

NATIONAL WEATHER SERVICE INSTRUCTION 30-1202
March 30, 2018

Maintenance, Logistics & Facilities
Configuration and Data Management 30-12
Engineering Drawings

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SUMMARY OF REVISIONS: This directive supersedes NWS 30-1202, *Engineering Drawing*, dated November 3, 2003. Changes made to reflect the NWS Headquarters reorganization effective April 1, 2015. Other revisions include:

- 1) Sections for purpose, scope, and applicability (page 3)
- 2) Updated Project Management Responsibilities (page 4)
- 3) Included System Configuration Project Manager and Engineering Design Support Manager responsibilities (page 5)
- 4) Provided further explanation of Document and Drawing Requirements (pages 5-6)
- 5) Included section on Product Drawings and Associate Lists (page 7)
- 6) Defined in greater detail Engineering Drawing Review Process (page 8)
- 7) Updated OBS32 Engineering Drawing Procedures for (Appendix A)

Signed	March 16, 2018
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Engineering Drawings

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1. Introduction

National Weather Service Instruction (NWSI) 30-1202 establishes the Engineering Drawing/Technical Data Package (TDP) requirements and the Configuration Management (CM) responsibilities for operational systems and NWS owned facilities.

The NWS identifies and generates engineering drawings to:

1. Establish system configuration baselines to provide a basis for Configuration Management and Change Control.
2. Support NWS equipment under CM control.
3. Provide CM control during the procurement of new NWS equipment.
4. Assist with field maintenance repair.
5. Modify NWS equipment under CM control.
6. Support the documentation of NWS owned facilities.

2. Purpose

The purpose of this policy is to ensure that CM processes are efficient, visible, uniform, and accountable, and that changes to operational equipment and facilities are performed in a controlled manner. This instruction also ensures that an appropriate level of review and technical tracking is administered during the process. This instruction is authorized by National Weather Service (NWS) Policy Directive 30-12, Configuration and Data Management.

3. Scope

This instruction implements National Weather Service Directive 30-12. It provides guidance on the CM process, and defines requirements and responsibilities for preparing the configuration baseline. This instruction also provides instruction for developing, approving, authenticating, revising, and releasing NWS engineering drawings and associated lists, and Engineering Change Notice (ECN) forms.

4. Applicability

Engineering Drawings/TDPs are collections of documents that identify a system's hardware and software products. The intent of the engineering documentation is to accurately reflect the product baseline so that it can be reproduced and maintained over its applicable life cycle.

This instruction is applicable to any program meeting any of the following criteria:

1. Hardware configuration is established to fulfill system requirements
2. Hardware procured
3. Hardware installation
4. Verification of hardware installation
5. Configuration audits of hardware are conducted
6. Hardware is subject to audit/validation

7. Establishment of contractual hardware baseline
8. Formal change control is implemented for hardware configuration
9. An inventory is maintained for hardware
10. Hardware inventories are maintained for logistics and ongoing lifecycle support

5. Project Management Responsibilities

The Program Manager has key roles with regards to the implementation of the CM Process. The Program Manager is responsible for the acquisition of new systems and facilities, as well as working with the CM Manager to coordinate/oversee the CM process. In conjunction to the CM process, there are additional responsibilities for the Program Manager that require coordination with the CM Manager.

The Program Manager is responsible for:

1. Including Engineering Drawings in the Statement of Work (SOW) for systems under CM control, as listed in NWS Instruction 30-1203, Configuration Management for Operational Systems. The SOW will define engineering drawings and associated lists levels for developmental equipment, as well as for Commercial-Off-the-Shelf (COTS) equipment.
2. Including Engineering Drawings in the SOW for NWS-owned facility construction projects that are:
 - 1) Over \$100,000 in construction costs
 - 2) Will result in changes relative to the operations and maintenance of the facility, especially in critical mechanical/electrical plumbing systems.
3. Coordinating or delegating SOWs specifying new or revised engineering drawings to the Office of Observations, OBS32 CM/EDS, for review and comment before issuing the SOW. OBS32 Services Branch CM will review and/or provide narrative in the SOW to ensure the engineering drawings are delivered or modified in conjunction with the appropriate level of CM control.
4. Developing the concept of operations and system requirements for the baseline TD package.

OBS32 CM will assist the Program Manager to define Work Breakdown Structure (WBS) elements required to implement the EDS for the project. OBS 32 CM will assist in defining the EDS WBS structure for the elements as shown in Table 1.

Table 1: Work Breakdown Structure Process

Section	Functionality
Organization	Defining the work
Planning / Schedule	Creating a realistic project task time line
Accounting	Evaluating the scope of work and associated costs
Analysis/Management Reports	Final report that will be used to determine if “Make or Buy” construction should be used on the

	program
Documentation	Documenting the requirements and maintenance

6. System Configuration Program Manager and Engineering Design Support Manager Responsibilities

The System Configuration Program Manager (SCPM) and Configuration Management/Engineering Design Support (CM/EDS) Manager have distinct roles.

