



NORTHEASTERN UNIVERSITY REQUIREMENTS FOR CLOSEOUT DELIVERABLES
STANDARDS FOR PRODUCTION AND FORMAT

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INTRODUCTION

This document is a resource for Northeastern University project managers, architects, engineers, and contractors working on construction and renovation projects at Northeastern University. The purpose of this document is to convey the requirements for project closeout documentation and provide standards for creating and delivering documentation at the close of Northeastern University projects. Section 1 outlines the required document types due at closeout; Sections 2 – 7 describe standards for the creation and delivery of project deliverables.

It is acknowledged that new construction and renovation project deliverables may vary depending on size and type of work. For instance, some projects may not produce drawings in any format or require regulatory approvals. However, all architects, engineers, and contractors are required to submit any and all applicable deliverables as described within this document.

These requirements ensure that Northeastern University receives an accurate record of final project work and promote a standard for consistency that ensures the long-term value and accessibility of construction project deliverables. Architects, engineers, and contractors must deliver required documentation (where applicable) and adhere to the standards described herein. If received documentation does not comply with the following standards, final payment may be delayed until documents conform to Northeastern University requirements.

There are two (2) checklist templates to assist with deliverable submissions. Appendices A and B provide summary lists of deliverables, submission locations, and quality checks. Appendix C – a drawing index – must be completed and submitted with project drawing sets on all projects.

These requirements are in accordance with:

- U.S. National CAD Standards (V6)
- Northeastern University Agreement Between Owner and Architect/Engineer
- Capital Project Design Guidelines
- Northeastern University MEP Design Standards
- Northeastern University BIM Standards

DOCUMENT UPDATES

This document was most recently updated on December 14, 2023, to reflect the following changes:

- Digital submissions only, no hard copy submissions will be accepted.
- Removed TIFF requirement, only drawings in PDF and DWG will be accepted.
- Added definitions for document deliverables with specific requirements for Northeastern University.
- Updated PDF requirements to include separate files for each discipline for:
 - As-Builts
 - Warranties
 - Operations and Maintenance Manuals (O&Ms)

NORTHEASTERN UNIVERSITY-SPECIFIC DEFINITIONS

As-Built Drawings

As-built drawings are drawings that are prepared at the end of a construction project by the Contractor. These are drawing/plans that show the completed project scope, as actually installed. This is a contractual obligation between the Contractor and the Owner.

Record Drawings

Record drawings are prepared by the Architect/Engineer and reflect significant on-site changes noted by the Contractor at the completion of construction, including in as-built drawings. This is a contractual obligation between the Architect/Engineer and the Owner.

Optical Character Recognition (OCR)

By default, computers save scans as images; Optical Character Recognition (OCR) is the process that converts an image of text into a digitally readable and searchable PDF document.

Environmental Reports

This may include documentation regarding environmental or hazardous remediation, as well as sustainability reports and soil samples.

Final Commissioning Reports

These reports are provided by the Northeastern University Commissioning Team as part of construction closeout. Commissioning reports establish the standards of performance for building systems and verify that designed and constructed work meets those standards.

DELIVERABLES OVERVIEW

- Complete the Drawing Index (Appendix C) with all drawing sets that have been submitted in the “As-built” folder
- Submit a Drawing Index in PDF format and place the file in the “Drawing Index” Closeout folder in e-Builder.
- Upload required closeout documents to the appropriate folders in e-Builder and/or deliver to the Northeastern University project manager via email or file transfer software for large files.
- All submitted PDFs are required to be processed through an OCR program, such as Adobe Pro or ABBYY, in order to comply with ADA requirements.
- Reports, certificates, and regulatory approvals must be signed by the appropriate authority having jurisdiction over the project and submitted in digital PDF format.

SECTION 1 – REQUIRED DOCUMENT TYPES

1.1 As-built and Record Drawings

All Architects/Engineers, Contractors, and Consultants (as may be applicable) contracted with Northeastern University are required to deliver a final version of their drawings and specifications.

Architects/Engineers must submit record drawings in PDF and DWG format, scaled to fit a standard 24" x 36" or 30" x 42" sheet.

