

<b>NCSX</b>	<b><u>NATIONAL COMPACT STELLARATOR EXPERIMENT</u></b>	
	<b>PROCEDURE: NCSX-PROC-007 Revision 1</b>	<b>Page 1 of 12</b>
<b>Title</b> NCSX Electronic Model and Drawing/INTRALINK Processes	<b>Initiated by:</b>  NCSX Systems Engineering Support Manager	<b>Effective Date:</b>  <b>Revision 1 June 8, 2005</b>
<b>Concurrence by:</b>  NCSX Quality Assurance Manager	<b>Concurrence by:</b>  NCSX Design Integration Manager	<b>Concurrence by:</b>  PPPL Mechanical Design Branch Head
<b>Concurrence by:</b>  PPPL Head, Engineering & Technical Infrastructure	<b>Approved by:</b>  NCSX Engineering Manager	<b>Supersedes:</b>  <b>Revision 0 May 4, 2005</b>

**Record of Revisions**

<b>Revision</b>	<b>Date</b>	<b>Description of Changes</b>
<b>0</b>	<b>5/4/2005</b>	<b>Initial Issue</b>
<b>1</b>	<b>6/12/2005</b>	<b>Clarified Fabrication Designation for Pro/E and Non-Pro/E Files.</b>

**Applicability**

This procedure is applicable to the entire NCSX Project and only addresses electronic files and drawings. Hard copy legacy drawings are not addressed.

**Introduction**

The NCSX Pro/E/INTRALINK Users Guide provides the processes by which a electronic 3D Computer Aided Design and Drafting (CADD) model, assembly, part, or drawing is promoted from a “conceptual design” status through a “release for fabrication” status. Once a drawing is “released for fabrication”, it is placed under configuration control and revisions are controlled by ECPs per PROC-002. INTRALINK provides both a storage capability that is utilized for both Pro/Engineer (Pro/E) models and drawings (mechanical) and non-Pro/E files and drawings (e.g., AUTOCAD electrical drawings, files utilized for numerical control (NC) fabrication (e.g., .dxf and .STEP files), and other non-Pro/E files such as adobe acrobat format (.pdf) and text (.txt) files . For files and drawings created within Pro/E, the files are reviewed and approved within INTRALINK and pdf representation contains a final electronic signature. In other electronic files such as .dxf data files, a review and approval is also accomplished within INTRALINK, but the file is not typically converted to a pdf format and signed. In AUTOCAD, the INTRALINK review and approval process is not available so electronic signatures of reviewers and approvers is done on the pdf representation.

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While this procedure will focus on Pro/Engineer (Pro/E) mechanical drawings as a reference, the differences for AUTOCAD drawings and other file formats will be noted. Rather than repeat the process for each step in the promotion process, this procedure will focus on the final step where a drawing or set of drawings have advanced to the stage where they are now ready to be released for fabrication and/or installation. It will then address the process by which these are revised.

Electronic models are the basic building block of the Pro/E CAD system. From these 3D mechanical models all the associated parts and assemblies with the exception of standard or “library” parts such as fasteners, washers, etc and 2D mechanical drawings are derived. This will also include data curves if they are needed or skeleton parts (used for making port cuts). However, STEP or IGES files are not stored in the promotion process since they are directly obtained from the approved data files that are in the promotion process. Only final 2D drawings are “physically” signed in a pdf format using the procedure described in the NCSX Electronic Signature Procedure PROC-005. All others will be electronically reviewed and approved using the inherent Pro/E/INTRALINK database processes and procedures in PROC-007. The Pro/E/INTRALINK database also provides configuration control processes for 3D models, parts, assemblies, and 2D drawings.

It is essential that vendors and in-house fabricators have a means by which to identify those files and drawings promoted to the “release for fabrication” status. Pro/E files are those designated with the .prt (parts and models), .asm (assemblies) and .drw (drawing). For these Pro/E drawings, a revision number 0 is initially assigned when the file is promoted and approved for “release for fabrication” and the revision number is then advanced (e.g., 1, 2, etc.) as the file is revised. For non-Pro/E files such as .dxf (data files), STEP (CAD exchange files that can be read by most CAD systems), .dwg (AutoCAD electrical drawings), .txt (text files), and .pdf (adobe acrobat representations of CAD drawing files or documents), the same process and assignment of a revision number (initially 0 and then advanced as the file is updated) should be done when file is promoted to “release for fabrication” status. In order to clearly identify that a file has been released for fabrication, this procedure will identify the methods by which files are “annotated” to show that the file has been “released for fabrication.”

While it is important to clearly identify those files that have been promoted to “release for fabrication” status, it is equally important to provide this information to suppliers and to in-house fabricators. For suppliers, the CSPEC and the Supplier FTP Site provides a ready reference to those files released for fabrication. The CSPEC (also posted on the Supplier FTP Site) and made part of the most recent contract modification, lists the most recent versions of the electronic files (usually contained in a .zip file format). In addition, the Supplier FTP Site provides a folder of the most recent drawing release packages with a “read me” file to clearly explain what is contained in these packages. Out-of-date or superseded drawing files are removed from this site and archived in INTRALINK. Electronic data files are also removed from the FTP site to preclude confusion.