The SCPM is responsible for:

1. Overseeing EDS portfolio projects under CM control, i.e., Operational Surface, Upper Air Systems, Fielded Dissemination Systems, and Central Processing Systems.
2. Planning and implementing the overall CM program, and approving the CM Project Plan, based on assessed need.
3. Providing implementation guidance for the CM policies and procedures.
4. Providing the necessary resources for the CM Program.
5. Coordinating with the Program Manager for WBS element definition.

The CM/EDS Manager is responsible for:

1. Providing estimates and support to the SCPM for the tasks associated with the five sections outlined in Table 1 under the baseline package development process.
2. Assuring drafting/design services for systems under CM control where:
 - 1) The equipment procurement exclude engineering drawings and associated lists in the SOW.
 - 2) The engineering drawings do not adequately disclose CM, re-procurement, and engineering support information that is required to sustain the equipment over its lifecycle.
 - 3) The Program Manager has funded the engineering design support activity within OBS CM.
3. Assisting Project Engineering logistics and program management.

7. Document and Drawing Requirements

Program Managers will procure engineering drawings and associated lists for development equipment using the military standard (MIL-STD-31000), or current industry standard definition for TDPs, and ASME Y14.100 for engineering drawing practices. Section 4.0 of the ASME Y14.100 specification defines the essential, general specifications for drawing types, associated lists, and the revisions of engineering drawings.

The OBS32 CM\EDS manager supports TDP development and ensure that the minimum levels of requirements are met with the engineering documents. TDP engineering drawing requirements are comprised of a variety of data types that will define the item.

The categories of data that may be included in a TDP are, but are not limited to:

1. Product Definition Data
2. Engineering Drawings
3. Associated Lists
4. Specifications
5. Packaging Details
6. 3D Modeling Data

In addition to categories of data that will be included, each project will identify one or more of the following TDP types which describe the form and format of the technical data, in accordance with MIL-STD-31000:

1. Type 2D: 2-Dimensional (2D) Technical Data Package
2. Type 3D: 3-Dimensional (3D) Technical Data Package. Type 3D comes in one of the following subsets:
 - 1) 3D models only
 - 2) 3D models with associated 2D drawings

Additionally, the project's data elements functional descriptions outlined in Table 2 will be tailored to the TDP.

Technical Data will be defined and developed using the WBS elements outlined, in accordance with MIL- STD- 31000, or current industry standards.

Table 2: Technical Data Elements for Engineering Drawings

Technical Data Elements for Engineering Drawings	
A	Conceptual Level
B	Developmental Level
C	As Built Level
D	Production Level

It is recommended that Program Managers use all four types of the technical data elements to meet the requirements of the Preliminary Design and Critical Design reviews, as well as the Physical Configuration Audit (PCA) and/or Functional Configuration Audit (FCA) requirements when a project is in the production phase of its life cycle.

OBS32 CM/EDS will ensure the documents support the acquisition strategy, development, manufacturing development, production, engineering, and logistics throughout the item's lifecycle. In addition, OBS32 CM/EDS will tailor the engineering design and drawing scope on the system requirements and its relationship to the project phases and contractor support.

8. Product Drawings and Associated Lists

Drawings and associated lists provide the design disclosure information necessary to enable a

manufacturer of similar products to produce a similar state of the art product, and maintain quality control. Product drawings and associated lists are required to meet the requirements of MIL-STD-31000, and conform to the requirements of industry standards American Society of Mechanical Engineers (ASME) Y14.100, Y14.5, Y14.24, and Y14.34.

Engineering drawings provide “item definition” which identifies all parameters required to define each unit, assembly, subassembly, part or material. In addition, item definition within an engineering drawing will outline the resulting physical and electrical performance characteristics of the original design.

The data for these drawings are presented on the applicable drawing format, and provided as a minimum:

1. Reflect the end product at its current level of design maturity
2. Provide the engineering data for logistics support products
3. Provide the necessary data to permit competitive acquisition of items identical to the original design items
4. Provide details of unique processes that are not published or generally available to the industry when needed to design or to manufacture
5. Include material performance ratings
6. Identify dimensional and tolerance data
7. Indicate critical manufacturing processes and assembly sequences
8. Identify input and output characteristics including deviation tolerances
9. Identify mechanical electrical connections
10. Indicate physical characteristics including form and finish
11. Identify important details of material identification, including heat treatment and protective coatings
12. Provide inspection, test and evaluation criteria
13. Provide the equipment calibration requirements and hardware marking requirements
14. Identify the requirements for reliability, maintainability environmental conditioning shock and vibration testing and other operational functional tests
15. Identify Vendor Item drawings in all SOWs for COTS equipment

For facilities drawings, OBS32 CM requires all documents to conform to the National Institute of Building Sciences National Computer-aided Drafting (CAD) Standards. See Appendix C, *OBS32 Engineering Drawing Procedures for NWS-Owned Facilities*, for additional information.

