Title	Initiated by:	Effective Date:
NCSX Electronic Model and Drawing/INTRALINK Processes	Bob Simmons Digitally signed by Bob Simmons DN: cn=Bob Simmons, c=US Reason: I am the author of this document Date: 2006.05.05 10:45:37 -04'00' NCSX Systems Engineering Support Manager	**5/5/2006**
Concurrence by:	**Concurrence by:**	**Concurrence by:**
Judith Malsbury Digitally signed by Judith Malsbury DN: cn=Judith Malsbury, c=US, o=PPPL, ou=Quality Assurance Reason: I concur with this procedure. Date: 2006.05.05 10:54:11 -04'00' NCSX Quality Assurance Manager	? Tom Brown 2006.05.08 08:25:28 -05'00' NCSX Design Integration Manager	James H. Chrzanowski Digitally signed by James H. Chrzanowski DN: CN = James H. Chrzanowski, C = US, O = PPPL, OU = Engineering Date: 2006.05.08 09:39:14 -04'00' PPPL Mechanical Design Branch Head
Concurrence by:	**Approved by:**	**Supersedes:**
Mike Williams Digitally signed by Mike Williams DN: cn=Mike Williams, c=US, o=PPPL, ou=Engineering, email=williams@pppl.gov Date: 2006.05.08 10:45:40 -04'00' PPPL Head, Engineering & Technical Infrastructure	Wayne Reiersen Digitally signed by Wayne Reiersen DN: CN = Wayne Reiersen, C = US, O = PPPL Reason: I am approving this document Date: 2006.05.08 13:59:35 -04'00' NCSX Engineering Manager	**Revision 1** **June 8, 2005**

Record of Revisions

Revision	Date	Description of Changes
0	**5/4/2005**	**Initial Issue**
1	**6/12/2005**	**Clarified Fabrication Designation for Pro/E and Non-Pro/E Files.**
2	**5/5/2006**	**Modified Section D (Annotation of Drawings with RFD or NCR Identification) to reflect new "stamp" process which permits modifying pdf drawing to post a "stamp" identifying the change approved by RFD or NCR).**

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.

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 is 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.

It has been noted, especially for the MCWF and VVSA procurements that we are processing and approving RFDs and NCRs that have an impact on existing revisions to the drawings, but are relatively minor in nature. Formally revising a drawing each time (via ECN to incorporate the RFD or NCR) is both time consuming and has created a real budget issue. Accordingly, it has been decided to permit an interim change to the drawing using the "Stamp Tool" in Adobe Acrobat to enable either the Design Integration Manager or the Systems Engineering Support Manager – ***these are the only two*** -- to make a change to the PDF drawing using the "Stamp Tool" without changing the full revision of the drawing or requiring a full review and approval cycle within INTRALINK to change the ProE models and drawings – this proposed change will ***ONLY*** impact the signed "Released for Fab" pdf drawings. ***NOTE: the "Stamp" will only reference the RFD or NCR. However, in keeping with the philosophy of PPPL ENG-010, once three "stamps" are accumulated against a drawing, the next "stamp" will require a formal ECN and drawing revision in a timely manner.***

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
PPPL QA Procedure 005	Control of Non-Conformances

Procedure

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

Designer determines that a Pro/E mechanical drawing package (model, parts, assemblies, and drawings) is ready for promotion to the "Release for Fabrication" stage and "promotes" file to "Release for Fabrication."
Note: Within the INTRALINK processes, a "Revision 0" is assigned when the file is promoted to "release for fabrication" vs. a Version number which is automatically assigned to Work in Progress (WIP) releases.

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Designer notifies the Design Integration Manager that a 3D mechanical drawing package (model, parts, assemblies, and drawings) is ready for promotion to the "Release for Fabrication" stage.

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Design Integration Manager (mechanical drawing package) coordinates with the Cognizant Engineer to develop a list of names of those individuals who need to review and approve the drawing package. This list will include at a minimum following personnel:

- Independent Checker
- Authorized Weld Engineer (for mechanical drawings containing welding)
- Design Integration Manager
- Cognizant Engineer /WBS Manager

NOTE: *The **Cognizant Engineer** may request additional reviewers be added as appropriate. The **Cognizant Engineer** and **Design Integration Manager** will determine the order of review.*

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Once list of reviewers identified, the **Design Integration Manager** establishes a release scheme within INTRALINK to identify the appropriate reviewers for the approval process.
NOTE: Once the release scheme is defined, INTRALINK will automatically transmit e-mail notification to the reviewer list that the affected drawing package(s) are ready for review and approval.

