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CAD Representative Handbook

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1 Foreword

Relationships with other Documents:

This document may be used in conjunction with:

- CRL Works Information Vol. 2B (various sections)
- CRL CAD standards (CRL1-XRL-O6-STD-CR001-00014)

1.1 Use of this Document:

This document has been produced as a reference guide for CRL Contractor CAD representatives and as such provides advice and guidance on all duties pertaining to that role. The document has been broken into numbered sections to assist the user when referring to or discussing content with CAD Services or others. This document does not constitute an instruction. For the avoidance of doubt all parties should refer to their relevant Works Information for the Employers Requirements applicable to their scope of Works.

1.2 Presentation Conventions:

Where useful information or hints are shown, they shall be expressed in blue italics as illustrated in this figure.

This document has been written as addressed to the user.

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2 Scope

2.1 General Information

The CRL ECMS, ProjectWise stores and manages all CAD data used on the Crossrail Project. Contained within these CAD files combined is the virtual representation and single source of truth for the design for Crossrail. In the future it may also contain a similar 'As Built' representation or 'Asset Model' of what has been installed for use in operations and maintenance by Information Maintainers (IMs).

This document is intended as a reference guide for CRL Contractor CAD representatives. Its content describes the CRL Electronic CAD Management System (ECMS), its workflows, users and associated processes and procedures.

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3 Access to the CRL ECMS

This document requires that you have a CRL ECMS user account. If not, please submit a service request to Crossrail IT through either the Service Connect page on the Crossrail Intranet or through your Site Team Administrator.

3.1 Accessing CRL ECMS

CRL ECMS is established through the CRL Citrix connection. Further information related to Citrix connectivity or troubleshooting a Citrix connection is provided by the Crossrail IT Service Desk. The IT Service Desk can be contacted using either of the following methods:

By email - [redacted]

By phone - [redacted]

3.2 Logging in to CRL ECMS

Open CRL ProjectWise.exe, this is normally located in the following location

For Windows 7:

Start > All Programs > Bentley > ProjectWise V8i (Select Series 2) > ProjectWise Explorer

If the CRL ECMS client is not located in the above locations, please contact either the Crossrail IT Service Desk (if installed by Crossrail) or your own IT Department (if installed by your own IT Department).

Click on the '**+**' symbol next to CRL Production 1 or CRL Production 2 to prompt the **ProjectWise Explorer Log in** box to appear. See **Figure 3-a** ProjectWise Explorer Datasources.

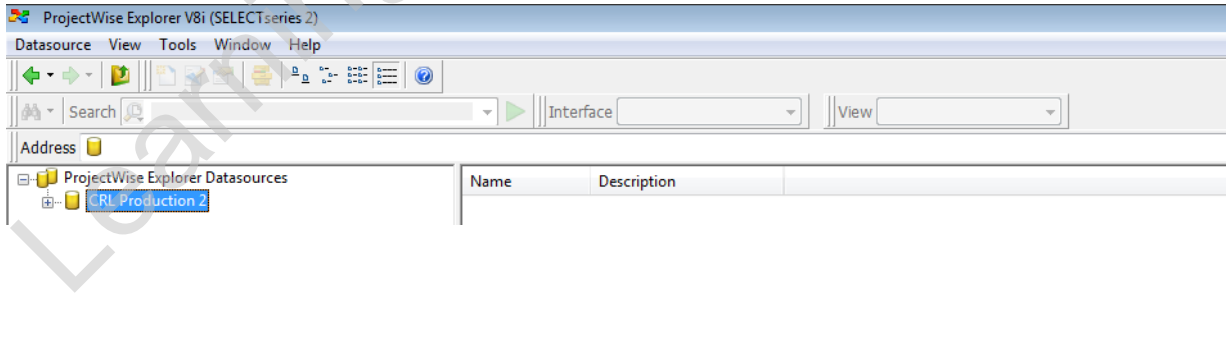

Figure 3-a ProjectWise Explorer Datasources

There is no difference between logging into CRL Production 1 and CRL Production 2. The number at the end refers only to a gateway into the datasource.

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If you are using a Crossrail account and a Crossrail provided PC which is connected to the Crossrail Network directly, the ECMS client software will automatically proceed to connect and authenticate you.

If you are accessing the CRL ECMS through Citrix, please enter your Crossrail User Name (preceded by **CRLAD**) then password and click the **Log in** button.

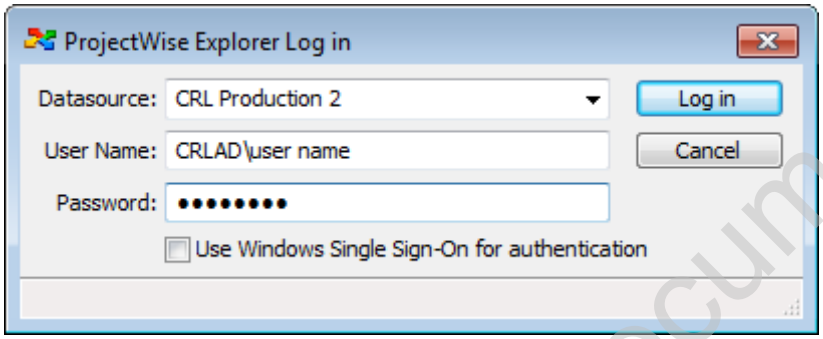

Figure 3-b ProjectWise Explorer Log in

If you are accessing the CRL ECMS through Citrix, please ensure that the Use Windows Single Sign-On for authentication box is not selected.

If the prompt **in Figure 3-c** Directory creation confirm dialog appears you should click **Yes.**

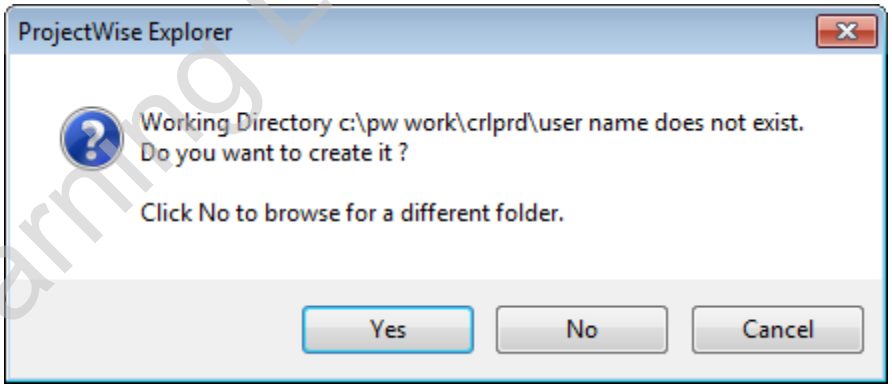

Figure 3-c Directory creation confirm dialog

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4 CRL ECMS Client Software (CRL ProjectWise Explorer)

4.1 CRL ProjectWise Explorer window

Figure 4-a CRL ProjectWise Explorer Window displays the structure of the CRL ECMS. The main application window is split into three key areas**:**

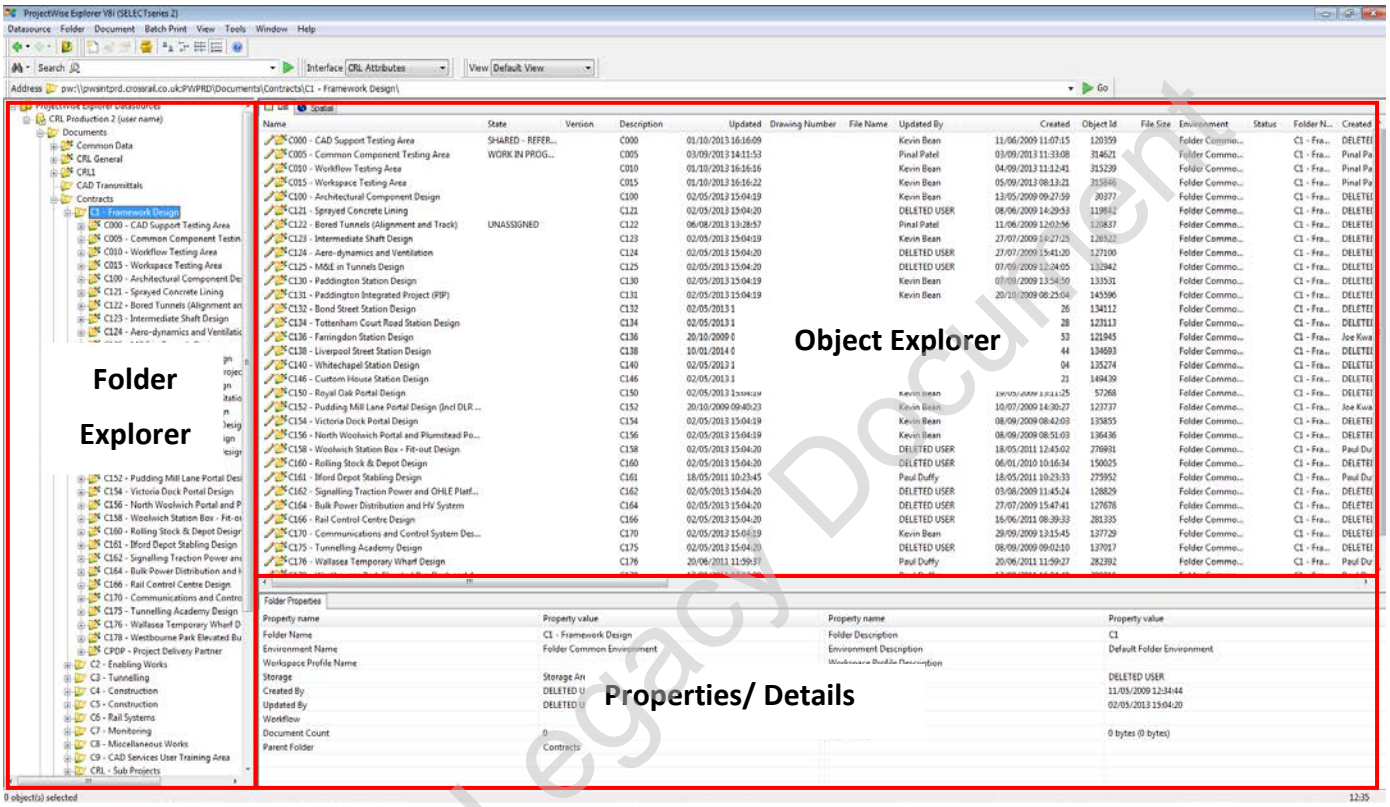

Figure 4-a CRL ProjectWise Explorer Window

Item	Description
Folder Explorer Column	A folder structure allowing you to navigate through the CRL ECMS data repositories.
Object Explorer Pane	Displays items relating to the specified object that has been selected within the Folder Explorer Column.
Properties/Details Pane	Displays information relating to the specified object that has been selected within the Object Explorer pane.

Approved files can now be viewed. If you require access to particular Unapproved files, you will need the relevant CRL ECMS permissions – See section 5 User Management tool for more information.

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4.2 Viewing Models & Drawings – Toolbars

The CRL ECMS layout is similar to Windows Explorer, and shares many of the same functions and features.

At the top of the CRL ProjectWise application window, you will find a row of **Toolbars**, which can be used to provide quick access to functions that are commonly used. You can choose which toolbars you want to display yourself. Go to View > Toolbars > (check toolbars to be used). The most common toolbars used on the Crossrail Project are; Standard, Navigation, View, Search, and Address - See **Figure 4-b View Menus**.

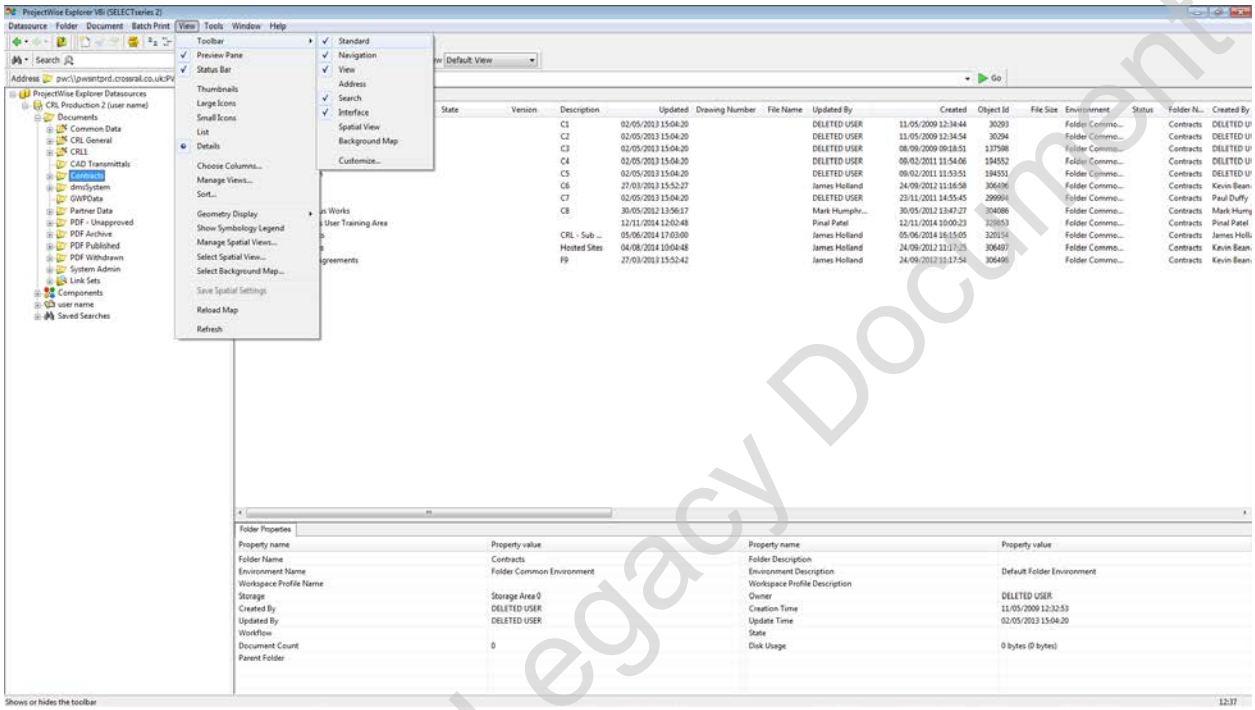

Figure 4-b View menus

Selecting toolbars through View > Toolbar allows you to add/remove toolbars to/from the CRL ProjectWise menu bar.

Item	Description
Standard	Creating and opening documents.
Navigation	Navigating back and forth through most recently used commands.
View	View options of files within the common folder structure area.

It is recommended to have the viewer set to Default View when viewing files.

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4.3 Quick Search in the CRL ECMS

The Quick Search toolbar (**Figure 4-c** Quick Search Toolbar) allows you to search for specific drawings or models - wildcards can be used if the full drawing or model number is not known. Alternatively drawings can be accessed via the Common Folder Structure/ File Explorer.

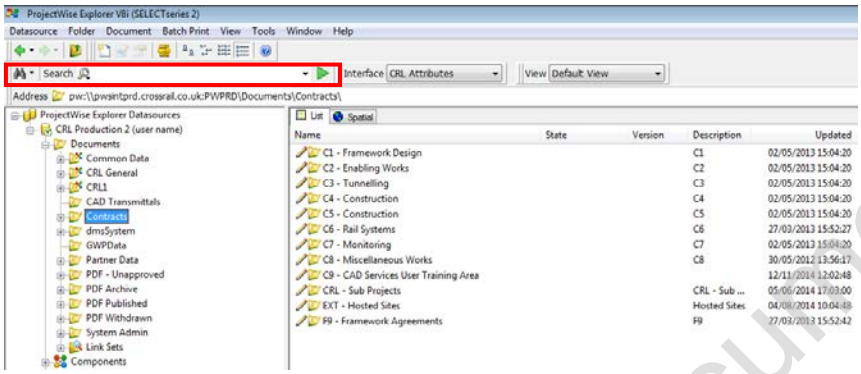

Figure 4-c Quick Search Toolbar

If your search returns 'no results', you may want to check you are searching the whole datasource and not just the current folder and that you have 'Show all versions' turned on. Without 'Show all versions' turned on, your search will only retrieve results for the current version and not previous revisions.

To turn on **Show all versions**:

Tools > Options > Settings (tab) > expand Document list > tick on **Show all versions** > Apply > OK

See **Figure 4-d** Settings – Show all versions dialog

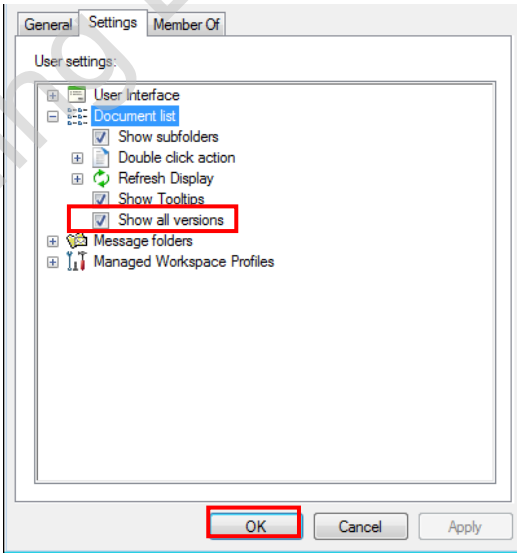

Figure 4-d Settings – Show all versions dialog

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To widen the scope of the search to include the whole datasource go to Search > Settings > select **Search in datasource** > OK

See **Figure 4-e** and **Figure 4-f** for further guidance.