9. Drawing Escrow

Drawing escrow accounts protect the NWS and assure full design disclosure is established and maintained, in the event the contractor can no longer support the equipment. Therefore, the Program Manager should implement a drawing escrow account whenever OBS32 CM requires full disclosure of an engineering design to maintain the equipment, in accordance with the defined ILS planning. Also, Program Managers should exercise drawing escrow accounts for

proprietary equipment if:

1. COTS items are critical for logistic support/provisioning.
2. There is a high risk of the contractor not being able to support the equipment over its lifetime.
3. Technological advances are expected to render the documentation obsolete and the documentation is not maintained by the contractor.
4. Technological advances are expected, but the NWS cannot upgrade the system design and is required to maintain discontinued equipment.

The NWS has uninhibited access to escrow TDP for audits at any point in the equipment life cycle. The Program Manager will require a Data List initially generated by the contractor to maintain status accounting of the escrow package. Also, OBS32 CM should audit and review escrow TDP annually, and keep a current data list containing the drawing numbers and revision levels representing each escrow account.

10. Engineering Drawing Review Process

Design Reviews will occur multiple times within the development cycle of the project development cycle or contract. The equipment configuration and documents are validated by CM/EDS for the following minimum requirements:

1. A list of engineering and manufacturing activities to be represented and identified of their responsibilities.
2. A data list of each subassembly and assembly for the electronic instruments or enclosures as required.
3. A review of the 3D model configuration structure and its conformance to MIL-STD-31000.
4. A review of the subassembly and assembly drawings and parts list configurations.
5. A review of assembly procedures and any other additional requirements.

Because multiple organizations handle configuration documentation support and there are differences in system management functions, the engineering drawing review process varies depending on the system.

The following sections provide details of two categories of review processes. The first section will describe engineering drawing review processes used within the NWS, and the second section will outline the process when engineering documents have been created by NWS contractors.

10.1 Configuration Branch (OBS32) Drawing Review Process

For those systems where OBS32 has CM responsibility, the Program Manager will serve as the

authorization official, and will approve engineering drawings and associated lists prior to formal release to the OBS32 Technical Reference Library. For NWS owned facilities, the Regional Systems Operation Division Chief of the Facilities Branch will serve as authorization official, and will approve facilities engineering drawings prior to the formal release to the OBS32 Technical Reference Library.

Formal release of the engineering drawings to the OBS32 Technical Reference Library constitutes the establishment of a system or facility baseline. Only the OBS32 Configuration Program Manager can authorize the release of engineering drawings and associated lists prior to the establishment of the system or facility baseline.

For those systems and NWS owned facilities under OBS32 CM control, the NWS will use the Engineering Change Notice (ECN) document to modify formally released engineering drawings and associated lists. Appendix A provides details on the OBS32 Engineering Drawing procedures for systems, including instructions for generating ECNs. Appendix C provides details on the OBS32 Engineering Drawing procedures for NWS owned facilities, including instructions for generating ECNs.

10.2 Program Branch (OBS31) Drawing Review Process

For the WSR88D system where OBS31 has CM responsibility, the responsible Project Team Engineering focal point will review and approve engineering drawings and associated lists prior to formal release into Agile. Agile is an electronic Change Management tool and is the technical reference library and repository for all engineering drawings. Formal release of engineering drawings into Agile constitutes the establishment of a system baseline.

For those systems under OBS31 CM control, the NWS uses the Engineering Change Order (ECO) document to modify formally released engineering drawings and associated lists, as well as, release engineering drawings into the baseline for the first time. Appendix B, *OBS31 Engineering Drawing Procedures for Systems*, provides details on the OBS31 engineering drawing procedures, including instructions for generating ECOs.

APPENDIX A OBS32 Engineering Drawing Procedures for Systems

1. Purpose of Engineering Change Notices

The Configuration Branch uses the Engineering Change Notice (ECN) as the authorizing document to make updates to the engineering drawing and associated lists for those systems listed in Section 9 under their CM responsibility. ECNs provide steps for maintaining an orderly audit trail of baseline document changes. It is the CM/EDS Manager responsibility to generate the formal ECN, red lines, and formal updates to the original documents for the ECN activity. A copy of the ECN form can be found via the main CM website.