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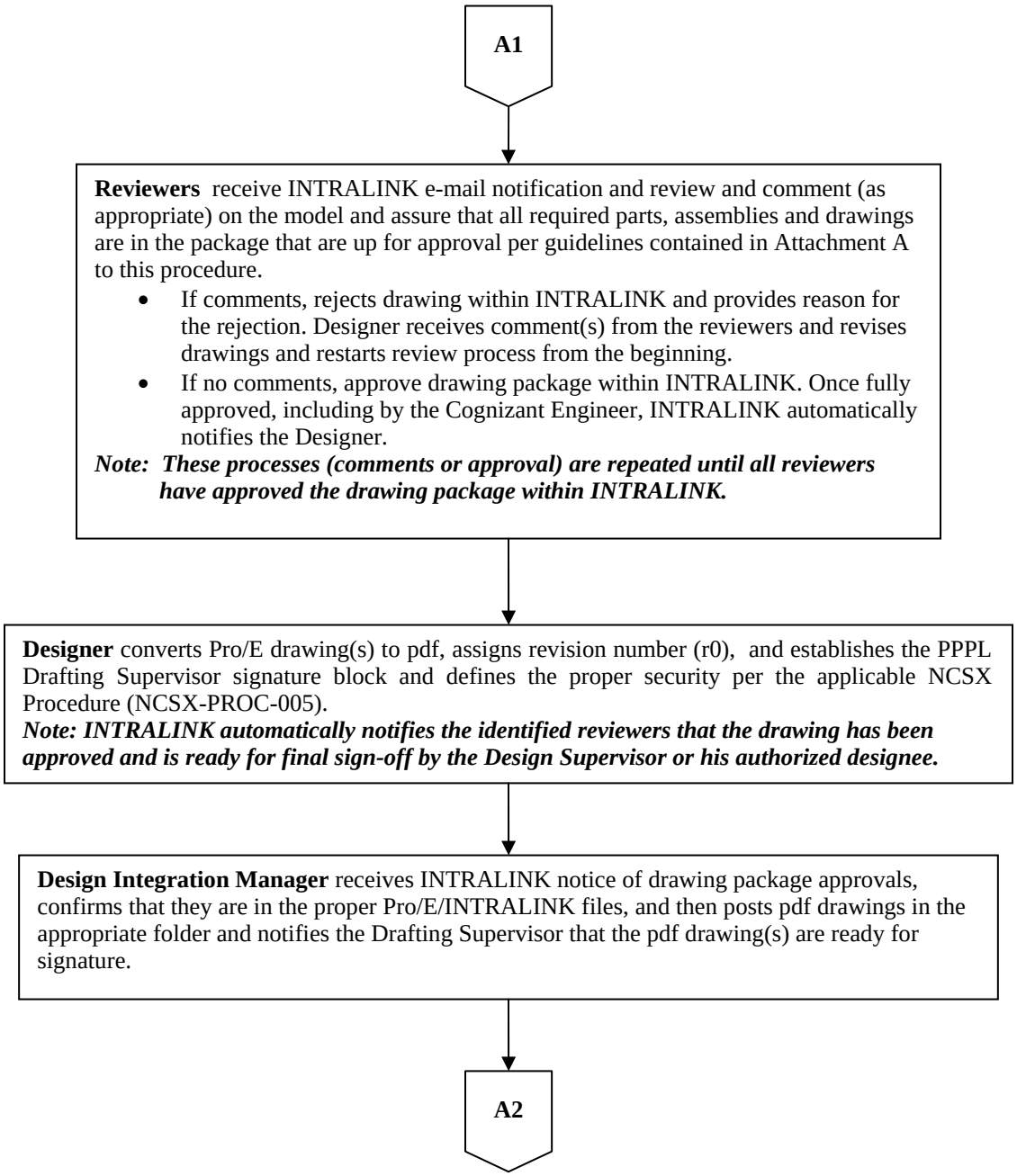
A1