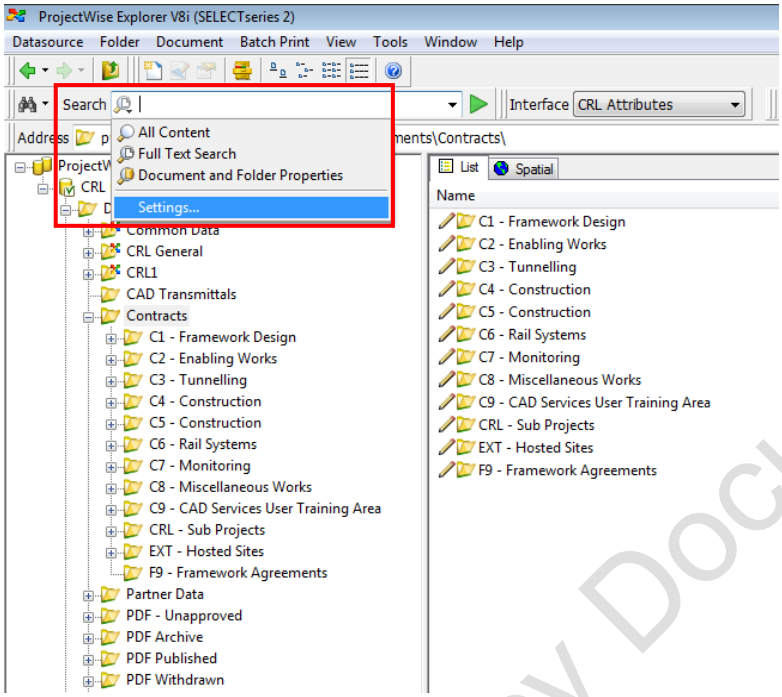

Figure 4-e Quick Search Toolbar settings

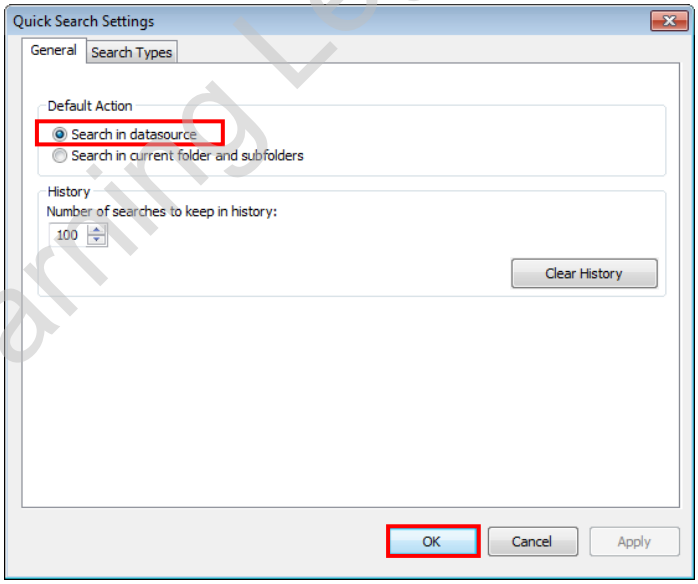

Figure 4-f Quick Search settings dialog

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4.4 Advanced Searching in the CRL ECMS

To perform a more thorough search there are two search functions available to use in CRL ProjectWise **Search Form** and **Search Builder**. See **Figure 4-g**.

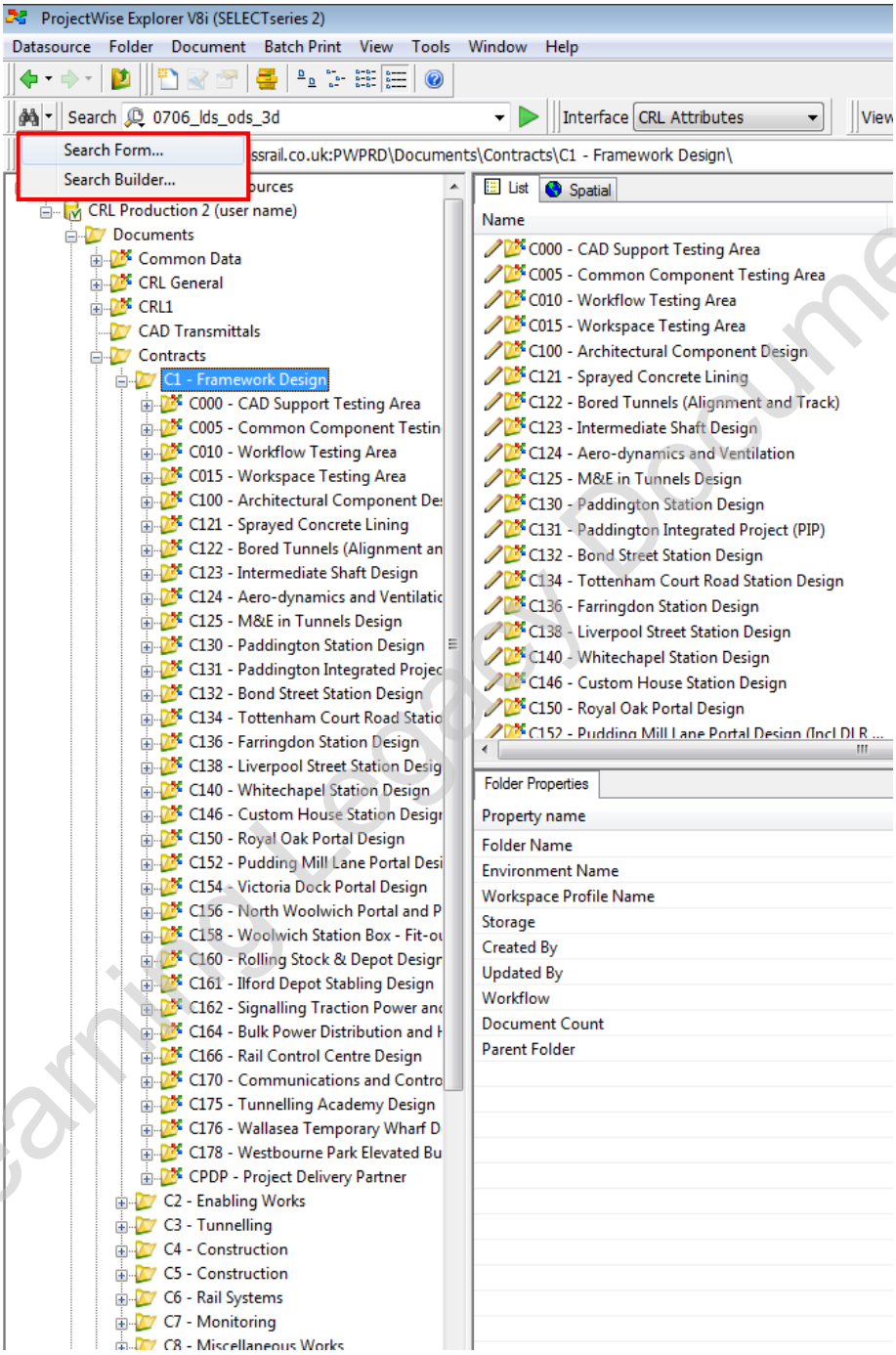

Figure 4-g Search Form and Search Builder

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Selecting **Search Form** brings up **Search by Form** dialog box, which has the same look as the document properties window.

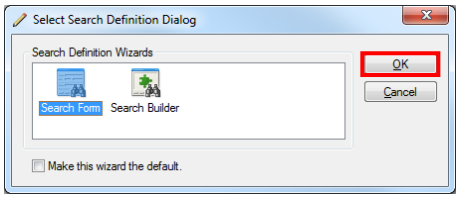

Figure 4-h Select Search Definition Dialog.

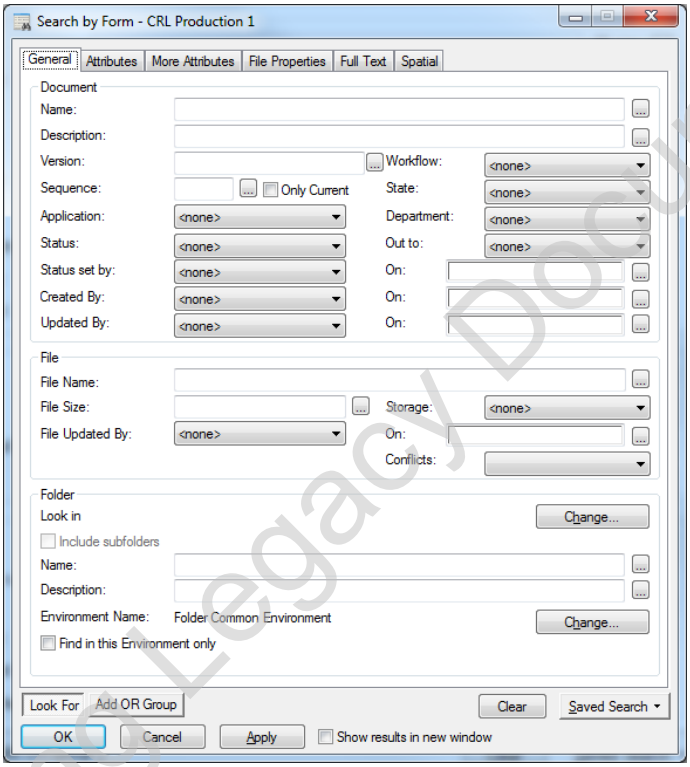

Figure 4-i Search by Form

The tabs at the top of the dialog box break down the search criteria. The following tabs are recommended for searching:

The **General** Tab lists document, file and folder information – you can use Wildcards to refine your search. There are drop down fields and buttons, which enable you to specify date ranges and criteria for the document or file. The folder area allows you to define what location you would like to perform your search in.

The **Attributes** and **More Attributes** tabs display the CRL ECMS specific metadata. This can include both project and document properties.

The **Full Text** tab lets you specify terms contained within document contents that need to be included in the search.

If required you can save your search, you should do this now before you start the search.

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When all the criteria have been set, select **OK** to display the search results.

Selecting **Search Builder** brings up **Define Search** dialog box, which allows you to define multiple criteria based upon selected properties and attributes using expressions to limit the results.

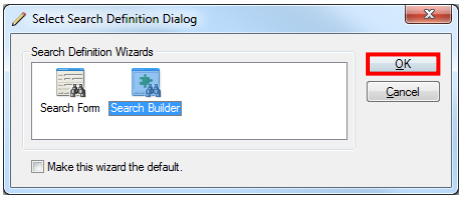

Figure 4-j Select Search Definition Dialog

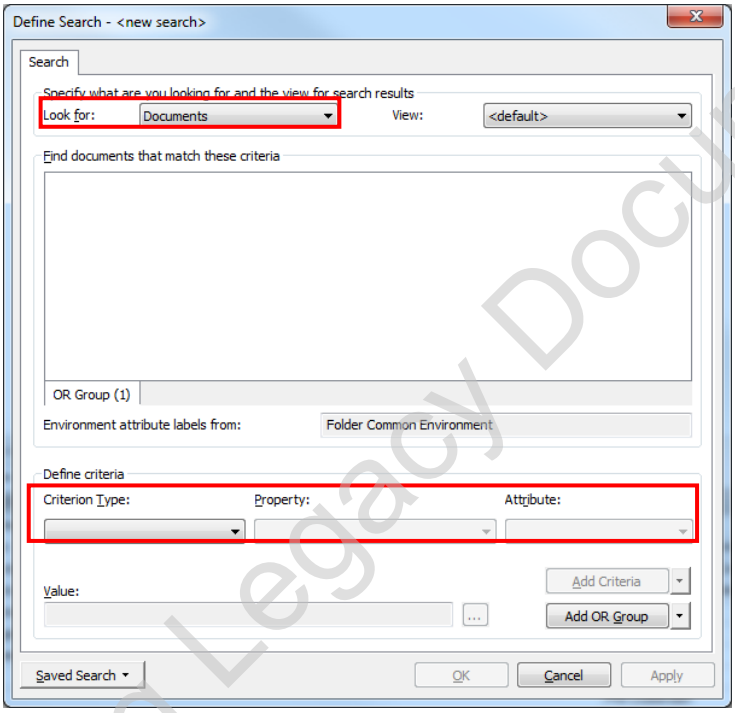

Figure 4-k Define Search

The **Look for** drop down list determines whether the search will look for **Documents** or **Projects and Folders**.

If you **Add Criteria** (such as **Document is created by 'user name'**) for your search, the criteria will be displayed in the middle window **Find documents that match these criteria**.

The **Define criteria** area allows you to set values for certain properties that will be used in your search. The options will vary depending on whether **Documents** or **Projects and Folders** are chosen.

Select the **Criterion Type** according to what you are searching for, then under **Property** and **Value** the options will change accordingly. Once the criteria and value have been set, click **Add Criteria**.

You may then create another criterion set by going through the same process and clicking Add Criteria again. These additional criteria are seen as a string of statements connected by *AND*. You can remove any criteria by selecting it in the list and clicking the arrow next to Add Criteria and picking **Remove Criteria**.

If required you can save your search, you should do this now before you start the search.

When all the criteria have been set, select **OK** to display the search results.

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5 Permissions in the CRL ECMS (ProjectWise)

User access within the ECMS to the various folders, processes and functionalities in the CRL ECMS contract folders require that users are assigned the appropriate permissions. The User Management Tool is available through the CAD Services webpage ([redacted]) to allow CAD representatives to assign and change permissions within the ECMS. In exceptional circumstances, CRL CAD services can assign users to permission groups as long as written permission from the appropriate Project Manager has been provided.

5.1 CRL User Management tool

The CRL User Management tool (accessed through [redacted] allows CAD Representatives to assign permissions to users within the CRL ECMS. See **Figure 5-a.**

To be able to access the User Management Tool, a Citrix session must be running. Once a connection is established, use [redacted] to access the User Management Tool.

Once the user has logged into CAD Services, the user is able to select 'User Management Tool' from the ribbon. The user will then have the option to select a user and assign or remove permissions where necessary.

CAD Reps are able to assign or remove multiple permissions at one time.

The User Management Tool is only useable by Project CAD reps. If you are not a CAD Rep, you will not be able to see this tool on the ribbon.

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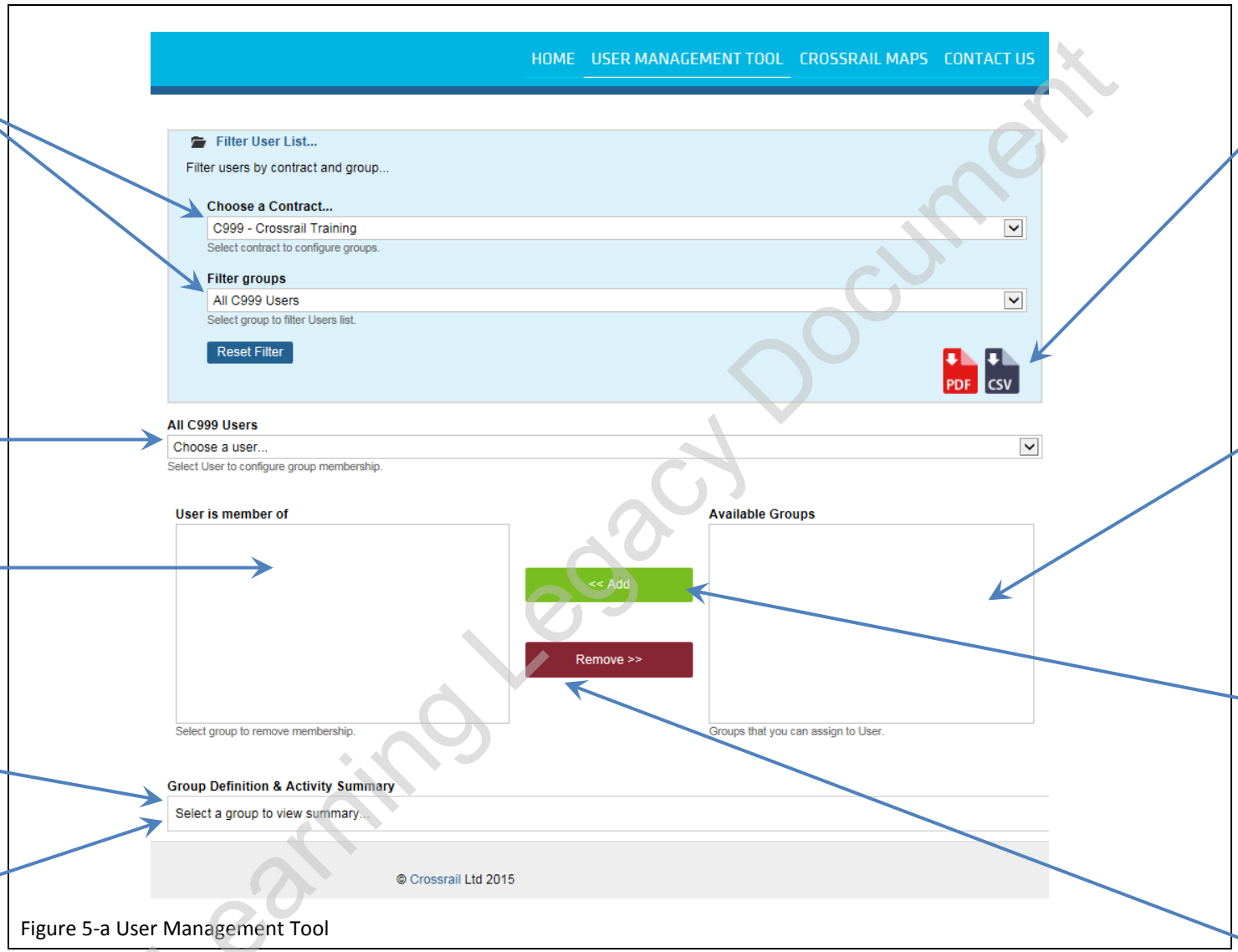

Figure 5-a User Management Tool

1. Users can be filtered by Contract or by particular Contract membership groups

2. Select user name from list

3. Display list of current group membership

4. Membership groups available to be assigned to users

5. Once a group is selected, click to add to user's membership

6. Once a group is selected, click to remove to user's membership

7. Group summary of membership definition

8. Messages summary of last action

9. Users are able to create a report (PDF/CSV) detailing user permissions and user groups (this is only available once a contract has been selected)

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5.2 CRL ECMS User Groups

User Groups in the CRL ECMS define within each workflow what actions a user can undertake at each state. CRL Contractor CAD representatives are responsible for assigning users to these groups.

Table 5-1– User Groups

User Group	Definition	Suggested Job Title / Role
Cxxx - Editor	Allows members to edit files in the Employer's ECMS at the Work in Progress workflow state. Initials appear as digital Signature in 'By' field.	Draftsperson - Should be familiar with the CRL Approved CRL Drawing Packages
Cxxx - Checker	Enables user to push files from Engineering Content Check workflow state forwards. Initials appear as digital Signature in 'Checker' field	Engineer/ Senior Engineer- responsible for checking the Design communicated by the CAD file.
Cxxx - Coordinator	Enables user to push files from Coordination workflow state forwards. Initials DO NOT appear as digital Signature.	Senior Engineer / Package Manager - responsible for facilitating the sharing and inter discipline coordination of design data.
Cxxx - Approver	Engineering/Design lead responsible for the Package sign off. Initials appear as digital Signature in 'Approver' field.	Senior Engineer / Package Manager etc.
Cxxx - Reviewer	Allows read only access to Cxxx CAD files at all stages of the chosen workflow.	Any - Decided by Contractor
Cxxx - Viewers	A viewer can view documents once they have reached the 'Coordination' or 'Interface Coordination' workflow state	Anyone on the project
Cxxx - PDF Publishers	A PDF Publisher can approve Final PDFs to be transferred by eB	CAD Services

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6 Third Party Data

Third Party data in the CRL ECMS is data which is supplied to CRL by companies not contracted to follow CRL standards or procedures and is not assured for design purposes. Its usage may be restricted by the supplier to a specific 'issued purpose' which CRL are bound by.

Most Third Parties make their data available as "for information". CRL determines this to mean that data is:

- Not verified or approved
- Must not be used for any other purpose than viewing
- Not editable
- Shall not be copied
- Shall not be misrepresented
- Shall not be used out of context

N.B. CRL does not accept liability for the content of Third Party or partner data in the CRL ECMS

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7 Creating Documents in the CRL ECMS - Drawings, 2D/ 3D Models, Coordination Models

CAD files should only be created in the appropriate discipline folders based on the type of file created. The image below shows the folder structure for the disciplines within a Contract folder in the CRL ECMS.

