

Administrative Procedure

HLMI-PRO-ENG-50435

Engineering Change Control

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Change Summary

Description of Change

Replaced references to Engineering procedures due document conversions from PRO to GD format: HLMI-PRO-ENG-50455, Engineering Change Control Guidance (HLMI-GD-ENG-51365); HLMI-PRO-ENG-50457, Guidance for Applying Engineering Codes and Standards to Design (HLMI-GD-ENG-51373); HLMI-PRO-ENG-50462, Engineering Change Notice Preparation and Work-Completion Walkdown (HLMI-GD-ENG-51368).

Engineering Change Control



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1.0 PURPOSE AND SCOPE

This procedure defines the process and responsibilities for control of changes to drawings for Hanford Laboratory Management and Integration, LLC (HLMI) facilities. This procedure defines the process for:

- Drawing Change Notice (DCN)
- Engineering Change Notice (ECN)

The engineering design change, whether developed by HLMI, or vendor personnel, shall follow this process unless noted otherwise in a contract, Statement of Work, or work plan. Approval from the Facility Engineering Manager is required if a vendor providing engineering service will generate design changes are not going to be subject to this Engineering Change Control process. New ECNs and DCNs processed in accordance with this procedure shall be created, revised, and processed using SmartPlant^{®1} Foundation (SPF).

This procedure is applicable to operations and maintenance as well as projects that remove, install or tie-in to existing structures, systems, and components (SSCs).

This procedure does not apply to the following types of changes:

- Direct drawing revisions (see HLMI-PRO-ENG-50436, *Engineering Drawings*)
- Changes to Plant Installed Software (see TFC-ENG-DESIGN-P-12, *Plant Installed Software*)
- Changes to Vendor Information (see HLMI-PRO-IRM-50389, *Vendor Processes*)
- Changes to technical documents (see HLMI-PRO-ENG-50439, *Technical Document Control*)
- Changes to Interface Control Documents (see HLMI-PRO-BSM-50322, *Interface Management*).

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the page 1 header.

3.0 RESPONSIBILITIES

3.1 Quality Assurance

The Quality Assurance (QA) organization acts in an oversight capacity by performing required inspections of modifications to Structures, Systems, and Components (SSCs). All Modification Quality Inspection Plans (MQIPs) shall be reviewed and approved by QA, and included in the modification by the Design Agent (see Appendix A).

¹ SmartPlant[®] is a registered trademark of Intergraph Corporation, Madison, Alabama.

3.2 Commissioning

The Projects organization ensures required tests are performed when Level 1 or 2 tests are invoked. MQIPs that include Level 1 and 2 test requirements are reviewed and approved by the Projects organization to ensure they are accurately reflected in the associated Test Plan.

3.3 Engineering

Key responsibilities are listed in the following sections. Further responsibilities are contained within Section 4.0.

3.3.1 Design Authority

The Design Authority (DA) is responsible for:

- The technical acceptability of the change
- Ensuring design inputs and requirements are properly developed and complete
- Ensuring the engineering change control process was followed for technical baseline changes.

The DA can informally delegate all activities identified in this procedure except for review, approval, and the responsibilities listed above.

3.3.2 Originator, Design Agent, or Agency

The Originator is performing the role of Design Agent.

The Originator, Design Agent, or Agency is responsible for:

- Preparing the DCN and ECN in accordance with this procedure and the instructions
- Preparing the MQIP (A-6006-954) in accordance with Appendix A
- Ensuring technical accuracy of the design
- Obtaining reviews and approvals.

3.3.3 Checker

The Checker is responsible for checking and approving the DCN and ECN in accordance with HLMI-PRO-ENG-50448, *Technical Reviews*, and HLMI-PRO-ENG-50471, *Checking of Engineering Documents*.

3.3.4 Design Verifier

The Design Verifier is responsible for verifying the design is in accordance with HLMI-PRO-ENG-50448 or HLMI-PRO-ENG-50470, *Design Verification*, as applicable.

3.3.5 Support Engineer

The Support Engineer is responsible for:

- Verifying field work activity status
- Approving work complete and/or restored to original status.

3.3.6 Engineering Manager

The Engineering Manager is responsible for:

- Approving the scope of the design change
- Identifying and assigning staff (originator, checker, DA, reviewers, and distribution)
- Obtaining/requesting work charging authorization for staff
- Ensuring the DCN and ECN is complete, accurate, and technically sound
- Ensuring approval of Work Authorization (WA) ECNs includes consideration of reversibility of the field work.

4.0 PROCESS

4.1 General Requirements

4.1.1 Drawing Change Notice and Engineering Change Notice Usage

Changes described by DCNs only apply to current drawings, which includes the released drawing plus any released DCNs or work completed ECNs not yet incorporated.

DCNs shall not revise ECNs, impact (by reference to) changes described by non-work completed ECNs, or rely on changes made by non-work completed ECNs.

DCNs shall be used to change drawings that do not modify facility configuration. Prepare DCNs in accordance with Section 4.2. Once issued, a DCN cannot be cancelled nor revised. To make changes that affect content of issued DCNs, a new DCN must be prepared that clearly references the original DCN content and how it should be changed. Do not list the original DCN as an affected drawing on the new DCN. List the original DCN as a reference on the new DCN.

DCNs shall not document software changes in accordance with Software Change Requests (SCRs) per TFC-ENG-DESIGN-P-12 that are in progress (i.e. not released).

Examples of DCNs:

- Corrections to facility drawings to describe existing configuration
- Document as-builts to drawings
- Modify fabrication drawings
- Modify standard detail drawings
- Modify project status drawings.

ECNs shall be used to document physical configuration changes to HLMI SSCs. ECNs shall be used in conjunction with SCRs per TFC-ENG-DESIGN-P-12 to document changes to drawings (e.g., P&IDs) that result from software changes. In such cases, the SCR number shall be entered onto the ECN form as a work package number. Prepare ECNs in accordance with Section 4.3. The changes shown on the ECN cannot be incorporated into the drawing until it is work-complete. An ECN may be revised or cancelled at any time before the ECN is work-complete.