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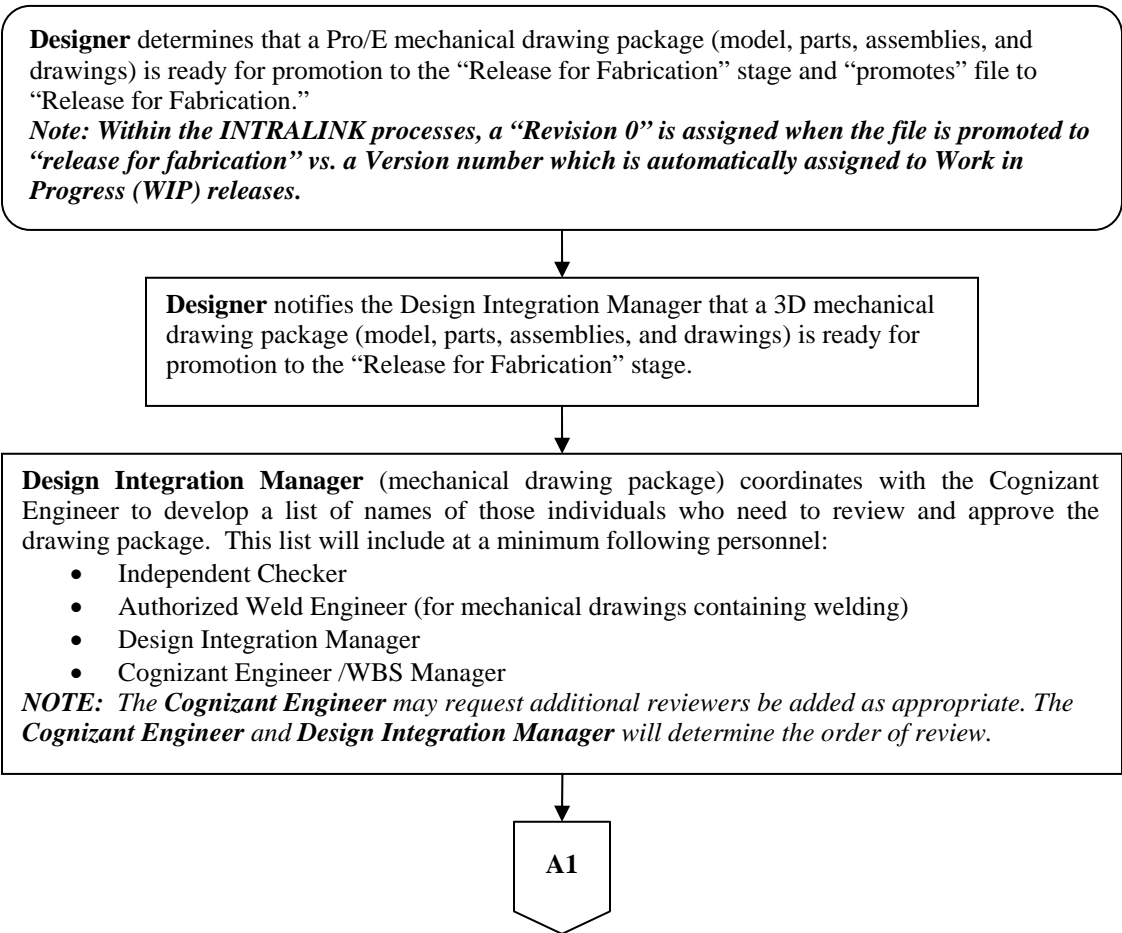
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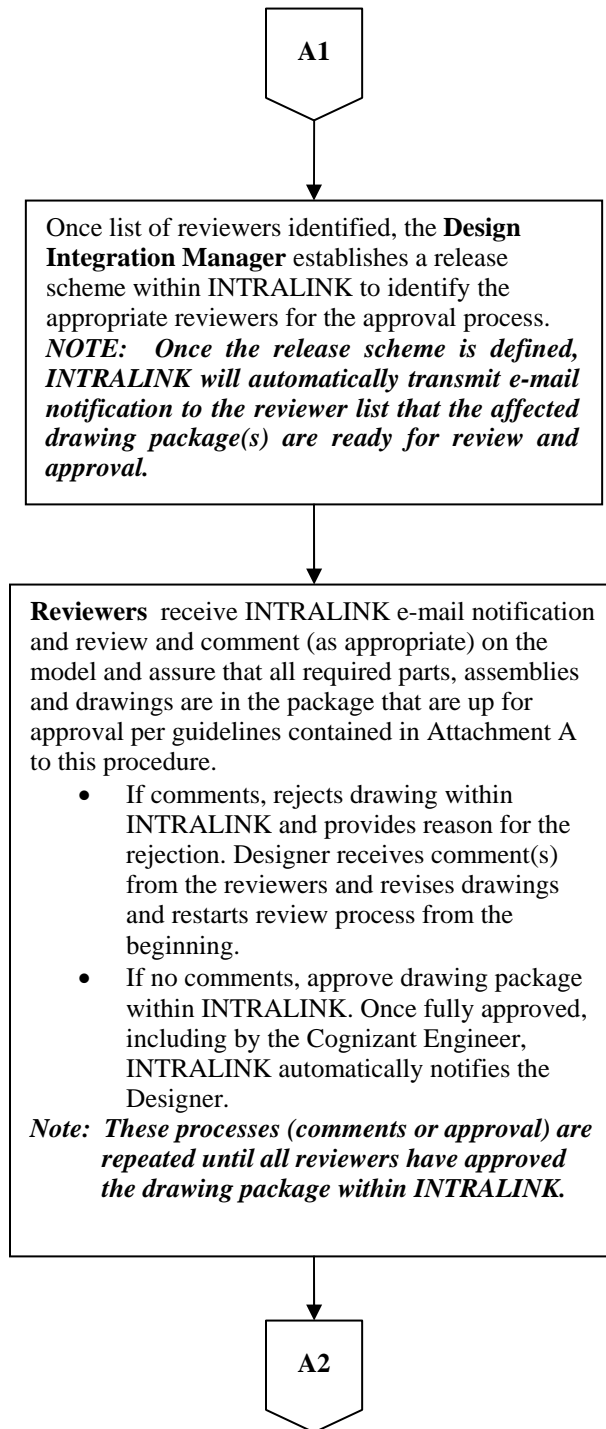
**Referenced Documents**

Document Number	Document Title
NCSX-PLAN-CMP	Configuration Management Plan
NCSX-GUID-PRO/INTR	Pro/INTRALINK Users Guide
NCSX-PROC-002	Configuration Control
NCSX-PROC-005	Electronic Signatures
NCSX-PROC-006	Control of NCSX Supplier and In-House Fabrication Information
NCSX-PROC-009	Requests for Deviations
PPPL Engineering Procedure 010	Control of Drawings, Software, and Firmware
PPPL-DRFT-001	PPPL Engineering Drafting Standard

