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RECORDS OF REVISION

Rev.	Date	Description	POC	OIC
0	6/29/99	Document rewritten and reformatted to support LIR 220-03-01, Facility Engineering Manual. This chapter supersedes LANL Facility Engineering Standards Drafting Manual, Vol. 2, Rev. 7, dated 4/17/98.	Danny Nguyen, *PM-2*	Dennis McLain, *FWO-FE*
1	10/29/01	Acronym list deleted and National Standards referenced; definition section added; symbol legends created & numbered; drawing revision procedures expanded.	Richard Trout, *FWO-SEM*	Mitch S. Harris, *FWO-SEM*
2	7/15/02	Minor Changes: Editorial changes for correction/clarification throughout, as indicated by revision bars. Additions to "General Definitions."	Richard Trout, *FWO-SEM*	Kurt Beckman, *FWO-SEM*
3	9/16/04	Minor editorial changes as noted with margin bars; changed LEM to the Engineering Standards Manual (ESM).	Richard Trout, *FWO-DECS*	Gurinder Grewal, *FWO-DO*
3 change 1	06/05/05	Minor change to reflect organizational name changes.	Richard A. Trout, *ENG-DECS*	Gurinder Grewal, *ENG-CE*
4	10/27/06	Administrative changes only. Organization and contract reference updates from LANS transition. ISD number changes based on new Conduct of Engineering IMP 341. Other administrative changes.	Richard Trout, *FM&E-DES*	Kirk Christensen, *CENG*

PLEASE CONTACT THE DRAFTING STANDARDS POC
for upkeep, interpretations, and variance issues

LDSM	Drafting Manual POC

100 GENERAL REQUIREMENTS

101 INTRODUCTION

The purpose of the LANL Drafting Manual is to establish a formal system of drafting requirements required by LIR220-03-01, Engineering Standards for LANL personnel, contractors, and subcontractors for nuclear and non-nuclear facilities. Use of this manual is required when creating or modifying drawings for LANL facility projects and preparing revisions (typical facility systems are defined by the Engineering Standards Manual, Chapter 1 Section 210). Use of this manual is recommended for programmatic work, where appropriate. This manual does not address weapons or machined parts work covered by other standards. For these types of designs, use the Global Engineering Manual by Jerome H. Lieblich, Drawing Requirements Manual – 10th ed. http://drm.lanl.gov/ , and accompanying LANL division procedures where applicable.

This manual provides minimum requirements for applying drafting concepts to both the initial development of drawings and their subsequent modification. The requirements of this manual apply to new drawings **only** (doesn't force updating of existing drawings). One **exception** is the case of revisions, for which Section 103 applies. The information contained herein is by no means all encompassing; however, this manual does present enough information to provide the user with a fundamental working knowledge level sufficient to understand the concepts presented. The manual web address is: http://engstandards.lanl.gov/#dm

The October 2001 revision of this manual introduced reliance upon the National CAD Standard (NCS) for some requirements. AEs and others will be required to purchase the NCS from www.nibs.org

Notes: 1) All stated fonts are AutoCAD. 2) Guidance statements (as apposed to requirements) appear in italics or are clearly indicated as such.

1.0 ACRONYMS

Acronym	Description
ACI	American Concrete Institute
ADC	LANL Authorized Derivative Classifier
AE	Architectural Engineer
AISC	American Institute of Steel Construction Inc.
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
CSI	The numbering and 3-part format defined by the Construction Specifications Institute's MasterFormat and SectionFormat documents.
D	Delta

Acronym	Description
DCP	Design Change Package
DC	Document Control Group or Team [in LANL IRM Division]
DCP	Design Change Package
DES	Design Engineering Services Group [in LANL FM&E Dvision]
ECN	Engineering Change Notice
ERD	Evacuation Route Diagram
ESA	Engineering Sciences and Applications Division
ESM	(LANL) Engineering Standards Manual
FCN	Field Change Notice
FM&E	Facility Management & Engineering Division (formerly FWO)
FPR	Floor Plan of Record
I&C	Instrumentation and controls
IRM-DC	Information Resource Management Division's Document Control Group
ISA	Instrumentation Systems and Automation Society
L	Length
LANL	Los Alamos National Laboratory
LPS	Lightning Protection System
NCS	National CAD Standards
NFPA	National Fire Protection Association
NMSPC	New Mexico State Plan Coordinate System
P&ID	Piping and Instrumentation Diagram
PC	point of curvature
PFD	Process Flow Diagram
PI	point of intersections
PT	point of tangency
R	Radius
RPR	Roof Plan of Record