Contractors/Consultants must submit as-built drawings reflecting the final built condition, which incorporate all changes made in the field. Submit as-built drawings in PDF and DWG format, scaled to fit a standard 24" x 36" or 30" x 42" sheet.

See Sections 2 and 4 below for CAD & PDF document standards and specifications.

1.1.1. Requirements

- All drawings should be stamped and signed showing actual construction with accurate dimensions; drawings shall not show alternate options.
- Name drawings in accordance with the standards and naming conventions prescribed by Northeastern – See Section 7.1 or New PM Toolkit in e-Builder.
- Submit drawings grouped by discipline. Resulting in one (1) digital file per discipline area that is applicable to the project. Please contact Northeastern University project manager for written consent to deviate from this requirement.
- Submit two (2) digital sets of drawings in total: one (1) set of CAD files (DWG format) and one (1) set of PDF files.

1.1.2. Production

- Drawings will be reviewed upon submission, and if required documentation is not received, and/or not submitted per these requirements, the project may not proceed through the closeout process, thus resulting in a potential delay of final payment until documentation is received and approved. The list below contains some examples of documents that may be rejected during the close-out process:
 - Pictures of documents (i.e., JPEGs)
 - Incomplete documents
 - Hand-drawn documents
 - Documents that do not contain Northeastern University's Use Disclaimer language (See Section 2.8 below)
 - Unsigned or unstamped drawings
 - PDF drawings with AutoCAD SHX comments (improper font usage)
- The prime architect/engineer must work with the contractor to coordinate as-built drawings reflecting the final built condition of the project. The prime architect/engineer is then responsible for producing the final record documents for the project (see Northeastern

University Agreement Between Owner and Architect/Engineer).

- For projects with no constructed scope (ex. furniture fit-outs), layout plans will be accepted as a final as-built. These drawings should be labelled as such and updated to reflect the final field conditions.

1.2 Operations and Maintenance Manuals (O&Ms)

- Submit separate PDFs for each discipline that pertains to the project. This means ONE (1) PDF file EACH for Mechanical, Electrical, and so on as appropriate for the project. O&M manuals should be organized into separate subsections for related equipment.
- Name O&Ms in accordance with the standards and naming conventions prescribed by Northeastern – See Section 7.1 or New PM Toolkit in e-Builder
- Include a description of each unit and related component parts, including name of manufacturer, model number, serial number, and equipment tag number.
- Provide manufacturer information, maintenance procedures, and servicing schedule(s).
- Submit O&Ms in PDF format organized as described above. **No paper will be accepted.**
- Each manual must contain and be organized in this manner: title page, table of contents, product data supplemented by text and/or drawings, bond, and service contract issued.
- All O&Ms should include phone lists of subcontractors, suppliers, manufacturers, and representatives.

1.3 Warranties

- Submit warranties as separate document(s) from O&Ms and place in the “05 Warranties” Closeout folder in E-Builder.
- Name warranties in accordance with the standards and naming conventions prescribed by Northeastern – See Section 7.1 or New PM Toolkit in e-Builder
- Submit as OCRRed PDFs.

1.4 Specifications

- For specifications submitted as a book, organize documents following the latest Construction Specifications Institute (CSI) format and indexing.
- For specifications submitted as a drawing, follow the sheet identification standards described in Section 3 of this document.
- Name Specifications in accordance with the standards and naming conventions prescribed by Northeastern – See Section 7.1 or New PM Toolkit in e-Builder
- Submit as OCRRed PDFs.

1.5 Final Commissioning Report

- Submit Final Commissioning Report, when applicable, in PDF.
- Submit as OCRRed PDFs.

1.6 Regulatory Approvals

- Any regulatory approvals completed on behalf of the project and approved by the authority having jurisdiction should be submitted as part of project closeout deliverables.
- Submit regulatory approvals, as may be applicable, in OCRed PDF format. Regulatory approvals may include but are not limited to the following below:
 - Asbestos / DEP Permits
 - Building Permits
 - Certificate of Inspection
 - Assembly Permits
 - Occupancy Permits
- Name Regulatory Approvals in accordance with the standards and naming conventions prescribed by Northeastern – See Section 7.1 or New PM Toolkit in e-Builder
- The information provided above is not intended to be comprehensive. For Projects located outside of the City of Boston and/or the Commonwealth of Massachusetts, the regulatory approvals shall conform to the local regulations and laws of the jurisdiction where the Project is located.