Temporary Modification (TM) and WA ECNs are sub-types of an ECN:

- TM ECNs shall be used to make temporary configuration changes to the HLMI facilities. ECNs shall be used in conjunction with SCRs per TFC-ENG-DESIGN-P-12 to document changes to drawings (e.g., process & instrumentation diagrams [P&IDs]) that result from software changes. In such cases, the SCR number shall be entered onto the ECN form as a work package number. Prepare TM ECNs in accordance with Section 4.3. TM ECNs are initiated and tracked in accordance with HLMI-PRO-OPS-50670, *Equipment Temporary Modifications and Bypasses*. A signature and date in the modification work-complete block indicates that the temporary changes have been performed. A TM ECN with the modification work-complete block signed off and dated may still be revised. A TM ECN may not be revised after the restored to original status block is signed. A TM ECN is not required on routine maintenance, testing, and operations activities controlled within approved work instructions. This exclusion shall not be used to circumvent the TM ECN process.
- A WA ECN is an authorization process for reversible field changes to allow field work to commence while the ECN is routed for approval. See Appendix B for minor field change examples. A WA ECN is an ECN with “Work Authorization” checked “WA” on the form. WA ECNs are initiated and/or revised in SPF.
 - Changes specified by WA ECNs shall meet the following criteria:
 - Shall not perform work or change SSCs that are in production service, energized, pressurized, active, etc. (e.g., not locked or tagged out of service)
 - The affected SSC shall not be embedded in concrete or otherwise inaccessible when installed and the work is not reversible without extensive demolition or rework as judged by the approving Engineering Manager.
 - A new PrHA is not required.
 - Prepare WA ECNs in accordance with Section 4.4. See Appendix B for WA ECN examples.

Telecon approval for all signatures is acceptable, see HLMI-STD-HR-50304, *Level of Authority*.

ECN and DCN forms and instructions are available at the SPF intranet web page at [SmartPlant Foundation \(rl.gov\)](#).

Trend codes are required for ECNs and DCNs and will be recorded directly in SPF, see Appendix C4).

See HLMI-GD-ENG-51365, *Engineering Change Control Guidance*, for additional engineering change control guidance.

4.2 Drawing Change Notification Preparation

The following process for preparing DCNs is shown in Figure 1. DCNs are initiated and/or revised in SPF and use the “Design Impacting” workflow in SPF for initial approval and release.

Actionee	Step	Action
Originator	1.	DEFINE the need and scope.
	2.	OBTAIN information on the design change to define the problem and determine the appropriate solution.
	3.	DETERMINE if a Process Hazard Analysis (PrHA) screening is required and prepare if applicable (see HLMI-PRO-ENG-50447, <i>Process Hazard Analysis</i>).
	4.	IDENTIFY all affected technical baseline (TBL) drawings, in accordance with HLMI-STD-ENG-50515, <i>Technical Baseline Management</i> .
	5.	PREPARE the DCN(s) following the SPF web page form instructions.
	6.	<u>IF</u> the DCN includes design, <u>THEN</u> PREPARE it in accordance with the applicable codes and standards such as those identified in HLMI-GD-ENG-51373, <i>Guidance for Applying Engineering Codes and Standards to Design</i> , subsystem specification, <u>OR</u> engineering standard.
	7.	IDENTIFY reviewers/approvers in accordance with HLMI-PRO-ENG-50448.
	8.	CONDUCT Technical Reviews in accordance with HLMI-PRO-ENG-50448.

Actionee	Step	Action
Originator	9.	OBTAIN the following approvals: <ul style="list-style-type: none"> • Originator (always required) • Checker (as required per HLMI-PRO-ENG-50448) • DA (required for technical baseline document changes only) • Unreviewed Safety Question (USQ) (as required per HLMI-PRO-NS-50488, <i>Unreviewed Safety Question Process</i>) • PrHA (as required per HLMI-PRO-ENG-50447) • Approvers (Interdisciplinary, EDLs, SMEs, etc.) as identified above in accordance with HLMI-PRO-ENG-50448 • Engineering Manager (always required) • Document Control (always required).
	10.	FORWARD to a Document Control for release (see Section 4.5).

4.3 Engineering Change Notice Preparations are initiated and/or revised in SPF and use the “Design Impacting”

The following process for preparing an ECN is shown in Figure 2 in SPF for initial approval and release.

Actionee	Step	Action
Originator	1.	DEFINE The need and scope.
	2.	OBTAIN information on the design change to define the problem and determine the appropriate solution.
	3.	DETERMINE if a Modification Traveler (MT) is needed <u>AND</u> prepare, if applicable. See HLMI-PRO-ENG-50449, <i>Modification Traveler</i> .
	4.	DETERMINE if a PrHA screening is required <u>AND</u> prepare, if applicable (see HLMI-PRO-ENG-50447).
	5.	IDENTIFY all affected TBL drawings, in accordance with HNF-1901, <i>Technical Baseline Description Document for the Tank Operations Contractor</i> .
	6.	CHECK ERB YES/NO checkbox ‘No’ in DCN details when prompted.
	7.	VERIFY existing configuration depicted on drawings.

Actionee	Step	Action
Originator	a.	IDENTIFY released change documentation against the drawings, <u>AND</u> PERFORM a field walkdown in accordance with HLMI-GD-ENG-51368, <i>Engineering Change Notice Preparation and Work-Completion Walkdown</i> (see Figure 3).
	8.	PREPARE the ECN(s) following the SPF web page form instructions.
	9.	PREPARE the MQIP (A-6006-954) in accordance with Appendix A, if applicable.
	10.	<u>IF</u> revising an ECN, <u>THEN</u> START a Revision workflow in SPF.
	11.	PREPARE design in accordance with the applicable Modification Traveler(s), codes <u>AND</u> standards such as those identified in HLMI-GD-ENG-51373, specification, <u>OR</u> engineering standard.
	12.	IDENTIFY reviewers/approvers as follows: <ul style="list-style-type: none"> • In accordance with HLMI-PRO-ENG-50448 • Projects organization for ECNs where Level 1 or 2 test requirements are specified on an MQIP.
	13.	CONDUCT Technical Reviews in accordance with HLMI-PRO-ENG-50448.
	14.	OBTAIN approvals. <ul style="list-style-type: none"> • Originator (always required) • Checker as required per HLMI-PRO-ENG-50448 • Design Verifier (as required per HLMI-PRO-ENG-50448) • DA (required for technical baseline document changes only) • Unreviewed Safety Question (USQ) (as required per HLMI-PRO-NS-50488) • PrHA (as required per HLMI-PRO-ENG-50447) • Approvers (interdisciplinary, EDLs, SMEs, etc.) identified above in accordance with HLMI-PRO-ENG-50448) • Engineering Manager (always required) • Document Control (always required). • Quality Assurance (as identified above) • Projects organization (as identified as above).

Actionee	Step	Action
Originator	15.	FORWARD to a Document Control for release (Section 4.5).