Acronym	Description
ST	standard drawing
T	Tangent
UDS	Uniform Drawing System
VPC	vertical point of curvature
VPI	vertical point of intersection
VPT	vertical point of tangency

2.0 ACRONYM AND ABBREVIATION USAGE ON DRAWINGS

A. System and component name acronyms ("IDs") shall be per ESM Chapter 1. Other abbreviations shall comply with ASME Y14.38, Abbreviations and Acronyms, or the National CAD Standard (NCS, which includes the CSI Uniform Drawing System [UDS]). Use the same system throughout drawing set. Minimize the use of acronyms whenever possible.

1. The referenced standard for abbreviations is not intended to be a complete listing of all possible abbreviations required for a project. If additional abbreviations are required, use standard industry abbreviations. An abbreviation legend is required for abbreviations used in the drawing set that are not referenced in the LANL Drafting Standards Manual.

B. Do not abbreviate single words with four letters or less, except for some very commonly used abbreviations such as:

& and
@ at

C. Avoid using abbreviations with more than one meaning except where they occur in different disciplines or when used in a context that makes the meaning unequivocally clear.

D. In general, write abbreviations in capital letters with no lower case letters or punctuation (except H_2O, CO_2, etc.). Use punctuation only when the abbreviation can be interpreted as a word without the punctuation such as: NO. (number). In this case, a period is needed for clarity.

3.0 DEFINITIONS

A. **Drawing Sheet Types:**

Note: These are used for drawing numbers and set organization (see Section 210).

- **Plans:** Views of horizontal planes, showing components in their horizontal relationship.
- **Elevations, Profiles and Cross Sections:** Views of vertical planes, showing components in their vertical relationship, viewed perpendicular from a selected vertical plane.

- **Sections:** Views of vertical cuts through and perpendicular to components, showing their detailed arrangement.
- **Large Scale Views:** Views of plans, elevations, or sections at a larger scale and with more detail than the referenced view.
- **Details:** Plans, elevations, or sections that provide more specific information about a portion of a project component or element than smaller scale drawings.
- **Diagrams:** (Schematics) Non-scaled views showing arrangements of special system components and connections not possible to clearly show in scaled views (e.g., one-lines, process flow, piping & instrument, grounding, instrument & control, lightning, wiring, riser, etc).
- **Schedules:** Tables or charts that includes data about materials, products, and equipment (e.g., panel schedules, mechanical equipment lists, door and window schedules, submittals).
- **3D Representations:** Perspectives, isometric drawings, and electronic CAD models.

B. **Drawing Formats**

Note: P&IDs, fabrication, construction, and architectural drawings can be presented using one of several different formats. The standard formats are cutaway, double-line, one-line, and pictorial. Each format provides specific information about a component or system.

Cutaway Drawings: A cutaway drawing is another type of pictorial drawing. In a cutaway, as the name implies, the component or system has a portion cut away to reveal the internal parts of the component or system. This type of drawing is extremely helpful in the maintenance and training areas where the way internal parts are assembled is important. Although not common, these drawings may be ordered by the client upon request. (e.g., 3D representations, diagrams)

Double Line Drawings: Double line drawings present the same type of information as a one-line. Double line drawings are useful in layouts and details where space restrictions and retrofits involve tight installations. (e.g., plans, elevations, details)

Electrical One-Lines: Designed to present functional information about the electrical design of a system or component. They provide the same types of information about electrical systems that P&IDs provide for piping and instrument systems. Electrical one-lines are not drawn to scale. Examples of typical one-lines are site or building power distribution, and motor control centers. (These are sometimes called single-lines.) (e.g., diagrams) See ESM, Chapter 7, example drawing D5000-2 (formerly ST7002).

Pictorial Drawings: Pictorial or double line drawings present the same type information as a one-line, but the equipment is represented as if it had been photographed. It requires much more effort to produce than a one-line drawing and does not present any more information as to how the system functions. (e.g., details, large scale views)

C. **Categories of Drawings**

Note: These categories are commonly encountered in industry practice and may be referred to throughout this manual. However, drawing sheet numbering is based upon drawing sheet

types defined by subpart 2.0A herein.