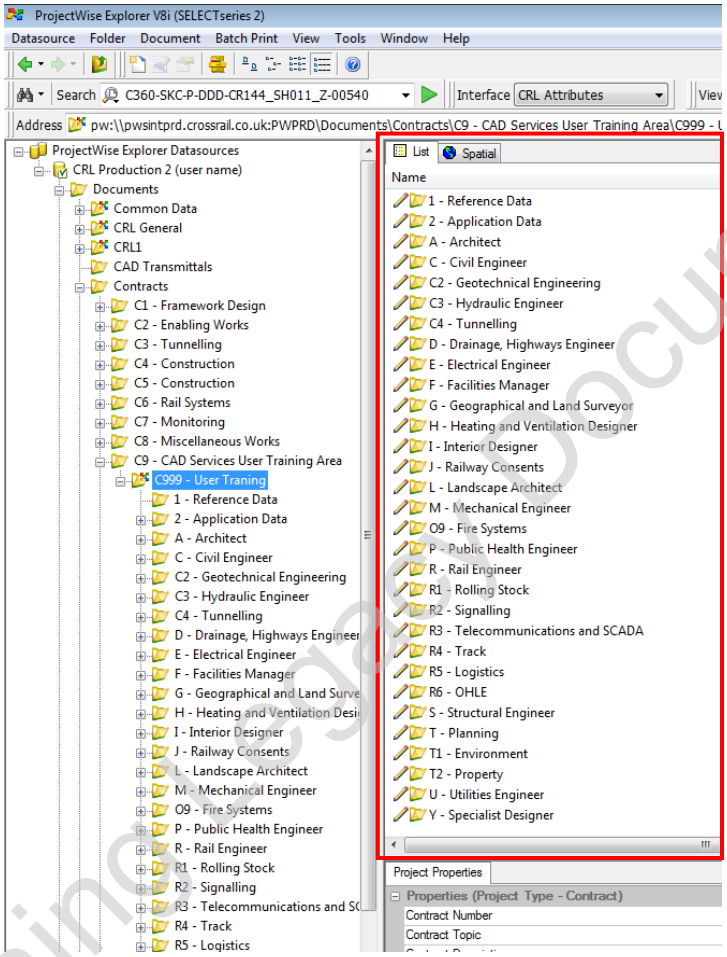

Figure 7-a CRL ECMS Discipline Folders

For example, within the folders **1 – Reference Data** and **2 – Application Data** you may create **Cells**, **Document Sets**, **Rebar DB Files** etc within their relevant folder.

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Within each discipline (From A – Architect to Y- Specialist Designer) the following will be displayed see **Figure 7-b.**

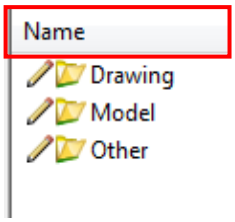

Figure 7-b Folders within each discipline

Under **Drawing** it is recommended to create drawings relevant to each folder, such as Elevations in the **Elevation** folder, see **Figure 7-c.**

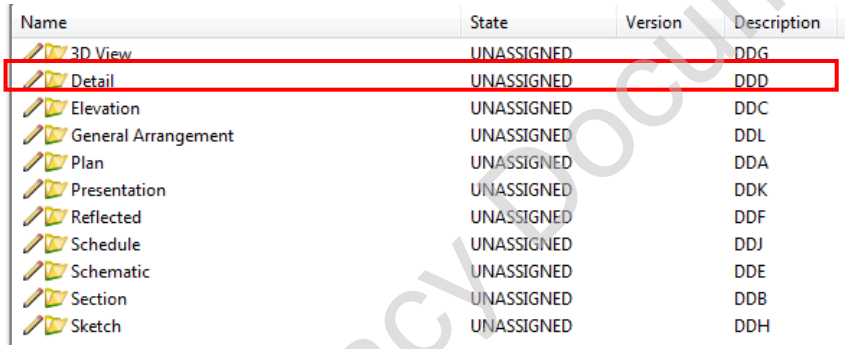

Figure 7-c Drawing folder type

Under **Model** it is recommended to create models relevant to each folder, such as Coordination models in the **Coordination** folder, see **Figure 7-d.**

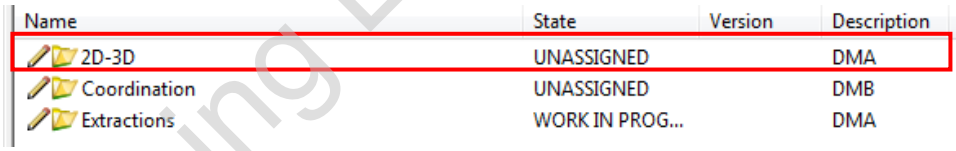

Figure 7-d Model folder type

Similarly, under **Other** you may use the folders to place relevant information, such as raster images in the **Raster Image** folder, see **Figure 7-e.**

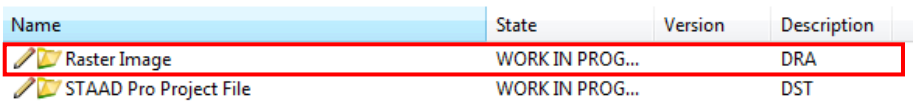

Figure 7-e Other folder type

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When drawings or models are moved from the state of **Work in Progress** to **Engineering Content Check** an additional folder will create automatically called **CAD QA Reports**, see **Figure 7-f.**

Within this folder you will find HTML files in the form of a report for your drawing or model. The report details whether the drawing or model has passed CAD QA or whether it has failed CAD QA – and why it has failed.

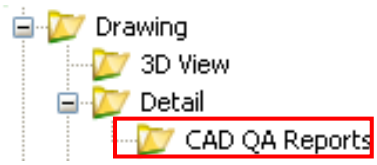

Figure 7-f CAD QA reports folder

Further information about the CAD QA process can be found in Section 11. CAD QA inside the CRL ECMS within this document.

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7.1 Creating Single Documents in the CRL ECMS

Once you have selected the folder where you wish to create your drawing or model, the next stage is to create the file using the Document Creation Wizard.

Select the **New Document** function from the toolbar menu **Document > New > Document**. The **Select a Wizard** dialog will be displayed:

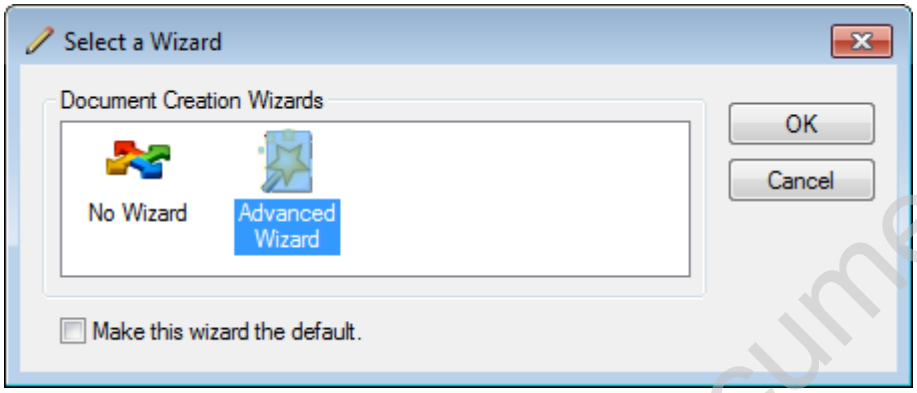

Figure 7-g Document creation wizard – select a wizard

The **Advanced Wizard** must always be used and it is recommended to set this as the default.

The 'No Wizard' option should not be used as this will cause the file to be created without the attributes required for the correct operation of the Title Block and Workflow functions.

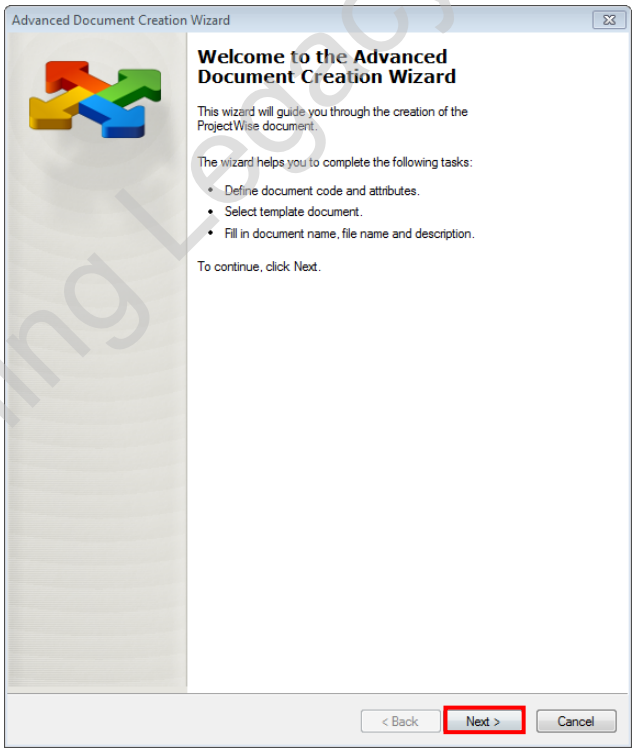

Figure 7-h Advanced wizard dialog

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The **Advanced Document Creation Wizard** will appear. The wizard guides you through the creation of your document.

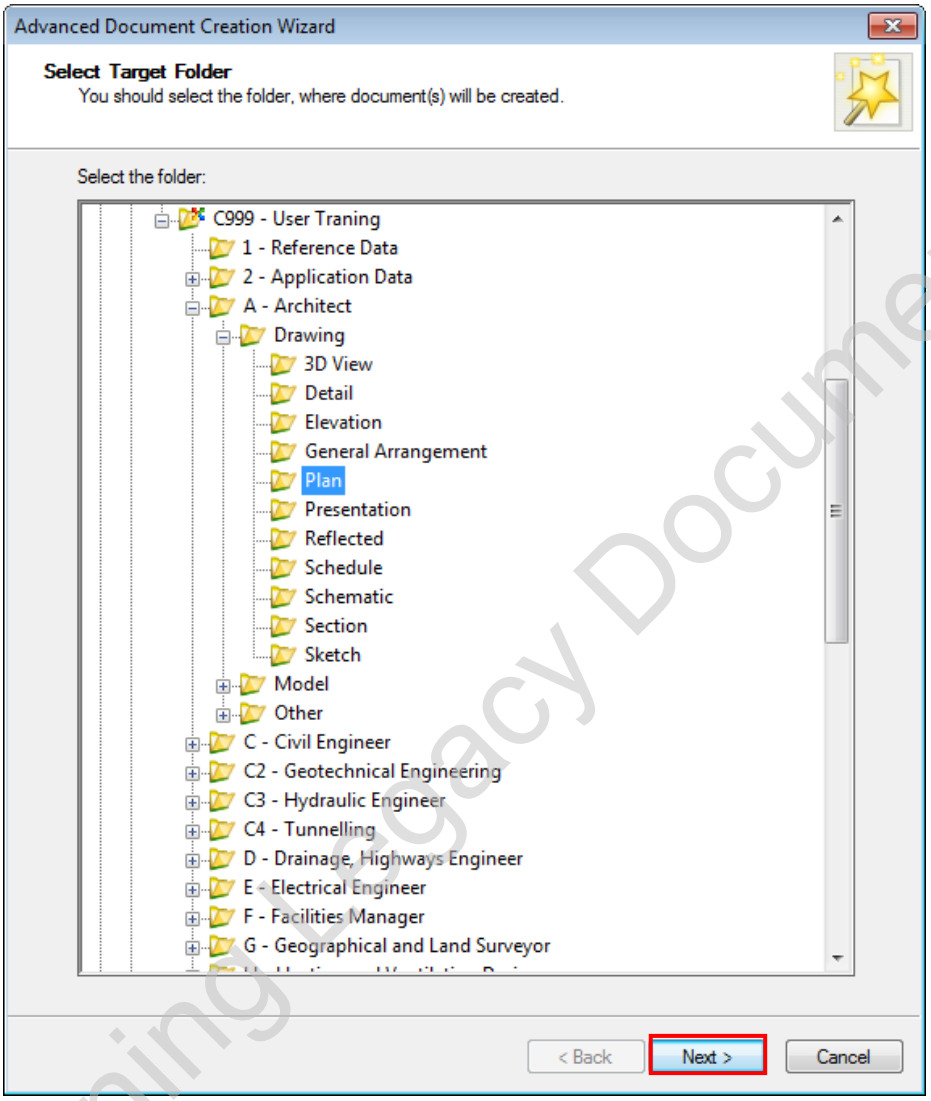

Figure 7-i Select Target Folder

Check Target Folder or change as desired. This is where your file will be created.

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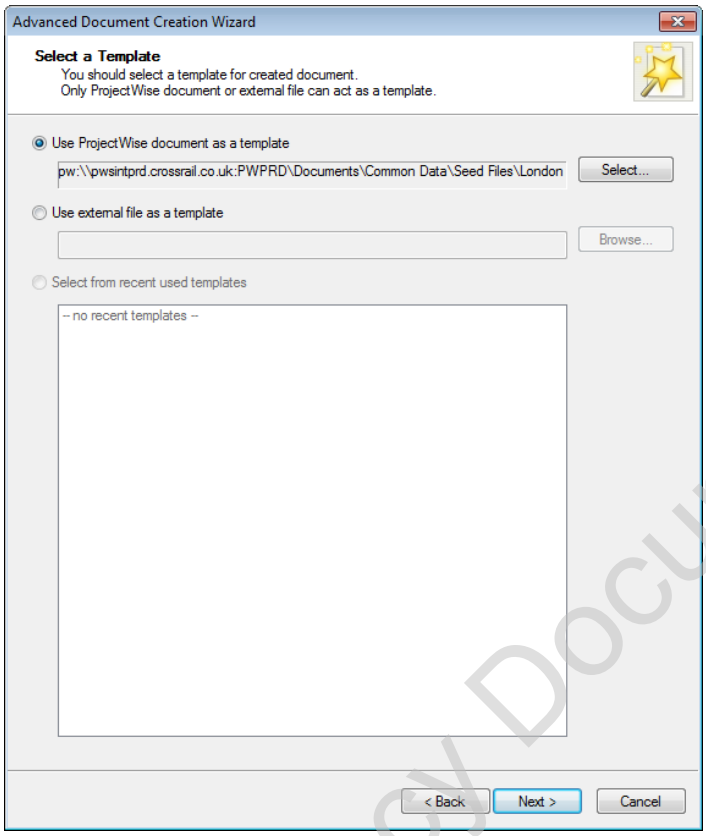

Figure 7-j Select a Template

This section allows the user to select the CRL seed file template for their file.

The CRL seed files should be used when creating files. The CRL Seed files can be found at the following path: Common Data/Seed Files/London Survey Grid/

Use ProjectWise document as a template – *Any existing CRL ECMS file (including seed files) can be used as a template for the new document. Use the select button to browse the CRL ECMS datasource for the file to be used.*

Use external file as template – *This option is not currently supported by CRL.*

Select from recently used templates – *The CRL ECMS will retain the recent history of any files previously used as templates.*

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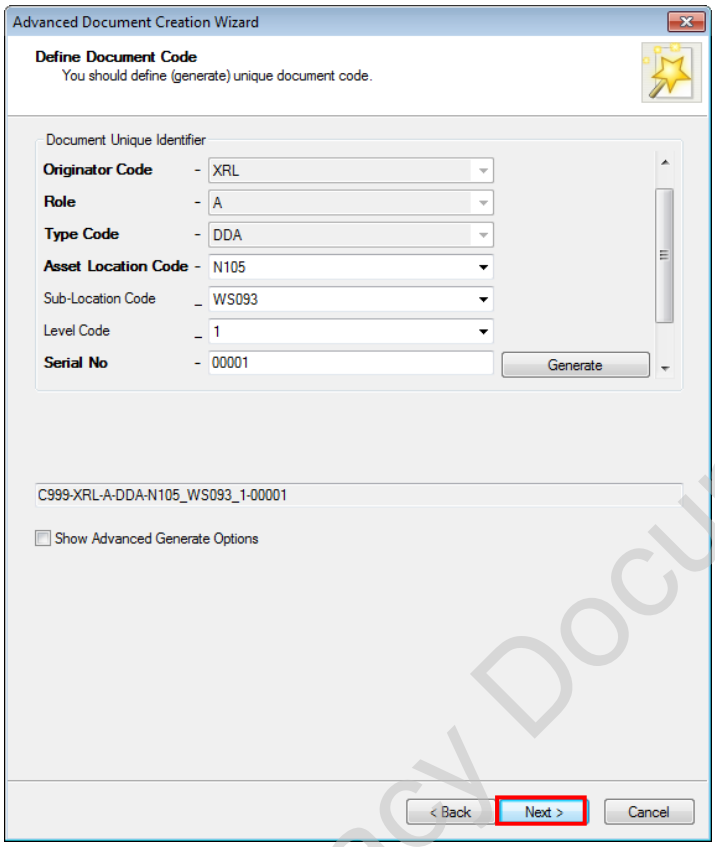

Figure 7-k Define Document Code

This section allows the user to create the drawing number for the file they are creating.

About the fields:

Programme Code – *Pre-defined by the folder location and contract.*

Originator Code *- Pre-defined by the folder location and contract.*

Type Code *- Pre-defined by the folder location and contract.*

Asset Location code- *User selects the appropriate location from the list.*

Sub-Location Code- *User selects the appropriate location from the list based on the Asset Location Code*

Level Code- *User selects the appropriate location from the list.*

Serial No- *This is a unique field auto-generated by the system but can be overridden by the user.*

Show Advanced Generate Options- *Offers more choices when defining the Serial No.*

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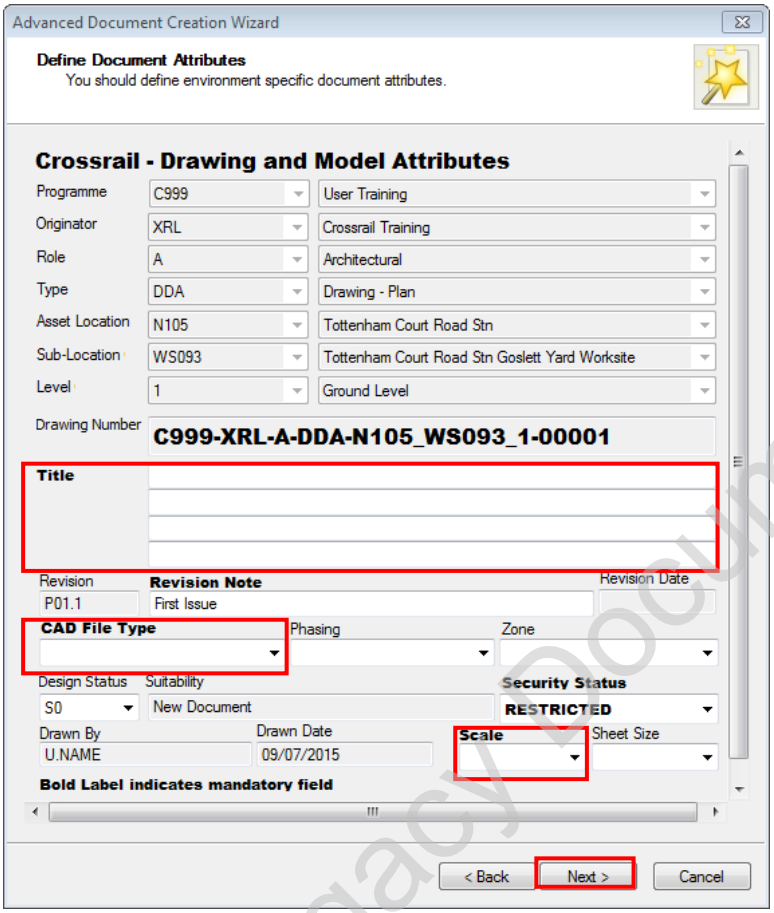

Figure 7-l Define Document Attributes

This section allows the user to create the drawing number for the file they are creating.