4.4 Work Authorization Engineering Change Notice Preparation

The WA process is for field changes to an approved design. See Appendix B for field change examples. WA ECNs are initiated and/or revised in SPF and use the “Design Impacting” workflow in SPF for WA approval.

The following process for preparing WA ECNs is shown in Figure 4.

Actionee	Step	Action
Originator	1.	DEFINE the need and scope: OBTAIN information on the design change to define the problem and determine the appropriate solution.
	2.	DETERMINE if a new MT is required (see HLMI-PRO-ENG-50449), <u>OR</u> if an existing MT is applicable.
	a.	<u>IF</u> a new MT is required, <u>THEN</u> PERFORM the change via a full ECN per Section 4.3.
	b.	<u>IF</u> an MT is not required or the design change is within the scope of an existing MT, <u>THEN</u> CONTINUE to step 3.
	3.	DETERMINE if a new PrHA screening is required (see HLMI-PRO-ENG-50447).
	a.	<u>IF</u> a PrHA screening is required and results in the need for a new PrHA, <u>THEN</u> PERFORM The change via a full ECN per Section 4.3.
	b.	<u>IF</u> the design change is within the scope of an in-process or completed PrHA screening, <u>THEN</u> DOCUMENT the PrHA screening number on the WA ECN form <u>AND</u> CONTINUE to step 4.
	4.	IDENTIFY all affected TBL drawings, in accordance with HLMI-STD-ENG-50515.
	5.	VERIFY existing configuration depicted on drawings.
	a.	IDENTIFY released change documentation against the drawings, <u>AND</u> PERFORM a field walk down in accordance with HLMI-GD-ENG-51368 (see Figure 3).
	6.	PREPARE the WA ECN(s) following the SPF web page ECN form instructions.

Actionee	Step	Action
Originator	<ol style="list-style-type: none"> a. PREPARE design in accordance with the applicable MT(s), codes, and standards such as those identified in HLMI-GD-ENG-51373, specification, or engineering standard. b. PREPARE a description of changes in sufficient details to allow work to continue. <ol style="list-style-type: none"> 7. IDENTIFY reviewers/approvers as follows: <ul style="list-style-type: none"> • In accordance with HLMI-PRO-ENG-50448 • Projects organization Commissioning for ECNs where Level 1 or 2 test requirements are specified on an MQIP. • OBTAIN minimum WA ECN approvals for work package incorporation. 8. Originator (always required) <ul style="list-style-type: none"> • Engineering Manager (always required). • PROVIDE a copy of the WA ECN to the Planner for incorporation into the work package. 9. <u>IF</u> additional changes are required prior to full release of the WA ECN, <u>THEN</u> GO TO Section 4.9. 10. PREPARE the MQIP (A-6006-954) in accordance with Appendix A, if applicable. 11. CONDUCT Technical Reviews in accordance with HLMI-PRO-ENG-50448. 12. OBTAIN Final Release approvals. 13. Checker (always required) <ul style="list-style-type: none"> • Design Verifier (as required per HLMI-PRO-ENG-50448) • Design DA • PrHA (as required per HLMI-PRO-ENG-50447) • Approvers (Interdisciplinary, EDLs, SMEs, etc.) in accordance with HLMI-PRO-ENG-50448, • Engineering Manager (always required) • Document Control (always required) • Quality Assurance (all ECNS on Safety Class [SC] or Safety Significant [SS] SSCs and ECNs, as needed) • Projects organization • Commissioning (All ECNs where Level 1 or 2 test requirements are specified on an MQIP). 	

Actionee	Step	Action
Originator	•	FORWARD to Document Control for release (Section 4.5).

4.5 Drawing Change Notice and Engineering Change Notice Release

Document Control will process and release all approved DCNs and ECNs.

Actionee	Step	Action
Originator	1.	As appropriate, ENSURE the assigned planner has received the released field work ECN for incorporation into the work package.

4.6 Off-Shift Drawing Change Notice and Engineering Change Notice Release

The following process is to be used in lieu of Section 4.5 to pre-release a DCN and/or ECN, when engineering management determines field work activities need to be expedited or Document Control is not available. The DCN or ECN will be automatically routed to Document Control following management approval.

Actionee	Step	Action
Originator	1.	PRINT The following within the Release Stamp block area on page 1 of the DCN and/or ECN: "Pre-released by 'Name,' 'Date,' and 'Time.'"
	2.	PROVIDE a copy of the pre-released DCN or ECN to the planner for incorporation into the work package.

4.7 Engineering Change Notice Close-out Process

4.7.1 Modification Work Complete

Individual ECNs shall be signed approved Modification Work Complete when their associated field work is complete. ECN work completion is performed using the "Work Completion" workflow in SPF.

NOTE: "Field walkdowns" in accordance with HLMI-GD-ENG-51368 and MQIP inspections do not apply to software-only changes in accordance with an SCR.

Actionee	Step	Action
Engineer	1.	ENSURE that the work activities prescribed in the ECN have been completed, as follows: <ul style="list-style-type: none"> • A field walkdown has been performed in accordance with HLMI-GD-ENG-51368 to ensure field conditions match the ECN.

Actionee	Step	Action
Engineer		<ul style="list-style-type: none"> • The required inspections and tests identified on the MQIP have been successfully completed. Level 1 or 2 testing has been addressed by Projects organization. a. <u>IF</u> an SCR number is entered as the work package, <u>THEN</u> ENSURE the SCR has been released by Document Control. b. <u>IF</u> the work was not completed in accordance with the ECN, <u>THEN</u> INITIATE a Nonconforming Report (NCR) per HLMI-PRO-ASYS-50760, <i>Nonconforming Item Reporting and Control</i>. <ol style="list-style-type: none"> 2. ENSURE the correct work package number(s) and/or SCR numbers are identified on the ECN. 3. APPROVE the ECN for Modification Work Complete. 4. ENSURE that the planner has received the released field work ECN for incorporation into the work package, if required.

4.7.2 Restored to Original Status

The following process applies to TM ECNs only. TM restoration is performed using the “Temporary Modification Restoration” workflow in SPF.

NOTE: *When the temporary configuration is determined to become permanent, the ECN is still signed off as “Restored to Original Status” and a DCN is prepared to document the permanent change.*

Actionee	Step	Action
Support Engineer		<ol style="list-style-type: none"> 1. VERIFY that field work activities have been completed, as follows: <ul style="list-style-type: none"> • The restored configuration matches the original field configuration • Any applicable acceptance testing has been successfully completed. • If the temporary configuration is decided to become permanent, a DCN is prepared to document the permanent configuration and the DCN references the Temporary ECN number. 2. ENSURE the correct work package number is identified on the ECN. 3. APPROVE for Restored to Original Status Complete.