As-Built: Documentation (for example, Piping and Instrumentation Diagrams, and database records) verified by physical inspection as depicting the actual physical configuration and verified as consistent with the design requirements.[1]

As-Built Process: The process of determining the as-found condition, resolving discrepancies, obtaining approval from the design authority, and producing the as-built documentation.

As Found Drawing: Information, often in the form of marked-up documents that reflects the actual physical configuration and identifies any discrepancies with currently-approved facility documentation.

Assembly Drawings: The assembly drawing is an "exploded" perspective of the object with all the components shown as they go together. This type of pictorial is usually found in vendor manuals and is used for part identification and general information relative to the assembly of the component. Although not common for facility work, these drawings may be ordered by the client upon request. (e.g., 3D representations, diagrams)

Construction (Physical) and Architectural Drawings: Designed to present the detailed information required to construct or fabricate a part, system, or structure. These two types of drawings differ only in their application as opposed to any real differences in the drawings themselves. (e.g., plans, elevations, sections, details, large scale views, double line drawings)

Construction drawings (commonly referred to as "blueprint" drawings), present the detailed information required to assemble a structure on site.

Architectural drawings present information about the conceptual design of the building or structure. Examples are building plans, building elevations (outside view of each side of a structure), equipment installation drawings, foundation drawings, and equipment assembly drawings.

Electrical Schematics: Designed to provide more interconnection information about an electrical component than the one-lines. Electrical schematic drawings present information such as the individual relays, relay contacts, fuses, motors, lights, and instrument sensors. Examples of typical schematics are valve-actuating circuits, motor starter circuits, and breaker circuits. (e.g., diagrams) See ESM, Chapter 7 example drawing D5020-1 (formerly ST7008).

Instrument Loop Diagrams: Are an extension of P&IDs, and illustrate control philosophy and confirm the completeness of submitted data in design, construction, startup, operation, maintenance and modification. For an example, refer to ISA 5.4. These diagrams will be located in the mechanical discipline, 6000 series, Section 211 of this manual.

Isometric Projection: The isometric projection presents a single view of the component or system. The view is commonly from above and at an angle of 30 degrees. This provides a more realistic three-dimensional view. This view makes it easier to see how the system looks and how its various portions or parts are related to one another. Isometric projections may or

1 DOE STD-1073-93.

may not be drawn to a scale. (e.g., 3D representations)

Logic Diagrams: Logic diagrams can be used to depict several types of information. The most common use is to provide a simplified functional representation of an electrical circuit. It is easier and faster to figure out how a valve circuit works using logic symbols versus using the electrical schematic with its complex relays and contacts. These drawings do not replace schematics, but they are easier to use for certain applications. (e.g., diagrams) For an example refer to ISA 5.2. These diagrams will be located in the electrical discipline, 6000 series, Section 211 of this manual.

Orthographic Projections: Orthographic projection is widely used for components and assemblies. Orthographic projections present the component or assembly through the use of three views. These are a Top view, a Side view, and a Front view. Other views, such as a bottom view, are used to more fully depict the component or system when necessary. (e.g., 3D representations)

Piping and Instrumentation Diagrams (P&ID): Designed to present functional information about a system or component. Piping configuration, flowpaths, pumps, valves, instruments, signal modifiers, and controllers are represented on P&IDs; flow diagrams do not show instrumentation. These drawings are not drawn to a scale and present only the relationship or sequence between components. Common synonyms for P&IDs include EFDs (Engineering Flow Diagrams), UFDs (Utility Flow Diagrams) and MFDs (Mechanical Flow Diagrams. For an example, see ESM I&C Chapter 8 Appendix I and example drawings D-6000 through D-6025).

Priority Drawings: Priority drawings include the small set of “upper-tier” design drawings that are necessary to support the safe performance of facility operations, maintenance, and design activities within the facility’s approved safety envelope. These drawings typically include piping & instrumentation diagrams, emergency evacuation maps (e.g., floor plans of record), logic drawings, electrical one-lines, and lightning protection and may include primary and secondary site utility location, and shop and vendor drawings. (e.g., diagrams, plans, 3D representations). ISD 341-1, Engineering Processes Manual, and ESM Chapter 1 Section Z10 further address priority drawing selection.