CONTROL NUMBER		REV.	ENGINEERING CHANGE NOTICE							SHEET 1 OF 4		
ITEM NO	DOC. TYPE	DOCUMENT NUMBER/ PART NUMBER	REVISION FROM TO		ITEM NO	DOC. TYPE	DOCUMENT NUMBER/ PART NUMBER	REVISION FROM TO		PROGRAM	CHANGE CLASSIFICATION <input type="radio"/> Major <input type="radio"/> Minor <input type="radio"/> PCA/PCA	
1					10					WORK ORDER	INTERCHANGEABLE <input type="radio"/> Yes <input type="radio"/> No	
2					11							
3					12					CHANGE CODE	COST ESTIMATE REQUIRED <input type="radio"/> Yes <input type="radio"/> No	
4					13							
5					14							
6					15					CONTRACT NO.		
7					16					AREA/AREAS AFFECTED	YES NO	
8					17					FIELD CHANGE REQUIRED	<input type="radio"/> <input type="radio"/>	
9					18					PUBLICATIONS AFFECTED	<input type="radio"/> <input type="radio"/>	
AUTHORIZED SIGNATURE			DATE		PART DISPOSITION		EFFECTIVITY BY BIN WHEN APPLICABLE		HARDWARE AFFECTED			
INSTRUCTIONS					ITEM				CAD/CAM FILES AFFECTED			
									SPARE PARTS AFFECTED			
									TEST SPEC. AFFECTED			
									TOOLING AFFECTED			
SYSTEM ENG./FACILITY CONCURRENCE			DATE		PURCHASE PART				SOFTWARE AFFECTED			
					SYSTEM				CRITICAL ITEM/INVENTORY AFFECTED			
					SOFTWARE VERSION				DIMS AFFECTED			
									DIMS AFFECTED			
									WEB PAGE AFFECTED			
									MASTER DRAWING NO. AFFECTED			
TITLE OF CHANGE												
DESCRIPTION OF CHANGE												
ORIGINATOR			DATE									
MECHANICAL DESIGNER			DATE		MAINTENANCE			DATE		LOGISTICS		
										DATE		
REGIONAL					SOFTWARE					CONTRACTOR		
										AUTHORIZING DOC. ACTION (IE SCRRP/PCRPC)		

Figure 1: ECN Form

2. Configuration Control/Revision Authorization Procedures

The configuration control/revision authorization procedures consist of two document release methods; those methods are:

1. Pre-Release (release sequence 0 – 100.....)
 - i. S100-93001, Rev 0 (Pre-Release)

2. Production Release (Initial release use “– “, thereafter, the revisions use letters starting with “A” thereafter.
1.S100-93001, Rev - (Production Release)

3. Engineering Change Requests/ECNs Data Field Descriptions

All engineering change notices (ECNs) are required to clearly identify the following critical items: Change Classification, Effectively, Configurations changes, Lead Time, and Production timing. Additional data fields are:

1. Originator name and address: Name and address of the activity submitting the Notice of Reference (NOR).
2. ECP number IF APPLICABLE: The number of the ECP describing the engineering change which necessitates the document revision covered by the NOR.
3. Document Revision Letter: Current revision of the document that the proposed NOR will revise.
4. Document Commercial and Government Entity (CAGE) code: The CAGE code of the original design activity that appears on the document to which the revision applies. If the original design activity is not the current design activity, also enter the CAGE code of the current design activity.
5. Title of Document: Title of the document to which the NOR applies
6. Description of Change: Exact wording of sentences or paragraphs that are to be added, or that are to replace designated sentences or paragraphs of the current document. State the dimensions, tolerances and other quantitative requirements that are to replace current requirements. Attach a marked print when necessary to clearly explain the desired revision. For text documents, use a "From - To" format or a word processor revision markup in the description of the change.

4. ECN Responsibilities

The following paragraphs detail the roles and responsibilities in the OBS32 ECN process. Section 5 lists specific organizations, for each system, designated with their responsibilities and established baseline documentation.

1. **CM/EDS Manager.** The CM/EDS Manager determines the appropriate level of review for the ECN, coordinates the review of all ECNs, convenes the ECN Review Meeting as required, provides CM impact analysis at the ECN Review Meeting, and ensures ECN status accounting.
2. **Technical Reference Librarian.** The Technical Reference Librarian issues the ECN number, and enters the approved ECN into the baseline document repository.
3. **Design/Drafting Technician.** The Design/Drafting Technician is responsible for drafting activities related to the Engineering Drawings. The Design/Drafting

Technician originates and assigns drawing numbers, ECN numbers, contacts the Technical Reference Librarian for the ECN number(s), completes all necessary information on the ECN (redlines and document updates), signs, and attends the ECN Review Meetings.

4. **Design/Drafting Checker.** The Design/Drafting Checker is responsible for design and drafting verification activities related to the Engineering Drawings. The Design/Drafting Checker verifies engineering drawings, ECNs, documents and associated lists. The Design/Drafting Checker ensures that the documents and design features are clear and define NWS equipment, systems, and system components per specified industry standards. The Design/Drafting Checker attends all Preliminary Design (PDR) and Critical Design Review (CDR) meetings.
5. **System Engineer Focal Point.** The System Engineer Focal Point reviews ECNs and attends the ECN Review Meeting to provide system engineering impact analysis regarding the change.
6. **Maintenance Focal Point.** The Maintenance Focal Point reviews the ECN and attends the ECN Review Meeting to provide maintenance impact analysis regarding the changes.
7. **Logistics Focal Point.** If applicable, the Logistics Focal Point reviews the ECN and attends the ECN Review Meeting to provide logistics impact analysis regarding the change.
8. **Regional Focal Point.** If applicable, the appropriate Regional Focal Point reviews the ECN for site specific drawings and attends the ECN Review Meeting via conference call to provide regional impact analysis regarding the change.
9. **Software Focal Point.** If applicable, the Software Focal Point reviews the ECN and attends ECN Review Meeting to provide software development impact analysis regarding the change.
10. **Contractor Focal Point.** If applicable, the Contractor Focal Point reviews the ECN and attends the ECN Review Meeting to provide the impact on the contract
11. **Authorization Official.** The Authorization Official is responsible for certifying the engineering drawing change has been executed properly. The Authorizing Official reviews the ECN and attends the ECN Review Meeting to provide overall approval of the change.