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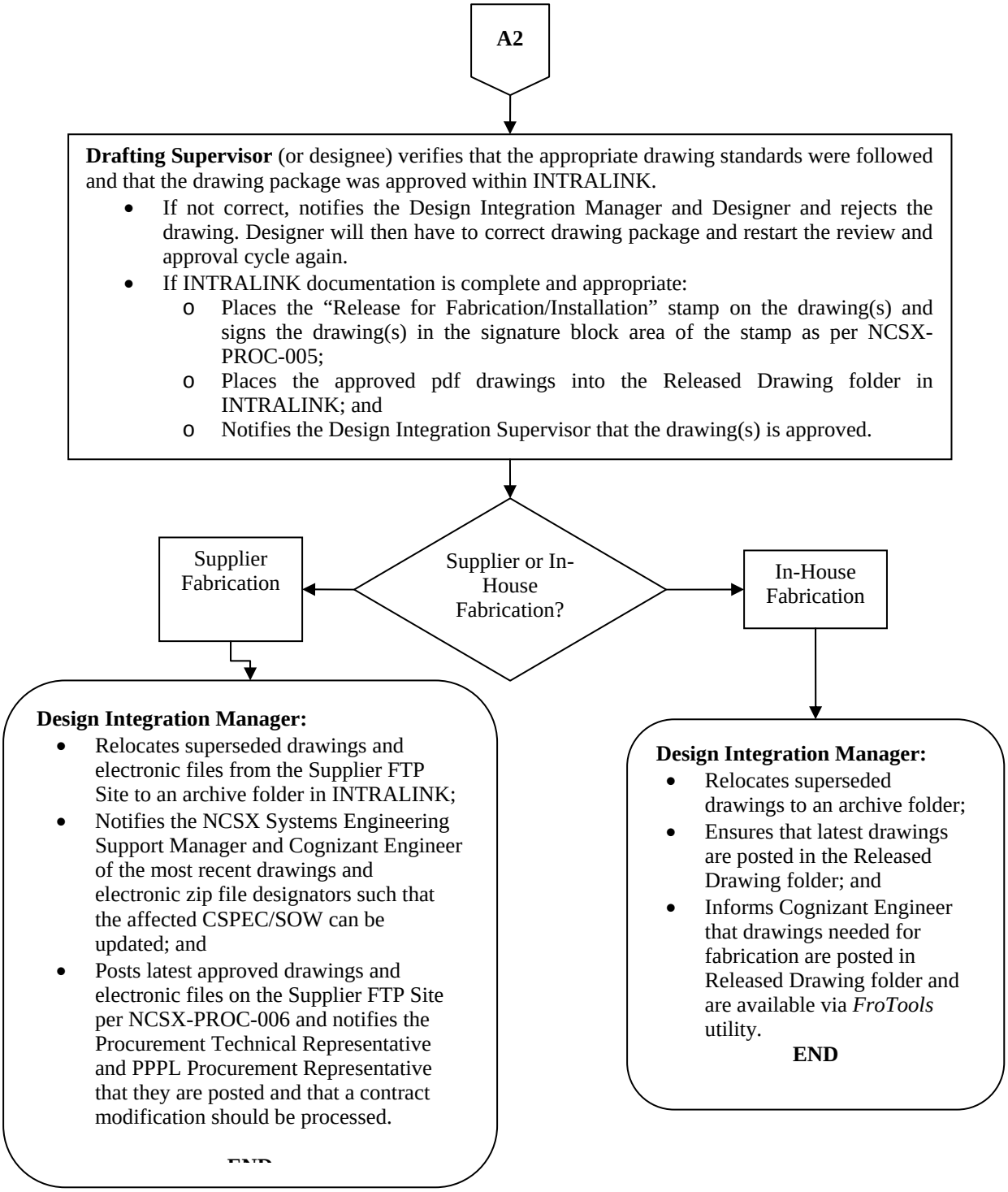
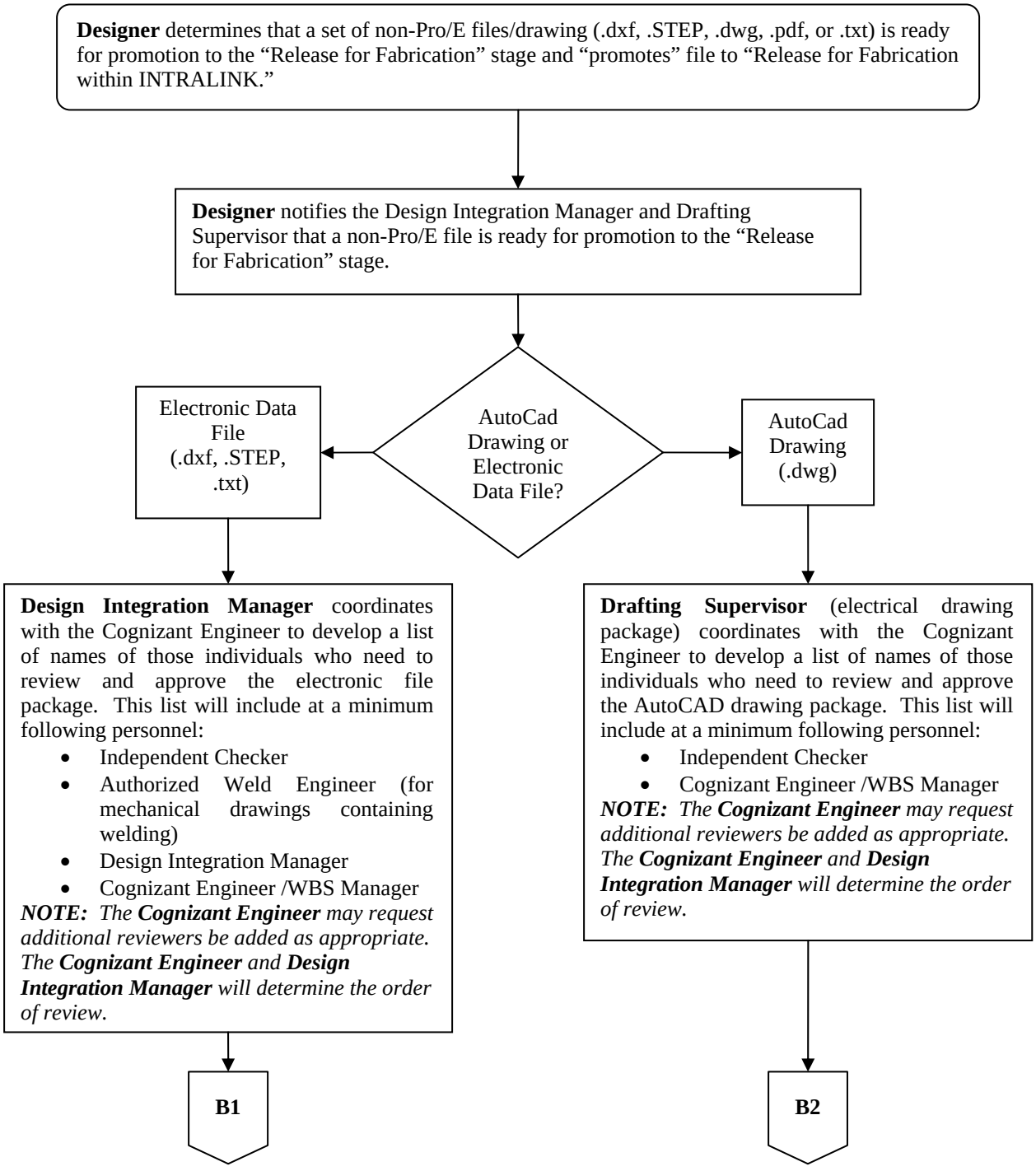

