HNF-64101
Revision 0

Preparation Standards for Engineering Drawings

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728

P.O. Box 650
Richland, Washington 99352

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Mission Support Alliance

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APPROVED
By Sarah Harrison at 9:04 am, Oct 13, 2020

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1.0 PURPOSE

This standard establishes the minimum drawing standards for the production of engineering drawings and computer-aided design (CAD) data files for Mission Support Alliance (MSA). It is the intent of this document to incorporate the United States National CAD Standard V6 (NCS V6) as base standard for all new Hanford drawings, except where specific Hanford practices differ. In drafting situations where NCS V6 is silent, and no Hanford practices dictates a course of action, then other nationally recognized standards, such as those from American National Standards Institute (ANSI) and American Mechanical Engineering Society (AMSE), are applied.

2.0 SCOPE

2.1 New Drawings

This standard applies to new engineering drawings intended for entry into the Hanford Document Management and Control System (DMCS) that depict design, installation, and configuration of an enduring facility, system, or equipment.

2.2 Existing Drawings

Drawings previously released to DMCS do not require revision to comply with this standard, except where specifically stated. Revisions to previously released drawings shall comply with the standards under which they were created.

2.3 Temporary Drawings

Drawings used to provide temporary construction designs are exempt from these requirements except for those designed items that will be abandoned in place (e.g., direct buried electrical lines, potable water lines). Other depiction methods (e.g. sketches, figures, maps, etc.) are exempt from this instruction.

2.4 Subcontractor Produced Drawings

These standards and requirements are applicable for all Architectural/Engineering vendors developing engineering drawings for the Hanford Site under contract to MSA, unless otherwise excluded in sections 2.2 or 2.3. HNF-14660, *Off-Site Subcontractor Direction for Preparation and Control of Engineering Drawings*, specifies the process for subcontracted Architectural/Engineering vendors to develop, revise, and submit engineering drawings that provide design documentation of permanent structures, systems, and components.

3.0 STANDARDS

3.1 Drawing Categories

Drawings that document baseline information for structures, systems, and components are covered by this standard. They include several different drawing types, such as arrangement, assembly, detail, schematic, wiring diagram, block diagram, flow diagram, installation, layout, plot plan, process and instrumentation diagram (P&ID), loop sheet, envelope, and altered-item drawings. This list is not all-inclusive, and other types of drawings may be necessary for particular purposes.

H-series – Official engineering drawings are assigned unique H-series drawing numbers. The H-series drawing numbers are issued and controlled using HDNS. These drawings are permanent records and may be subject to as-built requirements at the competition of fabrication and/or construction. These drawings need to be maintained as determined by the life cycle of the depicted SSC.

Vendor – A drawing prepared by a vendor according to his/her drawing requirements that provides information on configuration, installation, maintenance, and/or operation. Vendor supplied drawings that will be designated as design baseline shall be assigned an H number and shall meet the requirements of this standard. An altered-item drawing shall be developed for vendor items that require modification as part of a design, or modification to items covered by a vendor item file (see Section 3.9, Vendor Drawing / Altered Item). Vendor-supplied drawings are governed by MSC-PRO-ENG-16406, *Vendor Information Process*.

PFDs and P&IDs – Process Flow Diagrams (PFD) are a simplified graphic description of the basic process flow showing equipment, piping, and controls necessary to clarify the process, heat, and material balance conditions and control concept. Piping and Instrumentation Diagrams (P&ID) are a detailed graphical representation of a system used to develop system design and provide documentation for configuration control of a system, structure or component. The P&ID shows equipment, instrumentation, piping, and any other miscellaneous items required for the mechanical design of the system. PFD and P&ID drawings are governed by the standards in HNF-64103, *Preparation of Process Flow Diagrams and Piping and Instrumentation Diagrams*.

Altered-Item Drawing – An engineering drawing is used to control and depict the alterations to a commercial item. An altered-item drawing reflects only the change and is not intended to show complete fabrication details (see Section 3.9, Vendor Drawing / Altered Item).

3.2 Control of CAD Data Sets and Manual Drawings

3.2.1 CAD Program

AutoCAD® 2019 or shall be used for preparing all engineering drawings that will be released into the Hanford drawing storage/retrieval system. Subcontractor A/E firms may request, in writing and with justification, for exceptions to this requirement. Requests will be reviewed and may be approved by the MSA CAD manager.

Third-party software used in the development of AutoCAD-based drawings shall be the type that does not require access to the third-party software to view or revise the drawing. Drawings developed on CAD programs other than AutoCAD shall be converted to the standard AutoCAD program "DWG" format prior to releasing the data files to DMCS.

Final plots shall be generated from the .DWG format files.

3.2.2 Drawing Release

Drawings are released with the process as given in MSC-ENG-PRO-709, *CAD and Drawing Development and Control Process for Engineering Drawings*. Approved engineering drawings are transferred to DMCS. The AutoCAD data sets are transferred to site document control for input into the DMCS. The final hard copy engineering plotted drawing and the CAD data files (those with a "DWG" extension) are released concurrently into DMCS by document control, per MSC-ENG-PRO-709.

3.3 AutoCAD Layering

Uniform layering standards are established to make it easier to exchange AutoCAD data sets among organizations and companies. Consistency allows logical separation and identification of drawing data, and permits the user to view and plot related aspects of a drawing separately or in combination.

Designating layers by color and linetype is the preferred standard. Section 3.5 discusses linetypes and color options for layers. Layers can also be assigned on an entity basis.

Layer naming is performed using the guidelines in National CAD Standard (NCS). The NCS allows for flexibility in formatting options for layer naming. Layer names incorporate discipline designators and major and minor groups. Appendix A provides details for layer naming and tables of layer name designations.

Third-party software approved for use by MSA, with built-in layering standards, is exempt from this layering standard requirement. A special plotter configuration may be required to support third-party software.

3.4 New Drawing Setup Files

New drawing setup files (AutoCAD templates - .DWT) are available. Subcontracted A/E firms will be provided with the setup files at project startup by the MSA Drafting and Design manager. These files contain pre-created and pre-named discipline layers used for most routine projects. The startup files may not be all-inclusive for needed layers. Additional layers may be created as needed to provide for specific drawing needs. The NCS naming standard (Appendix A) is to be used to develop additional layer names.

New drawing setup files are available that include formatted title blocks, standard symbols and other drawing blocks, and pen table files (.CTB files).

3.5 Line Widths and Plotter Pen Assignments

Line widths are used on drawings to emphasize certain information and to de-emphasize other to improve understanding. Table 1 presents common line widths and usage.

Table 1. Line Width and Usage

Line Thickness	Plotted Line Width		Usage
	mm	in	
Extra Fine	0.13	0.005	Fine detail which cannot be accomplished using a fine (0.18 mm) line.
Fine	0.18	0.007	Material indications, surface marks, hatch lines, patterns.
Thin	0.25	0.010	Text: 2.5 mm (3/32") to 10 mm (3/8"). Dimension lines, leaders, extension lines, break lines, hidden objects, dotted lines, dashed lines, setback lines, center lines, grid lines, schedule grid lines.
Medium	0.35	0.014	Text: 4 mm (5/32") to 10 mm (3/8") Object lines, property lines, text, lettering, terminator marks, door and window elevations, schedule grid accent lines.
Wide	0.50	0.020	Text: 6 mm (7/32") to 10 mm (3/8") Titles, edges of interior and exterior elevations, profiling. Cut lines, property lines, section cutting plane lines, drawing block borders.
Extra Wide	0.70	0.028	Text: 13 mm (1/2") to 25 mm (1") Match lines, large titles, footprints, title block borders, sheet borders, schedule outlines.
XX Wide	1.00	0.039	Major title underlining and separating portions of designs
XXX Wide	1.40	0.055	Border sheet outlines and cover sheet line work.
XXXX Wide	2.00	0.079	Border sheet outlines and cover sheet line work.

Plotters are configured to produce line widths (weights) based on colors. Designating specific AutoCAD colors to the plotter pens does this. This allows specific line weights (widths) to be generated by the plotter and minimizes the need to use AutoCAD Polylines for all line work within a drawing.

Care should be taken to ensure the selected color/line weight produces the desired line width on the final drawing plot. The linetype and color should provide the optimum contrast with the visible/object line width on the drawing. See Table 1 for standard plotter line widths.

MSA AutoCAD templates have layers designated by color, linetype, and line weight.

CTB files are used to translate specific colors to specific line weights by the plotter. The MSA standard CTB file will be provided to subcontracted A/E firms with the MSA AutoCAD templates at project start up. Use of third party software may require custom CTB files to achieve the same results. Table 2 provides the plotter pen size associated with AutoCAD colors that are used in the standard MSA CTB file.

Note: Settings in the Polyline Properties may override the plotter pen assignment based on color.

Table 2. Plotter Pen - Line Color Assignment in Standard MSA CTB File

Line Thickness	Plotted Line Width		AutoCAD Line Color(s)	
	mm	in	primary	optional
Extra Fine	0.13	0.005		
Fine	0.18	0.007		
Thin	0.25	0.010	8 (gray)	13, 53, 123, 243
Medium	0.35	0.014	5 (blue), 6 (magenta), 7 (white)	12, 32, 152, 222
Wide	0.50	0.020	4 (cyan)	11, 71, 181, 241
Extra Wide	0.70	0.028	2 (yellow), 3 (green)	10, 90, 100, 230
XX Wide	1.00	0.039		
XXX Wide	1.40	0.055		
XXXX Wide	2.00	0.079		

3.6 Drawing Sizes and Material

New drawings are sized in accordance with the National CAD Standard. Revisions to existing drawings, or individual sheets within a drawing set, should be sized per the original or drawing set, as appropriate.

All drawing sheets of a multiple sheet drawing are to be the same size. Avoid mixing metric system and inch-pound system on drawing sheets on the same set of drawings (multiple disciplines) for the same project.