**Procedure**

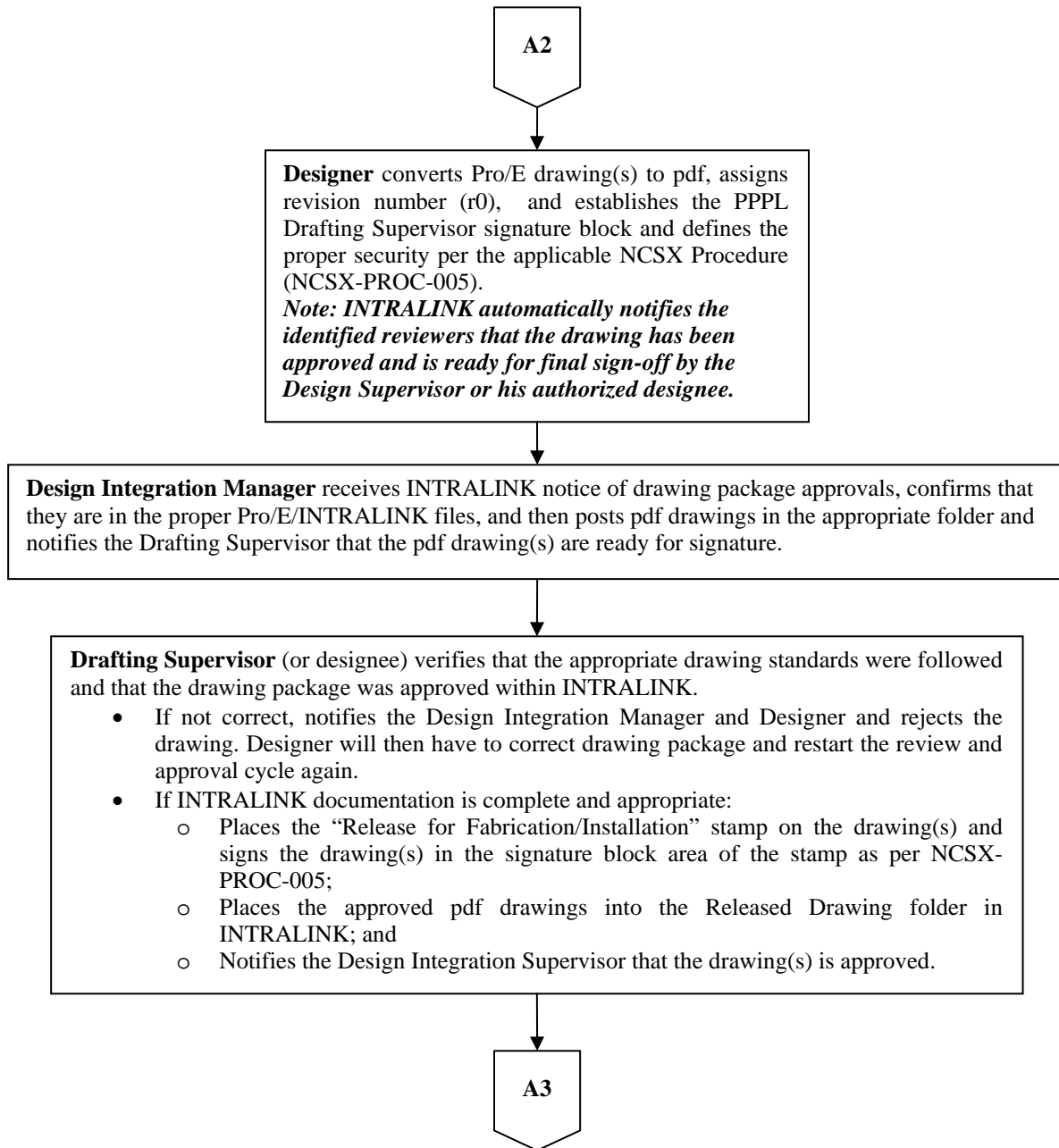
**A. Final Review and Approvals of Pro/E Models and Files (.drw, .prt, and .asm) Ready for Fabrication**