1.7 Surveys & Reports

- All land surveys, environmental reports, etc. must be submitted in PDF format.
- If Civil surveys were performed, DWG copies must be submitted.

SECTION 2 – CAD REQUIREMENTS

2.1 Version

- AutoCAD™ version 2013 or higher are acceptable file formats for As-Built project drawings. All architectural drawings prepared for Northeastern University must be submitted in .dwg format.

2.2 General Production

- CAD files containing multiple drawing sheets must be separated by discipline.
- All CAD drawings shall be purged of empty, unused, or non-essential drawing data prior to submittal. This includes all unused layers, line-types, blocks, fonts and entities.
- All CAD drawing models should be drafted at full scale in imperial architectural units, such that one drawing unit equals one inch.

2.3 Title Block Requirements

- The consultant responsible for producing the drawings should be clearly identified.
- Project Name – assigned by Northeastern University
- Project Number – assigned by Northeastern University
- Building – full name of the building

2.4 Sheet Identification Requirements

- Drawing Title – describes the drawing content
- Sheet identification –follow the Sheet Identification Requirements in Section 3
- Date – date of the drawing at final revision, as-built
- North Arrow showing orientation of drawing

2.5 Fonts and Text Styles

- Only use TrueType (TTF) fonts such as Arial, Courier New, and/or Times New Roman.
- Use only native CAD fonts, line-types, and hatch patterns.
- Do not use custom fonts, line-types, or hatch patterns, including any provided by 3rd party.
- Postscript fonts shall not be used.
- Shape (SHX) fonts shall not be used.

2.6 External Reference Files (XREFs)

- Northeastern University will not accept CAD drawing submissions that reference external reference files (XREFS).
- All XREFS must be “bound” to the final drawing.

2.7 Model and Paper Space Guidelines

- Place title blocks, schedules and general notes at full-scale in paper space whenever possible.
- Label scaled viewports with the appropriate scale in model space.
- Do not place or draw model-related blocks, tags and objects in paper space.
- Draw all model space objects at full scale.
- Scale objects using paper space viewports – zoom viewports to an appropriate scale where linework and annotations are clearly visible.

2.8 Use Disclaimer Requirement

- All final as-built drawings / plans must include the following disclaimer:

“Warning: This document may contain sensitive and/or proprietary information and therefore must be treated as a confidential document. Acceptance of this document constitutes an agreement that this document and the information contained herein shall be maintained and transmitted in a confidential manner. No part of this document shall be reproduced, released, or distributed without the express written permission of Northeastern University and any distribution to non-Northeastern University entities or persons must be subject to a written confidentiality agreement.”

2.9 General Layering Guidelines

- Use only the latest version of *US National CAD Standard* layer names.
- Use the minimum number of layers necessary to adequately separate entities in each drawing, and should not contain extraneous, redundant, or overly detailed layer names.
- Purge each drawing of unused layers prior to submittal. The drawing file should contain only those layers necessary for displaying and plotting the information and drawing entities.

SECTION 3 – SHEET IDENTIFICATION

3.1 General Requirements

These naming conventions refer to architectural sheets within drawing sets, NOT document names.

3.2 Sheet Identification

The sheet identification format contains four or five alphanumeric characters in a specific sequence.

The sheet identifier consists of three components: the discipline designator, the sheet type designator, and the sheet sequence number.

Example: SF-302

A	A		N	N	N
S	F	-	3	0	2
Discipline Designator(s)			Sheet Type Designator	Sheet Sequence Number(s)	

The **Discipline Designator** indicates the category of subject matter contained in the specified file. The first character is the discipline character, and the second character is an optional modifier.

DISCIPLINE DESIGNATORS

G	General
C	Civil
A	Architectural
S	Structural
FP	Fire Protection
M	Mechanical
E	Electrical
P	Plumbing
I	Interiors
Q	Equipment
T	TelCom/AV
O	Operations
V	Survey
H	Hazardous Materials
Z	Shop Drawings

OPTIONAL MODIFIER

AD	Architectural Demolition
AF	Architectural Finishes
AG	Architectural Graphics
AI	Architectural Interiors
MP	Mechanical Piping
EP	Electrical Power
EL	Electrical Light
FA	Fire Alarm

The **Sheet Type Designator** is a single numerical character that identifies the sheet type.