5. ECN Authorizing Signatures

The following section details the signature process.

1. **Design/Drafting Technician (Mandatory).** The Drafting Technician, responsible for incorporating the ECN changes, indicates concurrence by signing the appropriate ECN block.
2. **Design/Drafting Checker (Mandatory).** The Design/Drafting Checker, responsible for checking the ECN changes, indicates concurrence by signing the

- appropriate ECN block.
3. **Configuration Program Manager (Mandatory).** The Configuration Manager indicates CM impact and concurrence by signing the appropriate ECN block. The Configuration Program Manager will ensure the correct signatures appear on each ECN.
 4. **Systems Engineering Focal Point (Mandatory).** The System Engineer Focal Point assures the clarity of the change, certifies proper drafting standards have been incorporated into the document, and indicates concurrence by signing the appropriate ECN block.
 5. **Maintenance Focal Point (When applicable).** The Maintenance Focal Point indicates concurrence by signing the appropriate ECN block.
 6. **Logistics Focal Point (When applicable).** The Logistics Focal Point indicates concurrence by signing the appropriate ECN block.
 7. **Region Focal Point (When applicable).** The Regional Focal Point indicates concurrence by signing the appropriate ECN block.
 8. **Software Focal Point (When applicable).** The Software Focal Point indicates concurrence by signing the appropriate ECN block.
 9. **Contractor Focal Point (When applicable).** If a contractor is responsible for incorporating these changes, the Contractor Focal Point signs and indicates concurrence by signing the appropriate ECN block.
 10. **Authorization Signature (Mandatory).** The ECN Authorizing Official signs and dates the appropriate ECN block. If necessary, the Authorizing Official enters special instructions in the “Instruction” block. The Authorization Signature indicates completion of the ECN. The Authorization Official returns the approved ECN to the Technical Reference Librarian.

6. Assignment of OBS32 Drawing Numbers

All Engineering Drawings under OBS32 CM control have a drawing number defined in the SOW for drawings generated by the prime contractor. NWS Program Managers will request a block of drawing numbers from OBS32 to be used in engineering drawings during the acquisition of new equipment from vendors building equipment providing support outside of NWS/EDS. OBS32 CM will designate drawing block suffixes. For example:

1. 30000 = Interconnect, Schematics, and Block Diagrams
2. 40000 = Assembly Drawings
3. 45000 = Cable Assemblies
4. 50000 = Mechanical Details
5. 90000 = Vendor Item Drawings

OBS32 will designate the prefix of the Program identifier defined by OBS. For example:

1. J700 = Radiosonde Replacement System/Telemetry Receiver System

2. S100 = Automated Surface Observing System (ASOS)

OBS 32CM will use the following drawing number scheme:

Project ID

XXXXX-XXXXX Drawing Type – Document Title

7. CM Dash Numbering System

Program Managers should ensure new equipment contracts use the standard OBS32 dash numbering system for items and assemblies when generating engineering drawings. The following sections describe this numbering system.

1. **Detailed Item Dash Numbers.** Use sequential dash numbers on all defined detail items. Because they are reserved for assemblies, do not use dash numbers ending in “0”.

Table 3 demonstrates this numbering system.

Table 3: Detail Parts Numbering System

Detail Parts
-01
-02
-03
-04
-05
-06
-07
-08
-09 (do not use dash numbers ending in 0)
-11
etc.

2. **Assembly Dash Numbers.** Use dash numbers beginning with a digit(s) (1-9) in multiples of 10, and ending with “0” for all defined assemblies. Table 4 demonstrates this numbering system.

Table 4: Assemblies Numbering System

Assemblies
-10
-20
-30
-40
-50
etc.

8. OBS32 CM Drawing Requirements Manual (DRM)

The Drafting Technician Staff or Contractors can use the following Drawing Requirements Manual (DRM) to prepare or to make changes to system engineering drawings under its responsibility:

Drawing Requirements Manual
Ninth Edition (or later)
Global Engineering Documents
15 Inverness Way East
Englewood, CO 80112 USA
800-854-7179

9. ECN Support Responsibility

Organizations within ECN with responsibility for a system under OBS32 CM will provide the following:

1. Drafting/Design Technician
2. Configuration Manager
3. Technical Reference Librarian Support
4. Engineering Focal Point
5. Maintenance Focal Point
6. Logistics Focal Point

All ECNs are generated by the OBS32 CM/EDS organization.

