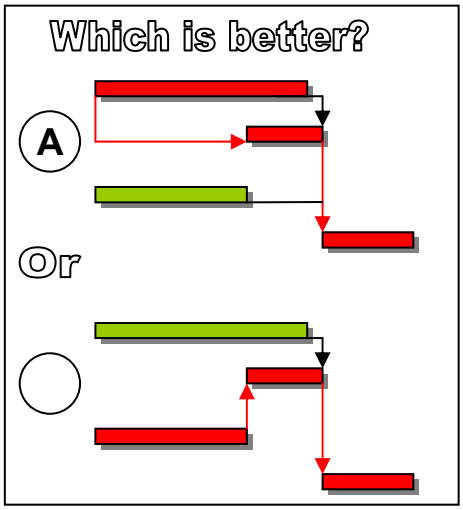
1. Open-ends should be avoided as they will not drive the schedule correctly if the task is delayed by a risk.

2. When using start-start links with a lag, you should consider whether the lag represents: a fixed duration after the preceding task; another task which is not shown that could be subjected to risk & uncertainty; the amount of time that the preceding task will take to reach a certain percentage to release the start of the task.

3. When using finish-finish links you should remember to enter the correct amount of lag where appropriate.

Process for Carrying out a project QSRA

1. Planner should update schedule with latest progress / status.
2. Project team to review risk register with Area Risk Manager / Area Risk Analyst and ensure risk information up-to-date (including time impact).
3. Planner and schedule risk analyst to review uncertainty on tasks based on level of supporting information available (i.e. if scope is not well defined then duration uncertainty will likely be high).
4. Planner and schedule risk analyst to review time-risks against schedule and either map risk to task, or update uncertainty to take into account risk (depending on level of analysis).
5. Schedule risk analyst to import schedule into Pertmaster and create risk model.
6. Results to be reviewed and accepted by project team.



QSRA for Decision Making

A QSRA should be considered to form part of the decision making process for key schedule changes. This will inform whether the decision provides a reduction or increase to the schedule risk profile of the project as well as identifying fallback options should particular risks occur. The Risk Management department can support the creation of appropriate QSRAs.

Support

For all questions regarding schedule risk analysis, please contact Rob Littlefair (ext 4433) or your Area Risk Manager.

Time Risk Allowances & Who owns the float?

Under the NEC contract, the contractor's Accepted Programme contains Time Risk Allowances. This is the amount of "time-contingency" built into each task to cover their own risks. Crossrail cannot obtain relief from their own delays using this time. The Project Manager should assess whether the level of Time Risk Allowance included in the Accepted Programme is appropriate as part of its approval.

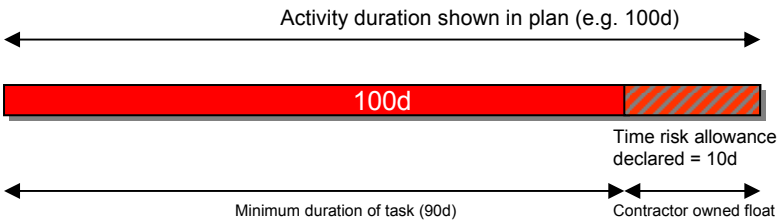
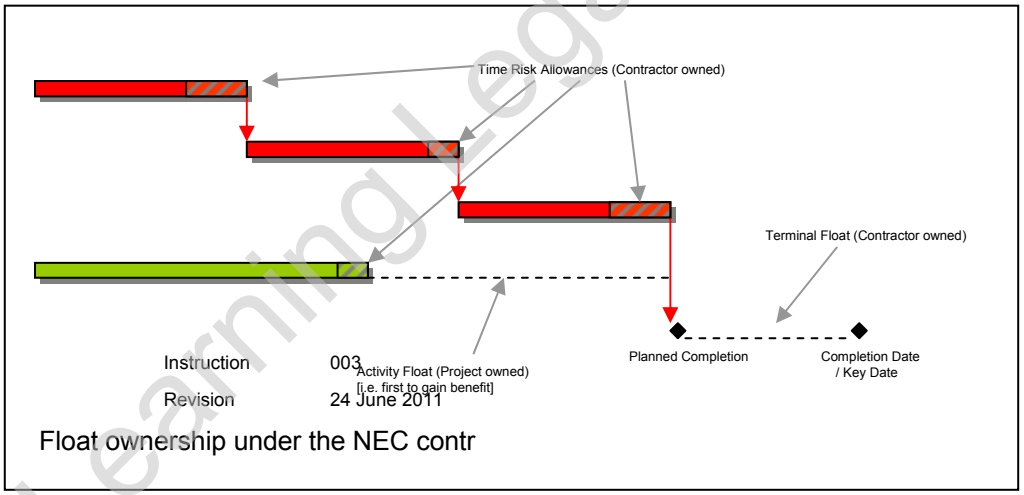