A2
Drafting Supervisor (or designee) verifies that the appropriate drawing standards were followed and that the drawing package was approved within INTRALINK.
If not correct, notifies the Design Integration Manager and Designer and rejects the drawing. Designer will then have to correct drawing package and restart the review and approval cycle again.
If INTRALINK documentation is complete and appropriate:
Places the "Release for Fabrication/Installation" stamp on the drawing(s) and signs the drawing(s) in the signature block area of the stamp as per NCSX-PROC-005;
Places the approved pdf drawings into the Released Drawing folder in INTRALINK; and
Notifies the Design Integration Supervisor that the drawing(s) is approved.
Supplier or In-House Fabrication?
Supplier Fabrication
In-House Fabrication
Design Integration Manager:
Relocates superseded drawings and electronic files from the Supplier FTP Site to an archive folder in INTRALINK;
Notifies the NCSX Systems Engineering Support Manager and Cognizant Engineer of the most recent drawings and electronic zip file designators such that the affected CSPEC/SOW can be updated; and
Posts latest approved drawings and electronic files on the Supplier FTP Site per NCSX-PROC-006 and notifies the Procurement Technical Representative and PPPL Procurement Representative that they are posted and that a contract modification should be processed.
END
Design Integration Manager:
Relocates superseded drawings to an archive folder;
Ensures that latest drawings are posted in the Released Drawing folder; and
Informs Cognizant Engineer that drawings needed for fabrication are posted in Released Drawing folder and are available via FroTools utility.
END

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



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B1

Once list of reviewers identified, the **Design Integration Manager** establishes a release scheme within INTRALINK to identify the appropriate reviewers for the approval process. ***NOTE: Once the release scheme is defined, INTRALINK will automatically transmit e-mail notification to the reviewer list that the affected electronic file package(s) are ready for review and approval.***

Reviewers receive INTRALINK e-mail notification and review and comment (as appropriate) on the electronic file package(s) and assure that all required parts, assemblies and etc. are in the package that are up for approval per guidelines contained in Attachment A to this procedure.

- If comments, rejects electronic file package(s) within INTRALINK and provides reason for the rejection. Designer receives comment(s) from the reviewers and revises electronic files and restarts review process from the beginning.
- If no comments, approve drawing package within INTRALINK. Once fully approved, including by the Cognizant Engineer, INTRALINK automatically notifies the Designer.