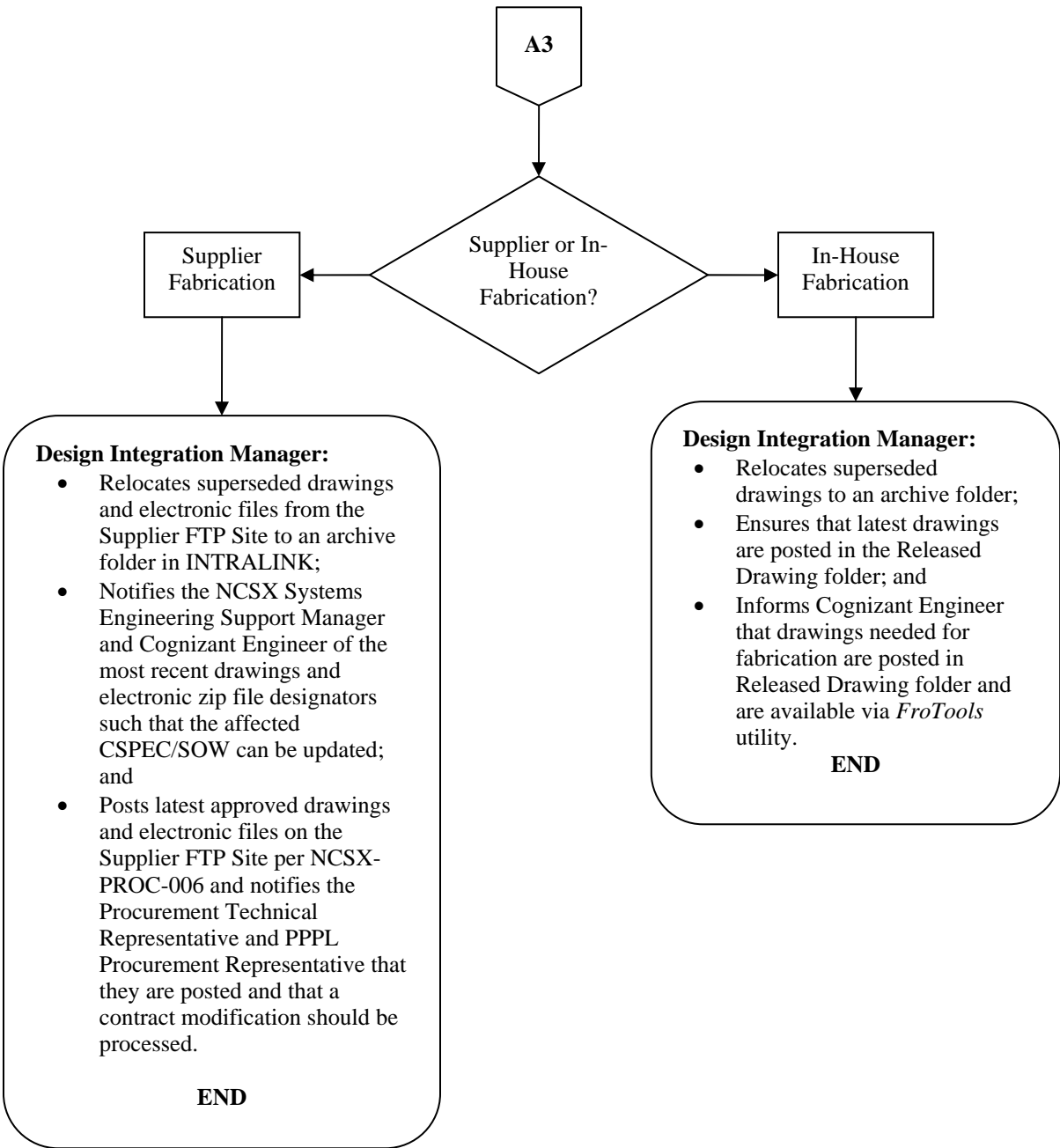
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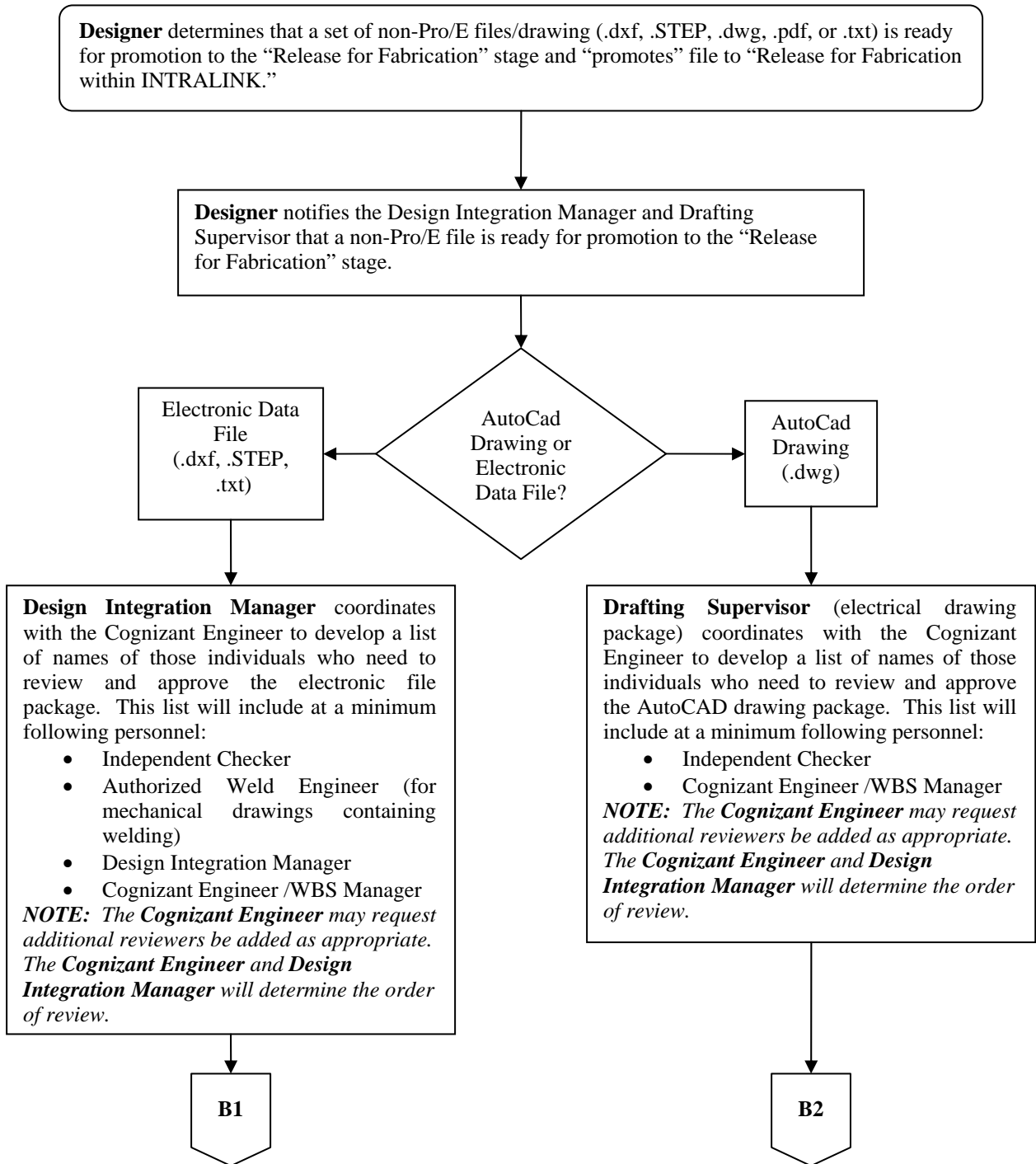