The fields in bold within the 'Define Document Attributes' dialog box are mandatory. You cannot continue if these are not filled in.

When completing the Title, you could follow the below suggestions:

Line 1 – 'Where' *Location e.g. Tottenham Court Road Station*

Line 2 – 'What' *Overall description e.g. Tottenham Court Road Stn Goslett Yard Worksite*

Line 3 – 'What *specifically' Description detail e.g. Ground Level*

Line 4 – 'Sheet Number' *e.g. Sheet 1 of 2*

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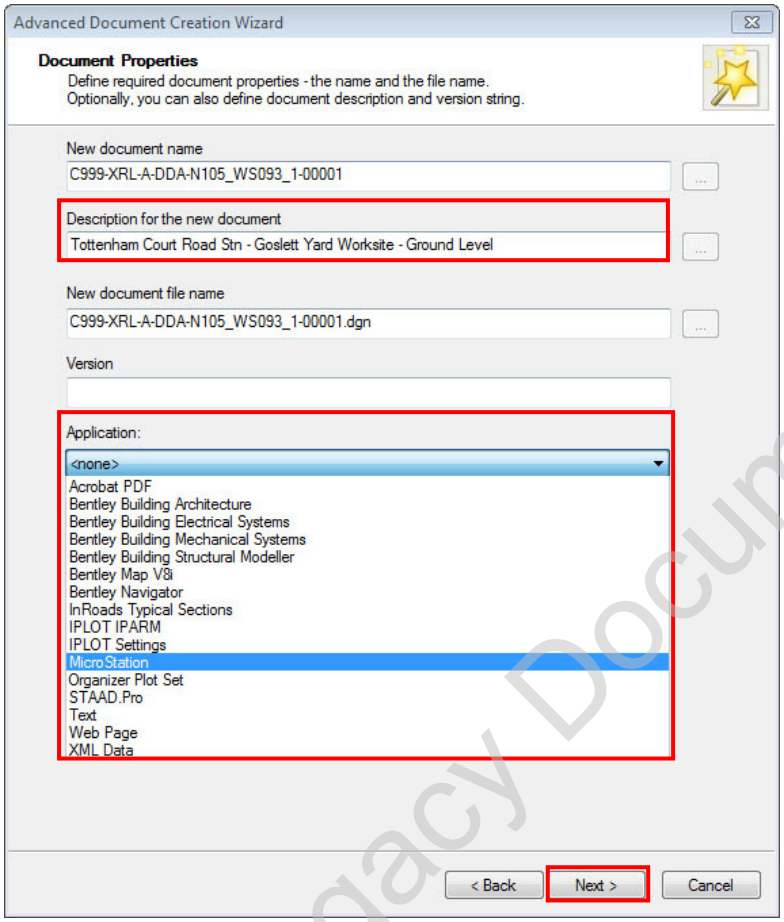

Figure 7-m Define Secondary Document Attributes

This information is populated when the drawing or model is moved up the workflow; See **Section 10** for more information.

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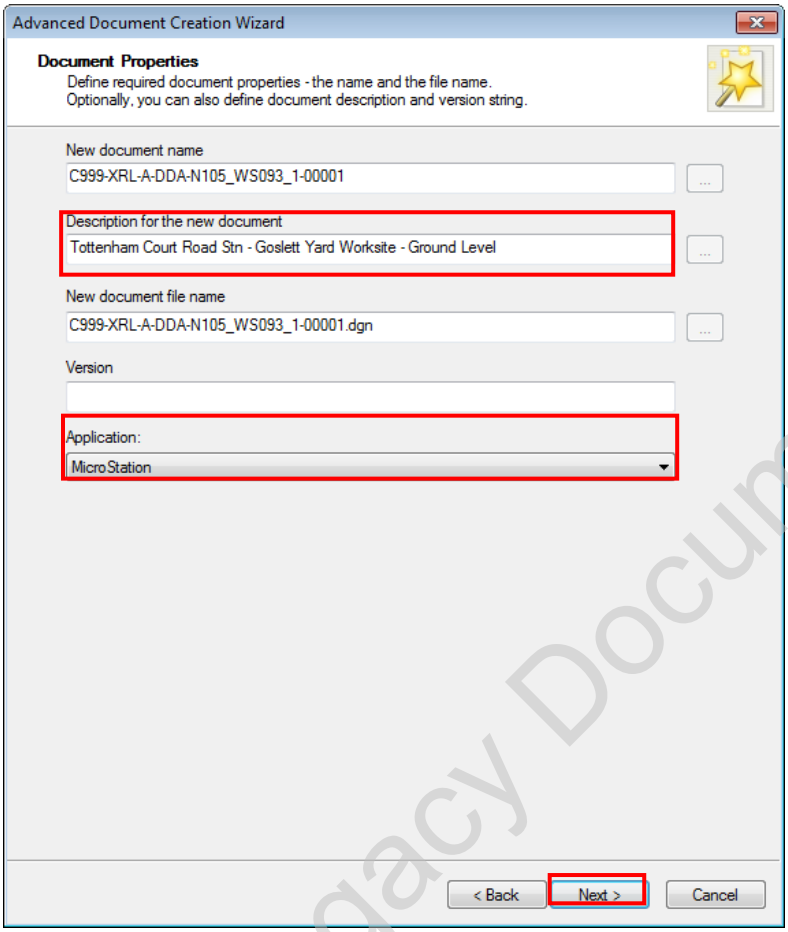

Figure 7-n Document Properties

Enter a **Description** for your drawing or model. Select an **Application** to specify the type of file – e.g. MicroStation, Bentley Building Architecture etc.

The more detail you enter in the Description field, the easier it will be to find the specific drawing or model for yourself, your contract and other contracts when they are using your approved data.

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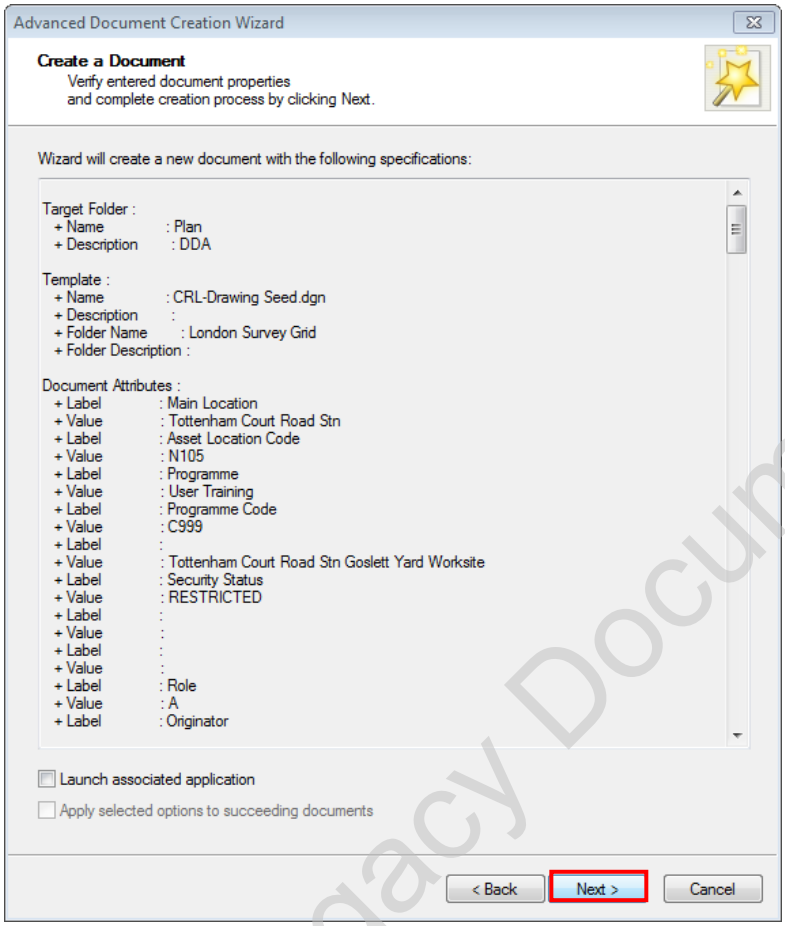

Figure 7-o Create a Document

Review the setup of your file. At this stage you can still go **Back** if you would like to make any changes.

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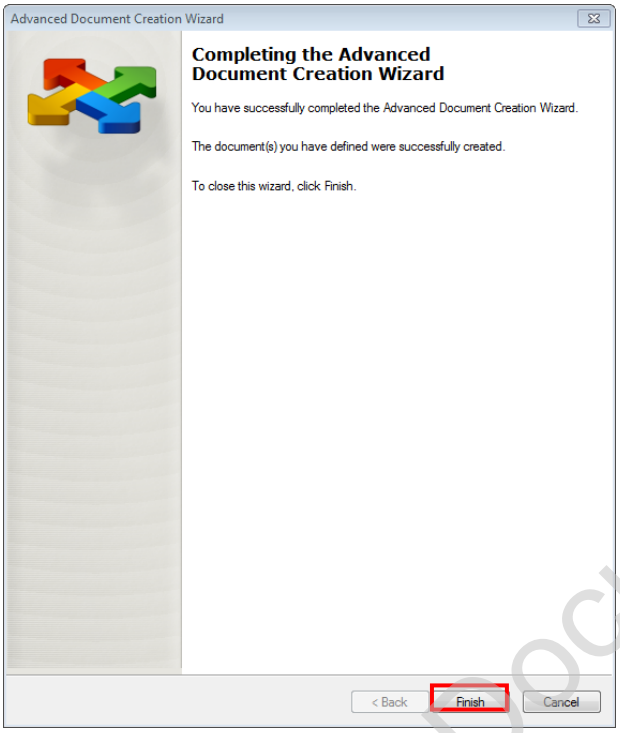

Figure 7-p Completion

Finish, your file will now be created in the target folder you selected at a version of P01.1 and a status of **Unassigned**, see **Figure 7-q** created drawing.

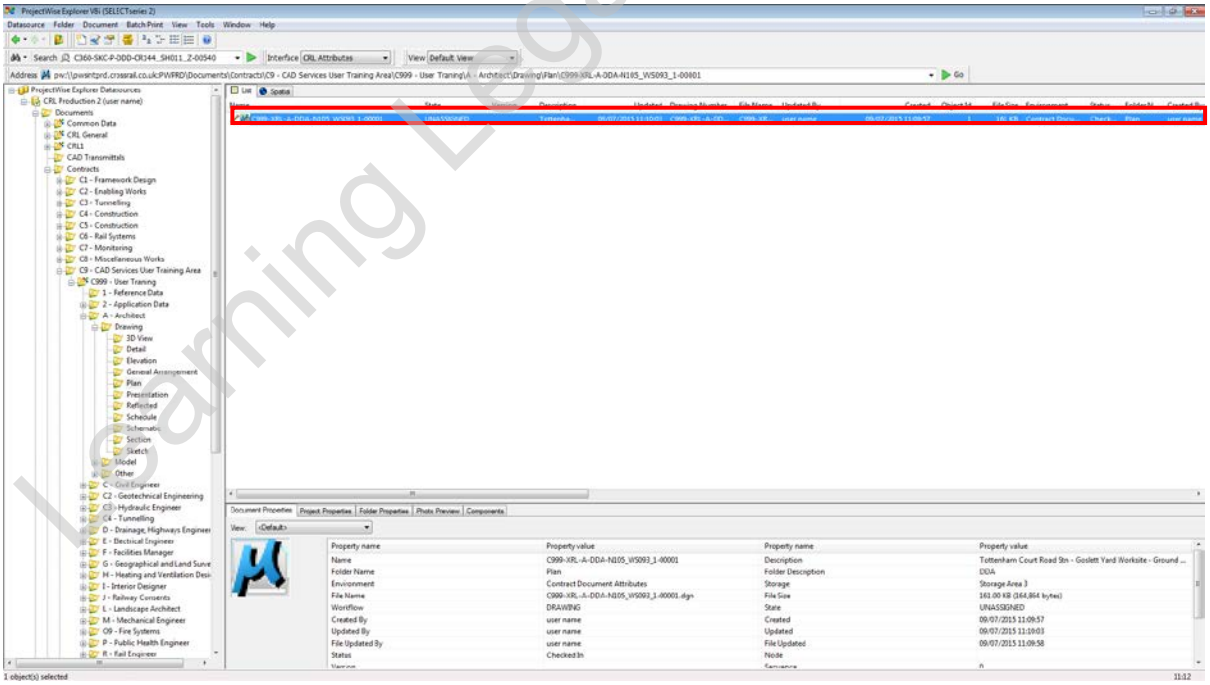

Figure 7-q Created Drawing

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7.2 Creating Multiple Documents

To create multiple documents, select the folder you wish to create your multiple documents in:

Document > **New** > **Multiple Documents** > - Enter the number of documents you wish to create and follow through the steps of the **Advanced Document Creation Wizard**.

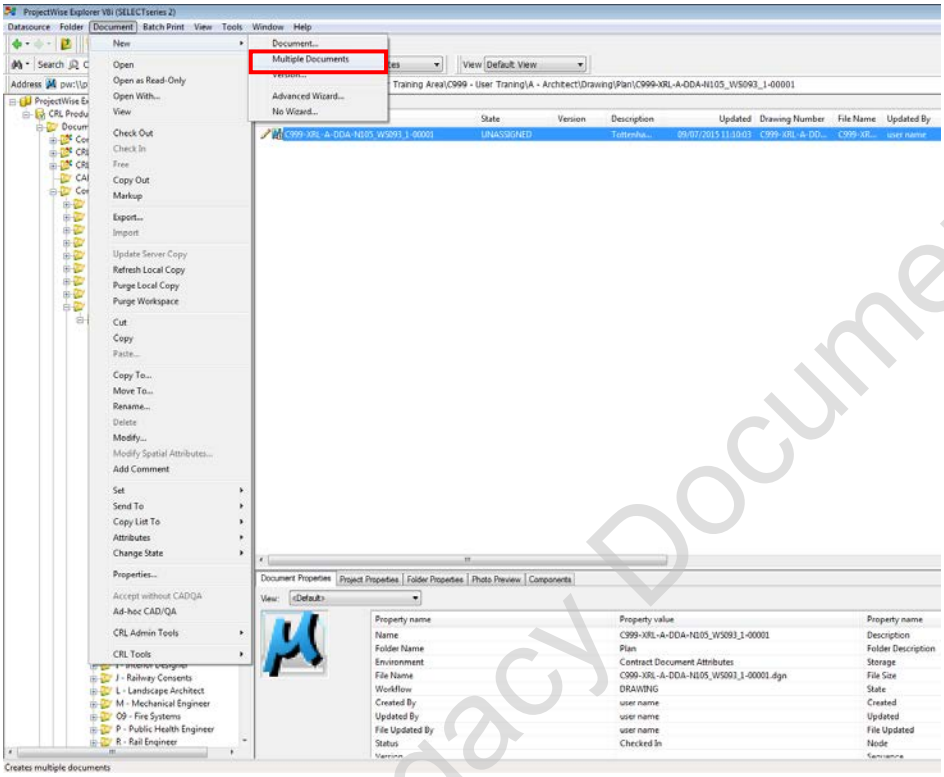

Figure 7-r Select Multiple Documents

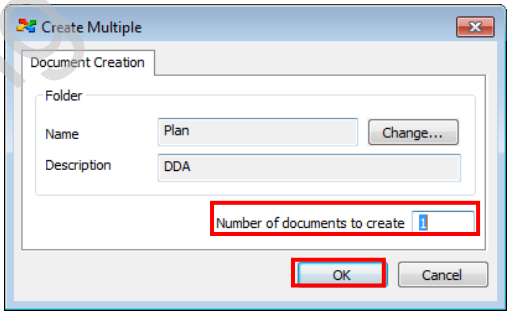

Figure 7-s Create Multiple

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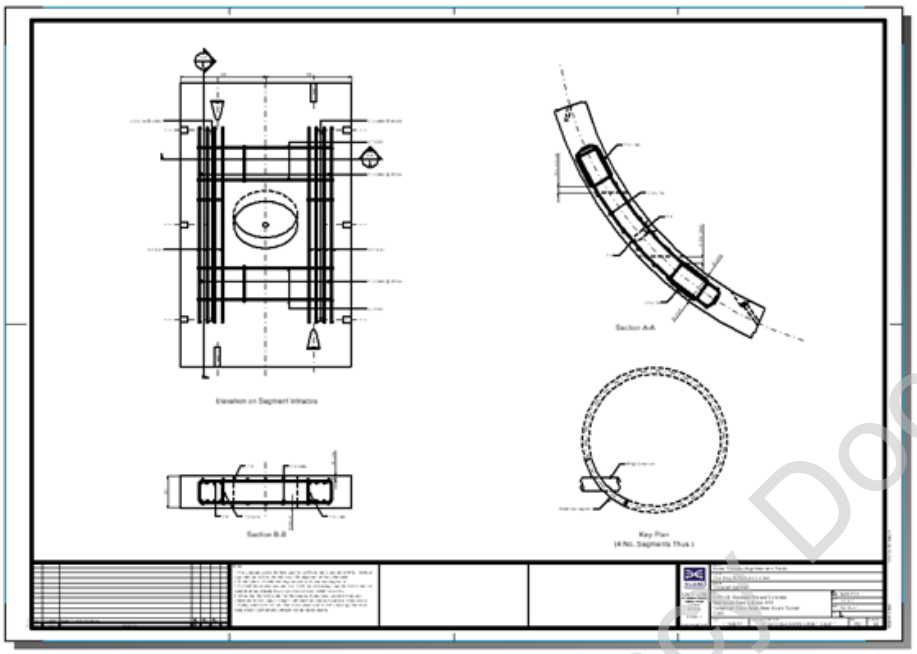
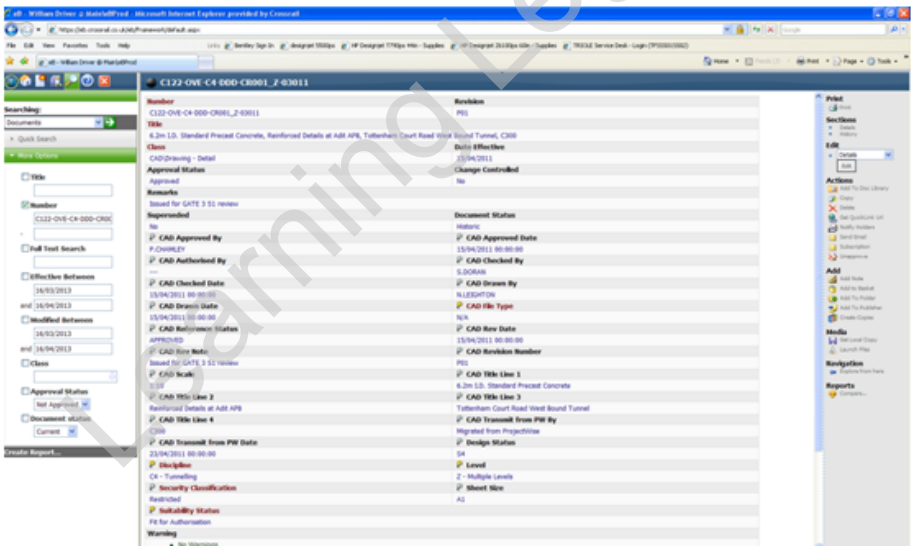
8 Reinforcing Schedules – Upload to the CRL EDMS (eB)

You must first approve the reinforcement drawing in the CRL ECMS to **Shared**; this creates an approved PDF of the drawing automatically, which is migrated to the CRL EDMS. A CRL EDMS record is automatically generated on migration of the approved PDF.