Note: These processes (comments or approval) are repeated until all reviewers have approved the electronic file package(s) within INTRALINK.

B3

B2

Once list of reviewers identified, the **Drafting Supervisor** will notify those personnel that the drawing is available for review in the drafting room.

Reviewers check and provide comments to the Designer and coordinate the resolution of the comments.

Once comments are satisfactorily resolved, the **Designer** updates the drawing and notifies the Drafting Supervisor that the drawing is ready to be signed.

Drafting Supervisor (or designee) verifies that the appropriate drawing standards were followed.

- If not correct, notifies the Designer and rejects the drawing. Designer will then have to correct drawing package and restart the review and approval cycle again.
- If documentation is complete and appropriate:
  - Converts the drawing to pdf format, establishes the electronic signature blocks, and the security per NCSX-PROC-005;
  - Places the "Release for Fabrication/Installation" stamp on the drawing(s) and assigns revision number 0; and
  - Notifies the Checker and Cognizant Engineer that the drawing(s) is ready for signature per NCSX-PROC-005.

B4

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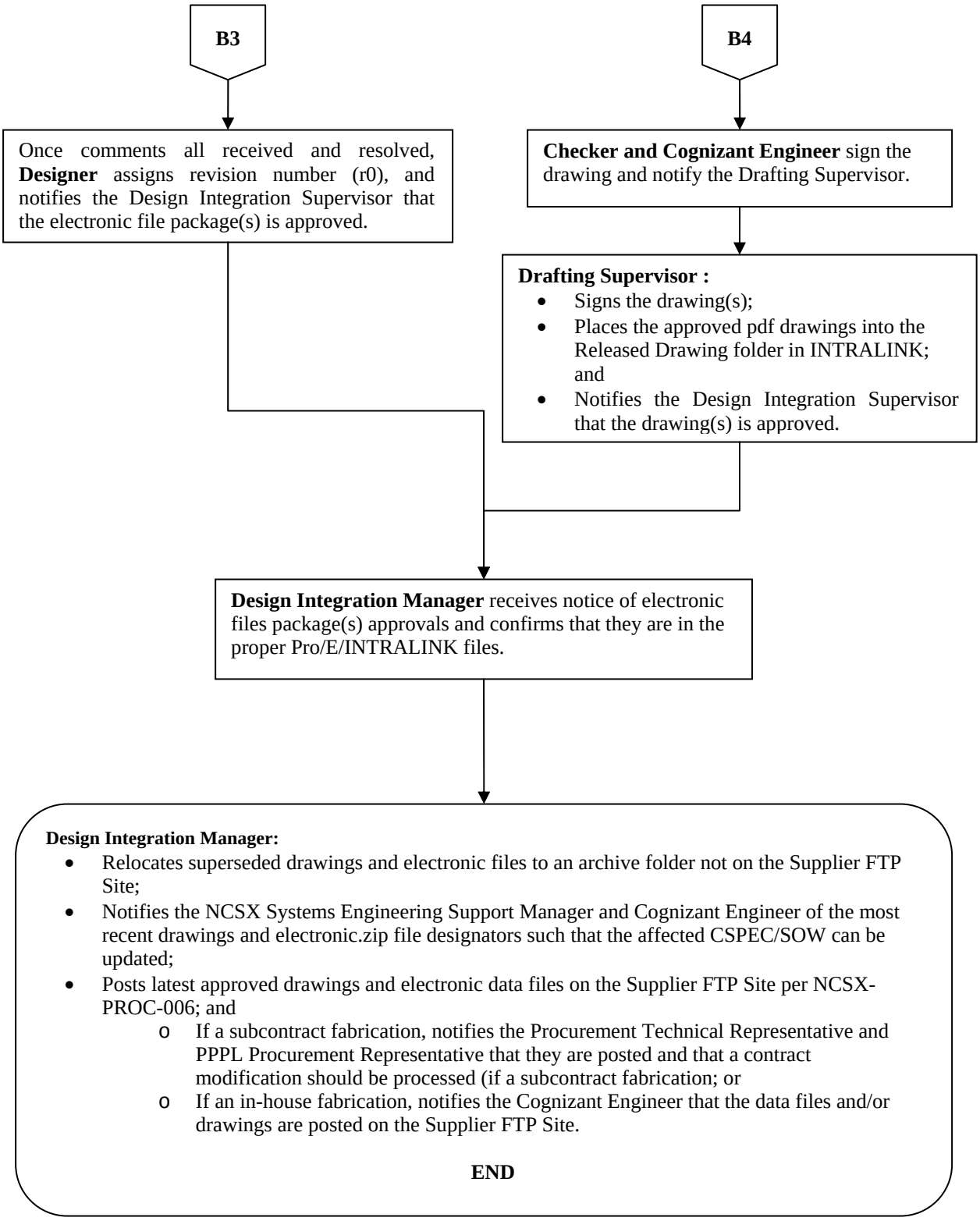