APPENDIX B

OBS31 Engineering Drawing Procedures for Systems**1. Purpose of Engineering Change Orders**

The CM Team uses the Engineering Change Order (ECO) as the authorizing document to make updates to the baseline documentation including engineering drawings and their associated parts lists for those systems listed in Section 6 under their CM responsibility. ECOs provide steps for maintaining an orderly audit trail of baseline document changes.

The OBS31 Engineering Drawing process is performed using a team approach and conducted electronically, using Agile. After a configuration change has been determined, a Project Team is formed to determine logistics, maintenance, software, system documentation, and engineering drawing impacts. The team meets periodically to discuss progress. ECOs and new engineering drawings are routed for comments and approval electronically using the “send” function in Agile. The “send” function permanently records the team member’s comments and is therefore used as an electronic signature. For ECOs on formerly released engineering drawings, the team approves the ECO including all redline drawings and Bills of Material (BOM), but only the Project Engineer is required to approve the final updated drawing. For new engineering drawings, the team approves the ECO and new engineering drawing.

2. ECO Responsibilities

The following paragraphs detail the participating organizations and their roles in the OBS31 ECO process.

1. **Project Team Engineer.** The OBS31 Project Team Engineer is responsible for preparing ECOs to generate new drawings and change existing drawings. This includes both manual and automated rough sketches, electronics diagrams for initial drawings, redlines to existing drawings and Bill of Materials (BOMs), and producing initial part lists for new drawings. The Project Team Engineer is the team leader for WSR-88D Engineering Change Proposals (ECPs). The Project Team Engineer calls team meetings and coordinates ECP project related tasks.
2. **Configuration Management Team (CMT).** The OBS31 CMT member is responsible for reviewing and approving ECOs and new drawings, and releasing them in Agile; ensuring the drawing meet the requirements of the Baseline Specs, Configuration Change Requests, and Engineering Change Proposals that defined them; and providing CM impact analysis.
3. **Documentation Team.** The OBS31 Documentation Team member is responsible for reviewing and approving ECOs and new drawings, ensuring that they concur with the Technical Manual Suite and maintenance philosophies.
4. **Retrofit Management Team (RMT).** The OBS31 RMT member is responsible for reviewing and approving ECOs and new drawings; ensuring the items are procurable,

and providing logistics and maintenance impact analysis regarding the change.

5. **Drafting.** The OBS31 Drafter is responsible for assigning drawing, parts, and ECO numbers; creating the object for documents. Parts, BOMS, and ECOs in Agile; creating the original drawing, and attaching and incorporating it into Agile; updating drawings from ECOs and redline drawings; and routing new drawings and ECOs for approval
6. **Software Engineering.** If applicable, the OBS31 Software Engineer is responsible for reviewing the ECO and new engineering drawings and providing software development impact analysis regarding the change.
7. **Hotline.** If applicable, the OBS31 Hotline member is responsible for reviewing the ECO and new engineering drawings and providing a troubleshooting impact analysis regarding the change.

3. **ECN Authorizing Signatures**

The following paragraphs detail the signature process.

1. **Project Team Engineer (Mandatory).** The Project Team Engineer assures the clarity of the change, certifies proper drafting standards have been incorporated into the document, and indicates concurrence by sending approval in Agile. The Project Team Engineer is the only authority required for approving formerly released engineering drawings.
2. **Configuration Management Team (CMT) (Mandatory).** The CMT member indicates concurrence by sending approval in Agile. The CMT member will approve ECOs for both formerly released engineering drawings (approving the redline drawings and BOMs) and new engineering drawings.
3. **Documentation Team (Mandatory).** The Documentation Team member indicates concurrence by sending approval in Agile. The Documentation Team member will approve ECOs for both formerly released engineering drawings (approving the redline drawings and BOMs) and new engineering drawings.
4. **Retrofit Management Team (RMT) (Mandatory).** The RMT member indicates concurrence by sending approval in Agile. The RMT member will approve ECOs for both formerly released engineering drawings (approving the redline drawings and BOMs) and new engineering drawings.
5. **Drafting (Mandatory on New Engineering Drawings).** The Drafter does not approve the engineering drawings; however the Drafter's name will appear in the "DWN" box in the title block on all new engineering drawings. After approval of the engineering drawing in Agile, the Drafter will add all of the Project Team member's names and dates to the title block of the new engineering drawings. The Drafter will also add the Project Team Engineers name and date to the revision history block on formerly released engineering drawings.