A	A		N	N	N
S	F	-	3	0	2
Discipline Designator(s)			Sheet Type Designator	Sheet Sequence Number(s)	

0	General (symbols legend, notes, etc.)
1	Plans (horizontal views and combination Plan & Profile)
2	Elevations and Profiles (vertical views)
3	Sections (sectional views, wall sections)
4	Large-Scale Views (Scaled up reproductions of plans, elevations, or sections that are not details)
5	Details
6	Schedules and Diagrams
7	User Defined (for types that do not fall in other categories)
8	User Defined (for types that do not fall in other categories)
9	3D Representations (isometrics, perspectives, photographs)

The **Sheet Sequence Number** is a two-digit number that identifies each sheet in a series of the same discipline and sheet type. Sequence numbering starts with 01; sheet number 00 is not permitted. The first sheet of each series is numbered 01, followed by 02 through 99.

A	A		N	N	N
S	F	-	3	0	2
Discipline Designator(s)			Sheet Type Designator	Sheet Sequence Number(s)	

SECTION 4 – PDF REQUIREMENTS

4.1 Guidelines

- PDFs can be digital scans or born digital documents.
- Submit separate documents by discipline for each indicated document type.
- Ensure the drawings adhere to the Quality Assurance Checklist (See [Appendix A](#)).
- Include a Drawing Index (found in e-Builder PM Toolkit and see [Appendix C](#)) containing filenames and sheet numbers for each submittal to the “As-Built” folder. Name each file following the appropriate convention described in the relevant section of this document.
- OCR all PDFs to conform to ADA standards for document accessibility.

SECTION 5 – BUILDING INFORMATION MODEL (BIM) REQUIREMENTS

5.1 Overview

Northeastern University maintains [BIM Standards](#) which should be followed on BIM-enabled projects. The below standards are a brief summary of best practices when working with BIM. All project teams must review and comply with the BIM Standards and complete an Execution Plan if requested.

Please contact BIMsupport@northeastern.edu with questions or to request documents.

5.2 Guidelines

- All projects receiving BIM files as reference must fill out a BIM Execution Plan prior to receipt of any existing conditions documents.
- Submit all models as Revit file format, in the same year/version of Revit that was provided by NU. If no Revit model was provided, +/- 1 year from the current version is acceptable.
- Submit one design model per project, updated to reflect all bulletins and addendums.
- Northeastern will expect to receive interim drawing deliverables as outlined in the kickoff meeting.
- Models must be audited, compacted, and purged of unused elements.
- Models must be free of excessive warnings.
- All linked models provided by subcontractors and consultants must be included.
- All models accompanied by non-BIM drawing submissions must have QA/QC and Collision Detection performed to ensure correct final conditions are documented.

SECTION 6 – DATA INVENTORIES

6.1 Overview

- An inventory of all equipment removed & installed must be provided in excel format (.xlsx).
- This data is typically collected by the Contractor, and sometimes passed to the Architect/Engineer for collation.
- Northeastern Commissioning oversees submission of this document. Northeastern University PMs should confirm final deliverable has been received.

6.2 Data

The following data should be included, as applicable:

Location Data	Identification Data	Installation Data
Building Code	Asset ID/Design Tag	Serial Number
Floor	Barcode	Submittal Number
Room Name	Serial Number	O&M Manual Number
Room Number	Manufacturer & Model	Install Date
	Unifomat Classification	

6.3 Inclusions/Exclusions

- All serviceable equipment associated with MEP/FP systems should be included.
- All elements tagged with Northeastern University barcodes must be included.
- All equipment identified by the Northeastern Commissioning Department must be included.
- A detailed list of included assets can be found in the [BIM Standards](#).

SECTION 7 – SUBMITTING ELECTRONIC PROJECT DELIVERABLES

7.1 File Naming Conventions

- Detailed naming conventions by document type can be found in the New PM Toolkit in e-Builder [Documents \ New PM Toolkit \ STEP 08 - Project Completion and Closeout \ 08-04 Closeout Documentation and As-Built Deliverables]
- Use underscores between naming elements; do not use spaces.