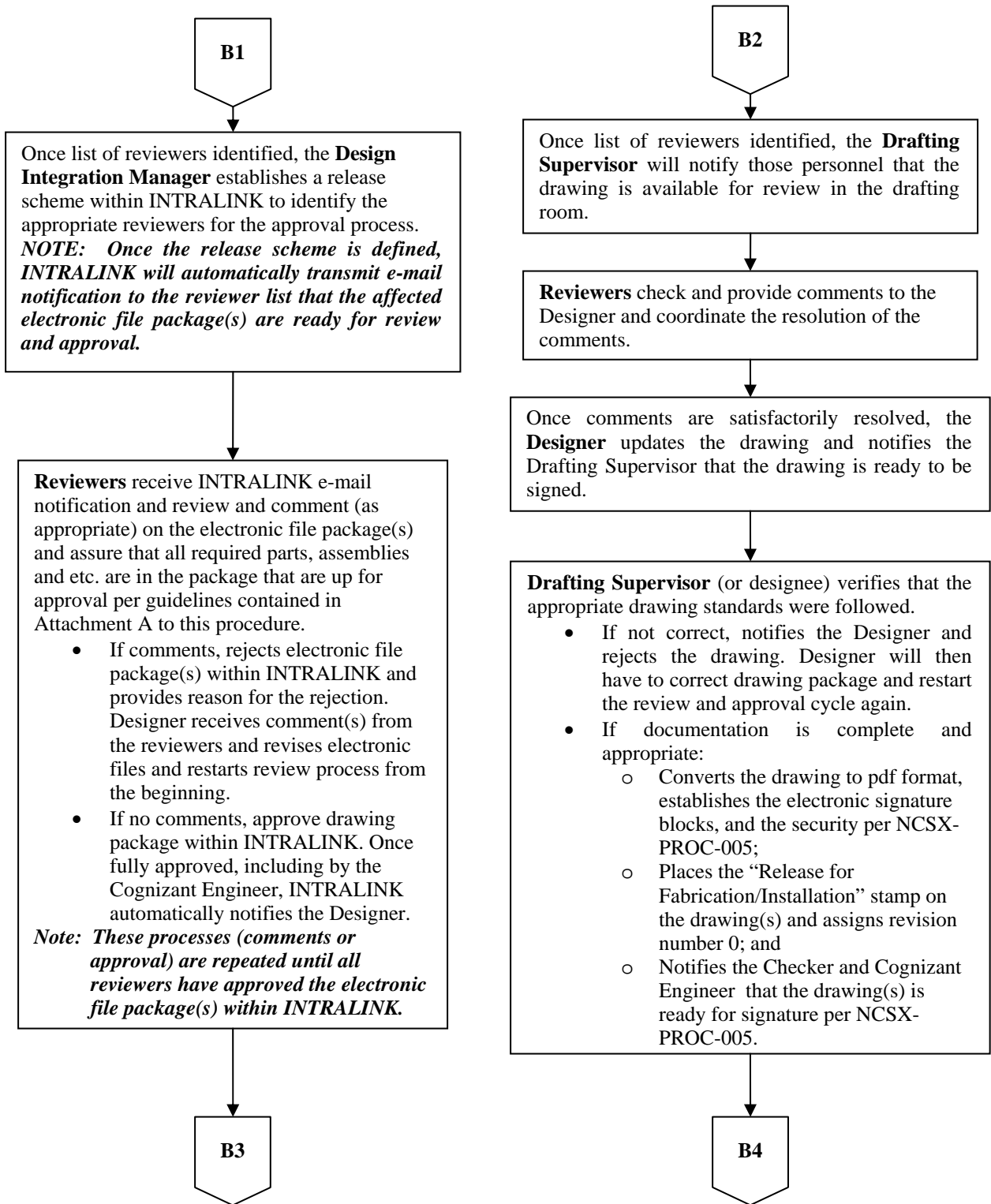
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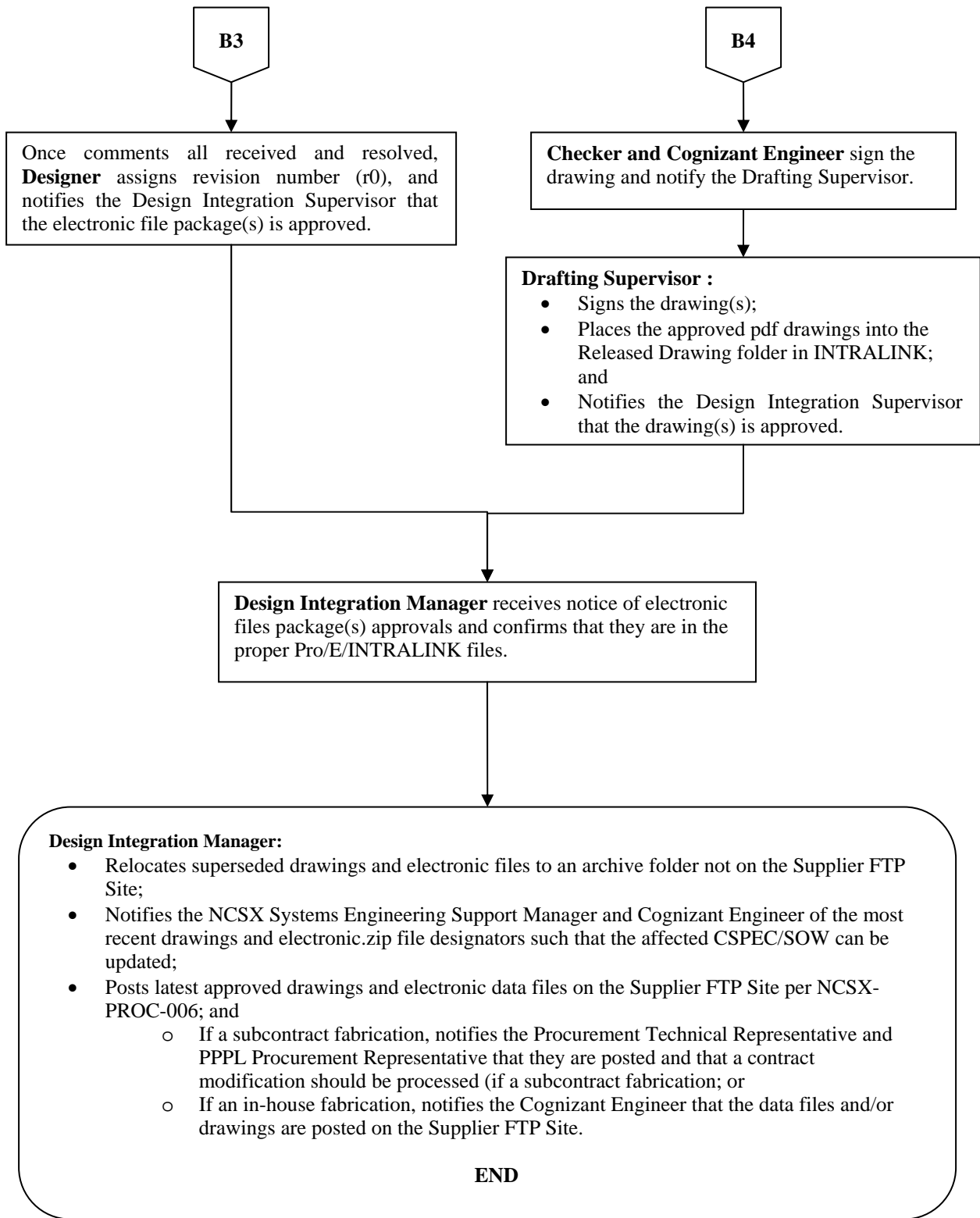