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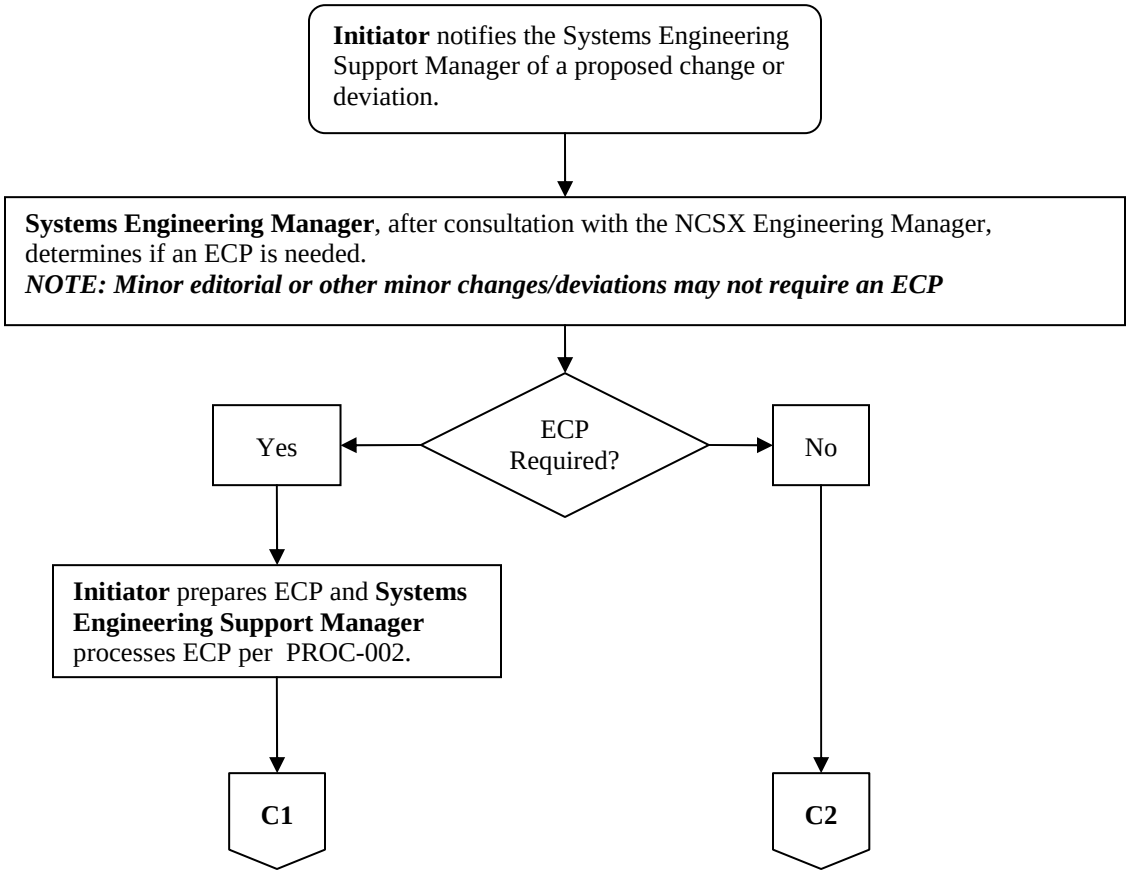
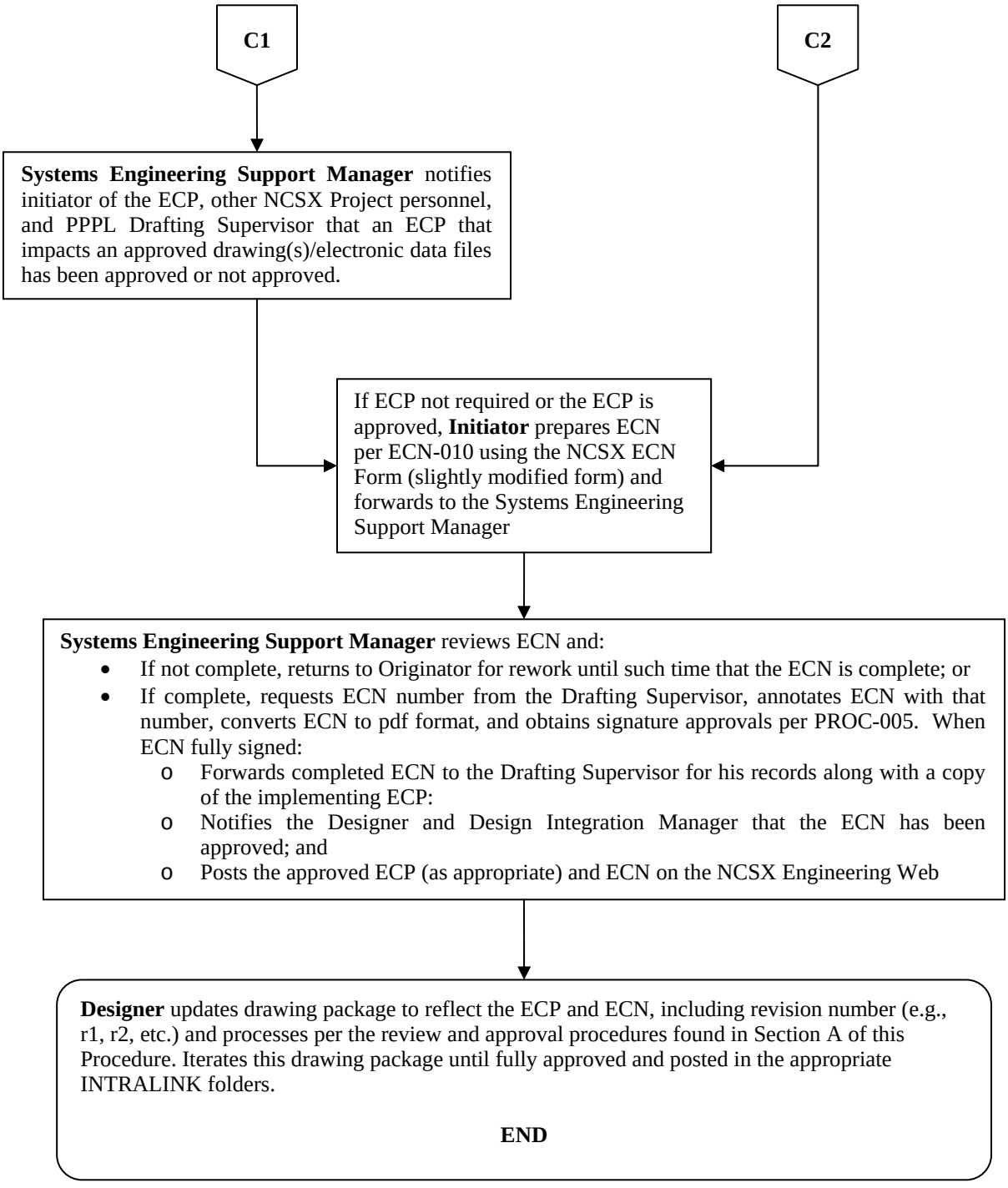
C. Revision of "Release for Fabrication" Drawings and Electronic Files