Actionee	Step	Action
Support Engineer	4.	PROVIDE a copy of the released Restored to Original Status ECN <u>AND</u> the permanent DCN, if applicable, to Operations.

4.7.3 Modification Work Partially Complete – Work Stoppage or Cancellation

This process applies to ECNs where field work has been performed such that the configuration of the facility is changed, but not to the extent defined by the ECN. This process is worked in conjunction with HLMI-PRO-MAINT-50655, *222-S Operations Contractor Work Control*. ECN work completion is performed using the “Work Completion” workflow in SPF. This process does not apply to ECNs where the work package is an SCR. Such ECNs shall be revised or cancelled in accordance with the corresponding scope of the SCR.

Actionee	Step	Action
Engineer	1.	PERFORM a walkdown to determine the extent of work performed and the as-left configuration of the facility.
	2.	REVISE the ECN in accordance with Section 4.3 to document the work performed and/or the as-left configuration.
	3.	ENSURE the correct work package number is identified on the ECN.
	4.	ENSURE that the required inspections and tests identified on the MQIP have been successfully completed.
	5.	APPROVE for Modification Work Complete in accordance with Section 4.7.1.
	6.	PROVIDE a copy of the released work complete ECN to the planner for incorporation into the work package.

4.8 Engineering Change Notice Cancellation

This process is applicable to cancellation of ECNs (DCNs may not be cancelled).

Actionee	Step	Action
Originator	1.	ENSURE the ECN being cancelled is NOT work-completed.
	2.	<u>IF</u> the ECN is partially worked, <u>THEN</u> GO TO Section 4.7.3.
	3.	CANCEL the existing ECN in SPF.

4.9 Work Authorization Engineering Change Notice In-Process Revision

This process is applicable to WA ECNs that have received 2-signature approval and are being worked in the field, but have not yet been through the full review cycle. The DA has determined that an additional change is required that also meets the criteria for a WA ECN change.

CAUTION: This process can create confusion with respect to knowing the currently approved change unless the progressive changes are carefully identified on the ECN.

Actionee	Step	Action
Originator	1.	ENSURE the WA ECN has not been released nor work-completed.
	2.	NOTIFY the Work Planner and Field Work Supervisor that an additional change is in process and that the current approvals to the WA ECN are being rescinded.
	3.	RESCIND all current approvals on the WA ECN.
	4.	PREPARE the new changes.
	5.	PREPARE a revision summary of the WA ECN changes in the justification block titled "WA ECN Record of Change."
	6.	RETURN to Section 4.4, step 9.

5.0 FORMS

Modification Quality Inspection Plan (A-6006-954)

6.0 DEFINITIONS

Definitions of terms unique to this procedure are provided in Appendix D.

7.0 RECORD IDENTIFICATION

The Record Capture table identifies records generated during the performance of this procedure.

Table 1. Records Capture

Record Name	Record Processed By
Drawing Change Notice (SPF-003)	Smart Plant Foundation (SPF)
Engineering Change Notice (SPF-002)	

Documents are controlled in accordance with HLMI-PRO-IRM-50386, *Document Control*.

Completed records are managed in accordance with HLMI-PRO-IRM-50387, *Records Management*.

8.0 SOURCES

8.1 Requirements

DOE O 422.1, *Conduct of Operations*

DOE-STD-1073-2016, *Configuration Management Program*

- Section 2.3, “Configuration Management Interfaces”
- Section 3.3, “Identifying and Documenting Design Requirements”
- Section 3.10, “Grading”
- Section 3.11, “Managing Design Change and Safety Bases Under Configuration Management”
- Section 5, “Change Control”
- Section 6, “Document Control”

HLMI-PLN-ENG-51064, *Engineering Program Management Plan*

HLMI-PLN-ENG-51086, *Engineering Design Program*

HLMI-PLN-ENG-51110, *Configuration Management Plan*

8.2 References

HLMI-GD-ENG-51365, *Engineering Change Control Guidance*

HLMI-GD-ENG-51368, *Engineering Change Notice Preparation and Work-Completion Walkdown*

HLMI-GD-ENG-51373, *Guidance for Applying Engineering Codes and Standards to Design*