**B. Final Review and Approvals of Non-Pro/E Files (.dxf, .STEP, .dwg, .pdf, and .txt) and Drawings Ready for Fabrication**



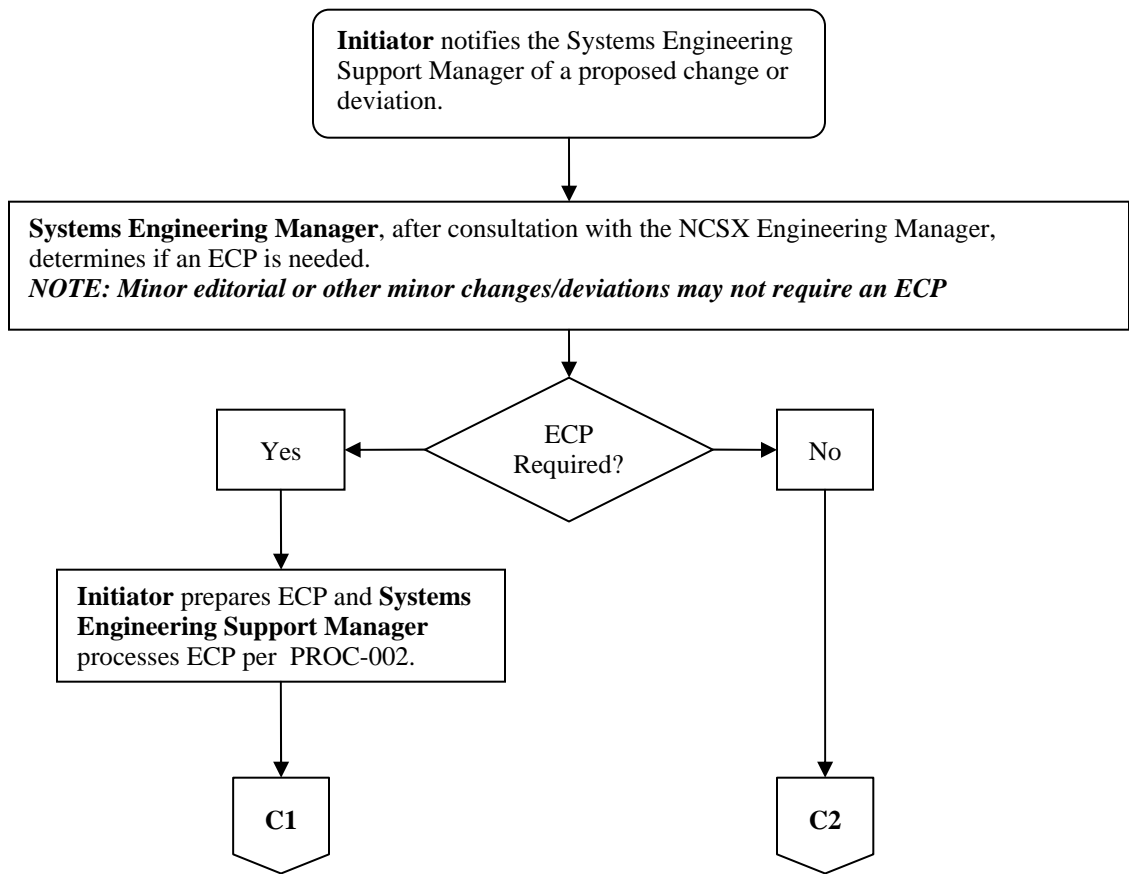




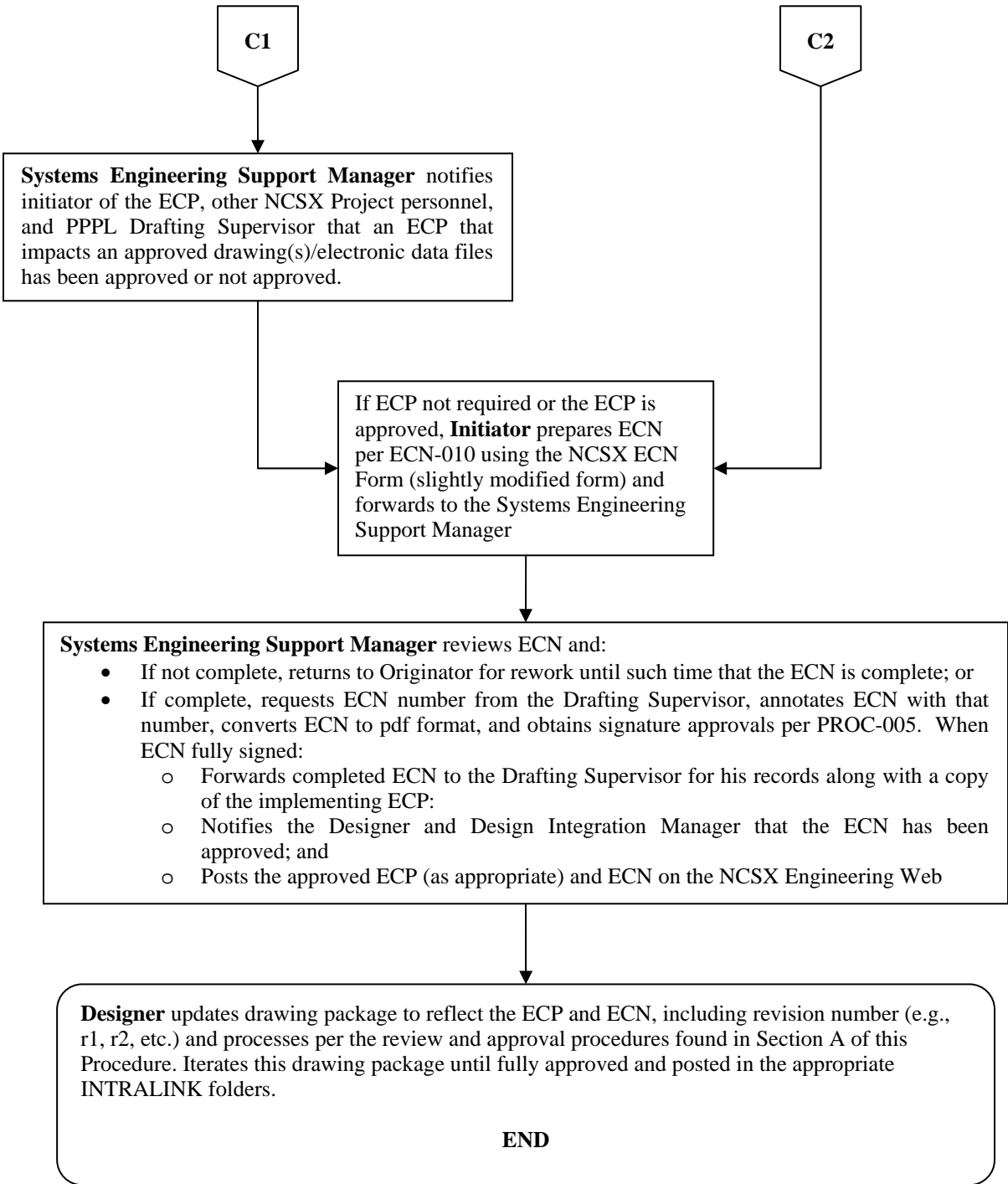


**C. Revision of “Release for Fabrication” Drawings and Electronic Files**

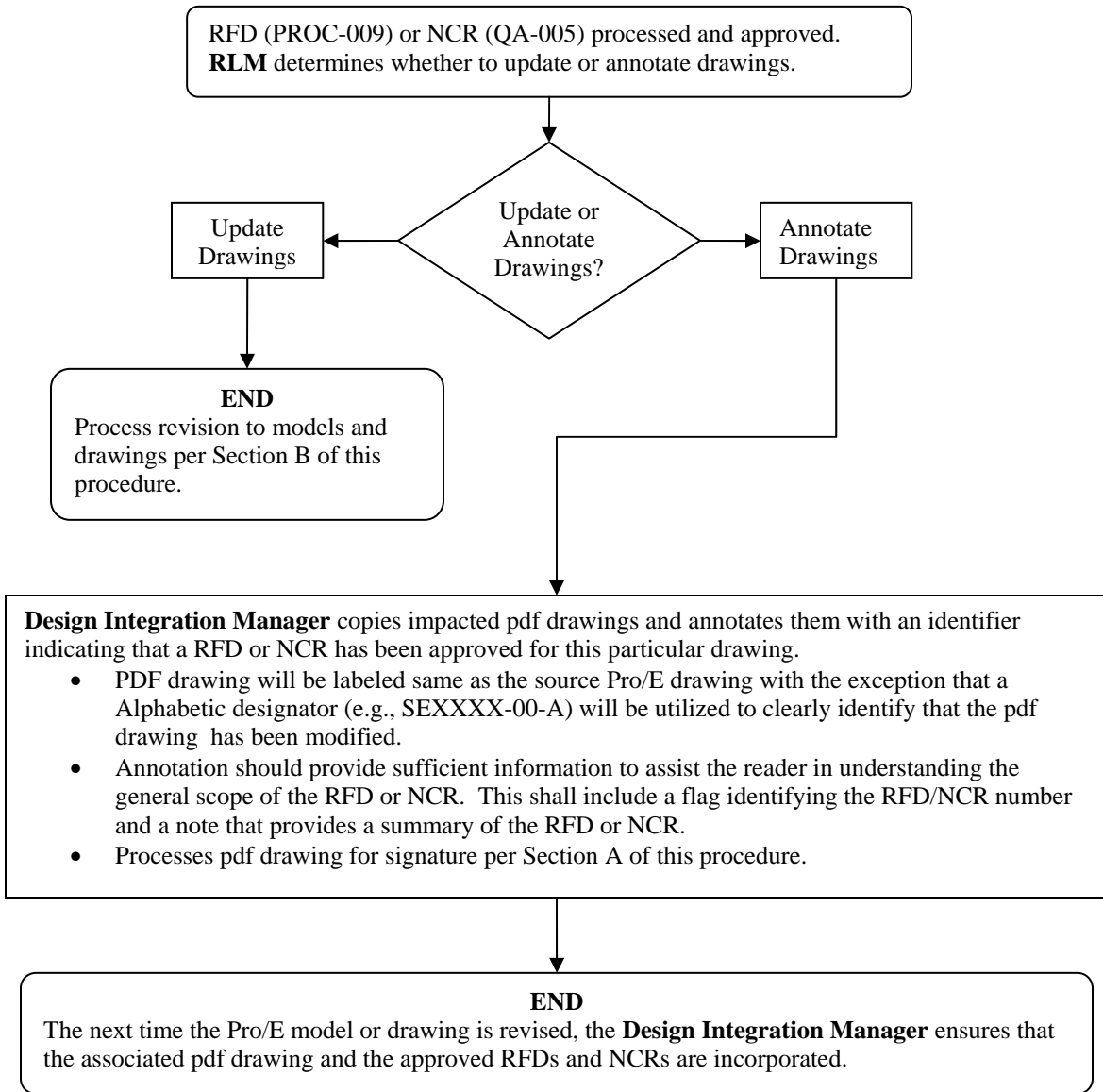
Once a drawing/electronic file is promoted and approved in a “Release for Fabrication” status, the drawing/electronic file comes under configuration control. In accordance with the NCSX Configuration Control process outlined in the NCSX Configuration Management Plan (NCSX-PLAN-CMP) and its accompanying NCSX Procedure (NCSX-PROC-002), once any document is under configuration control, an Engineering Change Proposal (ECP) is required to initiate and authorize a change or deviation (NCSX-PROC-009), unless the NCSX Systems Engineering Manager, after consultation with the NCSX Engineering Manager, specifically authorizes a change without an ECP (generally only limited to editorial and minor changes/deviations). Per the applicable PPPL Engineering Procedure (ENG-010), an Engineering Change Notice (ECN) is also required to document and authorize changes to drawings already in a “Release for Fabrication” status and/or add new drawings needed to fully implement and document the authorized change. When a drawing or file that has already been “released for fabrication” is updated, the revision number will be advanced (e.g., r1, r2, etc.) The procedure that follows provides the step-by-step process.