Process Flow Diagrams (PFD): PFD’s provide functional information about a system or component. PFDs depict piping configurations, flowpaths, pumps, and valves. Flow diagrams do not show instrumentation. These drawings are not drawn to a scale and present only the relationship or sequence between components. (e.g., diagrams) See ESM I&C Chapter 8 Appendix I and example drawings D-6000 through D-6025).

D. **Reference Drawings: General Definitions**

General Note: A word, number, phrase, sentence, or group of sentences that is applicable to, involving, related to, or characteristic to, several, a group, many, or the majority involved. See Section 214 for an example.

Geo-spatial Information: data that is referenced by geographic coordinates.

Keyed Note: A word, number, phrase, sentence, or group of sentences that gives specific explanation, identification, or task that provides a solution. See Section 214 for an example.

Sketch (SK): A rough preliminary, draft, or informal drawing that should follow LANL Drafting Manual Standards, but does not involve quality assurance procedures. Sketches are not stand alone documents and are normally associated with Engineering Change Notice, Field Change Notice and Design Change Packages. These sketch packages are only acceptable for building projects and/or project modifications costing up to $100,000; see Section 103.4 for requirements.

- **Freehand and AutoCAD:**

  A rough preliminary, draft or informal drawing, sketched well enough to be understood by others. The sketch shall be neat, simple, and the message clear. The sketch may by drawn on any size or type of reproducible and achievable medium, (8.5x11, 11x17, etc.) and attached to an ECN, FCN, or DCP document for later upgrading to standard electrical drawings or existing electronic drawings per LANL Drafting Standards Manual. Sketches may contain Plans, Elevations, Orthographic (3D), Dimensions, and Notes to concisely convey the idea. The information on the sketches may be shown in any order and on any page and disciplines may be mixed. In an AutoCAD sketch, the line types, colors, fonts, and symbols shall conform to the LANL Drafting Standards.

Plate (PL): A graphic representation similar to a sketch in that it is associated with Engineering Studies, Conceptual Design Reports, Conceptual Design Plans (CDP), and/or Design Criteria (DC). Sketches can be provided as a construction documents. A plate is conceptual in nature and is not used for construction.

Floor Plan of Record (FPR): The controlled set of architectural drawings identifying structural, electrical, mechanical, HVAC, and layout for a building. The FPR is used as a baseline priority drawing for developing Emergency Evacuation Plans, Space Planning and Management, Interior Design, geo-spatial information for the Geographic Information System (GIS), and Title II design. This is the “drawing of record” upon which the Authorization Basis of the building is based.

Standard Drawing (ST): A LANL produced formal drawing depicting standard details to provide a consistent method of construction and installation of equipment for all disciplines and achieve standardization in a record drawing set. These are on-line in the various Engineering Standards Manual Chapters.

Title I (Preliminary design): Design services that develop and evaluate the existing conditions, proposed system and facility changes, and confirm the most economical design approach to be completed in Title II (see below), which meets established design requirements. Elements of a Title I document include:[2]

a) preparation of a modification book;

b) evaluation of alternatives;

c) preparation of preliminary design calculations;

d) vendor evaluation and pricing recommendations;

e) development of outline construction specifications;

f) preliminary design installation layouts;

g) P&IDs;

h) electrical one-lines;

i) block diagrams;

j) general framing plans;

k) construction estimate;

l) schedule and sequence completion of the Title I Design Summary; and

m) a preliminary DIS (design information summary) for each system.

Title II (Definitive design): Design services that finalize the Title I design, with particular emphasis on working within existing conditions, minimizing system and facility changes, and confirm the most economical construction approach which meets established design requirements. Elements of a Title II document include:

a) preparation of detailed design calculations;

b) vendor evaluation and pricing recommendations;

c) **accurate** design installation layouts with tolerances specified;

d) P&IDs;

e) construction cost estimate;

f) schedule and sequence;

g) electrical one-lines;

h) framing plans;

i) equipment schedules;

j) test and inspection plans;

k) construction specifications; and

l) project turnover/closeout documentation.