6. **Software Engineering.** If applicable, the Software Engineering member indicates concurrence by sending approval in Agile. The Software Engineering member will approve ECOs for both formerly released engineering drawings (approving the redline drawings and BOMs) and new engineering drawings.
7. **Hotline.** If applicable, the OBS31 Hotline member is responsible for reviewing the ECO and new engineering drawings and providing troubleshooting impact analysis regarding the change. The Software Engineering member will approve ECOs for both formerly released engineering drawings (approving the redline drawings and BOMs) and new engineering drawings. The Hotline member's name will not appear on the engineering drawing, but will be recorded in the History tab in Agile.

4. **OBS31 Drawing Numbers**

All engineering drawings under OBS31 CM control have a drawing number. All OBS31 engineering drawing numbers are assigned in accordance with ROC Design Practice Instruction DPI-5. All OBS31 engineering drawing numbers consist of a combination of seven numbers that uniquely identify drawings, associated lists, and referenced documents. OBS31 engineering drawing numbers begin with the number 2, the second and third digits describe the type of document, and the fourth through the seventh are sequenced unique identifiers.

OBS31 will use the following drawing number scheme:

Drawing Type

[2XXXXXX]

Sequenced Unique Identifier

Examples of Drawing Type codes are:

1. 00 = Interconnection Diagram
2. 01 = Schematic Diagram
3. 10 = Detail Drawing
4. 20 = Vendor Item Drawing
5. 21 = Source Control Drawing
6. 30 = Assembly Drawing
7. 32 = Cable Assembly Drawing

Example Engineering Drawing numbers are:

1. 2000000 = Interconnection Diagram
2. 2010000 = Schematic Diagram
3. 2100000 = Detail Drawings

4. 2200000 = Vendor Item Drawings
5. 2210000 = Source Control Drawing
6. 2300000 = Assembly Drawings
7. 2320000 = Cable Assembly Drawing

5. **OBS31 Dash Numbering System.**

OBS31 uses a three-digit dash numbering system. The dash numbers represent different configurations of the same item and are also considered the PIN (Part Identifying Number).

1. **Reference Item Dash Numbers.** Dash numbers for reference items are always 000, and when specified on a drawing or a parts list, the dash numbers (000) are not specified. Reference items are items that do not represent parts and therefore do not have dash numbers. Examples of a reference item would be a Schematic Diagram or Interconnection Diagram.
2. **Detailed Item Dash Numbers.** Dash numbers for detail parts are assigned sequentially, starting with 101 and ending with 199. When dashes are numerous enough to exhaust 199, the next sequence will be 800 through 899.
3. **Purchase Item Dash Numbers.** Dash numbers for purchased parts are assigned sequentially, starting with 201, and ending with 299. When dashes are numerous enough to exhaust 299, the next sequence will be 400 through 499, and the next 600 through 699.
4. **Assembly Dash Numbers.** Dash numbers for assemblies are assigned sequentially, starting with 301, and ending with 399. When dashes are numerous enough to exhaust 399, the next sequence will be 500 through 599, and the next 700 through 799.

Examples of Engineering Drawing dash numbers are:

1. 2000000-000 = Interconnection Diagram
2. 2010000-000 = Schematic Diagram
3. 2100000-101 = Detail Drawings
4. 2200000-201 = Vendor Item Drawings
5. 2210000-201 = Source Control Drawing
6. 2300000-301 = Assembly Drawings
7. 2320000-301 = Cable Assembly Drawing

6. **OBS31 Engineering Drawing Procedures**

1. Drawing Requirements Manual (DRM). OBS31 Drafting Staff uses the following DRM to prepare or revise engineering drawings or to make changes to engineering drawings under its responsibility:

Drawing Requirements Manual
Ninth Edition (or later)
Global Engineering Documents
15 Inverness Way East
Englewood, CO 80112 USA

800-854-7179

Design Practice Instruction (DPI) and Work Practice Instruction (WPI). In addition to the above listed DRM, OBS31 maintains a series of Design and Work Practice Instructions.

These instructions are designed to define unique OBS31 procedures, such as assigning engineering drawing numbers and adding the drawing numbers to Agile. The following table compiles a complete list of the current DPIs and WPIs:

Table 5: Current DPIs and WPIs

DPI0001	DRAFTING PRACTICES
DPI0002	TYPES OF DRAWINGS
DPI0003	DRAWING SHEET SIZE AND FORMAT
DPI0005	DRAWING AND PART NUMBERING SYSTEM
DPI0006	DRAWING TITLES
DPI0007	DRAWING NOTES
DPI0010	REVISION OF ENGINEERING DRAWINGS
DPI0014	AGILE – ENTERING NEW DOCUMENTS AND PARTS
DPI0015	AGILE – ENTERING, SUBMITTING, SENDING AND RELEASING ECOs, (DRAFTING/HWCM FUNCTIONS)
DPI0016	AGILE – ENTERING NEW HANDBOOKS, FIGURES, AND ARTWORK
DPI0017	ENGINEERING DRAWING DEVELOPMENT/UPDATE PROCESS
WPI0009	AGILE – REDLINING ATTACHMENTS IN AGILE
WPI0010	AGILE – ENGINEERING ECO ORIGINATOR INSTRUCTIONS

OBS32 Engineering Drawing Procedures for NWS Owned Facilities

1. Purpose of Engineering Change Notices

The Configuration Branch uses the Engineering Change Notice (ECN) as the authorizing document to make updates to NWS owned facilities drawings. ECNs provide steps for maintaining an orderly audit trail of baseline document changes. A copy of the ECN form can be found on the main CM web site.