HLMI-PLN-ASYS-51063, *Quality Assurance Program Description*

HLMI-PRO-ASYS-50760, *Nonconforming Item Reporting and Control*

HLMI-PRO-BSM-50322, *Interface Management*

HLMI-PRO-ENG-50436, *Engineering Drawings*

HLMI-PRO-ENG-50439, *Technical Document Control*

HLMI-PRO-ENG-50447, *Process Hazard Analysis*

HLMI-PRO-ENG-50448, *Technical Reviews*

HLMI-PRO-ENG-50449, *Modification Traveler*

HLMI-PRO-ENG-50470, *Design Verification*

HLMI-PRO-ENG-50471, *Checking of Engineering Documents*

HLMI-PRO-IRM-50386, *Document Control*

HLMI-PRO-IRM-50387, *Records Management*

HLMI-PRO-IRM-50389, *Vendor Processes*

HLMI-PRO-MAINT-50655, *222-S Operations Contractor Work Control*

HLMI-PRO-NS-50488, *Unreviewed Safety Question Process*

HLMI-PRO-OPS-50670, *Equipment Temporary Modifications and Bypasses*

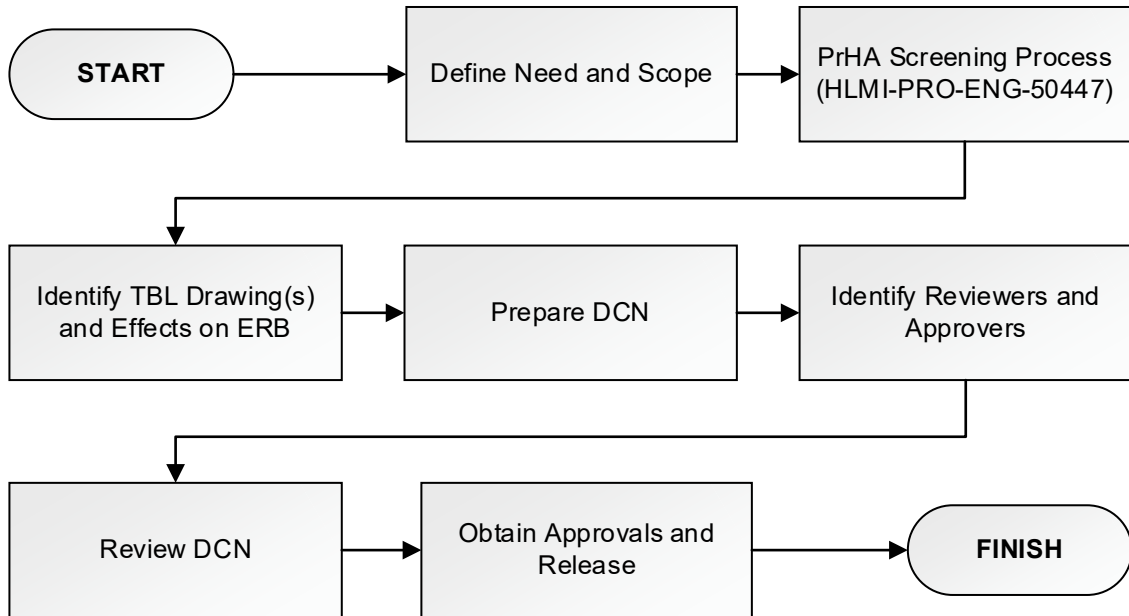
HLMI-STD-ENG-50515, *Technical Baseline Management*

HLMI-STD-HR-50304, *Level of Authority*

HNF-1901, *Technical Baseline Description Document for the Tank Operations Contractor*

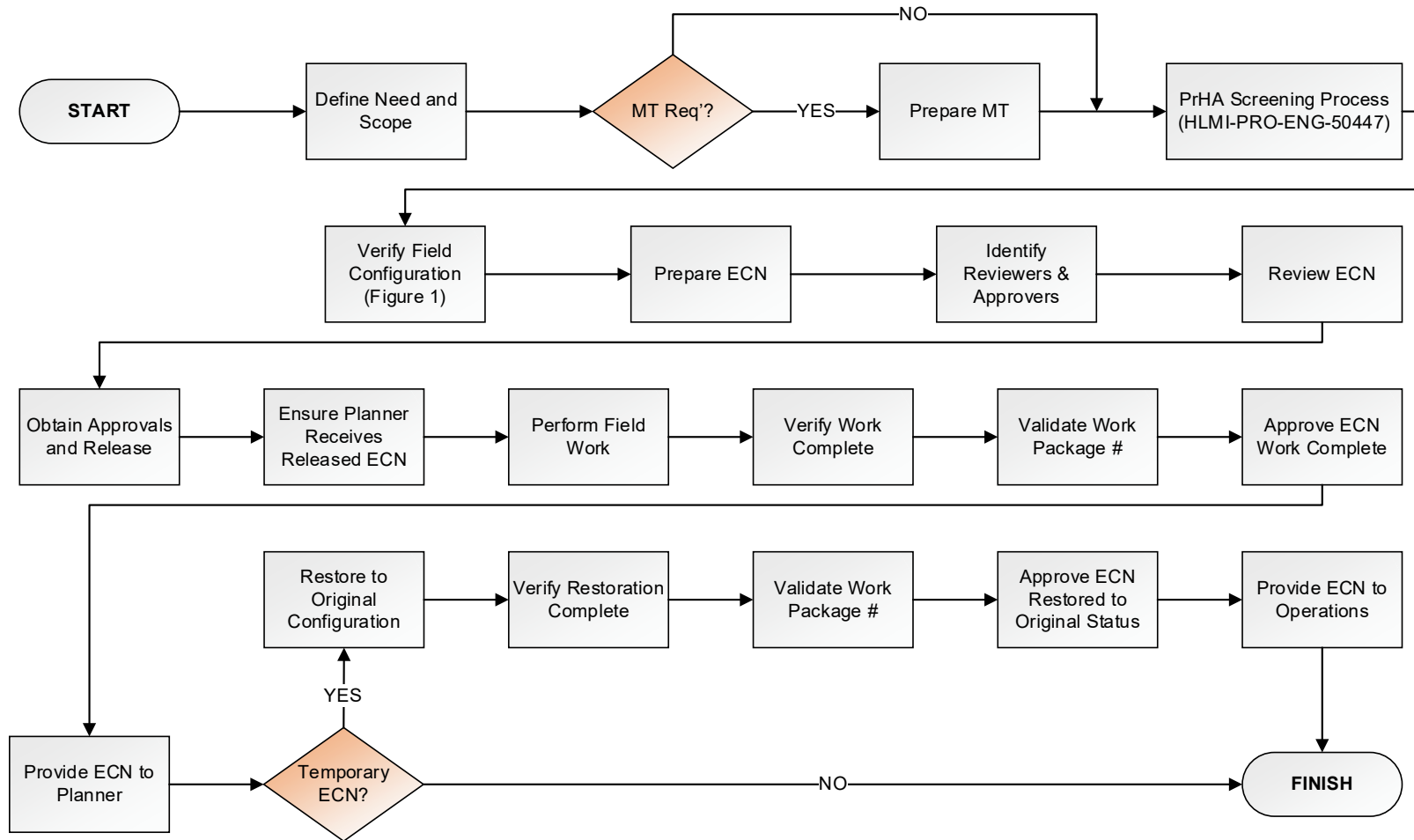
TFC-ENG-DESIGN-P-12, *Plant Installed Software*

Figure 1. Drawing Change Notice Process Flow Chart



Key
DCN: Drawing Change Notice
ERB: Electronic Routing Board
PrHA: Process Hazard Analysis
TBL: Technical Baseline

Figure 2. Engineering Change Notice Process Flow Chart



Key

DCN: Drawing Change Notice
ECN: Engineering Change Notice
TM: Temporary Modification
MT: Modification Traveler

PrHA: Process Hazard Analysis
SSC: System, Structure, and Components System
TBL: Technical Baseline