2 DOE Order 4700.1.

102 PLANNING AND COMPOSITION OF DRAWINGS

1.0 GENERAL FORMATTING GUIDELINES

A. *Proper planning and presentation of the drawing sheets is very important. Make every effort to anticipate and plan for the drawing space layout now and for future modifications: the symbols required, use of consistent terminology, and coordination of disciplines.*

B. *Map space in advance for each plan, section, elevation, detail, schedule, etc.*

C. *Each design group should develop a process for in-house design verification that is a formal documented procedure for ensuring technical reviews for drawings: development, design, change and regulatory compliance. Drafts could be controlled by letter revisions, e.g.:* ***Revision A*** *- research and layout;* ***Revision B*** *- walkdowns and design;* ***Revision C*** *- engineering overlay; and* ***Revision D*** *- final review.*

2.0 GENERAL FORMATTING REQUIREMENTS

A. Arrange each drawing so that it will not appear unbalanced or crowded.

B. Use drafting conventions that are clear, uniform and easily understood.

C. Use drafting conventions that are clear and readable, when the sheet is reduced to half size (e.g., D size to B size).

D. Use consistent line widths, text height, and line types in a drawing set for clarity and accuracy.

E. Do not combine different disciplines or systems on the same drawing sheet.

F. Show or call out information the least number of times possible, preferably once.

G. Coordinate embodiments, inserts, block-outs, and penetrations with all disciplines to ensure that the drawing set conveys consistent information.

H. Use terminology in the drawing set that is consistent with the terminology in the related specifications and throughout the drawing set.

I. Vendor drawings may be part of a document drawing set, but are used only as reference drawings used for fabrication, installation, or as-built by the vendor. These drawings do not need to conform to the LANL Drafting Manual and are to be labeled as “reference drawings” 1/4 inch text height located to the left of the Title Block.

J. Do not show calculations in the drawing set unless otherwise noted in this manual.

K. Put room numbers on all building plan drawings.

L. Do not hide, overlap or conceal text in hatching, line types, symbols, etc.

M. Do not combine sheet types on the same drawing sheet unless otherwise specified in this manual.

N. Eliminate useless data that can be reproduced endlessly.

O. Dimension styles shall be consistent within each discipline.

P. In instances where software conflicts occur with AutoCAD formatting (e.g., LANL UMAP, LANL survey drawings), the drawings must follow as closely as possible formats outlined in this drafting manual. In order for this to occur, the Drafting Manual POC must have a written agreement with the producer of the drawings (i.e., grandfather clause in effect). Fonts and text styles should be matched as close as possible and text placement must not interfere with lines in drawings as outlined in Sections 102.2, 212, and 213.

Note: When design agencies use drawings generated by firms that have grandfather clauses in effect, it is the responsibility of the AE firm to inform the Drafting Manual POC of where the drawings originated, place a general note on each affected drawing explaining origin of base map.

3.0 DRAWING LEGEND

A. Provide a standard legend of symbols and line treatment on the first drawing sheet of each discipline for the drawing set.

Note: A drawing legend will occur on the first sheet for each discipline identified by the discipline designator, followed by a " - " then followed by numerical sequence (e.g., A-0001), see Table 211-1.

B. Symbols used in the drawing package that do not appear in the standard LANL symbol library shall be identified on the symbol legend in the drawing set, by using the letters "NS" (non-standard) enclosed in parenthesis to the right of the symbol description.

C. The drawing legend should be developed showing both existing and proposed features. Legends that show the same symbols for existing and proposed are confusing and make it hard to read the drawing. This includes proposed and existing line types.

D. For information on the location of General Notes. See Section 214.9B.

103 DRAWING REVISIONS

1.0 DRAWING REVISION

Guidance: For existing facility modifications, designers shall make every effort to locate and revise existing drawings rather than create new drawings that result in unnecessary effort and documentation issues.

A. If a drawing is an initial issue, enter a "Rev. 0" in the revision block located within the drawing title block and issue for sign-off during final submittal.

B. Indicate revisions by numbers, beginning with the number "1." Use a sequential number for each revision on a sheet.

C. Number each revised sheet independently.

D. Enter the appropriate information in the revision block of the drawing title block.

E. In the Title Sheet, indicate each revised drawing sheet by drawing a revision cloud around the current revision number shown in the list of drawings "Revision Column," see Figure 203-1, Item 15.

F. Use the AutoCAD "cloud" (or other similar graphic symbol) command for revisions (layer-cloud, color- white, pen weight 0.35 mm, line type-continuous) to completely encircle the revised drawing elements. On subsequent revisions, delete the previous revision clouds. A revision cloud is illustrated in Figure 103-1.

G. A revision cloud is not required on a drawing sheet if the whole sheet was revised or it is a new sheet added to the drawing set.

H. Indicate the current revision number in the "NO." column of the revision block and "REV." block of the drawing title block (Figure 103-1).