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**D. Annotation of Drawings with RFD or NCR Identification**



**Attachments**

- 1 – Guidelines for Reviewing/Checking Electronic Models and Drawings**
- 2 – NCSX ECN Forms**

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The new PPPL Engineering Drafting/CAD Guidelines and Standards (ES-DRFT-001) contains guidelines and standards for electronic models and drawings. Section 6 of that new PPPL Engineering Standard contains general guidelines for reviewing/checking models and drawings. The NCSX Project has developed the following NCSX-specific guidelines to assist reviewers/checkers in performing these tasks:

### **General Responsibilities of a Checker**

An individual shall be assigned as checker to review the models and drawing relating to quality, accuracy, manufacturability and conformance to standards. These guidelines and responsibilities apply to mechanical Pro/E models and drawings as well as for electrical AUTOCAD drawings. The checker must be familiar with the function and criteria of the model and drawings to be checked, but should not have been an active participant in preparing this material. Responsibilities include:

- Ensuring the accuracy and completeness of the drawings submitted to him/her, taking into account the design requirements, and assuring compliance with PPPL Drafting/ CAD Process and Standards plus other applicable standards.
- Examining detail, layout, assembly and installation model and drawings for practicality of design; accuracy and conformity to the design criteria and/or existing specification & standards.
- Applying knowledge of mechanical and/or electrical design methods; of manufacture/assembly; and drafting techniques/procedures in performing this review and check.
- Identifying inconsistencies or needed changes (if any) in the models and drawings. The checker shall discuss required changes with Cognizant Individual and/or Designer and shall coordinate and check corrections.

### **Additional Responsibilities for Checking Mechanical Pro/E Models and Drawings**

In addition to the general reviewing and checking responsibilities identified previously, the following specific additional checks need to be made by a reviewer/checker of electronic Pro/Engineer Models and Drawings:

- All Intralink released objects must have a description. The description should all be in caps.

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**Attachment 1****Guidelines for Reviewing/Checking Electronic Models and Drawings**

- All objects should have a number – no names. The number should be of the form: se123-115, where “s” represents the NCSX Project, “e” represents the drawing size, 123 represents the WBS number (either 3 or 4 place WBS), and 115 is a sequential part/drawing number within this WBS. A vendor part number or legitimate library part number may also be used. It should be noted that concepts numbers such as smc123-115 (mc represents your initials) must be converted to se123-115 before the model is moved to the fabrication release level.
- Models should be moved out of our sketch areas and moved to the correct WBS INTRALINK folder if the model represents the final released part.
- All parts should have a density specified.
- All parts and assemblies should have the analysis, model analysis, model mass properties calculated based on the master rep.
- Make sure the “Insert Here” is located after the last feature or component in the model.
- Layers / Features should be placed on one layer only. Layers should be blanked and the status saved.
- Models should be check to assure that there are no warnings; frozen features, circular references, etc.
- Assembly models – Parts/components/subassemblies should not be placed on layers. Simplified reps should be used to control the display.
- Geometric datum(s) should be placed on a layer called 9\_GEO.

**Note:** Any components that are suppressed should be removed from the model. If the component or feature needs to be suppressed the Project should understand why and try to work in the direction of removing the suppressed features/models.

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**Forms are located at:**

[http://ncsx.pppl.gov/SystemsEngineering/Config\\_Mgmt/ECNs/ECN\\_StatusIndex.htm](http://ncsx.pppl.gov/SystemsEngineering/Config_Mgmt/ECNs/ECN_StatusIndex.htm)

PPPL ENGINEERING CHANGE NOTICE (ECN) ECN #

COGNIZANT INDIVIDUAL:	
ECN TITLE:	
ASSOCIATED ECP: None	
CC/WP/Job:	AREA OR PROJECT: NCSX

LIMITATION OF SCOPE - NOTE: A Work Planning Form is NOT required if the total change to be accomplished (ENG-032):

- Is not large or complex or does not represent a new installation into a usable space
- Does not have a significant ES&H impact
- Does not involve tritium or other radioactive contaminated or activated equipment
- Does not impact multiple projects, systems, or groups

OR does not change the scope or intent of the original design.

Responsible Line Manager CONCURRENCE: \_\_\_\_\_  
 (Signature indicates that no Work Planning form is required.)

If non-concurrence or associated with a work planning form, enter the WP Number:

DRAWING(S) AFFECTED NUMBER:	NEW Revision	TITLE
Continued on Back		

<b>DESCRIPTION OF CHANGE:</b> (State Drawing No., Zone/Group, or List Attachments)

ECN #

PPPL ENGINEERING CHANGE NOTICE (ECN) ECN #

REASON FOR CHANGE:
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ENGINEERING CHANGE PROPOSAL:	DATE:
COGNIZANT INDIVIDUAL MAKING THE CHANGE:	
RESPONSIBLE LINE MANAGER:	

ECN #