Drawing approved in CRL ECMS

PDF

Adobe

Approved PDF migrates to CRL EDMS and record is created

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Figure 8-a Overview of Reinforcement Schedule process

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You must now reopen the shared drawing file as ‘Read Only’ and create separate PDFs for each sheet of the schedule table.

- Open the relevant reinforcing drawing.
- Place a Fence around an A4 Schedule Table, snapping to each corner of the A4 Frame.

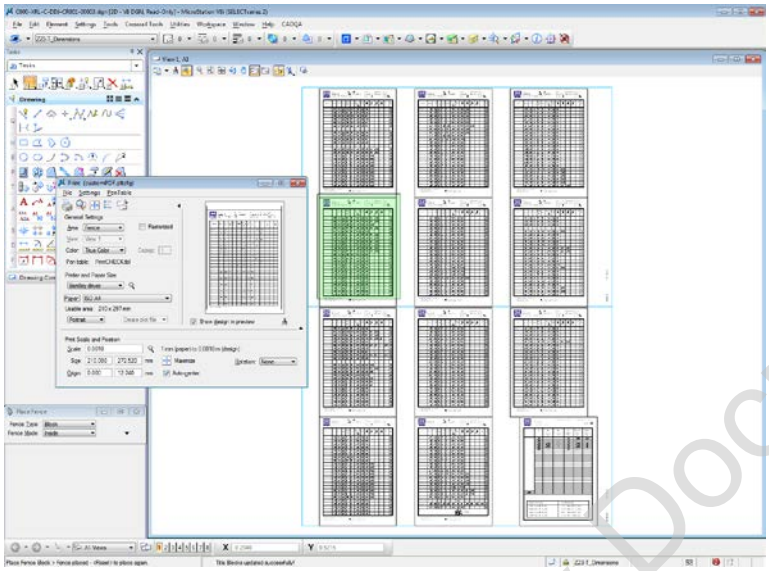

Figure 8-b Plotting to PDF of Schedules

- Select Print from the Crossrail Tools Menu
- Within the Print Options pane, ensure the ‘Plot Area’ is set to ‘Fence’ ‘Paper Size’ to A4
- Select Print and save in a relevant folder. (N.B. As each Schedule Table will need to have its own A4 Page

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Once you have finished exporting all of the schedule table pages as individual A4 PDFs, they should then be combined into a single PDF (ensuring they are in the correct order), which will then be uploaded into the CRL EDMS using its own disctinct number. See **Figure 8-c.**

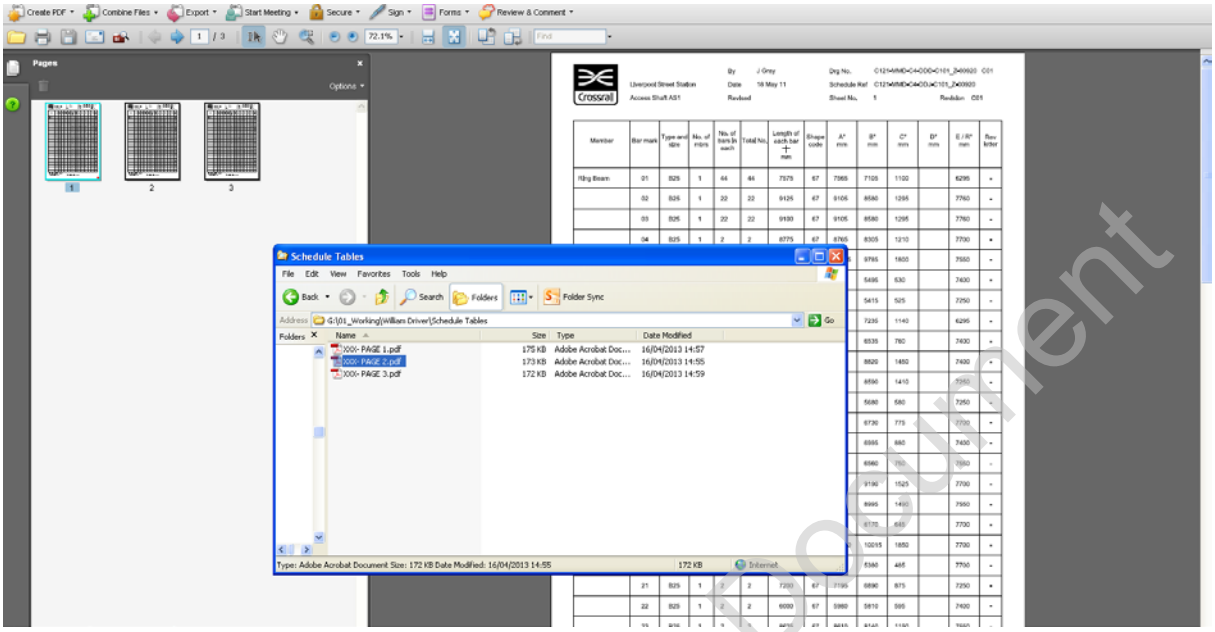

Figure 8-c Combined Schedule Tables PDF

A Document Controller will now need to create a CRL EDMS record for the Combined Schedule Tables PDF. The below example shows how this may be done:

In the CRL EDMS select **Add Document**

Select Document Template – **TSC-CRL – Schedule**

Construct the Document Number in relation to the drawing, e.g. using the relevant location etc. - see **Figure 8-e**.

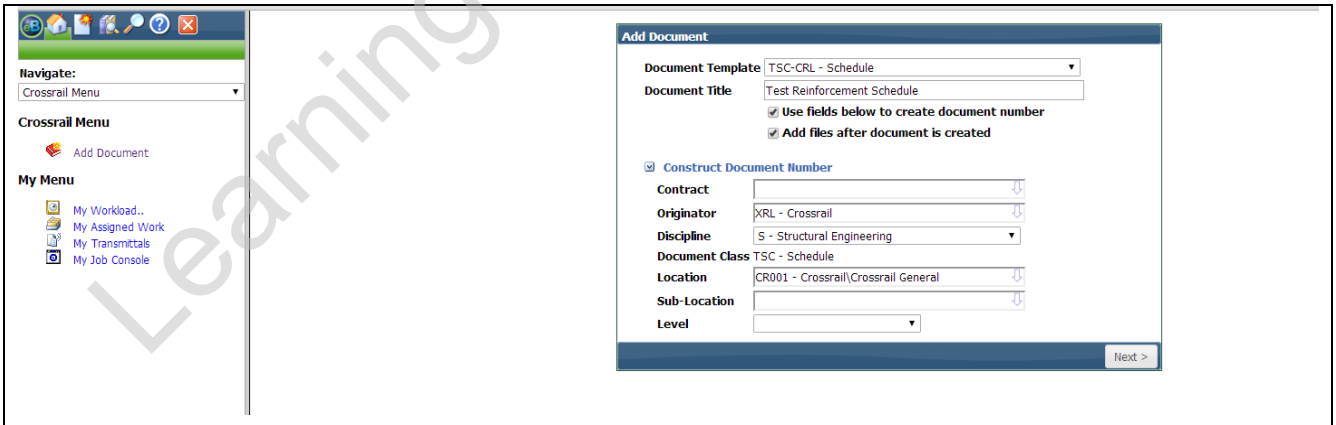

Figure 8-d Create CRL EDMS Document

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When created drag the Combined Schedule Tables PDF into the CRL EDMS record, see **Figure 8-e** Add Document to CRL EDMS record icon.

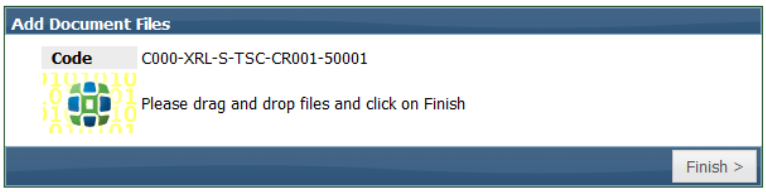

Figure 8-e Add Document to CRL EDMS record icon

You will now need to create a document relationship between the the original reinforcement drawing CRL EDMS record and the TSC-CRL – Schedule CRL EDMS record.

Open the CRL EDMS and browse the original reinforcement drawing number.

Under Document Relationships > click Add > Reference To > search for the TSC-CRL – Schedule CRL EDMS record and select Relate.

The reinforcement drawing should now have the accompanying schedule tables attached as a Document Relationship.

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9 Creating a Document Set in the CRL ECMS

A **Document Set** is used to group together CRL ECMS documents into a single container but with no physical connection to each other. Any files within the Set are stored as a 'shortcut' to the original and continue to remain in their original locations.

Figure 9-a shows how a Document Set looks in the CRL ECMS.

[TIP: CAD Services require a Document Set for amendments of 5 or more drawings.]

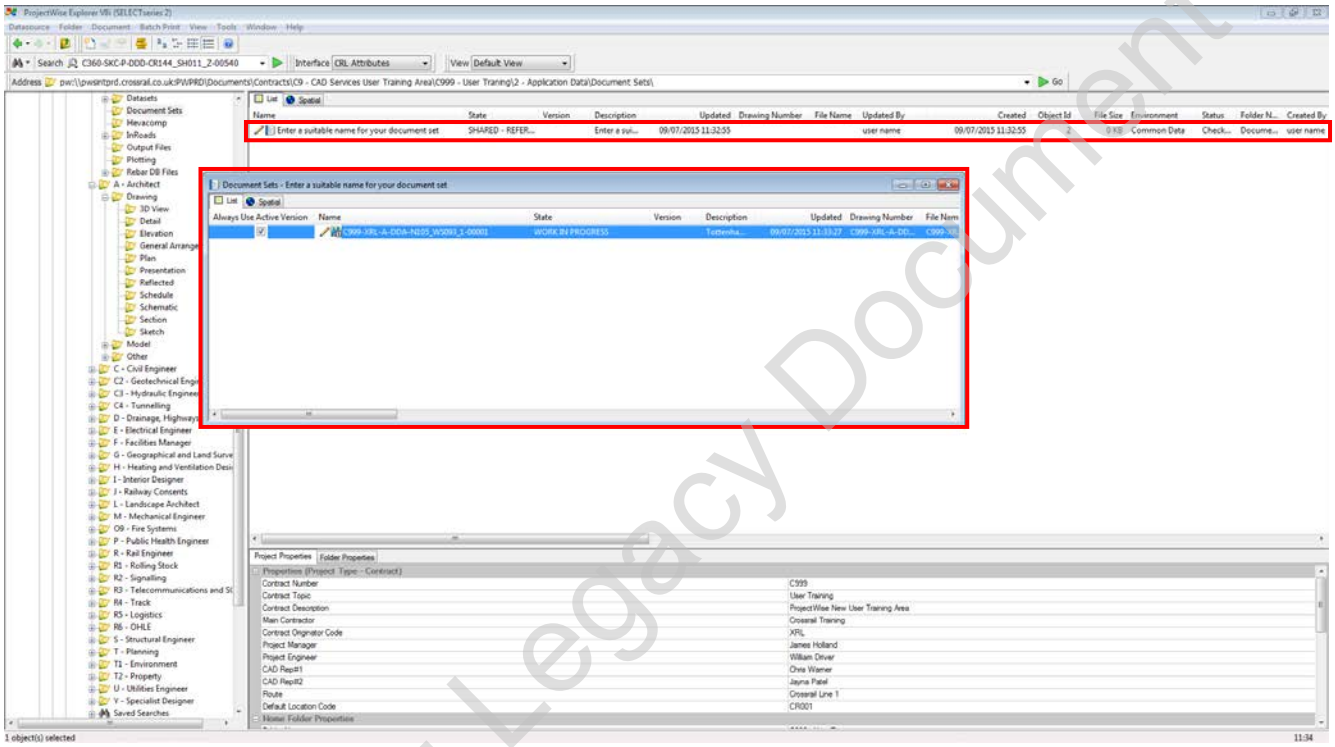

Figure 9-a Created Document Set

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To create a Document Set:

- Navigate to the appropriate CRL ECMS Folder

Document Sets must be stored in the Contract folder:

CXXX\ 2 – Application data\Document Sets

- Create new Set

Use the Document > Set > New function to create a Set, enter a name and description to identify its intended contents.

If the Document Set is being created to support the submission of drawings and models via an RIR then it is good practice to set the name of the Document Set as the RIR Number and Revision.

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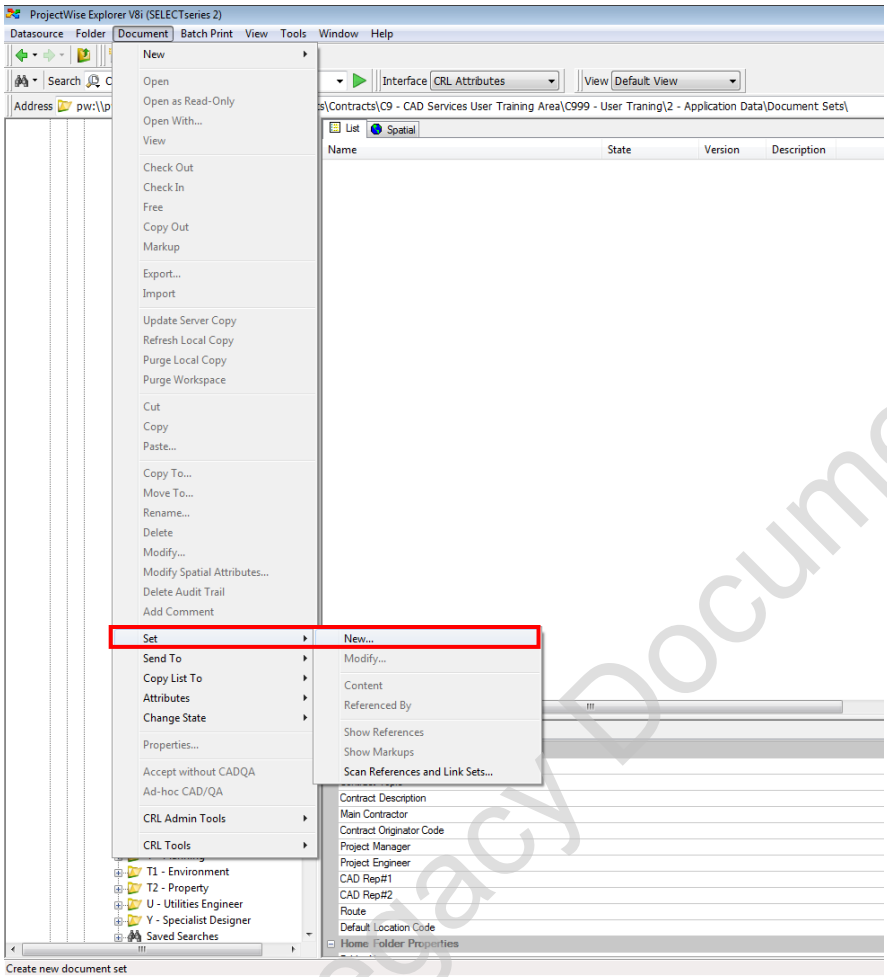

Figure 9-b Select New Document Set

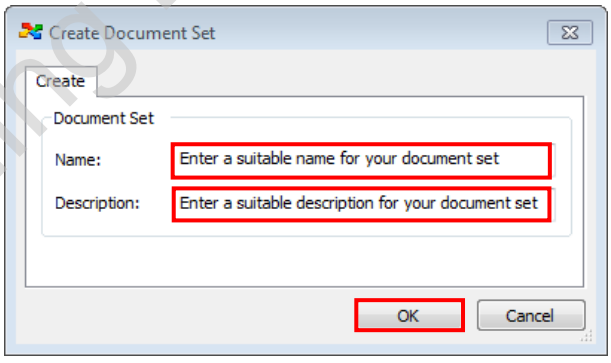

Figure 9-c Create document set

Add files to the Set

Drag documents from the CRL ECMS into the newly created Set window.

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Documents can be removed from the Document Set by using the Document > Set > Remove from Set function. If all documents are removed, the Document Set will disappear completely.

Selecting **Always Use Active Version** will ensure the current version is always present in the Document Set, even if the document is revised. If you would like to ensure the document doesn't update to the current revision in the Document Set, un-tick this box. See **Figure 9-d.**

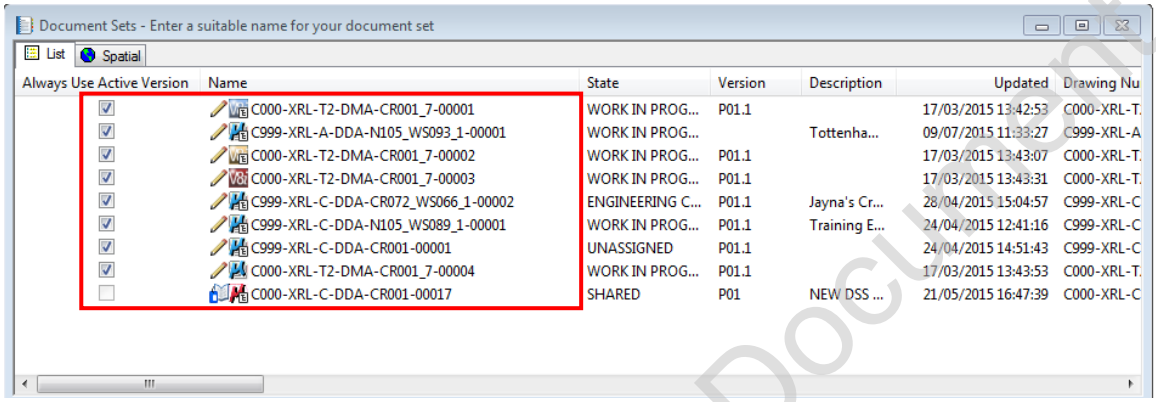

Figure 9-d Always Use Active Version

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10 Superseding or Cancelling CAD Drawings and Models in the CRL ECMS

Requests for superseding or the cancellation of drawings or models can only be made by a CAD Representative and in the case of Approved drawings or models, prior approval is required from the PM or PE for the relevant contract.