I. Indicate the current revision date in the "DATE" column of the revision block.

J. Hand written initials or signatures are not required in the drawing title block or on previous revision block entries, but are required in the revision block for the current revision.

K. The following are graphic examples of the Title Block modifications required and Sample Cloud when revisions have been made on a Drawing sheet.

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP
2	5-6-03	U	MN	ECN-3-410-00007 RELOCATE EXHAUST FAN FE-4	DM	AT	MN	MN	GL
1	1/1/00	U	MN	ADDED EXHAUST FAN IN RM 101	DM	AT	MN	MN	GL

DRAWING NO	REV
C76391	2

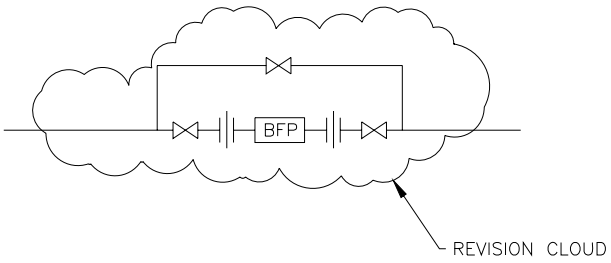

Figure 103-1

L. Non-electronic drawings with major changes (affecting 50% or more) shall be completely upgraded electronically following the current LANL Drafting Standards Manual.

M. Modify electronic drawings per the following criteria:

- The existing As-Built drawing on file shall be revised whenever possible (versus generating a new drawing for a modification or suite of modifications).
- If the proposed modification requires more space than is provided on the existing drawing, the following options, listed in order of descending preference, shall be followed:
  1. Generate new drawing that **supersedes** an existing drawing, and cancel the **superseded** drawing, **OR add a general note** on the new drawing indicating the supercede drawing C#, title, PI #, and date.
  2. Generate new drawing that **augments** the existing drawing, and cross-reference the drawings to each other, with an explanatory Note above the Title block of both the original drawing and all augmenting drawings, providing a clear identification of and cross-reference to the original drawing.
- Minor changes (affecting less than 30%) can be modified using the existing drawing format and symbology and current revision procedure.
- Major changes (affecting more than 50%) shall be completely upgraded to the current standards and depict the area changed by the revision.
- Gray area between minor/major (31-49%) changes to a drawing and/or sets of drawings shall be determined by the LANL Project Manager or Drafting Manual POC.

- Revisions to "Priority Drawings," electronic or non-electronic, shall be generated to the current ESM Drafting Manual.

N. Projects involving existing facilities and systems: the assigned design agency is required to research and locate all existing drawings pertaining to the project. Contact IRM Document Control Team for the drawing database location. **Note:** All existing drawings may not reside in the Document Control/Records center. Satellite records centers within the facility(s) may contain the essential documentation. Should this be the case, report these findings to a Document Control Team representative. These documents shall be collected and entered into the LANL master document database.

O. Revisions to existing drawings with an assigned PI# which are revised under a different PI# shall be noted in the revision block by the new PI# assigned to that change.

P. Use the Conduct of Engineering Administrative Procedure AP-341-505, Design Change Package; or AP-341-506, Engineering Change Notice. The ECN or DCP number shall be posted in the revision section of the drawing title block (Figure 202-2 item #4).

Q. Submit all ECN and DCP documentation to IRM-Document Control Team with the final revised drawings (*LANL MS K788 or hand-deliver to DC at TA-63-121*.

R. An ADC must review, classify, and sign each revision.

S. DCP/ECNs with sketch attachments may also include revised existing drawings associated with the document package. Provide proper information for cross-referencing data.

2.0 AS-BUILT AND AS-FOUND REVISION

Note: "As-Built" vs. "As-Found" - "As-Built" drawings have a pedigree: a paper trial documenting justification/rationale for each modification made; "As-Found" drawings reflect actual field configuration for which there is either:

- no documentation, or
- complete documentation is lacking

Follow Section 1.0 with the following additional requirements in order to revise an As-Built or As-Found drawing:

A. Delete all revision clouds from the drawing sheet.

B. Do not use revision clouds to denote As-Built or As-Found changes.

C. Enter the next sequential revision number in the drawing title block. Enter that same number in the revision block.

D. In the "REVISION" column of the revision block enter either "As-Built (or As-Found) With Changes," or "As-Built Without Changes," if there were no red-lines to incorporate (Table 202-1, Item 4 "Revision Description" of this manual).