Figure 3. Guidance for Determining the Current Design Configuration

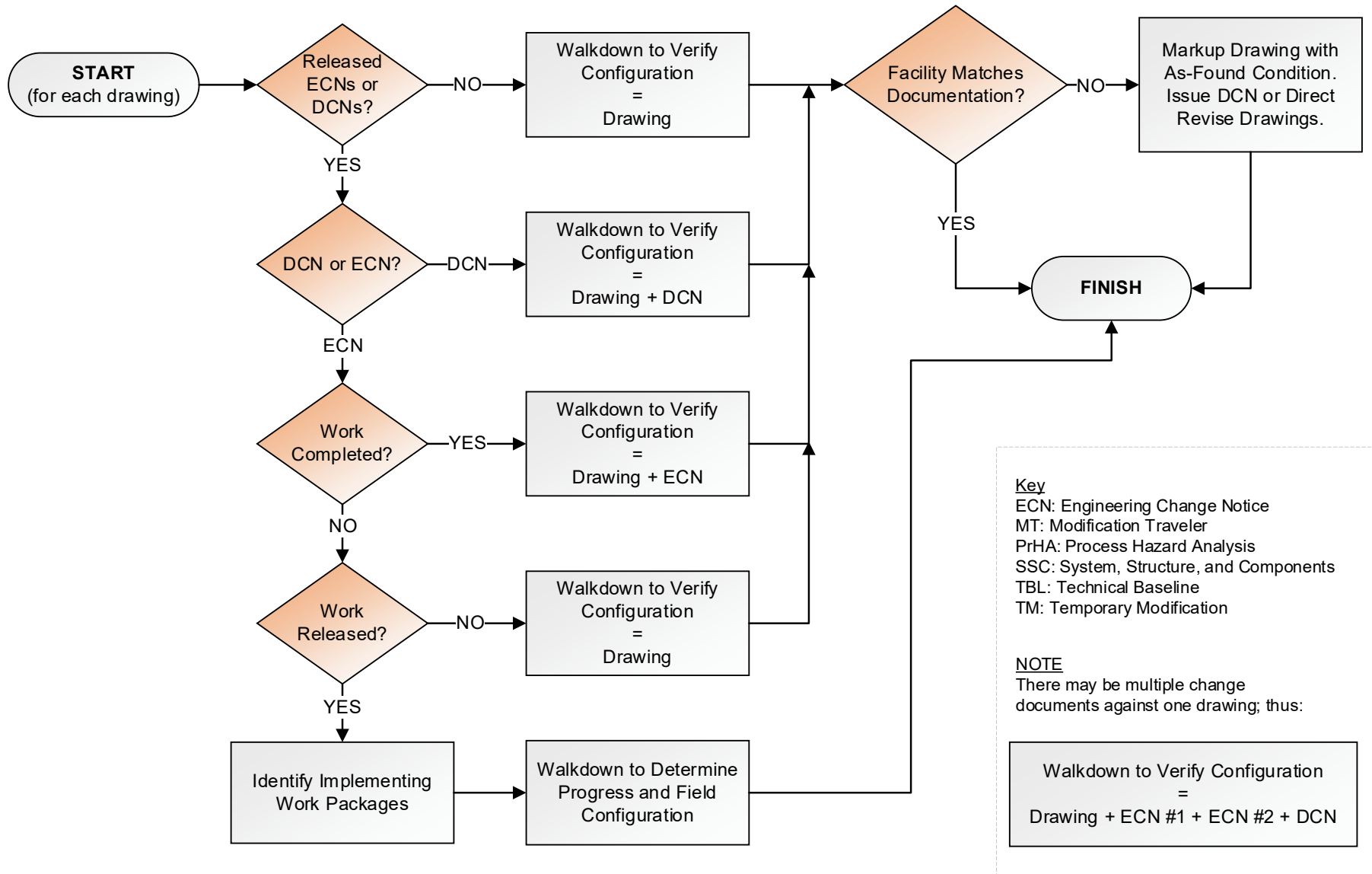
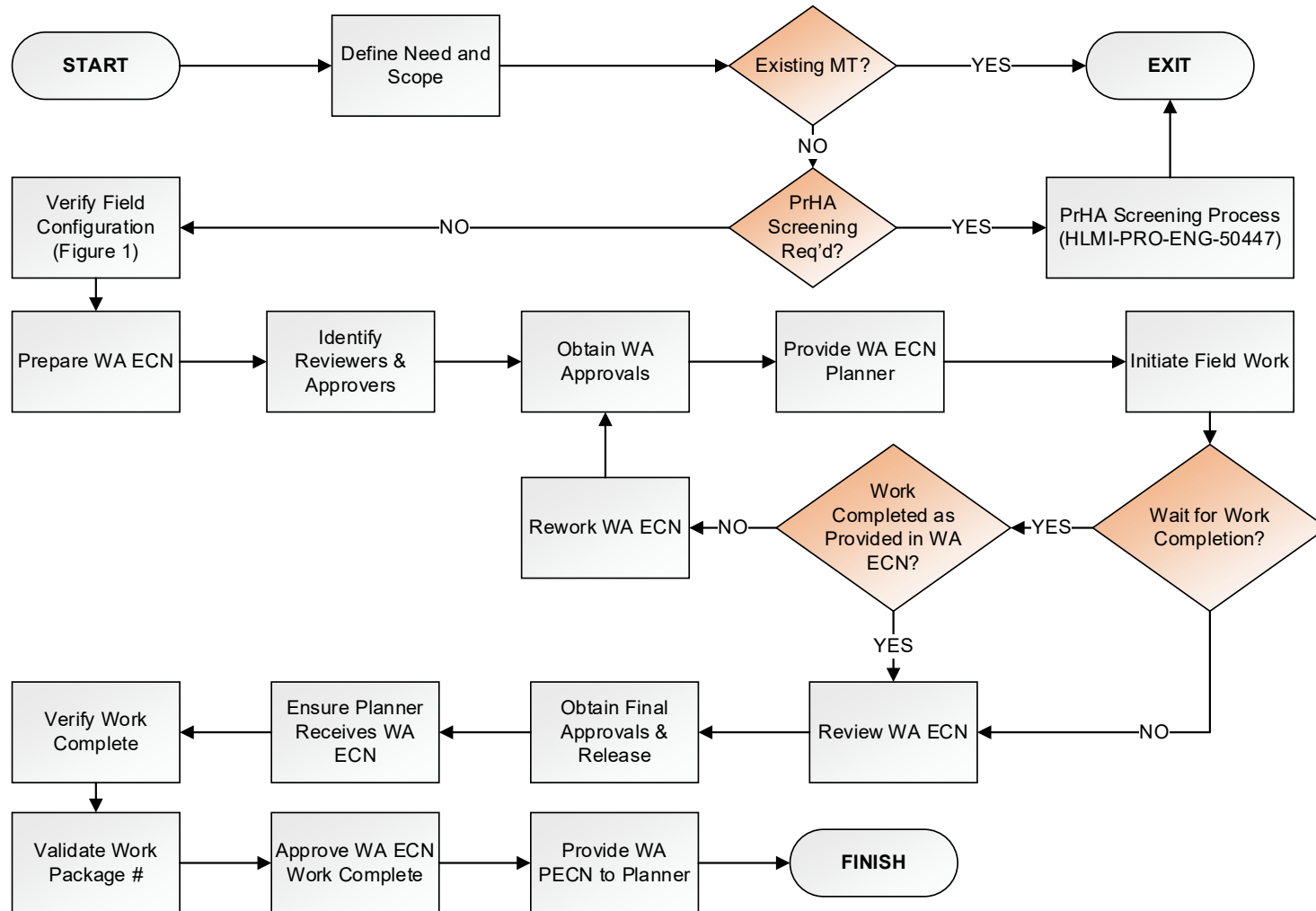