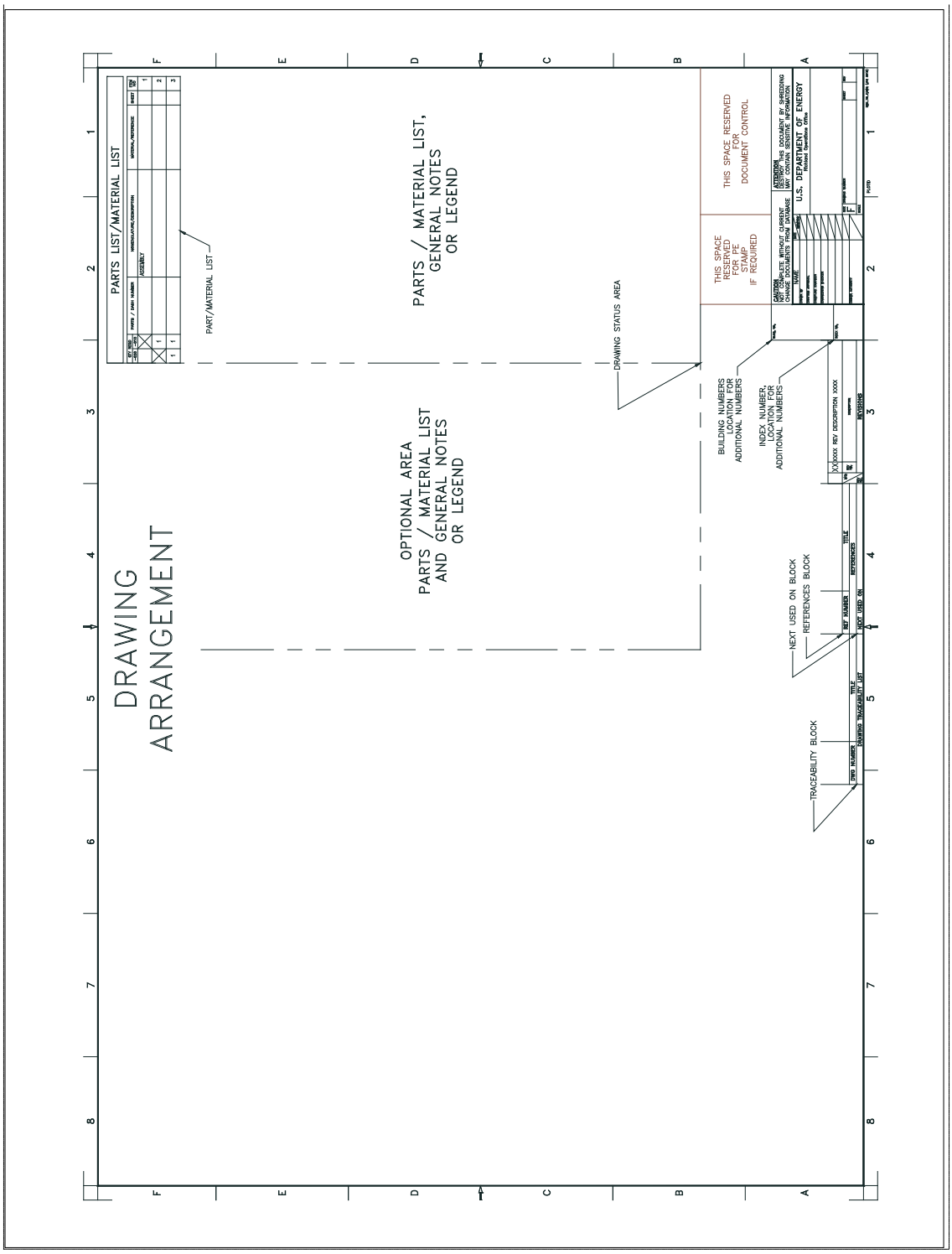
Do not use ANSI "E" size, ISO "A0" size, and roll or elongated size drawings.

CAD drawings are plotted on bond paper that is a minimum of 20 lb minimum opaque paper.

3.7 Drawing Arrangement

Drawing arrangement is configured as shown in Figure 1 and as defined in this standard.

Figure 1. Typical Drawing Arrangement



3.8 X-Reference Files

Prior to submitting files into DMCS, X-Reference files are bound to the AutoCAD "DWG" drawing file. All affected layers are changed to reflect the layering specified in the NCS V6 layer naming guidelines (Appendix A).

3.9 Vendor Drawings / Altered Items

If the design of a vendor-supplied item is altered after purchase for an existing Hanford Site application (documentation may be contained in a VI file), or for use in a new engineering design, then the requirements in this section apply.

A new H-series drawing number is assigned -or- a drawing is identified where the item will be documented in a parts list within an assembly or as a subassembly. See Figure 1 and Parts/Material List, section 3.10.8.

The following is placed on the Altered Item drawing:

- If the item is assigned or will be assigned a VI file number, the VI number is identified in the Material/Reference column. Also see MSC-PRO-ENG-16406, *Vendor Information Process*.
- If a manufacturer's drawing is available for reference, the reference in placed in the Material/Reference column.
- "ALTERED FROM (manufacturer's part number)" is placed in the Description column.
- A new part/assembly number is assigned.

Detailing the alteration:

- Reference features (features not needing alteration) are limited to orientation for describing where designated alterations are being made. These reference features are shown by thin lines as described in Table 1.
- Dimensional information needed for orientation only to identify where the alteration will be made are shown in (parenthesis).
- The alteration is detailed by medium lines as described in Table 1.
- Notes, tolerances and dimensions are applied to detail the alteration.

3.10 Delineation

3.10.1 General

Drafting is according to applicable United States National CAD Standard V6 and accepted national standards and industry practices. Where national practice differs from the direction of this document, this document prevails as the priority direction.

Process Flow Diagrams (PFDs) and Piping and Instrumentation Diagrams (P&IDs) comply with HNF-64103, *Preparation of Process Flow Diagrams and Piping and Instrumentation Diagrams*. Where there is conflict between HNF-64103 and this standard, this standard takes precedence, including symbology; see Section 3.10.3 Symbology.

3.10.2 Abbreviations and Acronyms

Abbreviations conform to the latest edition of National CAD Standard V6, except where commonly accepted industry or specific discipline usage dictates a deviation. PFDs and P&IDs comply with the abbreviations and acronyms listed on H-9-006015, *Master Abbreviations Legend Drawing.*

Abbreviations on a drawing are used only when space does not permit the word(s) to be spelled out, such as in the drawing title, parts list, or a reference drawing list. Industry-accepted abbreviations, such as DIA, SCH, and REF are used to the fullest extent. The face of the drawing should be planned and drafted to provide ample space so that abbreviations can be held to a minimum, for clarity and interpretation.

Non-industry-accepted acronyms should be avoided. However, if repeated use of a word in text (e.g., general notes) makes the use of an acronym an obvious advantage, the acronym may be created. Hanford site-specific acronyms are clearly defined by spelling out the acronym in the LEGEND or by using a general note.

3.10.2.1 Punctuation

Punctuation marks, except the slant (/) and the hyphen (-), are not used when abbreviations are used on drawings. A period (.) is added to an abbreviation only if its context does not obviously represent an abbreviation (e.g., ADD indicates addition or addendum). Duplicate abbreviations are specified in the latest edition of NCS V6 and ASME Y14.38. Before such abbreviations are used, care should be exercised to ensure the proper meaning is correctly interpreted.

3.10.2.2 Industrial and Professional Societies

The use of acronyms for industrial and professional societies (e.g., ASME, ANSI, AWS [American Welding Society], and IEEE [Institute of Electrical and Electronic Engineers]) is acceptable. These professional societies' acronyms are used at all times in text and on the field of the drawing.

3.10.3 Symbology

Symbology used on new drawings that defines components is traceable to a LEGEND placed on the drawing or a separate legend drawing maintained for the system or facility.

The NCS V6 symbolgy library of CAD files is available from MSA for use on new drawings. If additional symbology is needed, Section 3.10.3.1 provides a list of optional Hanford symbology sources. Industry accepted standards can also be used. Symbols used with the metric system (e.g., mm, Pa) need not be identified or referenced.

3.10.3.1 Optional Symbology

The symbology specified by the following drawings is optional. It is provided as a drafting aid to increase efficiency in producing drawings. These drawings are not to be referenced as legends for drawings. Subcontracted A/E firms can request these drawings from their project contact, as needed.

- H-6-l 4982 Hanford Standard, General Symbology,
- H-6-14983 Hanford Standard, Civil Symbology,
- H-6-14984 Hanford Standard, Structural Symbology,
- H-6-14985 Hanford Standard, Architectural Symbology,
- H-6-14986 Hanford Standard, Machine Symbology,
- H-6-14987 Hanford Standard, HVAC Symbology,
- H-6-l 4988 Hanford Standard, Fire Protection Symbology,
- H-6-14989 Hanford Standard, Control Systems Symbology,
- H-6-14990 Hanford Standard, Electrical Symbology,
- H-6-14991 Hanford Standard, Piping Symbology.

3.10.4 Drawing List

A drawing list is placed on the first drawing in the project set of 20 or more drawings. The drawing list may be placed on a separate or title sheet. The list contains, as a minimum, the following information:

- Drawing numbers
- Drawing index number
- Building numbers (if more than one building is involved in the project)
- Title of each drawing
- Vendor information (VI) lists
- Specifications

3.10.5 Lettering

For CAD-developed drawings, lettering is all upper case Gothic as defined in ANSI Y14.2M, *Line Conventions and Lettering* (i.e., AutoCAD's supplied fonts ROMANS and ROMAND are considered to be in compliance with ANSI Y14.2M). Nonstandard fonts (i.e., fonts not supplied by AutoCAD) are not to be used.

Letter height is a minimum of 3 mm (.12"), except where lower case letters or metric symbols are used (e.g., mm and g). Lower case letters and symbols are to be proportional. A minimum height of 2.5 mm (.1") is allowed in cases where smaller letter height is needed (e.g., mapping, drawing revisions on a crowded drawing, but not used on new engineering drawings).

3.10.6 Drawing orientation

North is oriented to the top or left side of the sheet. Exceptions are allowed where modifications are being made to existing facilities for which the orientation of the existing drawings is different or where industry practices dictate (e.g., civil drawings showing plan view strips with corresponding profiles). All plans on a given set of drawings are oriented the same and match the existing plant drawing orientation. A north arrow is placed and properly oriented on all maps, plans, layouts, and other drawings where applicable.

3.10.7 Coordinate system and elevation

The site standard coordinate system for Hanford is the Washington Coordinate System of 1983, South Zone 1991 (WCS83S).

The site standard vertical datum is the North American Vertical Datum of 1988 (NAVD88).

3.10.8 Parts/Material list

The parts/material list shall be located, or begin, in the upper right-hand corner on the first sheet of the drawing (see Figure 1).

A parts/material list shall be used on fabrication and assembly drawings, but not on project construction drawings as specified in Table 3.