Diagram showing how Time Risk Allowance is declared on a specific task.

Note that when assessing Compensation Events, contractors are entitled to additional time if the event changes the time-risk profile. Consequently it is important that the Project Manager has sufficient information on the Time Risk Allowances included in the Accepted Programme to make these assessments.



Planning and Scheduling Desk Top Instruction

Instruction	033
Revision	February 2016
8.2 - Programme Level Schedule Quantitative Risk Analysis	

Overview:

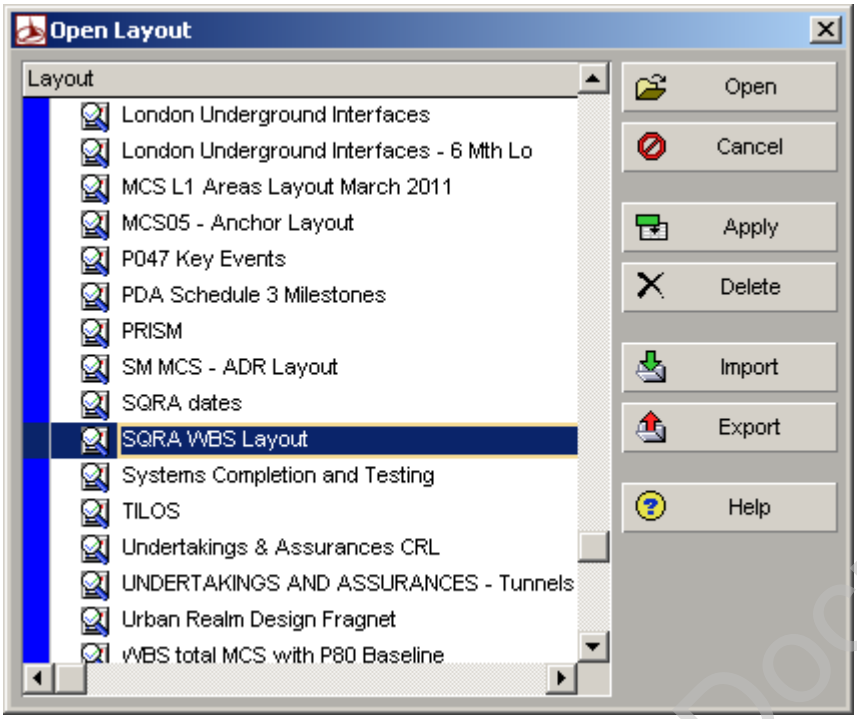
The purpose of this instruction is to define the requirements for setting up and maintaining risk data in the Master Operational Handover Schedule (MOHS) level one schedules together with an explanation of the tools available to facilitate the work.