Figure 4. Work Authorization Engineering Change Notice Process Flow Chart



Key

ECN: Engineering Change Notice
MT: Modification Traveler
PrHA: Process Hazard Analysis

TBL: Technical Baseline
TM: Temporary Modification
WA: Work Authorization

APPENDIX A – MODIFICATION QUALITY INSPECTION PLANS

1.0 INTRODUCTION & PURPOSE

A Modification Quality Inspection Plan (MQIP) is input to work package instructions and ensures that inspections and/or tests are performed that are needed to ensure the field condition is in compliance with ECN/design requirements. While some tests or inspections may be implemented by other HLMI processes, the MQIP ensures that specific tests or inspections not implemented by existing processes are documented such that engineering can confirm satisfactory completion. The MQIP supports effective work-completion of ECNs. The MQIP may be required by the DA for any ECN, including those designated as General Service (GS).

This appendix describes and establishes the requirements and responsibilities for the development, review, approval, revision, and control of HLMI Modification Quality Inspection Plans (MQIPs). MQIPs ensure that new and modified structures, systems, and components (SSCs) are inspected and tested in accordance with the approved design, and by meeting specified acceptance criteria are capable of fully performing their design functions to meet performance requirements.

HLMI-PLN-ASYS-51063, Part I, Chapter 3, Section 3.3, Design Process, requires, in part, that the final design shall specify required inspections and tests and include, or reference appropriate acceptance criteria. Part I, Chapter 10, Section 10.2, Inspection Requirements, requires, in part, that inspection requirements and acceptance criteria be included in the applicable design documents or other technical documents approved by the design organization.

2.0 INITIATION of MODIFICATION QUALITY INSPECTION PLAN REQUIREMENTS

An MQIP, Form number A-6006-954, shall be prepared by the ECN Originator, in conjunction with a representative of Quality Assurance, when there is a need for inspections or tests that are not otherwise driven by existing processes (e.g., receipt inspections, inspections identified in construction specifications, Design Requirements Compliance Matrices, Quality Assurance Inspection Plans). MQIPs identify the additional critical inspection and testing requirements/activities associated with field inspections and tests for defined design during field installation of modifications. Such critical, additional inspections should be considered those that the DA considers required and in addition to those not driven by existing processes. An MQIP should be initiated when the draft ECN is initiated. Inspections and tests are based on the function of the item or component relative to safety or other risk considerations such as code/standard compliance, complexity, uniqueness, and value of the work.

Inspections and tests to be considered, that are not driven by existing processes, include:

- Inspections and tests required by applicable codes, standards and/or specifications,
- Inspections and tests that cannot be performed after work is complete (e.g., item to be inspected will be obscured by other components, concrete pre-pour inspection),
- Conformance to design requirements,
- Proper assembly or disassembly of components, with specific criteria, for workmanship,
- Dimensions and installation critical to assembly,
- Testing to ensure satisfaction of the specified functional requirements, including leak and/or pressure testing where required,
- Personnel qualifications/certifications,
- Verification/Witness/Hold points.

Some examples of inspections and tests include:

- Mechanical Inspection Characteristics:
 - Torque (value; tolerance; basis; verification, witness, or hold point)
 - Fit-Up
 - Part # Verification
 - Final Configuration
 - Pressure Testing (Hydrostatic or Pneumatic)
- Electrical Inspection Characteristics
 - Resistance (Megger)
 - Continuity
- Civil Inspection Characteristics
 - Concrete form placement
 - Concrete slump testing
 - Drainage slope

The ECN Originator identifies inspection and test requirements by also reviewing documents such as:

- Design input documents
- Engineering Drawings
- Design output documents
- Applicable Codes and Standards
- National Electrical Code, NEC
- American Society of Mechanical Engineers, ASME standards
- Welding
- Nondestructive Examination

Requirements to be specified for inspections and tests shall include but are not limited to:

- Inspection and test requirements,
- Method to be used to conduct the inspections and tests,
- Acceptance criteria, including tolerances,
- Sample Size/Plan,
- Inspection/Test Organization, including Personnel qualifications/certifications, where required,
- Witness and Hold points, In-Process and Final Inspection, as applicable.

Sampling Criteria, if applicable:

- The acceptable quality level for the total population encompassed by the sample shall be specified.
- The sampling criteria are derived from recognized industry standards such as ANSI/ASQC Z1.4-1993 or others approved by the Design Agency or CQF. Technical justification is provided for alternative criteria.

The ECN Originator, in conjunction with the DA, shall evaluate the processes, activities, and items to establish the level, extent and acceptance criteria for inspections/tests. The basis for assignment, level, and intensity of inspection/test applied to processes, activities, and items shall be directly related to the safety classification. The basis shall also be commensurate with the importance of a process, activity, or item's function to human health, safety, nuclear safety, effect on the environment, reliability, maintainability, and operability.

3.0 MQIP REVIEW AND APPROVAL

A copy of the MQIP shall either be attached to the approved ECN or issued as a part of an "RPP" document as determined by the Project Engineer or DA. If the MQIP is contained in an "RPP" document, the "RPP" number must be referenced on the associated ECN(s).

MQIPs are reviewed and approved by the Design Agent, DA, and QA Representative when issued as an “RPP” document in accordance with HLMI-PRO-ENG-50439. When attached to an ECN, QA is included as part of the ECN approval.

4.0 REVISIONS

When MQIPs are attached to ECNs, revisions to inspection requirements depicted on the MQIP are processed as a revision to the ECNs.

When MQIPs are implemented in an “RPP” document, revisions are processed in accordance with HLMI-PRO-ENG-50439.

5.0 MQIP IMPLEMENTATION

The required inspections and tests identified on MQIPs shall be incorporated into the applicable work package, testing, or construction specification document.