Table 3. Parts/Material List Applicability

ENGINEERING DRAWING TYPE	PARTS/MAT'L LIST NOT USED	FORMAL PARTS/MAT'L LIST, REQUIRED (See code key below)	MATERIAL CALL-OUT ON FIELD OF DRAWING (See code key below)
Architectural			All
Civil			All
Structural		1	2
Electrical		1-2-4	7
Piping		1-3-5	2
Instrumentation		1-2-3-4	7
Heating, Ventilation, and Air Conditioning		1-3-8	2-7
Mechanical		1	2
DRAWING CLASSIFICATION			
Fabrication		All	
Construction		6	All
Altered Item		1	2
Specification Control			All
Non-Fabrication/Construction, i.e., maps, conceptual layouts, cell arrangements, diagrams, schematics, wire run list, drawings made for operational use.	All		

Code Key for Table 3

1. Fabrication or shop-oriented drawings
2. Construction field-installation-oriented drawings
3. In parts/material list description column, enter all pipe ells, tees, etc., as "size of pipe and miscellaneous fittings"
4. In parts/material list description column, enter all conduit lugs, pull boxes, etc., as required by National Electrical Code
5. Prefabricated
6. Electrical, instrumentation, and HVAC disciplines (non-project)
7. Project construction type drawings only
8. Process hood systems (supply and exhaust) and process exhaust systems drawings only

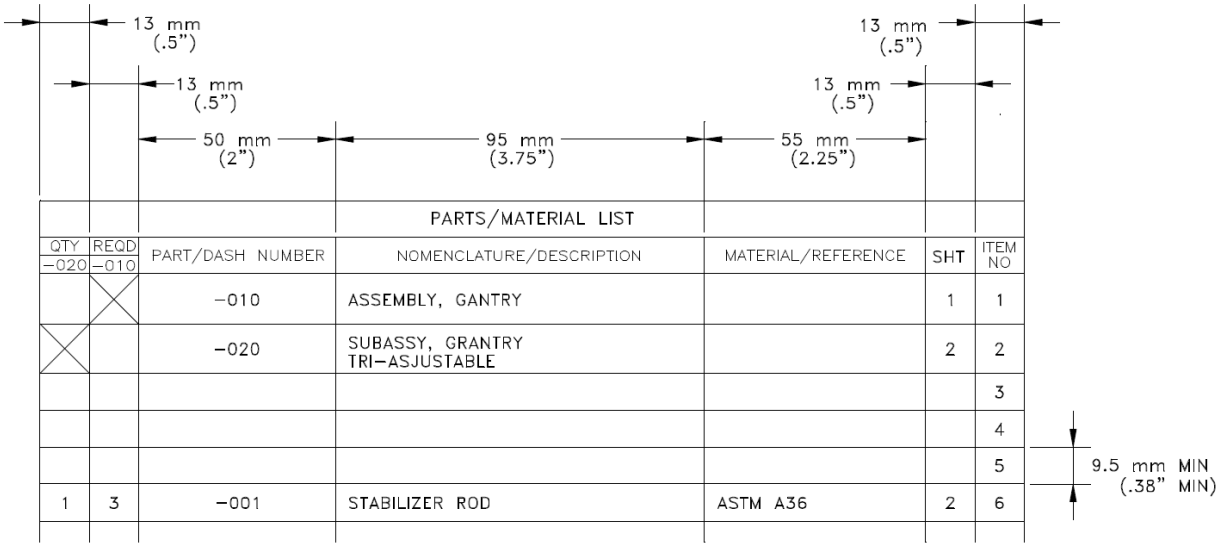
3.10.8.1 Arrangement and Size

The minimum width of the Parts/Material List block having one quantity column is 239 mm (9.5"). See Figure 2. Quantity columns may be added as necessary. The parts/material list shall be located, or begin, in the upper right-hand corner on the first sheet of the drawing.

3.10.8.2 Contents

The parts/material list shall contain all material and separable components on the drawing. The individual pieces of weldments or other inseparable assemblies normally are not numbered separately.

Figure 2. Parts/Material List



3.10.8.3 Part Arrangement/Order

The parts/material list should be arranged in a hierarchy (i.e., assemblies, subassemblies, detail parts, catalog items). It is not necessary to rearrange the parts/material list merely to add a later entry.

3.10.8.4 Part Number

Unique part numbers shall be assigned where control of a design configuration (i.e., assembly, subassembly and detail) is controlled on an H series drawing. A part number shall be used to uniquely identify a specific item. Non-interchangeable items shall be identified with separate and unique part numbers.

The official part number is the drawing number and the assigned dash number (see section 3.10.8.5 Dash Numbers for Parts and Assemblies). When a part number is referenced, both the drawing number and the dash number are required.

3.10.8.5 Dash Numbers for Parts and Assemblies

Each assembly, subassembly, and detailed part is assigned a separate and unique part (dash) number. The primary assembly is assigned the -010 dash number. Additional assemblies and subassemblies are assigned every tenth number consecutively (i.e., -020, -030, -040, etc). The first detailed part is assigned the -001 dash number. Additional detailed parts are assigned -002, -003, -004, etc., with every tenth digit reserved for assemblies.

3.10.8.6 Interchangeable Parts

Interchangeable parts are equivalent in performance and durability. They are capable of being exchanged one for the other without alteration of the item or of adjoining items, except for nominal adjustment. They are also interchangeable in terms of fit and performance. Interchangeability is also explained in general notes with a statement in the parts/material list to see the applicable general note.

3.10.8.7 Part Number Revisions

The parts/materials list periodically requires revisions and/or material deletions due to fabrication changes or modifications to the original design. The following are accepted methods for changing the parts/material list, when accompanied by an Engineering Change Notice (ECN):

Remove a part or material item by placing a double line through the part or material item (e.g., CAD or manual drawings).

Remove a part or material item and add the word "Deleted," in place of the part or material item (e.g., CAD revision).

3.10.8.8 New Part Number

New part numbers, including applicable altered item part numbers shall be assigned when the design of a part, fabricated assembly, or procured item is changed. The following conditions determine if a new part number is required:

- Performance or durability is affected to the extent superseded items must be discarded for reasons of safety, failure, or malfunction.
- Parts, assemblies, or subassemblies are changed so the new designs are not directly and completely interchangeable with respect to installation and/or specified performance.
- When replaced/redesigned parts are limited to use in specific applications and the newly designed items are not so limited.
- When an existing Hanford item, or vendors' purchased item, requires alteration.

- When existing items cannot be reworked to be directly and completely interchangeable with the new design.

NOTE: New materials shall be added at the end of the parts/materials list using sequential part numbers. Part numbers shall not be reused for new or different parts/material; new part numbers are required.

3.10.8.9 Purchased Items

Purchased items shall be identified in the parts/materials list with the manufacturer's part number or vendor information (VI) number as applicable. These items are normally controlled by the vendor, by industrial or government codes, standards, or file number.

3.10.8.10 Altered Item

If the design of a vendor-supplied item is altered after purchase for an existing Hanford Site application (documentation may be contained in a VI file), or for use in a new engineering design, the following requirements apply:

"ALTERED FROM (manufacturer's part number and part name or existing Hanford part number and part name)" is recorded in the description column of the parts list.

A new Hanford part number shall be assigned and placed in the part number column.

The alteration is detailed by medium lines (Table 1). Reference features (features not requiring alteration) shall be limited to orientation for describing where designated alterations are required. Reference features are shown by thin lines (Table 1).

3.10.8.11 Quantities and Customary Trade Units

Quantities shall be counted accurately and shown in customary trade units.

3.10.8.12 As Required (AR) Designation

The letters AR (as required) shall be used where the quantity is not known or where the quantity could vary.

3.10.8.13 Part Description

The part description shall be generic, except where a specific item is required, and the design depends on or is tailored to the specific item. The name of the item shall be listed first with supplemental descriptive words following. The description of an item shall be complete and provide specifications sufficient to procure the item.

Standard industry language shall be used to define the item. If the item can be completely described in the parts/materials list, it shall not be delineated on the drawing. If description/specification is lengthy, it may be in the general notes or in a separate specification. If the description/specification is placed in the general notes or in a separate specification, the general note or separate specification shall be referenced in the description column of the parts list, as required.

3.11 Title block

A specially attributed drawing title block is required for all H-Series Drawings. Each discipline has specific attributes and specially developed AutoCAD start models are available (AutoCAD .dwt file). See Section 3.4, New Drawing Setup Files.

New drawings and drawings being redrawn into CAD are required to use the latest available title block. The latest title block is available through the HTP or HANTIP function. See MSA Hanford User Help (HUH) at http://www7.rl.gov/msd/ for additional help.

Only one title block is to exist in any data file. The title block may be inserted in Model Space or Paper Space.

Figure 3 presents an example of the Hanford standard title block.

3.11.1 Company Name

In the approval section of the title block the acronym of the contractor for each identified name is placed in the block next to the date. See Figure 3. For A/E contract drawings, the name of the firm may be placed above the title block. See Figure 4.

Figure 3. Hanford Standard Title Block

NAME	DATE / COMPANY
DRAWN BY JB DRAFTER	2/2013 MSA
DRAFTING APPROVAL SB CHECKER	2/2013 MSA
DISCIPLINE ENGINEER DB ENGINEER	2/2013 MSA
ENGINEERING CHECKER IM INCHARGE	2/2013 MSA
DESIGN AUTHORITY DA ENGINEER	2/2013 MSA

U.S. DEPARTMENT OF ENERGY
Richland Operations Office

SLUDGE
CONTAINERIZATION SYSTEM
PFD AND P&ID LEGEND

SIZE	DRAWING NUMBER	SHEET	REV
F	H-X-XXXXXX	3	0

SCALE NONE

3.11.2 Drawing Title

Titles are arranged in one, two, or three lines centered in the block. All sheets of multiple-sheet drawings have the same title. The title identifies the system/project subsystem/subproject, and/or component, as appropriate, using the first and second lines of the title block and as defined below:

- The drawing type is identified on the second line of a two line drawing title, or the third line of a three line drawing title.
- The title clearly identifies the subject matter.
- The title does not include capitol project numbers or building numbers (e.g., W-120).
- The area number is used only for area-wide presentations.
- The total number of characters, including spaces, does not exceed 60.
- Height of the lettering in the title is a minimum of 6 mm (.24") for ISO A1 and ANSI D and F size drawings. Height of the lettering is 3 mm (.12") for all other drawing.
- For capital projects, the project number and project title are entered in a supplemental block above the Title Block. See Figure 4.

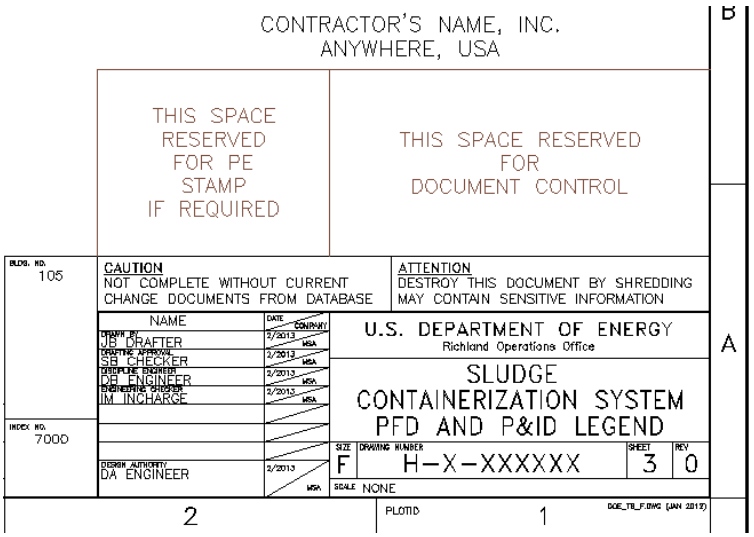
3.11.3 Building Number

The building or area number is noted in the Title Block.