2. ECN Responsibilities

The following paragraphs detail the roles and responsibilities in the OBS32 ECN process. Section 6 lists specific organizations designated with these responsibilities for each system with established baseline documentation.

1. **Configuration Program Manager.** The Configuration Program Manager determines the appropriate level of review for the ECN, coordinates the review of all ECNs, convenes the ECN Review Meeting, provides CM impact analysis at the ECN Review Meeting, and ensures ECN status accounting.
2. **Technical Reference Librarian.** The Technical Reference Librarian issues the ECN number, and enters the approved ECN into the baseline document repository.
3. **Facilities Engineer.** The Regional Facilities Engineer reviews ECNs, and attends the ECN Review Meeting via conference call to provide facilities related impact analysis regarding the change.
4. **Drafting Technician.** The Drafting Technician is responsible for drafting activities related to the Engineering Drawing. The Drafting Technician originates the ECN, completes all necessary information on the ECN, signs, and attends the ECN Review Meeting.
5. **Regional Facilities Branch Chief.** If a Region has established this position, the Regional Facilities Branch Chief reviews the ECN, and attends the ECN Review Meeting via conference call to provide Regional impact analysis regarding the change.
6. **Contractor Focal Point.** If it has been determined ECN participation is necessary by a Contractor implementing the change, the Contractor Focal Point reviews the ECN, attends the ECN Review Meeting via conference call to clarify all issues, and provides any impact to the contract.
7. **Authorization Official.** The Authorization Official is responsible for certifying the engineering drawing change has been executed properly. The Authorization Official reviews the ECN, and attends the ECN Review Meeting to provide overall approval of the change.

3. ECN Authorizing Signatures

The following paragraphs detail the signature process.

1. **Drafting Technician (Mandatory).** The Drafting Technician, responsible for incorporating the ECN changes, indicates concurrence by signing the appropriate ECN block.
2. **Configuration Program Manager (Mandatory).** The Configuration Program Manager indicates concurrence by signing the appropriate ECN block. The Configuration Program Manager will ensure the correct signatures appear on each ECN.
3. **Facilities Engineer (Mandatory).** The Regional Facilities Engineer assures the clarity of the change, certifies proper drafting standards have been incorporated into the document, and indicates concurrence by signing the appropriate ECN block.
4. **Region Facilities Branch Chief (When applicable).** The Regional Facilities Branch indicates concurrence by signing the appropriate ECN block.
5. **Contractor Focal Point (When applicable).** If a contractor is responsible for incorporating these changes, the Contractor Focal Point indicates concurrence by signing the appropriate ECN block.
6. **Authorization Signature (Mandatory).** The ECN Authorizing Official signs and dates the appropriate ECN block. If necessary, the Authorizing Official enters special instructions in the “Instruction” block. The Authorization Signature indicates completion of the ECN. The authorizing official must return the approved ECN to the Technical Reference Librarian.

4. **OBS32 Drawing Numbers**

All Facility Drawings under OBS32 CM control have a drawing number. Program Managers should request a block of drawing numbers from OBS32 to be used in engineering drawings during the construction and/or modification of a facility, prior to issuing the SOW.

OBS32 will designate the prefix of the facility drawing to be the Site Identifier (SID) listed in the NWS Location Identifier System (NWSLI). For example:

ABR = Aberdeen, SD WFO Facility

OBS32 will designate drawing block suffixes in accordance with the National Institute of Building Sciences National CAD Standard.

OBS32 will use the following drawing number scheme:

WFO ID

XXX-X(XX)XX

- Numbering Series
- Drawing Type Code

5. National CAD Standard

Facilities Engineers, Drafting Technicians, or contractors must use the following National CAD Standard to prepare or revise Facility Engineering Drawings under its responsibility:

The National CAD Standard
National Institute of Building Sciences
1090 Vermont Avenue, NW, Suite 700
Washington, DC 20005-4905
Phone: (202) 289-7800; Fax: (202) 289-1092
www.nationalcadstandard.org

6. Branch Signature Responsibilities

The following table lists organizations with ECN responsibilities for Facilities Engineering Drawings.

Table 6: Organizations with ECN Responsibilities

ECN Responsibility	Organization
Drafting/Design Technician	OBS32 or Region Staff
Configuration Program Manager	OBS32
Technical Reference Librarian	OBS32
Facilities Engineer	Region or Office of Facilities (OF)
Authorization Signature	Region System Operation Division Chief or Office of Facilities (OF) Branch Chief