APPENDIX B – WORK AUTHORIZATION ENGINEERING CHANGE NOTICE EXAMPLES

NOTE: *This listing is examples of the use of WA ECNs and is not intended to be all-inclusive.*

Examples of potential WA ECNs include:

- Any change to a general service SSC that is reversible (modifications / corrections can be made to the field work if required during the formal approval & release of the WA change)
- Craft input after start of field work modifying power connection from hard wired to cord and plug
- Revised multipole breaker configuration based upon new shared neutral results (e.g., single to multipole breaker, or three-pole to two-pole breaker)
- Removal of unnecessary Man-off-auto switches for equipment control circuits
- Removal of out of service equipment
- Changes resulting from NCR dispositions

Changes reflecting as-built information.

APPENDIX C – TREND CODES AND DEFINITIONS

Table C-1. Document Trend Codes

CHARACTER – 1		CHARACTER – 2		CHARACTER – 3	
CAUSE CODES		COMMODITY CODE		DISCIPLINE DRIVER CODE	
Code	Description	Code	Description	Code	Description
A	Ease of Construction	A	Architectural	C	C/S/A
B	Construction Error	B	Concrete	E	Electrical
C	Design Procedure / Specifications / Standards	C	Electrical Equipment	J	Instrument & Controls
D	Design Error *	D	Instrumentation	M	Mechanical
E	Drafting Error / Typos	E	Supports – Designed	P	Plant Design
F	Design Clarification	F	Supports – Cookbook	Z	Other
G	As-Built Documentation	G	Mechanical Equipment		
J	Initial Design Release	H	Conduits, Boxes		
K	Customer Initiated Changes	J	Piping, Tubing		
L	Vendor Issue	K	Steel (Structural, Rebar, Embeds, Misc.)		
M	Design Error related to codes and standards **	L	HVAC / Ductwork		
Z	Other Causes	M	Cable, Wiring		
		Z	Other Commodities		

* If the ECN/DCN is correcting a Design Error, then “D” shall be selected regardless of the original purpose of the ECN/DCN. Otherwise, the most prevalent cause code shall be used.

** If the ECN/DCN is correcting a Design Error related to codes and standards, then “M” shall be selected regardless of the original purpose of the ECN/DCN. “M” takes precedence over “D”. Otherwise, the most prevalent cause code shall be used.

Table C-2. Cause Code Definitions

Cause Code	Description	Definition
A	Ease of Construction	Those changes requested by Construction to install the design in a more efficient and cost effective manner. The design is capable of being installed as originally designed.
B	Construction Error	Those instances where Construction Craft deviated from the design without Engineering approval, such as: installing components in the wrong orientation, utilizing the wrong materials, welding, construction documentation and procedural problems. (Change is typically initiated association with an Integrated Contractor Assurance System (iCAS) Action Request (AR) or an NCR.)
C	Design Procedures / Specifications / Standards	Problems/deficiencies with administrative procedures, specifications, or standards; or changes resulting from revised procedures, specifications, or standards.
D	Design Error	Issued design cannot be installed, operated, or maintained as designed. Includes omissions. Does NOT include drafting errors, typos, or interferences not caused by the Design Agency.
E	Drafting Error/Typos	Typical "drafting errors" on design documents such as: transposing numbers, incorrect reference dimensions, missing/incorrect EINs, etc.
F	Design Clarification	Changes issued to clarify specific design points, typically at the request of Construction and/or QC to ensure there will be no misinterpretation of the design intent. The design would be capable of being installed as is. Excludes interferences, drafting errors, tolerance accumulation, omissions, etc.
G	As Built Documentation	Changes issued to document as-built conditions. Excludes changes associated with Integrated Contractor Assurance (iCAS) Action Requests (ARs) or NCRs.
J	Initial Design Release	Original Design Issue
K	Customer Initiated Changes	Client directed scope or preference changes. (Client = Project Manager and/or DOE.) Change must NOT fall into any other category.
L	Vendor Issues	Problems/deficiencies with Vendor supplied components caused by the Vendor. Includes Vendor documentation problems, procurement, and receiving/storage problems.
M	Design Error related to codes and standards	Issued design is not compliant with codes or standards, or codes/standards have been misused or misapplied. "M" shall take precedence over "D."
Z	Other causes	Includes all problems not categorized above.

Table C-3. Commodity Code Definitions

Commodity Code	Description	Definition
A	Architectural	Includes all Architectural hardware, fixtures, doors, windows, etc.
B	Concrete	Includes concrete, grout, and respective constituents.
C	Electrical	Equipment includes transformers, motors, motor control centers, distribution panels, batteries, lights, terminal boxes, etc.
D	Instrumentation	Includes all instrumentation.
E	Supports – Designed	Includes all uniquely designed supports. Excludes cookbook supports.
F	Supports – Cookbook	Includes all supports selected by Construction from a design generated handbook.
G	Mechanical Equipment	Includes pumps, valves, heat exchangers, tanks, filters, in-line components. Excludes motors and HVAC equipment.
H	Conduits, Boxes	Includes conduit, fittings, and junction boxes.
J	Piping, Tubing	Includes all process/service piping and tubing commodities, including instrument air services.
K	Steel (Structural, Rebar, Embeds, Misc.)	Includes all non-support related structural steel and associated structures (rebar, embeds, etc.).
L	HVAC / Ductwork	Includes all HVAC duct and HVAC equipment (blowers, filters, etc.).
M	Cable, Wiring	Includes all cable and wiring, terminal blocks, connectors, etc.
Z	Other commodities	Includes all commodities not categorized above.

APPENDIX D - GLOSSARY

Term	Definition
Drawing Change Notice (DCN)	A change to a drawing under HLMI control that has no facility SSC changes associated with the change. A DCN may be used to modify a portion of a drawing or capture an as-found field condition (no field modifications are allowed).
Engineering Change Notice (ECN)	A change to a drawing under HLMI control that has facility SSC changes associated with the design media change.
Technical Baseline (TBL)	The complete set of documents/data, identified by the D A, used to identify, justify, and demonstrate the physical, functional or operational requirements of configuration controlled structures, systems, and components. See HLMI-STD-ENG-50515 for additional information.
Temporary Modification (TM)	Temporary minor alterations made to SSCs. The alterations are temporary in that they generally are expected to be installed for a short time period (see HLMI-PRO-OPS-50670).
Work Authorization (WA) ECN	An authorization process for minor field changes to approved design. A minor field change shall not require a new modification traveler in accordance with HLMI-PRO-ENG-50449. See Appendix B for typical minor field changes examples that range from drafting errors and landscape changes, to rotating valve handles, relocation of fixture or instruments, and correcting identification tags.