If more than 12 buildings are depicted within the same area, the assigned building number is the area number followed by the letter G (e.g., 200G and 400G).

If additional space is needed, the additional building number(s) are listed above the Title Block along the right border in the in the block provided (see Figure 1).

Figure 4. Capital Projects Title Block



3.11.4 Index Number

The Drawing Index System uses numerical digits to identify Hanford Site drawings for storage and retrieval purposes. All drawings developed are indexed in accordance with HNF- 23001, Index Number Standard for Engineering Drawings. Index numbers are placed on each drawing. The number is shown on the Title Block of each drawing before releasing the drawing into the Hanford drawing system.

An index number is assigned for each major category covered by the drawing. Nonessential numbers are not shown (e.g., 0801 and 0802 are not shown along with 0800 on a single drawing).

If additional space is needed, the additional Index number(s) it is listed above the Title Block along the right border in the block provided (see Figure 3).

Off-site A/Es obtain index numbers from their MSA CAD point of contact.

3.11.5 Drawing Number

There are two locations for the drawing number, in the title block and outside the right border of the drawing in zone "B." The drawing number shall be 6 mm to 8 mm (.24" to .35") high.

Obtain new drawing numbers using the guidance in this section, and connecting to the Hanford Document Numbering System (HDNS) to complete the drawing number assignment process. Off-site vendors obtain drawing numbers from the appropriate MSA point-of-contact.

Drawing numbers are assigned in accordance with the Hanford Site area that the drawing will represent. To obtain the correct drawing number, the area that the drawing will cover is used to select the correct drawing number. The drawing prefix series and the representative areas are shown in Table 4.

Table 4. Drawing Number Prefix Series

H-1	100 Area
H-2	200 Area
H-3	300 Area
H-4	400 Area; Fast Flux Test Facility (FFTF)
H-5	Unassigned except for electrical drawings not specifically applicable to other areas usually civil drawings and maps
H-6	General area, not included in other defined areas.
H-7	700 Area and City of Richland (RCHN, RCHC, and RCHS)
H-8	800 Area, Exploratory Shaft Site
H-9	Specification Control Drawings
H-10	NOT USED
H-11	1100 Area (no new numbers assigned, use H-7)
H-12	3000 Area (no new numbers assigned, use H-7)
H-13	General mapping of the Hanford Site
H-14	Waste Tank Farm (200 East, 200 West, transfer lines, and associated electrical and instrumentation)

Note: The 1100 and 3000 area designations are no longer used and therefore no new H-11 and H-12 drawing numbers are issued. These former areas are now considered City of Richland, and thus new drawings use an H-7 number. Existing H-11 and H-12 drawings may be revised using the existing drawing number. New drawings for facilities in these areas will receive an H-7 number and will be prepared using this standard.

3.11.6 Revision Number

Numeric revision numbers are used. The current revision number is noted in the Title Block, auxiliary block just outside the right side of the drawing border, and in the REVISION block. See Figure 3. Zero (0) is normally used for the initial release. Also see Section 3.12, Revisions.

During the development of a drawing and prior to the formal initial approval alpha characters are used staring with the letter 'A' and advancing through the alphabet.

3.11.7 Scale

Enter predominant scale of the drawing or if the predominant scale of the drawing cannot be determined, enter "SHOWN" and identify the scale under each graphic. Enter "NONE" when no scale is used.

The use of a standard Architectural, Engineering/Civil or Mechanical scale is preferred, for example: 1/4"=1'-0", 3"=1'-0", 1=10, 1=100, 1/2, 2/1. The use of non-standard scales such as 1/3, 1.315=1 are discouraged.

3.11.8 Sheet Number

For single sheet drawings, a "1" is entered in the SHEET block. For multiple-sheet drawings, the sheets are numbered in sequence starting with 1. All multi-sheet drawings sheets shall have the same title (i.e. when a new drawing title is used, a new drawing number and sheet sequence must be used).

Enter the total number of sheets on sheet 1 only. Each subsequent sheet only shows the next sequential sheet number.

3.11.9 Drawn By

The initials and surname of the drafter are printed in the Drawn By box (see Figure 3).

3.11.10 Drafting Approval Block

All drawings are checked against the appropriate preparation standard for compliance. Section 2.0 Scope discusses which standard is appropriate. Approval of the drafting is governed by MSC-PRO-ENG-709 or HNF-14660, *Offsite Subcontractor Instructions for Preparation and Control of Engineering Drawings*, as appropriate.

The initials and surname of the individual who checked the drawing for compliance are placed in the "Drafting Approved" block. The initials and surname are printed with the signature placed next to or below the printed name.

3.11.11 Engineering Approvals

Approval of the engineering represented in the drawing is governed by MSC-PRO-ENG-709 or HNF-14660 as appropriate. The initials and surnames of the Discipline Engineer and the Engineering Checker are placed in the appropriate box in the title block (see Figure 3).

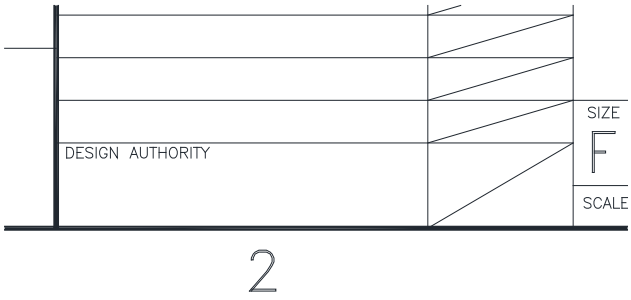
3.11.12 Design Authority Approval

Final approval of the drawing and engineering is made by the Design Authority per MSC-PRO-ENG-709 or HNF-14660. The Design Authority (DA) signs and dates the Title Block in the bottom approval space (Figure 5). The company designator is identified and placed in the block provided next to the approver's signature and date. The initials and surname are printed with the signature placed next or above the printed name.

When required, professional engineer stamps are placed above the title block (see Figure 4).

The initials and surnames of people are placed into the approval block.

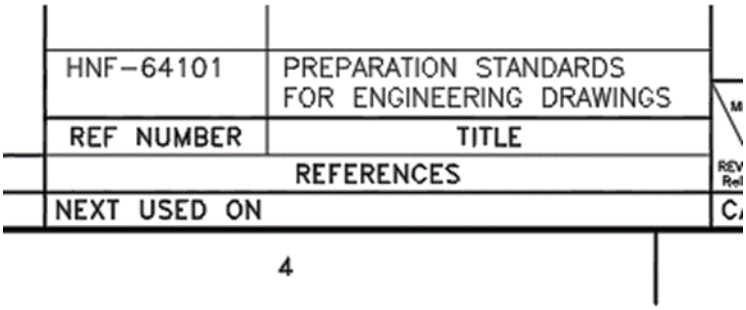
Figure 5. Design Authority Approval Box



3.11.13 Reference Block

The drafting standard used to develop the drawing shall be listed in the "REFERENCES" section of the drawing (see Figure 6). Additionally, reference documents needed by construction contractor may appear the references block (e.g. specifications, etc.). Vendor Information File number of supplied/existing equipment is referenced, if applicable. New drawings depicting new construction or definitive design are not listed in the REFERENCES block, but are shown on the drawing for continuation. The reference document number is entered in the REF NUMBER field. The reference document title is entered in the TITLE field and may be abbreviated.

Figure 6. Typical Reference Block



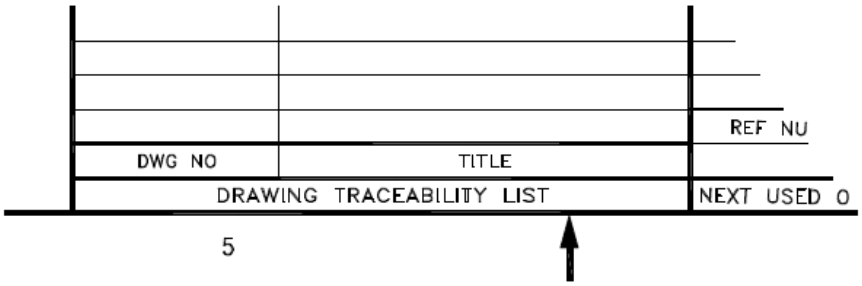
3.11.14 Next used on

The NEXT USED ON block is used to document drawings that are linked together (e.g., a subassembly, detail and installation drawings). See Figure 6. These drawings shall be linked by referencing the next higher level or generation (e.g., a subassembly drawing will list the drawing number of the assembly or the installation drawing), as allocated. If the drawing is the top drawing, the words "END ITEM" are entered.

3.11.15 Drawing traceability

The DRAWING TRACEABILITY LIST block itemizes the existing drawings affected by changes in design. See Figure 7. All affected drawings are shown. The drawings are not duplicated in the REFERENCES block. All existing drawings affected by a new design or modification need cross-referencing to the new drawings, and vice versa, to provide two-way traceability.

Figure 7. Drawing Traceability List

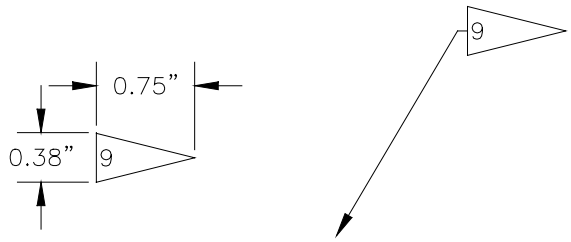


3.11.16 General notes

The preferred location of the general notes is above the Title Block. Other locations may be used when additional space is needed. On multiple-sheet drawings, general notes start on sheet 1, but may continue on subsequent sheets, as necessary.

When a reference back to the general notes is required, a "flag note" or notation (for example, "SEE GENERAL NOTE 5") is placed in the body of the drawing near the affected area. Leader lines from the flag note or notation is used when clarification of the reference is required. If a flag note symbol is used, it is sized and configured as shown in Figure 8. A flag note symbol is also placed in the general notes to indicate that a general note is flagged in the body of the drawing.

Figure 8. Flag note size and configuration



3.11.17 Drawing status area

A space approximately 75 mm (3") high above the Title Block is reserved on the drawing for recording additional Title Block information and for the application of A/E stamps according to individual contractor procedures.

3.12 Revisions

Drawings previously released into the Hanford drawing system do not need to be revised to meet the format specified in this standard, e.g., title block, revision block, parts list.