There can be a variety of reasons why a file is no longer required. For example, a plan for work is no longer required due to cancellation of programme activity. This action should be clearly stated in the metadata or the watermark.

It is important to highlight that a drawing or model has been superseded or cancelled to ensure the file cannot be modified.

To Cancel or Supersede a CRL ECMS drawing or model file:

- Document is deemed Superseded or Cancelled by document owner
- Contract CAD Representative notifies Crossrail CAD Services by email [redacted] with details of the documents to be Superseded or Cancelled. A request for a document to be superseded requires the corresponding superseding documents (preferably as a ProjectWise URL link). The email request must contain full CRL ECMS document numbers and revisions (preferably as a ProjectWise URL link).

Approved drawings or models require prior approval from the PM or PE for the relevant contract.

- Once CAD Services have actioned the request, the file will become locked to prevent further editing or revision and the icon will be changed to identify the file as withdrawn.

Figure 10-a Locked file icon

- The PDF will be automatically generated and watermarked and will be created in the appropriate sub-folder of the **PDF Withdrawn** CRL ECMS folder
- CAD Services will contact the CRL Document Controller with details of the PDFs to be replaced and marked as superseded or cancelled in eB
- The CRL Document Controller will replace the PDF and metadata in eB in accordance with CR-XRL-Z3-GUI-CR001-50164
- The CRL Document Controller will notify CAD Services and the relevant contract by email that the process has been completed. CAD Services will remove the PDFs from the CRL ECMS

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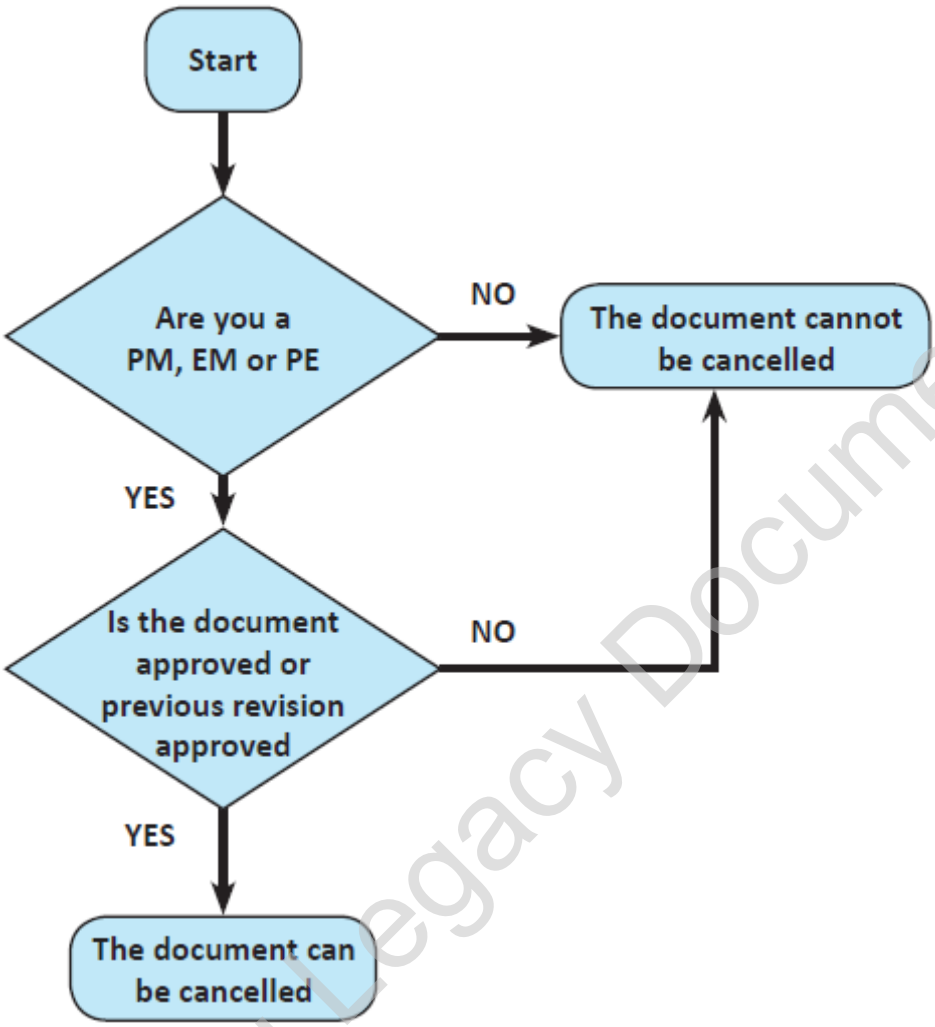

Figure 10-b Cancelling a document

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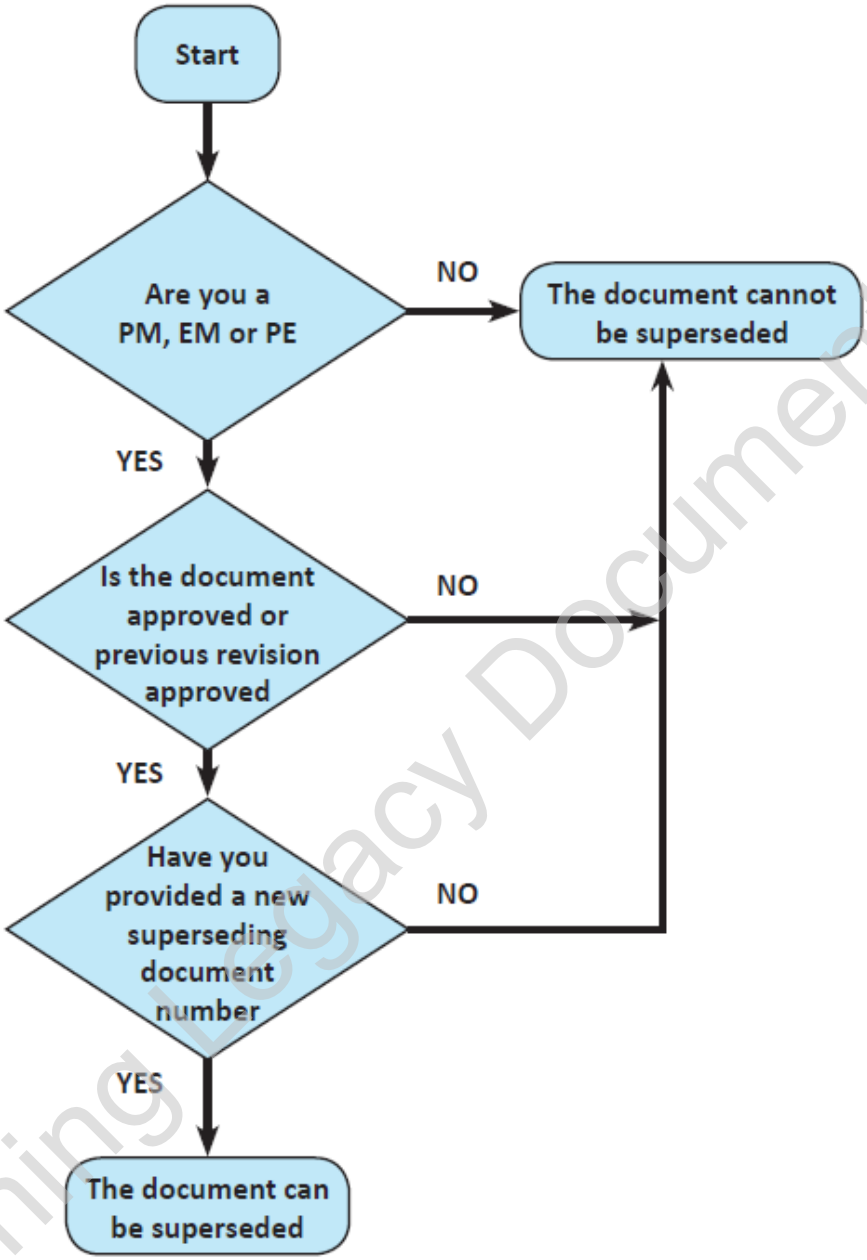

Figure 10-c Superseding a document

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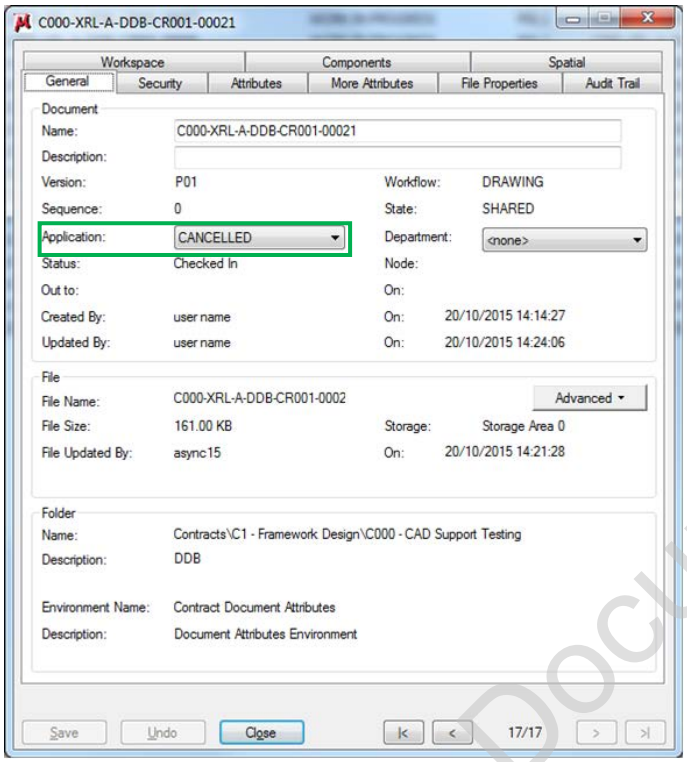

Figure 10-d Document becomes Cancelled

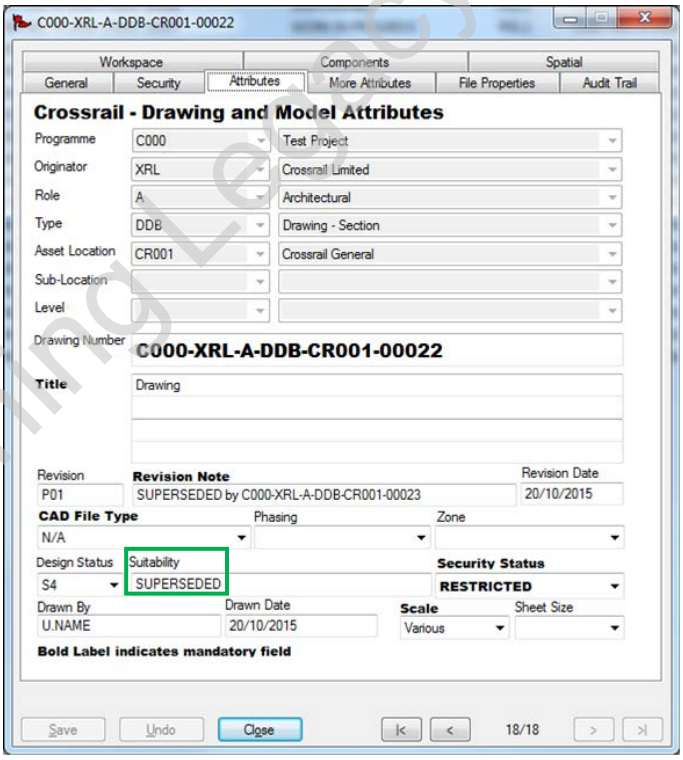

Figure 10-e Document becomes Superseded

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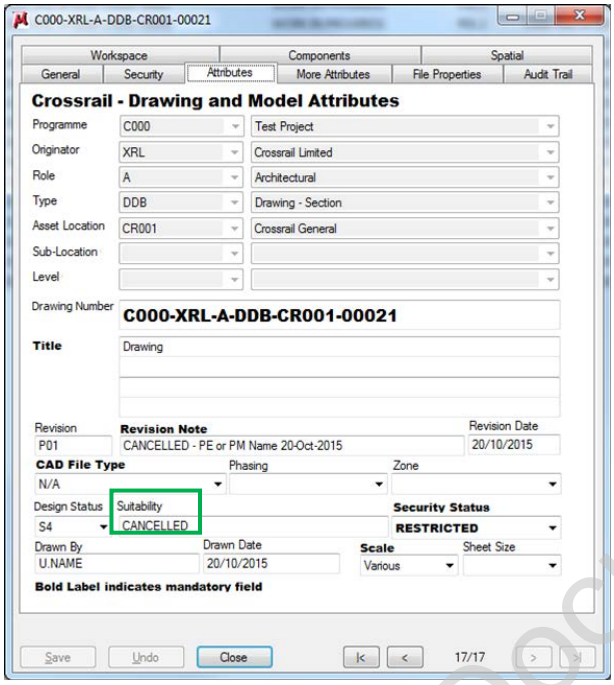

Figure 10-f Suitability becomes Cancelled

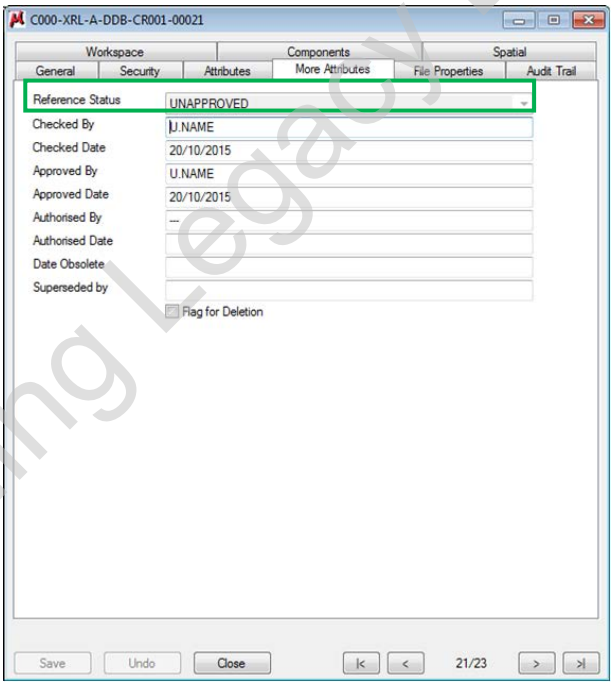

Figure 10-g Reference status becomes Unapproved

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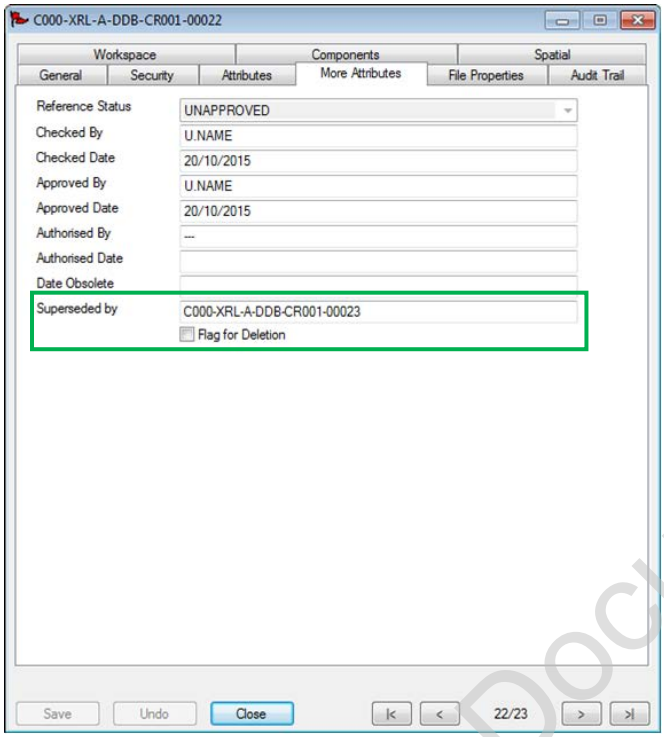

Figure 10-h Document is Superseded by

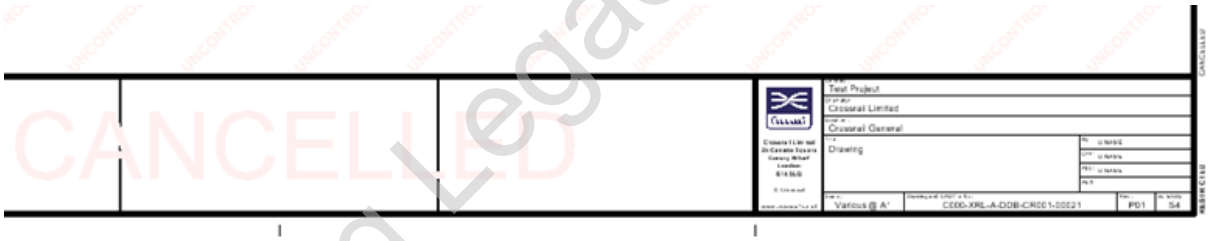

Figure 10-i Drawing is marked as cancelled in drawing border

Figure 10-j Drawing is marked as Superseded in drawing border

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11 Deleting documents in the CRL ECMS

Before CRL CAD Services may delete a file from the CRL ECMS they must consider whether the request meets a number of criteria first. These criteria are described in **Figure 11-a**. For further details please contact CRL CAD Services.

Requests for deletions can only be made by the listed Engineering Manager and/or CAD Representative stated within the document.