	Building ID	Year	Document Type	Project Name	Discipline	Document Name	Floor [FL-01]	Room	Date [MM-DD]	Project Number
As-Built/Record Drawing	✓	✓			✓	✓	✓		✓	✓
Drawing Index	✓	✓	✓	✓						✓
Operating Manual	✓	✓			✓	✓				✓
Warranty	✓	✓			✓	✓				✓
Specification	✓	✓			✓	✓				✓
Building Permit	✓	✓			✓	✓			✓	✓
Certificate of Occupancy	✓	✓	✓				✓	✓		✓
Certificate of Inspection	✓	✓	✓				✓	✓	✓	✓
Hazardous Material Permit	✓	✓	✓				✓	✓	✓	✓
Assembly Permit	✓	✓	✓				✓	✓	✓	✓

- Ex. As-built: DG_2023_A-101_Floor Plan_FL-01_230100
- Ex. Certificate of Inspection: DG_2023_COI_01-101_03-28_230100

7.2 Uploading Files to e-Builder

- All electronic drawing files that are in the Closeout “As-Built” folder must be accompanied by a drawing index (See [Appendix C](#)).
- Electronic project deliverables are to be uploaded into e-Builder Documents module as follows:
 - Upload Drawings into 07 Construction Closeout > **01 As-Built**s
 - Upload Certificate(s) of Occupancy into 07 Construction Closeout > **02 Certificate of Occupancy**
 - Upload O&Ms into 07 Construction Closeout > **04 Operating Manuals**
 - Upload Warranties into 07 Construction Closeout > **05 Warranties**
 - Upload Drawing Index into 07 Construction Closeout > **06 Drawing Index**
 - Upload Specifications into 07 Construction Closeout > **07 Specifications**
 - Upload Permits into 07 Construction Closeout > **09 Permits**
 - Certificate of Inspection into 07 Construction Closeout > **10 Certificate of Inspection**

Appendix A. Quality Assurance Checklist

General Document Check:

- ☐ File naming convention [Section 1]
- ☐ OCR post-processing for PDFs [See definition]
- ☐ Organized and collated by discipline [Section 1]

PDF	CAD		Reference
<input type="checkbox"/>	<input type="checkbox"/>	Format/Production Requirements	Section 1.1
<input type="checkbox"/>	<input type="checkbox"/>	Title Block Requirements	Section 2.3
<input type="checkbox"/>	<input type="checkbox"/>	Sheet Identification Requirements	Section 2.4
<input type="checkbox"/>	<input type="checkbox"/>	Purged/Bound External Reference Files (XREFs)	Section 2.6
<input type="checkbox"/>	<input type="checkbox"/>	Model Space & Paper Space Requirements	Section 2.7
<input type="checkbox"/>	<input type="checkbox"/>	Use Disclaimer Requirement	Section 2.8
<input type="checkbox"/>	<input type="checkbox"/>	Layer Requirements	Section 2.9
RVT			Reference
	<input type="checkbox"/>	Purge Unused Elements	Section 5.2
	<input type="checkbox"/>	Collision Detection & DWG Cross-Reference	Section 5.2
	<input type="checkbox"/>	Warnings Review	Section 5.2

Appendix B. Project Deliverable Submission Checklist

Confirm that documents are submitted to the correct folder in e-Builder under 07 Construction Closeout:

- ☐ As-Builts
 - DWG
 - PDF
- ☐ RVT (if required)
- ☐ Certificate of Occupancy
- ☐ Operating Manuals
- ☐ Warranties
- ☐ Drawing Index
- ☐ Specifications
- ☐ Final Commissioning Report
- ☐ Permits
- ☐ Certificate of Inspection
- ☐ Surveys & Environmental Reports

Appendix C. Drawing Index Template

Drawing Index Template as Fillable PDF is located in e-Builder:

Documents \ PM Toolkit \ 07 Close Out \ 01 Documents \ Project Closeout Drawing Index
Template

To have a template emailed to you, email ProjectControl@northeastern.edu

[illegible]