E. A detailed description of the "As-Built" (or As-Found) changes is not required; however, the date of origination is required.

F. Once the as-built drawing is complete, convert all existing features on the drawing to a 0.35 mm line width and a "continuous" line type. This can be accomplished by using DDLMODES Layer Management. All entities of the drawing (layer, color, line type, etc.), are to be "by layer." Refer to the AutoCAD Users Guide for procedure. This process ends the construction phase of the project and initiates the operation and maintenance phase.

3.0 TITLE BLOCK DATE STAMP (*GUIDANCE*)

A. Newdate is a lisp routine to label a drawing as to it's location on the server, the date it was created or upgraded, the time it was last saved and by whom the file was created by or modified by last. There are two (2) files named (NEWDATE.dwg) and (NEWDATE.lisp) that make the Title block Date Stamp work. These files can be downloaded from the on-line LANL Drafting Manual here:

DOWNLOAD(NEWDATE.dwg)
DOWNLOAD(NEWDATE.lisp)

Download the two (2) files into the AutoCAD 20XX\Support directory. Start the AutoCAD program, and under the pull down menu "TOOLS\LOAD APPLICATIONS", load the NEWDATE.lisp file and add it into the history case.

Upon starting a new drawing, after opening, inserting, or X-Refing a Title Block, insert the drawing file named "NEWDATE" just outside of the title block border on the lower left corner. Type "NEWDATE" and the date stamp should update itself. (See example in Section 203.2, Figure 203-1.)

It is not mandatory that this Date Stamp be used. The stamp is provided as an aid for drawing file management and can be modified to suit.

B. *This stamp should appear on all drawings.*

4.0 SKETCHES

A. Sketches are not "stand-alone" documents and must be accompanied with an approved DCP or ECN (refer to AP-341-505, Design Change Package; or AP-341-506, Engineering Change Notice).

B. Sketches are used to revise, update or modify an existing condition on existing drawings.

1. May be hand generated or electronically produced.
2. Shall contain all information required to represent a complete design for the project or task. The sketch shall be technically correct, engineered properly and constructible.
3. May be drawn on an "A" to "D" size sheet. (Section 201).
4. Do not require a formal FM&E technical design review, but is highly recommended.

5. Shall have a "sketch document tracking number" assigned by IRM-DC Team (667-4696).
6. Shall have in the lower right hand corner a section devoted as a title block that will appear on each sketch sheet as a minimum the following information: TA number, Building number, ECN/DCP number (or similar document number per AP-341-505, Design Change Package; or AP-341-506, Engineering Change Notice), date of sketch, sketch number and a printed name and signature of responsible engineer approving the engineering change and authorizing the design modification.
7. Costs related to the ECN/DCP sketches are not to exceed $100,000 in design and construction. Variances are granted by the Drafting Manual POC when warranted. Any change above the stated dollar amount shall be submitted as a formal design package.
8. Electronically produced sketches shall comply with the Drafting Manual:
   a) Section 103, General Requirements (exceptions for E and L).
   b) Section 201.1, Drawing Sheet Sizes and Format; and 201.5, Grid System.
   c) Section 204, Plan Orientation.
   d) Section 205, North Arrow.
   e) Section 206, Partial Plans.
   f) Section 208.2, Drawing Scales.
   g) Section 209, Dimensioning.
   h) Section 211.2, Priority Drawings.
   i) Section 212, Line Work.
   j) Section 213.1, Font Styles and Text Size Requirements.
   k) Section 214, Elevations, Details, and Callouts.
   l) Section 215.3, CAD Layering Guidelines.
   m) Section 301, Symbols.
9. Hand-produced sketches shall comply with the same Drafting Manual sections except for Sections 208.1, 213.1, and 215.3.
10. Sketch numbering scheme is not per Drafting Manual, combining disciplines and sheet types are permitted. Numbering scheme is simplified to discipline ID followed by sheet number (i.e., C1, C2,…; S1, S2,…; M1, M2, etc.).

C. Once construction or as-built modifications have been incorporated, all pertinent documentation (DCP/ECN, sketches, revised drawing [hardcopy and electronic]) shall be submitted to IRM-DC Team for document control and records management.

D. ECN/DCPs with associated drawings and sketches shall be submitted to IRM-DC Team as records after construction verification.