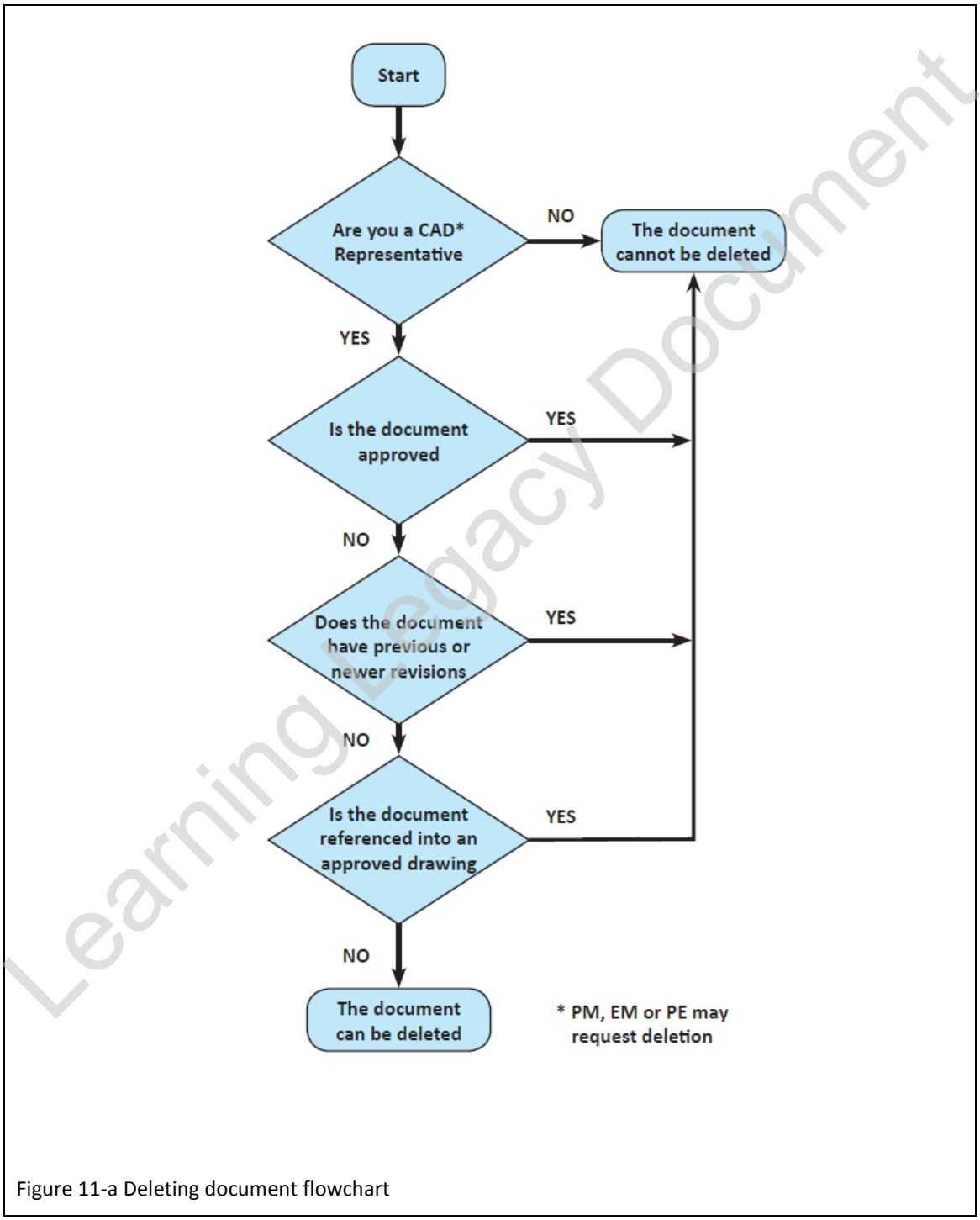

Figure 11-a Deleting document flowchart

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12 CRL ECMS Workflows

Workflows in the CRL ECMS are a progression of sequential steps or states through which CAD data must pass in order to progress from initiation to completion.

Each workflow state may require a manual or automated action to be completed before progression to the next is permitted. Through this method CRL assurance and other required checking processes may be enforced on data where required, before it is released to a wider audience.

The main workflows in the CRL ECMS are all related to CAD data types.

For example:

Drawings	Applied to all CAD drawing files
Models	Applied to all CAD model files (2D & 3D) containing live graphics
Coordination	Applied to all coordination and master model files

Workflows differ because the data held within the CRL ECMS serves different purposes; therefore permission to access it varies. The differences are expressed through the order of Workflow States (the stages of a workflow), this in turn affects the additional metadata information about the file and the users assigned role. Please see **Figure 5-a** and **Table 5.1** for more information regarding the CRL ECMS permissions and roles.

Figure 12-a Model Workflow has three Workflow States, **Work In Progress** and **Shared**. The file is created, and developed fully inside the CRL ECMS.

Figure 12-b Coordination Workflow has two Workflow States, **Work In Progress** and **Shared**. The file is created, and developed fully inside the CRL ECMS.

Figure 12-c Drawing Workflow has two Workflow States, **Work In Progress**, **Shared** and **Published**. The file is created, and developed fully inside the CRL ECMS.

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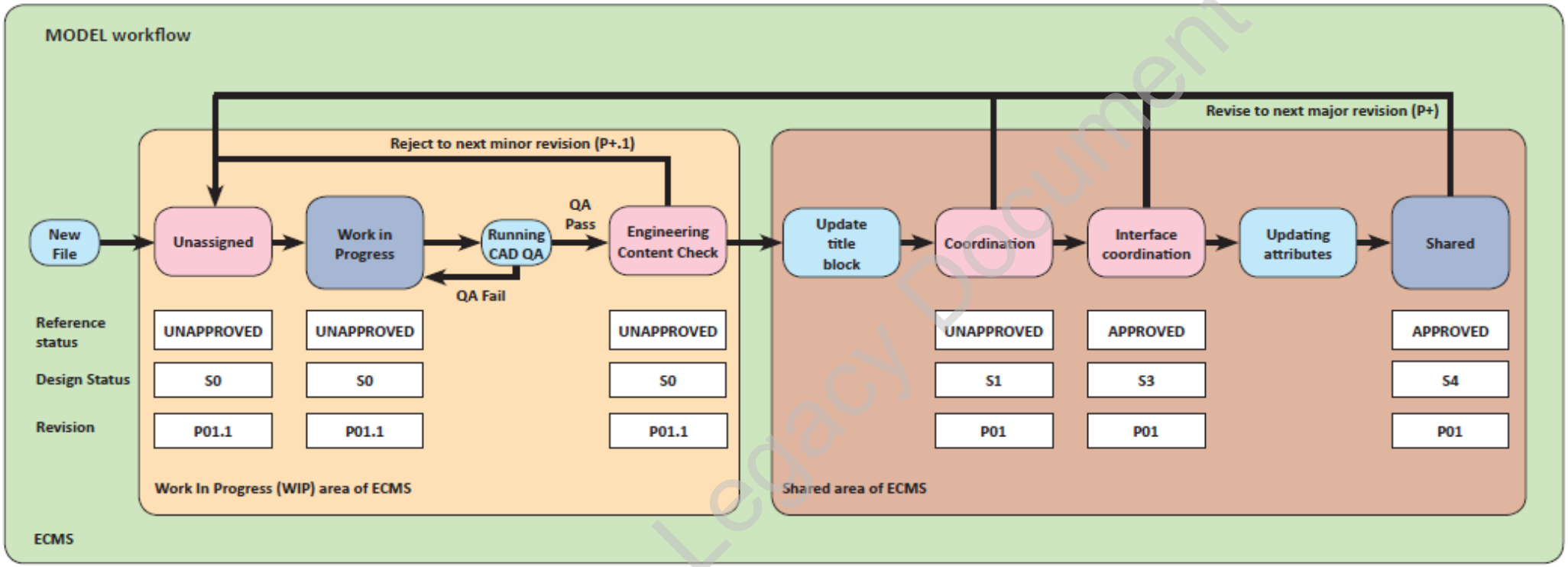

Figure 12-a Model Workflow

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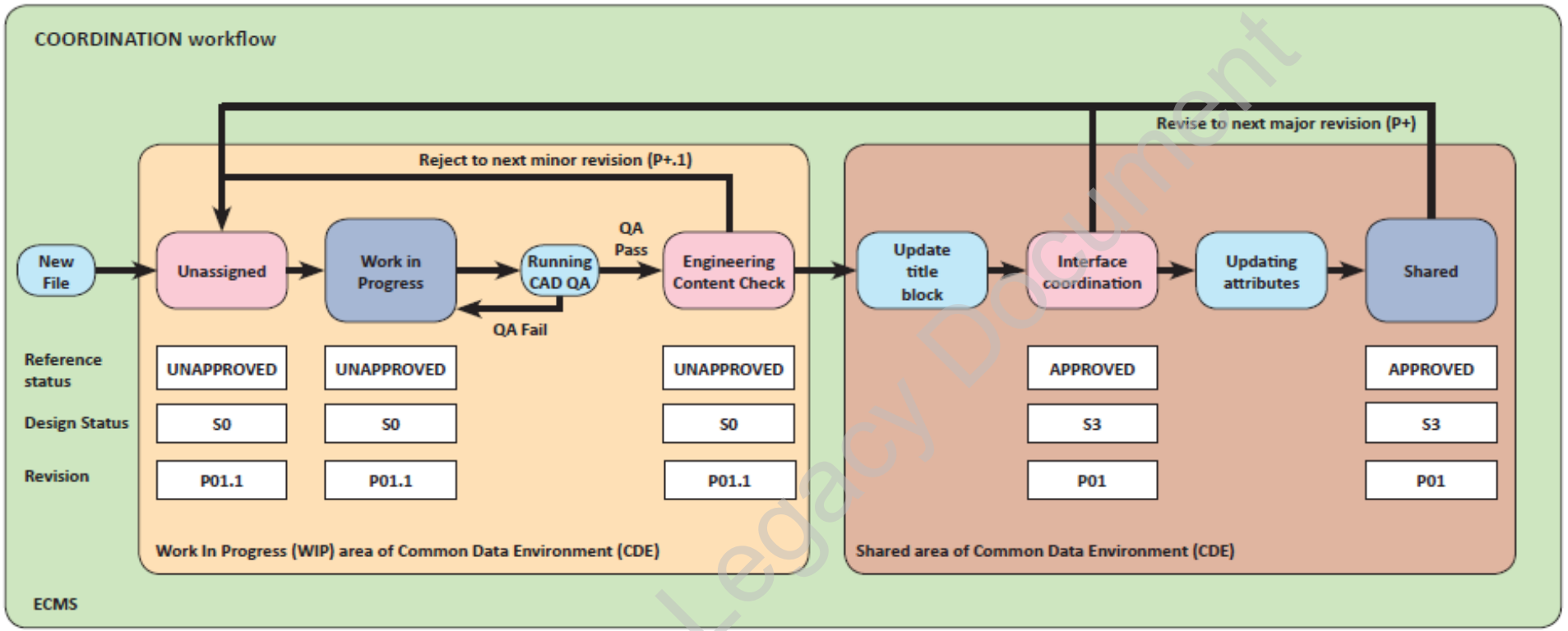

Figure 12-b Coordination Workflow

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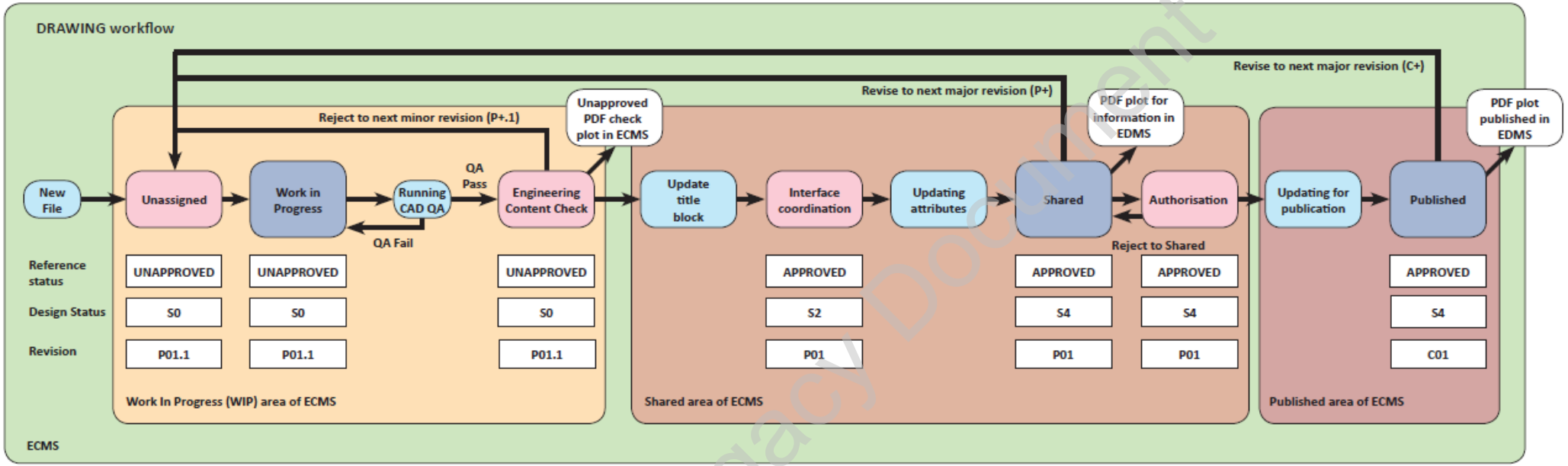

Figure 12-c Drawing Workflow

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13 CAD QA inside the CRL ECMS

The CRL ECMS CAD QA is performed when a drawing, 2D/3D model or coordination model is moved up the Workflow from **Work in Progress** to **Engineering Content Check**. Multiple drawings or models can be moved at the same time by selecting them, then right clicking and selecting **Change State** and **Approve**.

You will then be prompted to accept or decline the following dialogue box:

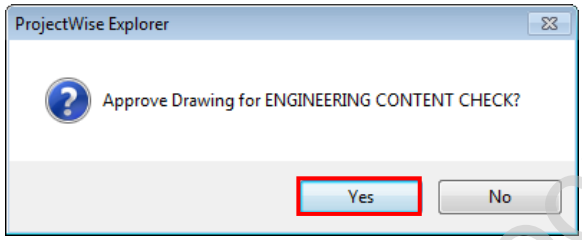

Figure 13-a Approve drawing for Engineering Content Check to start CAD QA

The State for the drawing, 2D/3D model or coordination model will become **RUNNING CAD QA** whilst the CRL ECMS runs the CAD QA for the drawing/ model.

If the drawing, 2D/3D model or coordination model successfully passes the CAD QA the State will become **Engineering Content Check** if it fails it will revert back to **Work in Progress**.

A HTML will be created on the completion of the CAD QA. The HTML is stored under the **CAD QA Reports** folder, which is a sub folder of where the drawing, 2D/3D model or coordination model resides.

Passing CAD QA does not confirm that the CAD Data is necessarily fully compliant with the CRL CAD Standard.

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13.1 Guide to the CAD QA Rules

A number of rules are checked against during the CAD QA. The next three pages provide information on what the CAD QA is checking against for Drawings, 2D/ 3D Models and Coordination Models.

Table 13-1– Drawings QA Checks	
QA Check	Notes
ProjectWise Tag Set Check	Seed file CRL ECMS Tag set must not be changed.
Filename Check	The filename must match the drawing number.
Single Sheet Model check	Only 1 sheet model should exist in design file.
Reference Files Displayed Check	All reference files must be displayed.
Reference Files Nest Depth Check	Reference files using Live Nesting must have a nest depth setting of 1.
Valid Level Name Check	All level names/ numbers must be approved.
All Levels On Check	All active file levels must be displayed ON, except for Watermark level.
No Elements Check	All design models (except Title Block) must not contain live elements.
Active View Check	View 1 in the sheet model must be open and active.
View Attributes Check - Constructions	View attribute should be **OFF**
View Attributes Check - Dimensions	View attribute should be **ON**
View Attributes Check - Fast Cells	View attribute should be **OFF**
View Attributes Check - Fast Curves	View attribute should be **OFF**
View Attributes Check - Fill	View attribute should be **ON**
View Attributes Check - Level Overrides	View attribute should be **ON**
View Attributes Check - Line Styles	View attribute should be **ON**
View Attributes Check - Line Weights	View attribute should be **ON**
View Attributes Check - Patterns	View attribute should be **ON**
View Attributes Check - Tags	View attribute should be **ON**
View Attributes Check - Text	View attribute should be **ON**
View Attributes Check - Text Nodes	View attribute should be **OFF**
View Attributes Check - Data Fields	It is advised that this view attribute should be **OFF**
Global Origin Check	Seed file global origin must not be changed.
Working Units Check	Seed file working units must not be changed.
Resolution Check	Seed file resolution must not be changed.

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Table 13-2–Models QA Checks	
QA Check	Notes
ProjectWise Tag Set Check	Seed file CRL ECMS Tag set (called Title Block) must not be changed.
Filename Check	The filename must match the drawing number.
Sheet Model check	No sheet models should exist in the design file.
Reference Files Displayed Check	Reference files must NOT be displayed.
Reference Files Nest Depth Check	Reference files using Live Nesting must have a nest depth setting of 1.
Valid Level Name Check	All level names/ numbers must be approved.
All Levels On Check	All active file levels must be displayed ON, except for Watermark level.
View Attributes Check - Fill	View attribute should be **ON**
View Attributes Check - Line Styles	View attribute should be **ON**
View Attributes Check - Line Weights	View attribute should be **ON**
View Attributes Check - Patterns	View attribute should be **ON**
View Attributes Check - Tags	View attribute should be **ON**
View Attributes Check - Text	View attribute should be **ON**
Active View Check	It is advised View 1 in the design model should be open and active.
View Attributes Check - Constructions	It is advised this attribute should be OFF.
View Attributes Check - Fast Cells	It is advised this attribute should be OFF.
View Attributes Check - Fast Curves	It is advised this attribute should be OFF.
Global Origin Check	Seed file global origin must not be changed.
Working Units Check	Seed file working units must not be changed.
Resolution Check	Seed file resolution must not be changed.

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Table 13-3– Coordination Models QA Checks	
QA Check	Notes
ProjectWise Tag Set Check	Seed file CRL ECMS Tag set (called Title Block) must not be changed.
Filename Check	The filename must match the drawing number.
Sheet Model check	No sheet models should exist in the design file.
Reference Files Displayed Check	Reference files MUST be displayed.
Reference Files Nest Depth Check	Reference files using Live Nesting must have a nest depth setting of 1.
Valid Level Name Check	All level names/ numbers must be approved.
All Levels On Check	All active file levels must be displayed ON, except for Watermark level.
No Elements Check	All design models (except Title Block) must not contain live elements.
View Attributes Check - Fill	View attribute should be **ON**
View Attributes Check - Line Styles	View attribute should be **ON**
View Attributes Check - Line Weights	View attribute should be **ON**
View Attributes Check - Patterns	View attribute should be **ON**
View Attributes Check - Tags	View attribute should be **ON**
View Attributes Check - Text	View attribute should be **ON**
Active View Check	It is advised View 1 in the design model should be open and active.
View Attributes Check - Constructions	It is advised this attribute should be OFF.
View Attributes Check - Fast Cells	It is advised this attribute should be OFF.
View Attributes Check - Fast Curves	It is advised this attribute should be OFF.
Global Origin Check	Seed file global origin must not be changed.
Working Units Check	Seed file working units must not be changed.
Resolution Check	Seed file resolution must not be changed.

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14 MicroStation Standalone CAD QA

The standalone CAD QA is a piece of customised CRL software provided as an aid to allow users to test their data before moving it through the workflow.