3.12.1 Manual Modification or Revision of CAD-Generated Drawings

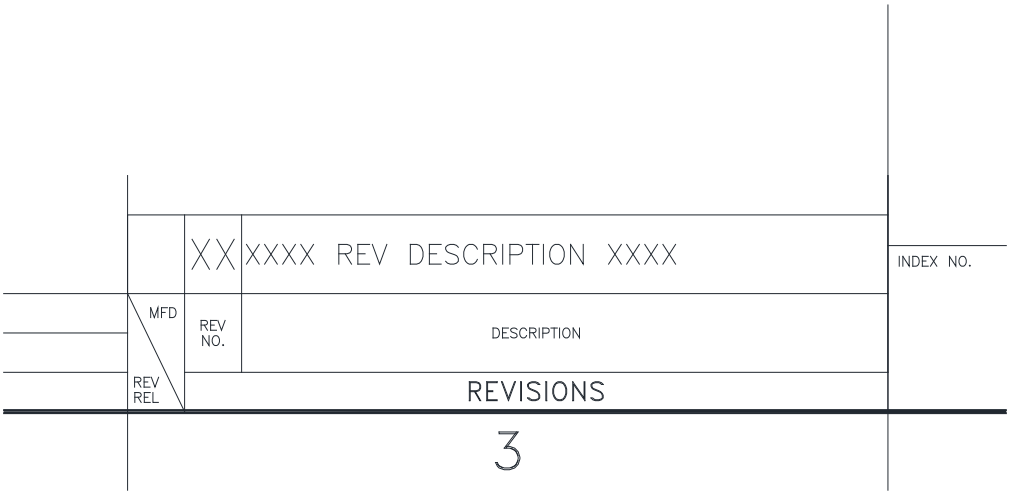
Manual modification of drawing originals is not permitted. All drawing originals and master files shall be the latest revision and contain identical graphical data. Inaccurate engineering graphical data found before or during final review and approval, requires an update to the master file to reflect the changes and the drawing re-plotted and re-approved before issuing the drawing for release.

3.12.2 Revisions Block Size and Location

REVISION blocks on new drawings are sized and configured as shown in Figure 9. Location of the block is according to the drawing arrangement format. See Figure 1.

Revision 1 and higher approval signatures or initials are placed in the revision block.

Figure 9. Typical Revision Block



3.12.3 Description

When a drawing is revised, the complete authorizing change document number is placed in the revision description block (e.g. FMP, DCN, ECR, etc.). Conservation of space is essential; therefore, abbreviations are used to the best advantage.

3.12.4 Revision Numbers

When revising multiple-sheet drawings, each sheet is considered a separate drawing. Revision numbers are advanced only on the sheet or sheets being affected by the change.

3.12.5 Change Documents

MSC-PRO-ENG-2001, *Facility Modification Package Process* and MSC-PRO-ENG-8016, *Design Change Notice Process*, are change documents that address changes affecting existing drawings and are the authorizing engineering document for revising MSA engineering drawings.

3.12.6 Change Incorporation

The authorizing change document number is shown in the REVISIONS Block (e.g., REVISED PER [change document number]).

During change document incorporation, an additional change document is not needed for the non-technical changes. Examples include but are not limited to:

- When adding an additional sheet(s) to an affected drawing as a result of the incorporation of an change document. Under these circumstances the original change document being incorporated is the authorizing change document.
- Correcting misspelled words.
- Adding or revising related/referenced arrangements, views, sections, details, and/or tables to accurately delineate the approved change document incorporation on an affected drawing.
- Delineating the change document incorporation on a subsequent sheet(s) of an affected drawing when there is insufficient space available for depicting the needed information.

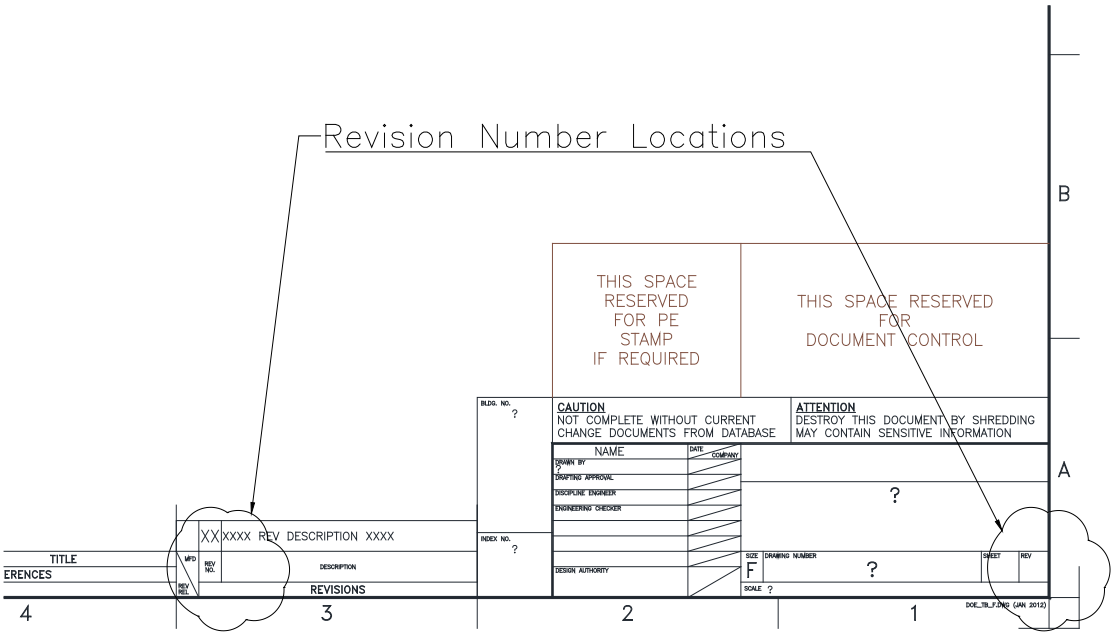
A statement describing variances from the authorizing change document is added in the revision description block to document the changes. Examples are as follows:

- Incorporated change document (number), was sheet 3 of 4,
- Incorporated change document (number), moved detail X,
- Incorporated change document (number), added detail X due to insufficient space on sheet X,
- Incorporated change document (number), added new sheet X,
- Adding or removing the words "ESSENTIAL" or "SUPPORT" (for control of drawings as essential or support sec MSC-PRO-ENG-20050)

3.12.7 Revision Numbering and Release

Each new revision is listed in numerical sequence. Only released (issued) drawings are revised. Each subsequent revision is released before another revision is made. The latest revision number is shown in the Title Block (Figure 10).

Figure 10. Revision Number Locations



3.12.8 CAD-Revised Drawings

CAD-developed drawings do not need to have the approval signatures from previous revisions printed in the spaces of the Title or REVISIONS Block. Reference to see the applicable revision is placed in the approval block (e.g., See Revision 0, or See Revision 5).

3.12.9 Removing Revisions

Drawings in the Hanford system that have been previously approved and issued may have revisions removed from the drawing(s) on subsequent revisions.

3.12.10 Adding Additional Sheets

Additional sheet(s) are released as revision "0". The change document number being incorporated is placed in the block identified for the change document. All multi-sheet drawings sheets shall have the same title (i.e. when a new drawing title is used, a new drawing number and sheet sequence must be used).

3.13 SUPERSEDED DRAWINGS, VOIDED DRAWINGS, AND TITLE BLOCK CHANGES

When drawings are superseded or voided, or when a building, index, or drawing number is changed, the affected drawings is revised with a change document in accordance with MSC-PRO-ENG-2001.

3.13.1 Superseding a drawing

Developing or revising a drawing that replaces a system, structure or component that is documented on an existing drawing requires the old drawing be superseded. The new and existing drawings are revised to provide two-way traceability to the current and old drawing configurations.

3.13.2 Voiding a drawing

When the physical configuration of a structure, system and/ or component is demolished, destroyed, dismantled or otherwise permanently removed, the engineering drawing is voided in Document Management and Control System (DMCS) via the change document process. The void status on a drawing is equal to voiding a document through the change document process. It is done by updating the DMCS to reflect that the drawing is void and the drawing is maintained for historical purposes only. Drawings placed into a void status shall not be revised, referenced or used for any activity other than historic purposes. Also see MSC-PRO-2001.

3.13.3 Superseding a Drawing with a Different Drawing Number

On the Superseded Drawing a note stating, "SUPERSEDED BY DWG [number] REV.[number]," is placed near the Title Block in 6 mm (.24") high lettering.

On the New Drawing a note stating, "SUPERSEDES DWG [number] REV. [number]," is placed near the Title Block in 6 mm (.24") high lettering.

3.13.4 Changing Drawing Numbers, Index Numbers, or Building Numbers

Add or delete additional Index Numbers by revision of the drawing.

Add or delete Building Numbers by revision of the drawing.

3.13.5 Changing the Title of a Drawing

Changes in the title of an approved drawing are done through a revision. When changing the title of a drawing use the direction contained in Section 3.11.2, Drawing Title.

3.14 Classified/Sensitive drawings

When classified or sensitive information is to appear on any drawing, a Authorized Derivative Classifier (ADC) shall review and determine the security classification level (Top Secret, Secret, or Confidential) and the category (Restricted Data, Formerly Restricted Data, National Security Information) or other control designation (e.g., Unclassified Controlled Nuclear Information, Export Control Information) for the drawings.

The originating organization shall:

- mark the drawing to reflect the security classification level and category or other required controls
- contact the Classified Document Control organization to establish accountability, as required
- protect the document using security and handling requirements

Classified drawings are released through Hanford Classified Document Control. Refer all questions regarding classifications to the Classified Matter Protection and Control Program office.

3.15 Metric Measurement System

Metric designations (e.g., mm) are considered symbols and are used to the fullest extent possible. See the metric system (SI) symbology, in the latest edition of ANSI/IEEE Standard 268, American National Standard for Metric Practice.

Modifications to drawings containing English units may continue to use the English system unless otherwise specified by the DA.

3.15.1 Metric Measurement

In designs specifying metric system of measurement, hard metric measurements are used to the fullest extent. Hard metric measurement means the actual physical size and configuration of a part, product, or process is created/measured in the metric system. Soft metric measurement means the physical size was created/measured in the inch/pound system and that measurement was/is then converted to the metric equivalent on drawings. Soft metric measurements and conversions are to be avoided.

3.15.2 Metric Dimensioning

Linear dimensions on engineering drawings shall be shown in millimeters, except on large site plans and civil drawings. Large site plans and civil drawings show linear dimensions in meters, which shall always be carried to one, two, or three decimal places.

Commas are not used in metric system numbers. Spaces are used in place of commas to separate digits into groups of three (e.g., 1 500 000 mm). However, four-digit numbers are not separated by a space (e.g., 5000 m). A space always separates the numeric value from the measurement unit, but the number and the unit are never separated between the lines of text.

Metric dimensions and unit symbols are always in upright type (i.e., vertical lettering), even when the surrounding text is in italics.

When area is being specified, square meters or sub-multiples are used (e.g., m2, cm2, and mm2). Fluid volumes are specified in liters (symbol is upper case L), except large volumes may be expressed in cubic meters (m3) (e.g., 1 000 L = 1 m3).