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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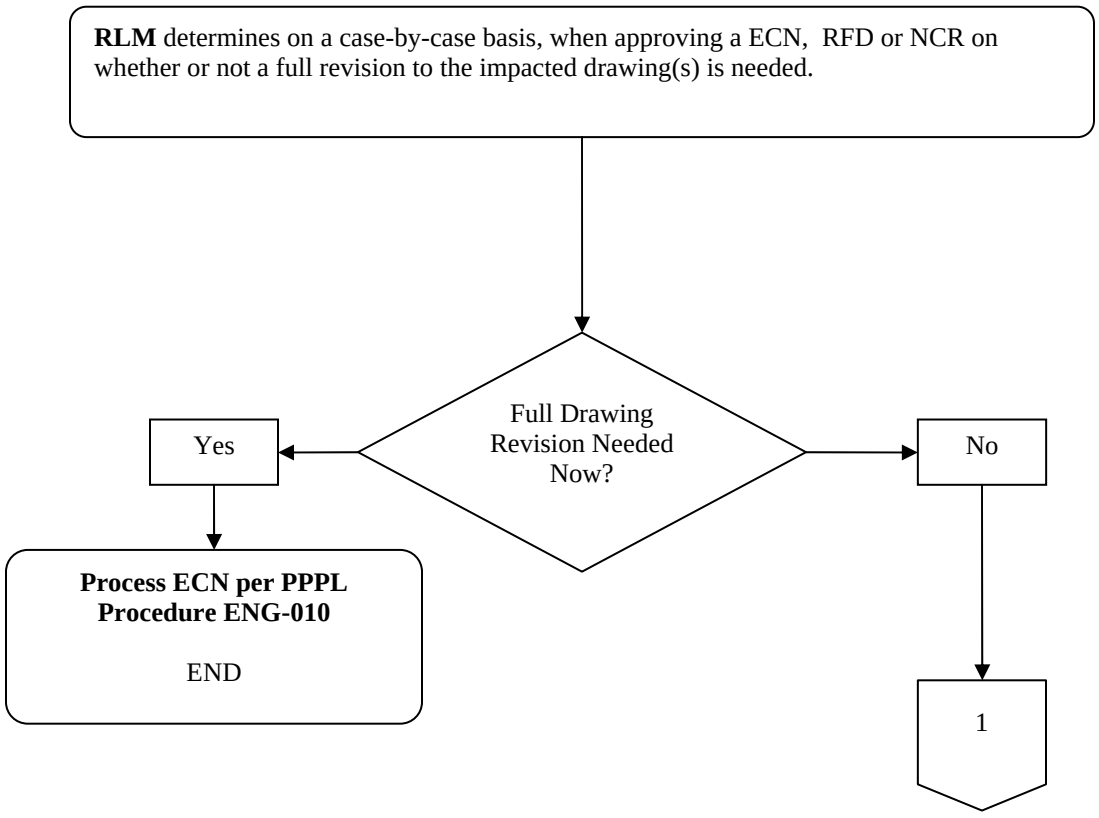
D. Annotation of Drawings with RFD or NCR Identification