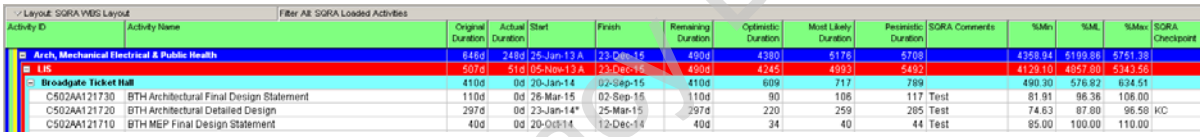
Background

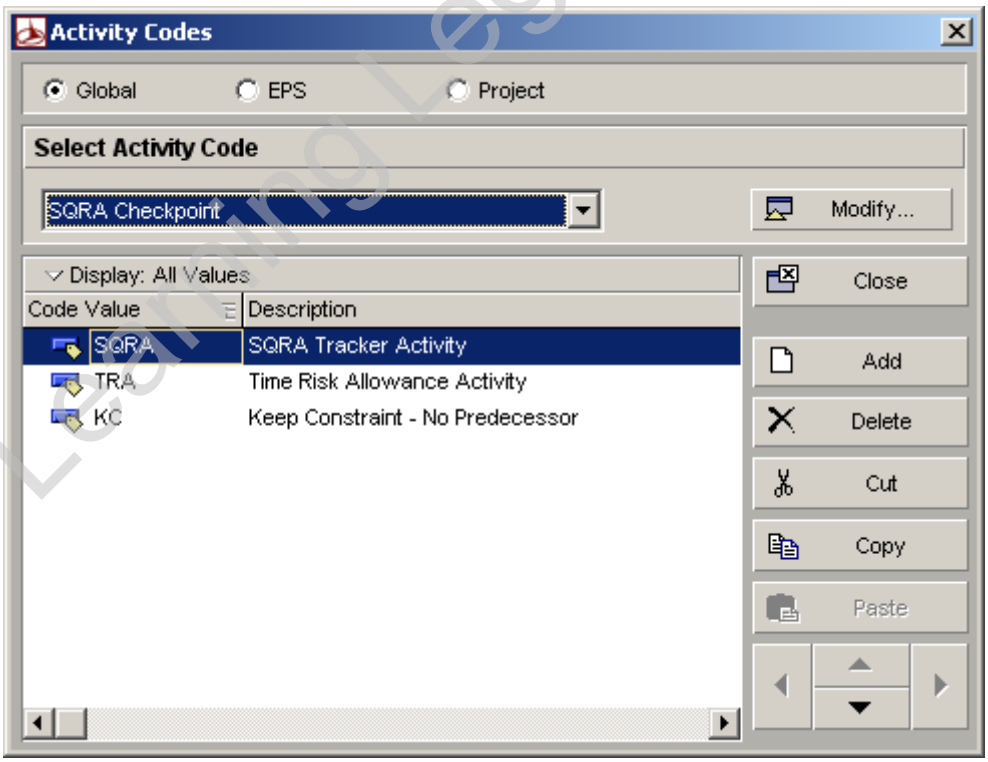
Crossrail are required to produce a Semi-Annual Construction report (SACR). As the name suggests this is produced twice every year at month end March and September. Within the SACR is included a programme level quantitative schedule risk analysis based on the combined MOHS L1 schedule information and undertaken in collaboration with the Project Controls Risk Team.

MOHS Level 1 Schedule Requirements

There is a layout, some user defined fields and global codes provided, which, when populated, enables the risk team to run the risk model with minimum pre-processing which greatly improves reliability and turnaround time of the SQRA output.







The SQRA WBS Layout has a filter which selects task dependant activities which are not completed. The user defined fields which need to be populated are the optimistic,

most likely and pessimistic durations together with any relevant comments and codes.
The KC (Keep constraint) code has been provided so that the constraint is not removed from that activity by the risk team after the schedule is imported into Oracle Primavera Risk Analysis (Pertmaster). All other constraints are removed by the risk team. Please provide a comment in the SQRA comment field to explain why the constraint is required.

To help automate the input of the required user-defined fields in Primavera a Microsoft Access database has been developed. The location and instructions for using the database are located here: U:\Programme Controls\1.3 Planning\1.3.31 Pertmaster SQRA Tools

During the database upload of the risk spread data the percentages of optimistic, most likely and pessimistic durations compared to the remaining duration of the activity are calculated and also loaded into the %Min, %ML and %Max user defined fields of Primavera.

Each period, as the schedules are progressed, the remaining durations of activities are liable to change. This change will not be reflected on the values of the risk spread durations which will remain unchanged during scheduling. To realign the risk spread durations a global change (Reset Risk Durations) is provided to recalculate the risk durations based on the new activity remaining duration and the %Min, %ML and %Max values.

The responsible planner should run the global change after each period schedule update