Dual dimensioning (both inch/pound and metric shown for the same dimension) should be avoided. In cases where dual dimensioning is determined to be required, the following shall apply:

- Metric dimensions are shown first with the inch/pound equivalent shown in parentheses.
- A general note shall be added to the drawing stating the inch/pound dimensions shown in parentheses are equivalent to the metric dimensions they follow.
- Tolerances for the inch/pound dimension, where necessary, shall be shown at each occurrence.

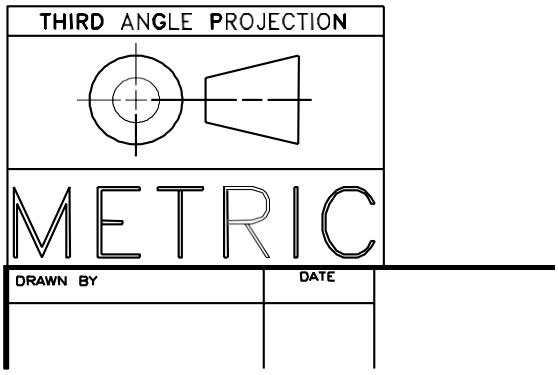
3.15.3 Metric Notation

Drawings delineated in the metric system shall have the word “METRIC” placed directly above the Title Block in 6 mm bold gothic lettering as defined by ANSI Y14.2M-1992. See Figure 11.

3.15.4 Third Angle Projection

All drawings developed using the multi-view system of orthographic presentation as specified in ASME Y14.3M-1994, Multi and Sectional View Drawings, use the third angle projection method. On metric drawings, the international projection symbol and the words "THIRD ANGLE PROJECTION" is placed directly above the metric notation. See Figure 11.

Figure 11. International Projection Symbol



3.15.5 Converted Metric Designations

Converted metric designations are designations of materials and parts converted from the inch/pound system (e.g., 2" pipe converted to DN 50 pipe; 2x4 lumber stud converted to 50 x 100 mm lumber stud). These conversions are made where items can be equivalently identified by metric designation.

Many industrial products have been given metric designations by the appropriate industry organizations. In some cases where designations will lose their proper meaning, inch or metric equivalents are never shown (e.g., 1/4-20 thread loses its proper meaning if designated as 6.35 mm-20 thread; conversely, a 6 mm-20 thread loses its proper meaning if designated as a .236-20 thread).

4.0 RECORD IDENTIFICATION

All records are generated, processed, and maintained in accordance with MSC-PRO-RM-10588, Records Management Processes, or MSC-PRO-RM-32281, Electronic Records Management, as applicable.

Table 1. Records Capture Table

Name of Record	Submittal Responsibility	Retention Responsibility

5.0 SOURCES

5.1 Source Requirements

ANSI/ASME Y14 Series, *Drafting Practices*
ASME Y14.1M-1992, Metric Drawing Sheet Size and Format
ASME Y14.2M-1992, Line Conventions and Lettering
ASME Y14.3M-1994, Multi and Sectional View Drawings Data Value Standard,
AMSE Y14.38,
ANSI/IEEE Standard 268, American National Standard for Metric Practice
ANSI/ASME Y14 Series, Drafting Practices
ANSI Y1.1 (latest edition), Abbreviations for Use on Drawings and in Text
ANSI Y14.1-1980 (R1987), Drawing Sheet Size and Format
ANSI Y14.5M (R1982), Dimensioning and Tolerance
Data Value Standard, Protocol Standard, Geodetic Elevation Data
Federal Standard 376B, Preferred Metric Units for General Use by the Federal Government
United States National CAD Standard V6

5.2 References

MSC-PRO-ENG-709, CAD and Drawing Development and Control Process for Engineering Drawings.
MSC-PRO-ENG-16406, Vendor Information Process.
MSC-PRO-RM-10588, Records Management Processes
MSC-PRO-2001, Facility Modification Package Process,
MSC-PRO-RM-32281, Electronic Records Management
HNF-PRO-1819
HNF-14660, Off-Site Subcontractor Direction for Preparation and Control of Engineering Drawings
HNF-23001, Index Number Standard for Engineering Drawings
HNF-64102, Preparation Standards for Legacy Engineering Drawings
HNF-64103, Preparation of Process Flow Diagrams and Piping and Instrumentation Diagrams

Appendix A United States National CAD Standard (NCS V6), Layer Naming Convention

6.0 LAYER NAME FORMAT

6.1 Hierarchy of Data Fields

The layer name format is organized as a hierarchy. This arrangement allows users to select from a number of options for naming layers according to the level of detailed information desired. Layer names consist of distinct data fields separated from one another by dashes. A detailed list of abbreviations, or field codes, is prescribed to define the content of layers. Most field codes are mnemonic English abbreviations of construction terminology that are easy to remember.

There are four defined layer name data fields: **Discipline Designator**, **Major Group**, two **Minor Groups**, and **Status**. The Discipline Designator and Major Group fields are mandatory. The Minor Group and Status fields are optional. Each data field is separated from adjacent fields by a dash ("-") for clarity.

Example 1. The complete NCS layer name format, showing the Discipline Designator, the Major Group, two Minor Groups, and the Status fields.

A	I	-	W	A	L	L	-	F	U	L	L	-	D	I	M	S	-	N

6.2 Before You Begin

The NCS allows you to select from a number of format options for creating layer names. It is recommended that you select the options that you wish to use for layer names on a given project, and then apply the resulting format consistently for all layer names on that project.

6.3 Discipline Designator, Level 1

Example 2. A typical layer name showing the required data fields only. Note that only the mandatory discipline character is shown, creating a Level 1 Discipline Designator.

A	-	W	A	L	L

The Discipline Designator denotes the category of subject matter contained on the specified layer. The Discipline Designator is a two-character field. The first character is the discipline character, and the second character is an optional modifier. The Discipline Designator is described in greater detail in UDS Section 1.3.

Table 1. Level 1 Discipline Designators	
A	Architectural
B	Geotechnical
C	Civil
D	Process
E	Electrical
F	Fire Protection
G	General
H	Hazardous Materials
I	Interiors
L	Landscape
M	Mechanical

Table 1. Level 1 Discipline Designators	
O	Operations
P	Plumbing
Q	Equipment
R	Resource
S	Structural
T	Telecommunications
V	Survey / Mapping
W	Distributed Energy
X	Other Disciplines
Z	Contractor / Shop Drawings

6.4 Discipline Designator, Level 2

The optional second character is used to further define the discipline character. As an example, the Level 2 Discipline Designators for Architectural are shown:

Example 3. A typical layer name showing the required data fields only. Note that the mandatory Level 1 discipline character is supplemented by the optional discipline modifier to create a Level 2 Discipline Designator.

A	D	-	W	A	L	L

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
A		Architectural
	AD	Architectural Demolition
	AE	Architectural Elements
	AF	Architectural Finishes
	AG	Architectural Graphics
	AI	Architectural Interiors
	AJ	User Defined
	AK	User Defined
	AS	Architectural Site
B		Geotechnical
	BJ	User Defined
	BK	User Defined
C		Civil
	CD	Civil Demolition
	CG	Civil Grading
	CI	Civil Improvements
	CJ	User Defined
	CK	User Defined
	CN	Civil Nodes

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	CP	Civil Paving
	CS	Civil Site
	CT	Civil Transportation
	CU	Civil Utilities
D		Process
	DA	Process Airs
	DC	Process Chemicals
	DD	Process Demolition
	DE	Process Electrical
	DG	Process Gases
	DI	Process Instrumentation
	DJ	User Defined
	DK	User Defined
	DL	Process Liquids
	DM	Process HPM Gases
	DO	Process Oils
	DP	Process Piping
	DQ	Process Equipment
	DR	Process Drains and Reclaims

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	DS	Process Site
	DV	Process Vacuum
	DW	Process Waters
	DX	Process Exhaust
	DY	Process Slurry
E		Electrical
	ED	Electrical Demolition
	EI	Electrical Instrumentation
	EJ	User Defined
	EK	User Defined
	EL	Electrical Lighting
	EP	Electrical Power
	ES	Electrical Site
	ET	Electrical Telecommunications
	EY	Electrical Auxiliary Systems
F		Fire Protection
	FA	Fire Detection and Alarm
	FJ	User Defined

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	FK	User Defined
	FX	Fire Suppression
G		General
	GC	General Contractual
	GI	General Informational
	GJ	User Defined
	GK	User Defined
	GR	General Resource
H		Hazardous Materials
	HA	Hazardous Materials Asbestos
	HC	Hazardous Materials Chemicals
	HJ	User Defined
	HK	User Defined
	HL	Hazardous Materials Lead
	HP	Hazardous Materials PCB
	HR	Hazardous Materials Refrigerants
I		Interior

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	ID	Interior Demolition
	IF	Interior Furnishings
	IG	Interior Graphics
	IJ	User Defined
	IK	User Defined
	IN	Interior Design
L		Landscape
	LD	Landscape Demolition
	LG	Landscape Grading
	LI	Landscape Irrigation
	LJ	User Defined
	LK	User Defined
	LL	Landscape Lighting
	LP	Landscape Planting
	LR	Landscape Relocation
	LS	Landscape Site
M		Mechanical
	MD	Mechanical Demolition
	MH	Mechanical HVAC

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	MI	Mechanical Instrumentation
	MJ	User Defined
	MK	User Defined
	MP	Mechanical Piping
	MS	Mechanical Site
O		Operations
	OJ	User Defined
	OK	User Defined
P		Plumbing
	PD	Plumbing Demolition
	PJ	User Defined
	PK	User Defined
	PL	Plumbing Fixtures
	PP	Plumbing Piping
	PQ	Plumbing Equipment
	PS	Plumbing Site
Q		Equipment
	QA	Equipment Athletic
	QB	Equipment Bank

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	QC	Equipment Dry Cleaning
	QD	Equipment Detention
	QE	Equipment Educational
	QF	Equipment Food service
	QH	Equipment Hospital
	QJ	User Defined
	QK	User Defined
	QL	Equipment Laboratory
	QM	Equipment Maintenance
	QP	Equipment Parking Lot
	QR	Equipment Retail
	QS	Equipment Site
	QT	Equipment Theatrical
	QV	Equipment Video / Photographic
	QY	Equipment Security
R		Resource
	RA	Resource Architectural
	RC	Resource Civil

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	RE	Resource Electrical
	RJ	User Defined
	RK	User Defined
	RM	Resource Mechanical
	RR	Resource Real Estate
	RS	Resource Structural
S		Structural
	SB	Structural Substructure
	SD	Structural Demolition
	SF	Structural Framing
	SJ	User Defined
	SK	User Defined
	SS	Structural Site
T		Telecommunications
	TA	Telecommunications Audio Visual
	TC	Telecommunications Clock and Program
	TI	Telecommunications Intercom