The standalone CAD QA is installed to your local PC, there is no means for automatic update therefore it may not be as up to date as the CRL ECMS CAD QA.

Passing CAD QA does not confirm that the CAD Data is necessarily fully compliant with the CRL CAD Standard.

Please refer to the IT Representative Handbook for information on installing the MicroStation Standalone CAD QA on your computer.

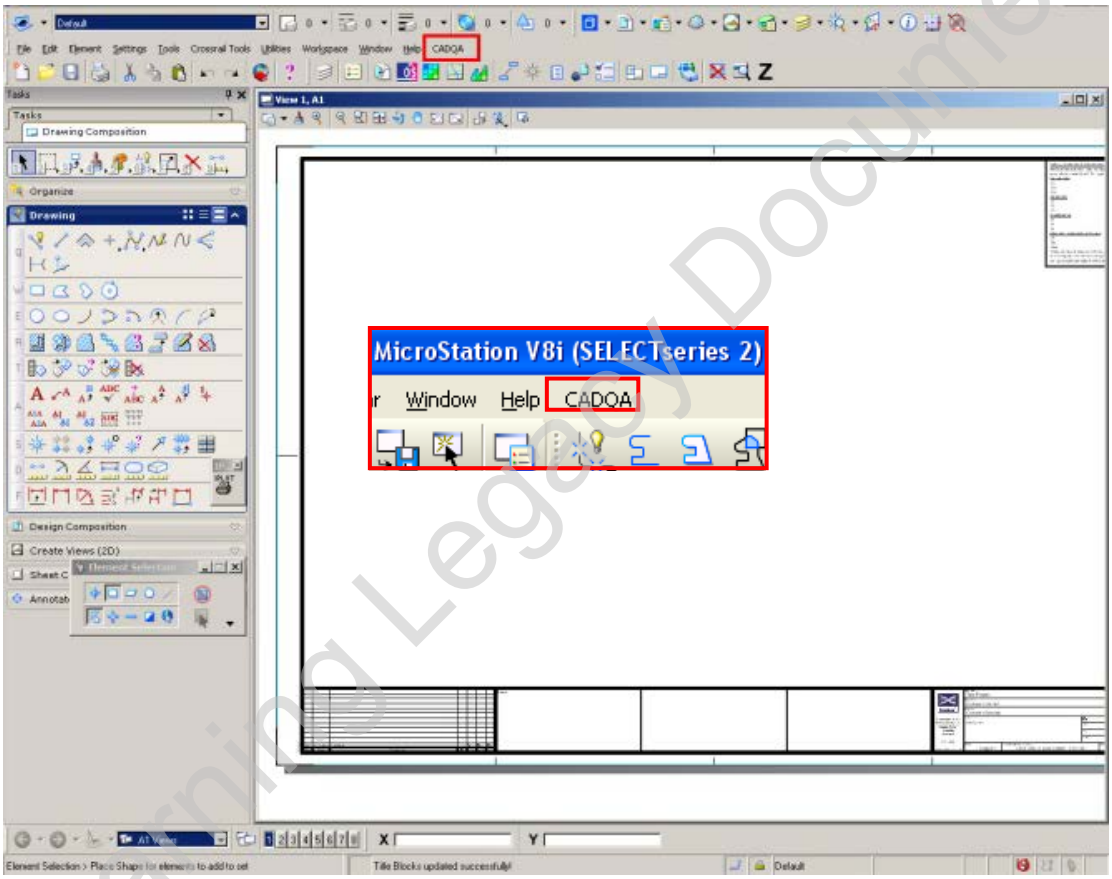

Figure 14-a Microstation standalone CAD QA

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The user has the option to run:

- a CAD QA check on a Drawing (to check the integrity of the drawing file including borders and text etc…)
- a 2D/3D Model check (to check the integrity of the model file etc…)
- a Coordination Model check (to check the integrity of the coordination model file etc…)
- or a Level Name Check (to ensure only levels within the CRL seed file are being used. See **Figure 14-b**

The aim of this tool is to assist the file in passing the CAD QA when being pushed through the CRL ECMS workflow.

Click **OK** to run the CAD QA.

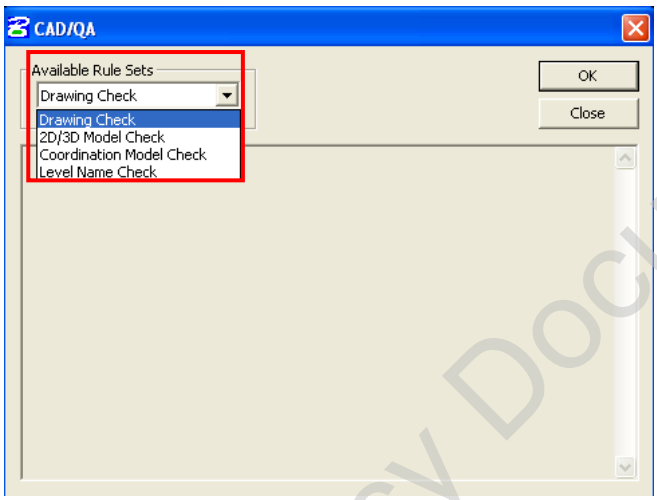

Figure 14-b CAD QA available rule sets option

An HTML should appear whether the drawing, 2D/3D model or coordination model passes or fails, **see Figure 14-c.**

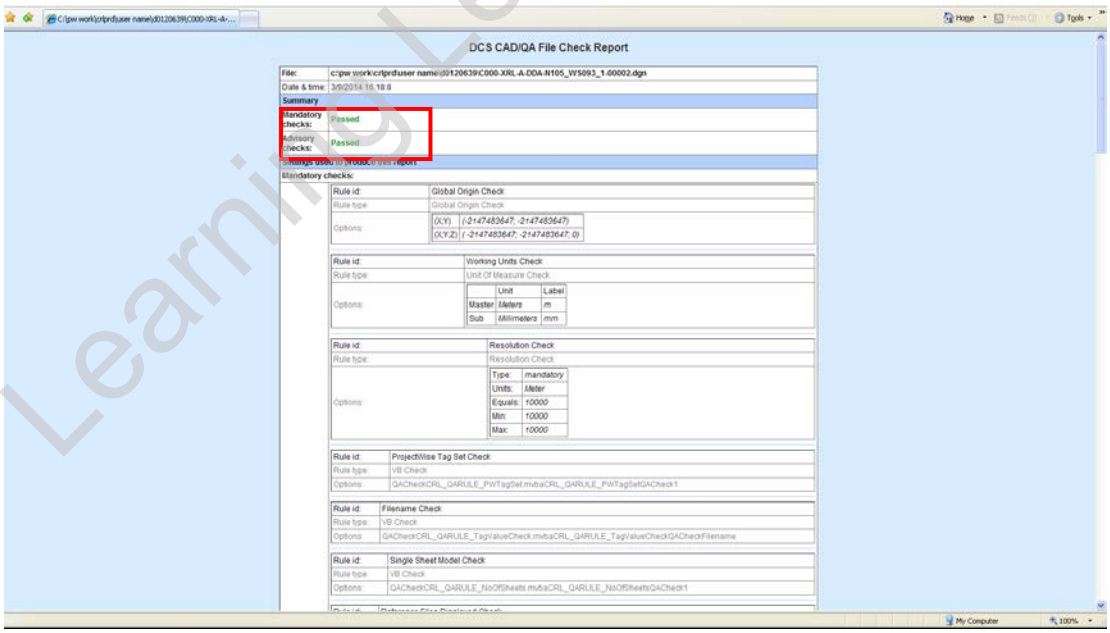

Figure 14-c HTML CAD QA report- Passed

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The **Summary** notifies the user whether the drawing, 2D/3D model or coordination model has passed the CAD QA or not.

If a drawing, 2D/3D model or coordination model fails the CAD QA, the reason will be displayed in the Summary.

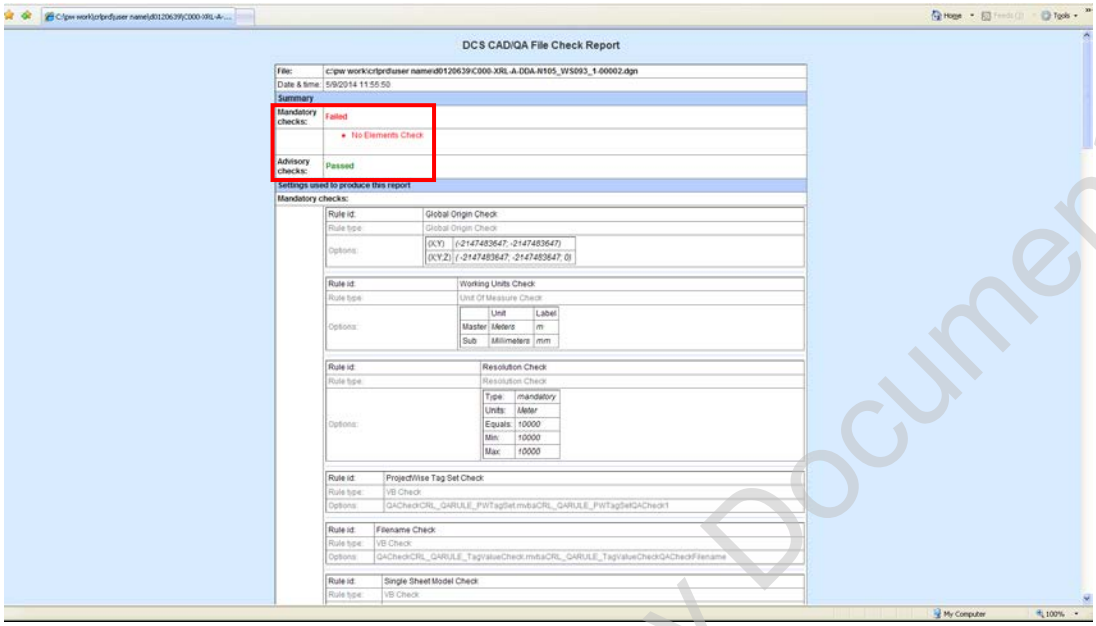

Figure 14-d HTML CAD QA report- Failed

Drawings, models and coordination models must pass the mandatory checks to successfully complete the CAD QA.

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15 Publishing documents in the CRL ECMS

This diagram shows the process of requesting that files are published through CRL CAD Services.

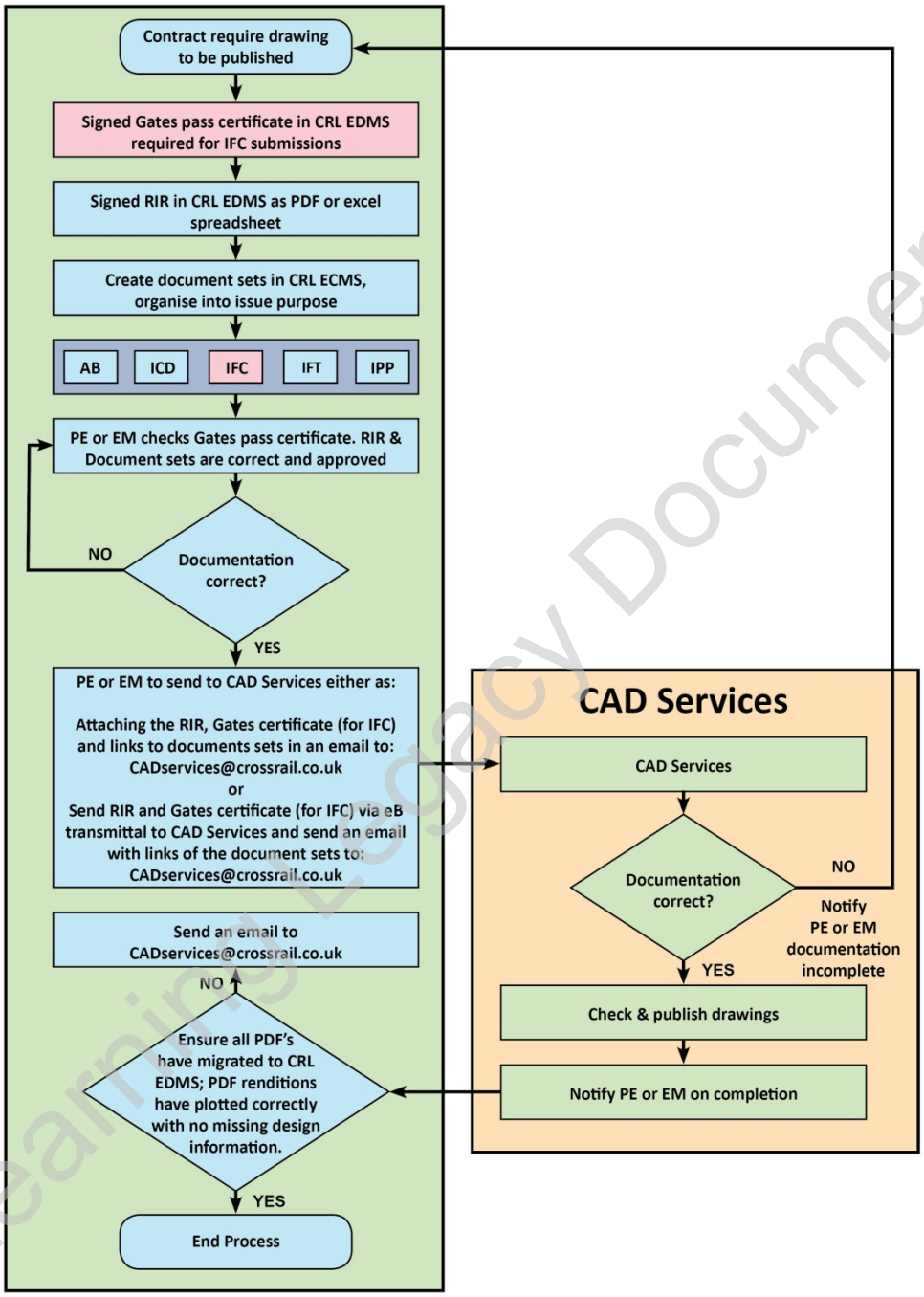

Figure 15-a Request for Publishing flowchart

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16 Additional Resources

Below are some additional references to help learn more about Bentley Systems and related technologies.

16.1 Crossrail-Bentley Information Academy (CBIA)

Crossrail and Bentley Systems have collaborated on the creation of a dedicated Academy to provide hands-on introductory sessions to the Crossrail supply chain. This includes current and future technology and software being used to design the digital railway.

The Academy, located in Bentley Systems' offices in Gracechurch Street, offers a curriculum particular to the current Crossrail system configuration. The introductory sessions on offer are designed to benefit the construction industry by driving forwards standards of design innovation.

Figure 16-a Crossrail Bentley Academy

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16.2 Bentley Learn Server

The Bentley Learn server is an online training tool which allows users to participate in interactive tutorials. Training comes in the form of online Streaming Videos, Exams or Real-Time Lectures.

Training is free with login access obtained for anyone who attends the Crossrail Bentley Academy BIM Awareness Session (See **section 16** for more details). Once registered, users have the opportunity to access a wide range of training material based on their targeted learning path.

Once access to Bentley Learn has been granted users will need to visit the following link to login https://ims.bentley.com see **Figure 16-b.**

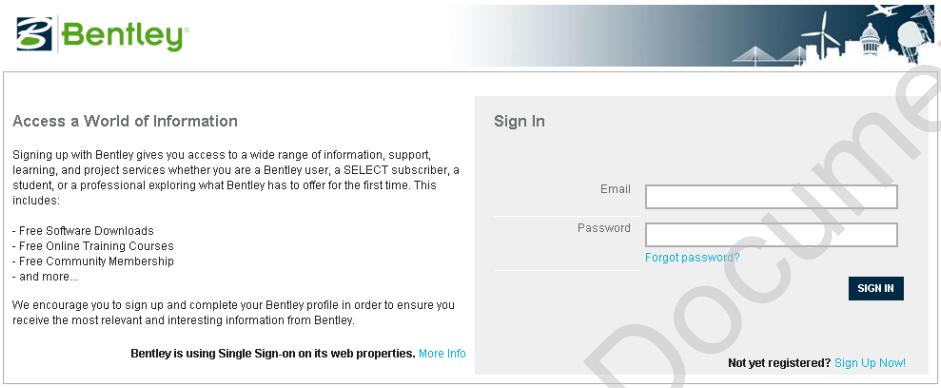

Figure 16-b Bentley Sign- in

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17 Contacts

17.1 Contacting CAD Services

Normal business hours:

Crossrail CAD Services are available via the following methods:

By email - [redacted]

By phone - [redacted]

17.2 Contacting the Crossrail IT Service Desk

Alternatively if you have a general technical inquiry, you can contact the Crossrail IT Service Desk, via the following methods:

By email - [redacted]

By phone - [redacted]

All support calls will join a queue and be responded to in turn.

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18 Glossary

CAD	Computer Aided Design and/or Draughting.
CAD Data	All electronic files and associated resources that make up the content within and the output from, the CAD Drawings, CAD Models and CAD Object.
CAD Drawing	A type of CAD Data file that is held within ECMS comprising content and one or more reference files. It is a representation of a Drawing and is saved and stored in a manner that allows reproduction of that Drawing.
CAD Model	A type of CAD Data file that is held within ECMS and comprising content and other source files held within ECMS. This file is typically two dimensional (2D) when it is a reference file to a CAD Drawing. This file is typically three dimensional (3D) when it is used as a source file to a 2D CAD Model.
CAD Object Orientated Model	A type of CAD Model where the CAD Data file contains discipline specific building and construction components and systems, and/or objects that have attributes and relationships to other objects. This file is typically produced by a discipline specific CAD Object Orientated Modelling software application.
CAD QA	CAD Quality Assurance
CAD Standard	The Employer's document (CR-STD-005) that sets out the requirements for CAD Data held within ECMS.
CRL	Crossrail Limited
Design Data	All drawings, reports, documents, plans, software, formulae, calculations, method statements and other data whatsoever in any medium prepared by the Employer or the Contractor relating to the design and construction of the Relevant Works
Document Set	A ProjectWise container which is populated with Drawing and Models. Used to group Drawings and Models together for a purpose, for example to Issue for Authorisation.
eB	The Employer's electronic document management system (EDMS).
Electronic CAD Management System (ECMS)	The Employer's collaborative system used for the integrated management and production, of all CAD Data. This system facilitates the design review of CAD Data by the Employer and automatically transfers Drawings into EDMS.
EDMS	Electronic Document Management System
IM	Information Maintainer

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London Survey Grid	Crossrail Standard CR-STD-010 – London Survey Grid
Master Model	CAD Model that is three dimensional which: Reflects the current issue of all drawings for each part of the works for which the Contractor is responsible for design. Contains one design discipline CAD Model per discipline which in turn contains all CAD Models for that discipline. Does not contain live design data but only references to other CAD Models including those that contain geospatial or survey data.
ProjectWise	The Employer's electronic CAD data and model management system.
QRG	Quick Reference Guide
RIR	Register and Issue Record

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