As per PPPL ENG-010 the Engineering Change Notice is the vehicle by which a drawing that has been released for fabrication may be revised. Because of limited NCSX resources and time constraints on formally revising drawings, the use of the "Stamp Tool" in Adobe Acrobat can be used by either the Design Integration Manager or the Systems Engineering Support Manager to change a "Release for Fab" PDF drawing to reflect an approved RFD or NCR. Note that as per the logic of ENG-010, after the third (3) "stamp" is posted against a specific drawing a formal revision **MUST** be made.



1

Design Integration Manager or Systems Engineering Support Manager (NO OTHERS):

- Make a copy of the impacted PDF drawing(s) and label them as a letter update (e.g., Rev 1-a, b, c, etc.) and save it to their desktop. Annotate the drawing revision as 1-a, 1-b, etc. to reflect the current revision approved and the letter update.
- Delete the Drafting Supervisor's signature from the "Release from Fabrication" to permit adding of notes using the PDF "Stamp Tool".
- Adds/revises drawing security to "Password Protected" with the allowance for "High Resolution" printing and "Commenting, Form Filling and Signing" options if not already established.
- Using the "Stamp Tool" creates a unique stamp for each approved RFD or NCR with the following details included in the note:
  - Identification of the implementing document (e.g, RFD-14-019 or NCR XXXXX.).
  - Brief description of the changes – if the content of the document cannot be clearly described, a hard copy of the implementing document will need to be provided to the Supplier or ATI.
  - Applicability of the change (e.g., for RFD-14-019, only applicable to C6 and all Type A and Type B castings, etc.)

  NOTE: Only three (3) "stamps" are permitted to accumulate against a drawing -- the next "stamp" will require an ECN and the drawing MUST be formally revised in a timely manner.
- Ensures that the "stamp" is highlighted in yellow with a thick border to stand out.
- Save the drawing and send to the Drafting Supervisor for his signature in the "Release for

Drafting Supervisor re-signs the "Release for Fabrication" stamp block and sends the PDF drawing to the Systems Engineering Support Manager

Systems Engineering Support Manager provides copy of the implementing RFD or NCR to the appropriate party if needed for completeness. Otherwise, passes impacted drawings on to the Design Integration Manager for posting.

Design Integration Manager posts the impacted drawings on the NCSX Manufacturing Web and the INTRALINK data base.

At the next full revision of the drawing (either as a result of a "major" change or the decision to update the drawing to pick up numerous "minor" changes, the RLM, Design Integration Support Manager, and the Systems Engineering Support Manager **ensures that the letter updates are incorporated.** Systems Engineering Support Manager **provides hard copy of referenced ECN, RFD, or NCR to responsible ATI if needed.**

END

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Attachments

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

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Attachment 1

Guidelines for Reviewing/Checking Electronic Models and Drawings

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 me 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.

- 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.

Forms are located at:

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

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

ECN #

PPPL ENGINEERING CHANGE NOTICE (ECN) ECN #

REASON FOR CHANGE:

ENGINEERING CHANGE PROPOSAL: DATE:
COGNIZANT INDIVIDUAL MAKING THE CHANGE:
RESONSIBLE LINE MANAGER:

ECN #

PPPL ENGINEERING CHANGE NOTICE (ECN) ECN #

(Continuation Page)

DRAWING(S) AFFECTED NUMBER:	NEW REV.	TITLE

ECN #