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	TJ	User Defined
	TK	User Defined
	TM	Telecommunications Monitoring
	TN	Telecommunications Data Networks
	TT	Telecommunications Telephone
	TY	Telecommunications Security
V		Survey / Mapping
	VA	Survey / Mapping Aerial
	VC	Survey / Mapping Computated Points
	VF	Survey / Mapping Field
	VI	Survey / Mapping Digital
	VB	Survey / Mapping Boundary
	VL	Survey / Mapping Land
	VJ	User Defined
	VK	User Defined
	VN	Survey / Mapping Node Points

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	VS	Survey / Mapping Staked Points
	VU	Survey / Mapping Combined Utilities
W		Distributed Energy
	WC	Distributed Energy Civil
	WD	Distributed Energy Demolition
	WI	Distributed Energy Interconnection
	WJ	User Defined
	WK	User Defined
	WP	Distributed Energy Power
	WS	Distributed Energy Structural
	WT	Distributed Energy Telecommunications
	WY	Distributed Energy Auxiliary Systems
X		Other Disciplines
	XJ	User Defined
	XK	User Defined

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
Z		Contractor/Shop Drawings
	ZJ	User Defined

Table 2. Level 1 and 2 Designators		
Designator		Description
Level 1	Level 1+2	
	ZK	User Defined

6.5 Major Group

Example 4. A typical layer name showing the required data fields only. The mandatory Major Group field is highlighted:

A	-	W	A	L	L

The major group is a four-character field that identifies a major building system. The prescribed Major Group field codes (four-character abbreviations) shown on the Layer List are logically grouped with specific discipline designators. However, any Major Group may be combined with any prescribed Discipline Designator, provided that the definition of the Major Group remains unchanged. Therefore, any reasonable combination of the prescribed Discipline Designators and Major Groups is permitted.

NOTE: The NCS recognizes that there will be instances where user-defined Major Group field codes will be required. The NCS set of Major Group field codes is not intended to be all inclusive. There will be instances when project specific Major Groups will need to be created. In these cases Major Group field codes are allowed, however, they must contain four alphabetic and/or numeric characters and/or "~", and must be fully documented on the NCS Compliance Disclosure Statement for the project or identified as project specific in the standard supplement in which they are used.

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
ACCS	Access
ACID	Acid waste systems

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
AERI	Aerial Survey

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
AFFF	Aqueous film-forming foam system
AFLD	Airfields
AIR~	Air
AIRS	Airport Airspace related features
ALGN	Alignment
ALRM	Alarm system
ANNO	Annotation
APRN	Apron related features
AREA	Area
AUXL	Auxiliary systems
BARR	Barrier
BCNS	Beacons
BCST	Broadcast related system (radio or TV)
BEAM	Beams
BELL	Bell system
BLDG	Buildings and primary structures
BLIN	Baseline

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
BNDY	Political boundaries
BORE	Borings
BRCG	Bracing
BRDG	Bridge
BRIN	Brine systems
BRKL	Break / fault lines
BRLN	Building restriction line
BZNA	Buffer zone area
CABL	Cable systems
CATH	Cathodic Protection System
CATV	Cable television system
CCTV	Closed-circuit television system
CEME	Cemetery
CHAN	Navigable channels
CHEM	Chemical
CHIM	Chimneys and stacks
CLNG	Ceiling
CLOK	Clock system

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
CMPA	Compressed / processed air systems
CMPR	Computer
CNDW	Condenser water systems
CO2S	CO2 system
CODE	Code compliance plan
COLS	Columns
COMM	Communications
CONT	Controls and instrumentation
CONV	Conveying systems
CRPT	Carpet / carpet tiles
CSWK	Casework
CTRL	Control points
CWTR	Chilled water systems
DATA	Data / LAN system
DECK	Deck
DECN	Decontamination
DETL	Detail
DFLD	Drain fields

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
DIAG	Diagrams
DICT	Dictation system
DOMW	Domestic water systems
DOOR	Doors
DRAN	Drains
DRIV	Driveways
DTCH	Ditches or washes
DUAL	Dual temperature systems
DUST	Dust and fume collection systems
ELEC	Electrical system, telecom plan
ELEV	Elevation
ELHT	Electric heat
EMCS	Energy monitoring control system
ENER	Energy management systems
EQPM	Equipment
EROS	Erosion and sediment control
ESMT	Easements
EVAC	Evacuation plan

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
EXHS	Exhaust system
FENC	Fences
FIRE	Fire protection
FLHA	Flood hazard area
FLOR	Floor
FNDN	Foundation
FNSH	Finishes
FRAM	Braced frame or moment frame
FSTN	Fasteners and connections
FUEL	Fuel systems
FUME	Fume hood
FURN	Furnishings
GAS~	Gas
GATE	Gate
GLAZ	Glazing
GLYC	Glycol systems
GRAD	Grading work
GRAY	Graywater systems
GRID	Grids

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
GRLN	Grade line
GRND	Ground system
HALN	Halon
HELI	Heliport / pad
HWTR	Hot water heating system
HVAC	HVAC systems
HYDR	Hydraulic structure
IGAS	Inert gas
INGR	Ingrants
INST	Instrumentation system
INTC	Intercom / PA systems
IRRG	Irrigation
JNTS	Joints
JOIS	Joists
LAND	Land
LEGN	Legend, symbols keys
LEVE	Levee
LGAS	Laboratory gas systems
LIQD	Liquid

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
LITE	Lighting
LNTL	Lintels
LOCN	Limits of construction
LTNG	Lightning protection system
MACH	Machine shop
MAJQ	Major equipment
MDGS	Medical gas systems
MILL	Millwork
MINQ	Minor equipment
MKUP	Make-up air systems
MNTG	Mounting system
MPIP	Miscellaneous piping systems
NGAS	Natural gas systems
NODE	Node
NURS	Nurse call system
OBST	Obstructions
OIL~	Oil
OTGR	Outgrants
OVRN	Vehicle overrun

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
PADS	Pads
PERC	Perc testing
PGNG	Paging system
PHON	Telephone system
PIPE	Piping
PLAN	Key Plan (Floor Plan)
PLAT	Platform
PLNT	Plant and landscape material
POND	Ponds
POWR	Power
PRKG	Parking lots
PROC	Process systems
PROF	Profile
PROJ	Projector system
PROP	Property
PROT	Fire protection system
PRTN	Partitions
PVMD	Photovoltaic modules
PVMT	Pavement

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
RAIL	Railroad
RAIR	Relief air systems
RCOV	Energy recovery systems
REFG	Refrigeration systems
RIGG	Rigging / automation systems
RIVR	River
ROAD	Roadways
ROOF	Roof
RRAP	Riprap
RUNW	Runway
RWAY	Right-of-way
SECT	Section
SERT	Security system
SGHT	Sight distance
SIGN	Sign
SITE	Site features
SLAB	Slab
SLUR	Slurry
SMOK	Smoke extraction systems

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
SOIL	Soils
SOUN	Sound system
SPCL	Special systems
SPFX	Entertainment special effects system
SPKL	Sprinkler
SRFS	Surface sensor system
SSWR	Sanitary sewer
STEM	Steam system
STIF	Stiffener
STRM	Storm sewer
STRS	Stairs
SURV	Survey
SWLK	Sidewalks
TAXI	Airport taxiway or taxilane
TEST	Test equipment
TILE	Tile
TINN	Triangulated irregular network
TOPO	Topographic feature

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
TRAF	Traffic
TRAL	Trails or paths
TRAN	Transmission system
TRUS	Trusses
Δ	
TVVS	Television and video system
UNID	Unidentified site objects
UTIL	Utilities

Table 3. Major Group Layer Name	
Major Group Layer Name	Description
VACU	Vacuum
VIDO	Entertainment projection systems
WALL	Walls
WATR	Water supply
WETL	Wetlands
WIND	Wind powered
WWAY	Waterway

6.6 Minor Group

Example 5. A typical layer name showing one optional Minor Group field:

A	-	W	A	L	L	-	F	U	L	L

Example 6. A typical layer name showing two optional Minor Group fields:

A	-	W	A	L	L	-	F	U	L	L	-	T	E	X	T

This is an optional, four-character field to further define the Major Groups. For example, *A-WALL-FULL* denotes *Architectural, Wall, Full-height.* A second minor group may be used for still further delineation of the data contained on a layer. For example, *A-WALL-FULL TEXT* indicates *Architectural, Wall, Full-height, Text.*

The prescribed Minor Group field codes (four-character abbreviations) shown on the Layer List are logically grouped with specific Major Groups. However, any Minor Group

may be used to modify any Major Group, provided that the definition of the Minor Group remains unchanged. Therefore, any reasonable combination of the prescribed Major and Minor Groups is permitted.

NOTE: User-defined Minor Group field codes are permitted. They must contain four alphabetic and/or numeric characters and/or "~", and must be fully documented on the NCS Compliance Disclosure Statement for the project on which they are used.

Table 4. Minor Group Layer Names

Minor Group Layer Name	Description
025Y	25-year mark
04FT	Four feet high
050Y	50-year mark
06FT	Six feet high
100Y	100-year mark
1XWD	Extra wide lines 0.70 mm (0.028")
200Y	200-year mark
2XWD	XX wide lines 1.00 mm (0.039")
3XWD	XXX wide lines 1.40 mm (0.055")
4XWD	XXXX wide lines 2.00 mm (0.079")
AA~~	Agitation air-system
ABLT	Anchor bolts

Table 4. Minor Group Layer Names

Minor Group Layer Name	Description
ABOV	Above
ABUT	Abutment
ACCS	Access
ACFU	Fused ac
ACPK	Aircraft parking
ACTL	Aerial horizontal and vertical control points
ACNF	Unfused ac
AGGR	Exposed aggregate
AIR~	Air
ALOC	Allocation
ALRM	Alarm
ALUM	Aluminum
AMEX	Ammonia exhaust-system

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
AMW~	Ammonia waste-system
ANNN	Optional number (A = letter, NNN = number between 001 and 999)
ANNO	Annotation
ANOD	Sacrificial anode
ANTN	Antenna
AR~~	Argon-system
ARB~	Argon bulk-system
ARC~	Regenerative caustic-system
AREX	Arsenic exhaust-system
ASPH	Asphalt
BA~~	Breathable air-system
BACK	Back
BAFL	Baffle block and splash pad
BARR	Barrier
BASE	Basecourse
BASN	Stilling and settling basin
BBAC	Battery backup

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
BEDS	Perennial and annual beds
BENT	Top of bent
BFW~	Boiler feed water-system
BKRS	Breakers
BLBD	Boiler blow down piping
BLDG	Building points
BLIN	Baseline
BMRK	Benchmarks
BNDY	Boundary
Δ	
BORO	Borough
BOT1	Bottom group 1
BOT2	Bottom group 2
BOTB	Bottom of bank
BOTM	Bottom
BOXD	Mixing box, dual duct
BOXS	Mixing box, single duct
BRCK	Brick

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
BRDG	Bridge
BRGX	Bridging
BRKL	Break lines
BRNG	Bearings and distance labels
BROW	Brush row points
BRSH	Brush points
BUOY	Buoy
BUSH	Bushes and shrubs
BUSS	Bus duct
BUSW	Busways
BUT~	Butane-system
BWTR	Breakwater
C~~~	Caustic-system
CA~~	Compressed air-system
CABL	Cable
CAIR	Compressed air
CARS	Cars and other vehicles
CATV	Cable television

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
CAVI	Cavity
CBOX	Combiner box
CD~~	Condensate drain-system
CDA~	Clean dry air-system
CDFF	Ceiling diffusers
CHIM	Chimney
CIPR	Culvert inlet protection
CIRC	Circuits
CITY	City
CLAS	Classifications
CLDA	Cold air
CLG~	Chlorine gas-system
CLHD	Ceiling heads
CLNG	Ceiling
CLV~	Chlorine vacuum-system
CLW~	Concentrated lead waste-system
CMTL	Corrugated metal

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
CMUW	Concrete masonry unit
CMW~	Concentrated metals waste-system
CNDS	Condensate piping
CNDT	Diversionary/bypass conduit/culvert
CNMB	Circuit numbers
CNTE	Construction entrance
CNTJ	Construction joint
CNTR	Center
CNTY	County
COAX	Coax cable
COFF	Coffer dam
CONC	Concrete
CONI	Coniferous trees
CONS	Conservation
CORP	Corporation
COVR	Coverage
CPIP	Cold water piping

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
CRIT	Critical
CRKT	Crickets
CSTG	Construction/Grading
CSWK	Casework
CTLA	Controlled access
CTLJ	Control joint
CTNR	Container or planter
CUPW	Copper plating waste-system
CURB	Curb
CURR	Impress current
CURT	Curtain
CURV	Curve
CURW	Copper rinse waste-system
CUSW	Copper slurry waste-system
CV~~	Chemical vacuum-system
DACL	De-Authorized channel limits, anchorages, etc.
DAM~	Dam

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
DASP	Description attributes for survey points
DATA	Data
DCFU	Fused dc
DCNF	Unfused dc
DDIV	Drainage divides
DECK	Deck
DEIC	Deicing
DEPR	Depression
DEV~	Developer-system
DEVC	Devices
DFEE	Disposed fee
DIAG	Diagrams
DIMS	Dimensions
DIR~	De-Ionized water return-system
DIRC	DI reclaim-system
DIS~	De-Ionized water supply-system
DISC	Discharge

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
DIWP	DI polishing loop-system
DLPH	Dolphin
DLW~	Dilute waste-system
DMPR	Fire, smoke, volume damper
DOCK	Decks, docks, floats, piers
DOOR	Equipment doors
DRAN	Drainage slope indications
DRIP	Drip irrigation tubing
DRIV	Driveway points
DRNS	Drains
DSCO	Disconnect switches
DSRF	Design surfaces
DTCH	Ditches or washes
DUCT	Ductwork
DVDK	Diversion dike
DVDR	Thin dividers
EASP	Elevation attributes for survey points

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
EDGE	Edge
EDGR	Planting bed edger
EFAN	Equipment with electric fans
EG~~	Ethylene glycol-system
EGW~	Ethylene glycol waste-system
ELEC	Electrical
ELEV	Elevation
EMER	Emergency
ENCL	Equipment enclosures
ENGR	Engineering Information
EPDU	Equipment with piping, ductwork and electricity
EPIP	Equipment with piping and electricity
EQPM	Equipment
EQUI	Equipotential
ERTH	Earth
ESMT	Easement
EV~~	Equipment vacuum-system

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
EVGR	Evergreen trees-broadleaf
EVTR	Elevator cars and equipment
EWAT	Edge of water
EXHS	Exhaust air
EXIT	Exit
EXPJ	Expansion joint
EXTI	Extinguishers
EXTR	Exterior
FACE	Face
FALT	Fault/break lines
FDPL	Flood plain
FDTA	Field data
FEE~	Fee
FEED	Feeders
FENC	Fences
FEND	Fender
FIBR	Fiber optics cable
FILE	File cabinets

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
FILL	Fill and cover material
FINE	Fine lines 0.18 mm (0.007")
FIRE	Fire protection
FISH	Fish ladder/passage
FIXD	Fixed
FIXT	Fixtures
FLDR	Floor drains
FLLW	Flow
FLNE	Fire lane
FLOR	Floor
FLOW	Flowline
FLPL	Flagpole
FLUM	Flume
FLYS	Fly station
FNSH	Finishes
FORC	Force main
FREE	Freestanding
FRMG	Framing

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
FTNG	Footings
FTPT	Area footprints
FULL	Full-height
FURN	Furnishings
FW~~	Fire water-system
GAGE	Gauge
GCVR	Ground cover
GENF	General features
GENR	Generators
GGEP	Gas general piping
GLAZ	Glazing
GNDW	Ground water
GPRP	Gas process piping
GRAL	Guard rail
GRBM	Grade beams
GRID	Grid
GRIL	Grilles
GRND	Ground

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
GRTG	Grating
GRVL	Gravel
H2~~	Hydrogen-system
H2O2	Hydrogen peroxide-system
HCDA	High pressure clean dry air-system
HCL~	Hydrochloric acid-system
HDIR	Hot DI return-system
HDIS	Hot DI supply-system
Δ	
HDRC	Hot DI reclaim-system
HE~~	Helium-system
HEAD	Door and window headers
HF~~	Hydrofluoric acid-system
HFW~	Hydrofluoric waste-system
HIDD	Objects or lines hidden from view
HOLE	Holes
HORZ	Horizontal

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
HOSE	Hoses
HOTA	Hot air
HPDR	High pH DI return-system
HPDS	High pH DI supply-system
HPIP	Hot water/high-pressure piping
HPN2	High purity nitrogen-system
HPO2	High purity oxygen-system
HRAL	Handrails/guard rails
HRDW	Hardware
HSSS	Hollow structural steel
HTCH	Hatch
HTEX	Heat exhaust-system
HV~~	House vacuum-system
HVA~	Arsenic house vacuum-system
HVAC	HVAC systems
HVPT	Horizontal/vertical
HWAL	Headwall
HYDT	Hydrants and connections

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
IA~~	Instrument air-system
ICW~	Industrial city water-system
IDEN	Identification tags
INEG	Ingress/egress
INPR	Inlet protection
INST	Instrumentation
INTK	Intake
INTR	Interior
IPA~	Isopropyl alcohol-system
IW~~	Industrial waste-system
JACK	Jacks
JAMB	Door and window jambs
JETB	Airport jetbridge
JBOX	Junction box
JNTC	Control joint
JNTE	Expansion joint
KEYN	Keynotes
LABL	Labels

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
LADD	Ladders and ladder assemblies
LATL	Lateral line
LCHE	Leak check helium-system
LDTA	Laboratory data
LEAS	Lease
LEGN	Legend, symbol keys
LEVL	Level changes
LFEE	Disposed less than fee
LICN	License
LIMI	Limit of earthwork
LINE	Lines
LINK	Chain link
LMTA	Limited access
LO~~	Lube oil-system
LOGO	Company logo
LONG	Longitudinal
LOWR	Lower
LPG~	Liquid petroleum gas-system

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
LPIP	Low-pressure piping
LQPG	Liquid petroleum gas
LSCP	Landscape
LTRL	Lateral pipe
MAIN	Mainline
MAJR	Major
MARK	Markers, break marks, leaders
MATC	Match lines
MBND	Material beyond cut
MCUT	Material cut by the view
MEDM	Medium lines 0.35 mm (0.014")
MESH	Mesh or wire
METL	Metal
METR	Metering devices
MHOL	Manhole
MINR	Minor
MISC	Miscellaneous

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
MKUP	Make-up water
MLCH	Mulches-organic and inorganic
MNTG	Mounting system
MOOR	Mooring
MOVE	Movable
MPIP	Medium-pressure piping
MRKG	Pavement markings
MRKR	Landmarks or other markers for orientation
MSNW	Masonry
MULT	Multi-conductor cable
MVNG	Moving/Suspended
MW~~	Metals waste-system
N2~~	Nitrogen-system
N2O~	Nitrous oxide-system
NAID	Navigation aids
NATL	National
NFEE	Non-fee

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
NG~~	Natural gas-system
NGAS	Natural gas line
NITG	Nitrogen
NOTE	Notes
NOVR	Non-overflow structure
NOXG	Nitrous oxide
NPLT	Non-plotting graphic information
NPW~	Non-potable water-system
NPWR	Non-potable water reuse-system
NSBR	Noise barrier
O2~~	Oxygen-system
OA~~	Outside air-system
OBJT	Objects
OBSC	Obstruction identification surface
OCCP	Occupant or employee names
ODFF	Other diffusers

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
OFA~	Oil-free air-system
OFST	Offset zones
OFZ~	Obstacle free zone
OGEP	Oil general piping
OIW~	Organic industrial waste-system
OLW~	Organic liquid waste-system
OPNG	Openings
OPNX	Opening indication
OPRP	Oil process piping
OSW~	Organic solvent waste-system
OTHD	Other heads
OTLN	Outline
OVHD	Overhead
OXYG	Pure O2
PA~~	Plant air-system
PADM	Pad-mounted
PADS	Pads

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
PALM	Palm trees
PANL	Panels
PASP	Point number attributes for survey points
PATT	Texture or hatch patterns
PAVR	Unit pavers
PCAP	Pile caps
PCST	Pre-cast concrete
PCWR	Cooling water return-system
PCWS	Cooling water supply-system
PENE	Penetrations
PENS	Penstock
PEQP	Process equipment
PERI	Perimeter
PERM	Permanent
PHON	Telephone line
PHOS	Phosphoric acid-system
PHRC	Phosphoric acid reclaim-system

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
PIER	Drilled piers
PILE	Piles
PIPE	Piping
PLAY	Play structures
PLNT	Plants
PLYW	Plywood
PMIT	Permit
PNHS	Penthouse
PNLS	System panels
PNPT	Panel points
POCC	Point of common coupling
POFA	Precision object free area
POFZ	Precision obstacle free zone
POI~	Point of interconnection
POLE	Poles
POLM	Pole-mounted
POND	Retention pond
POOL	Pools and spas

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
POST	Posts
PPIP	Process piping
PRCH	Porch
PRCL	Parcels
PRHT	Partial-height
PRIM	Primary
PRKG	Parking
PRO~	Propane-system
PROF	Profile
PROS	Date/time/file name stamp
PROV	Province
PRPT	Parapet
PRVC	Privacy
PSW~	Photo solvent waste-system
PUMP	Pumps
PV~~	Vacuum-system
PVMT	Pavement
PW~~	Potable water-system

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
QTRS	Quarter section
RAIS	Raised
RAMP	Accessible ramp
RATE	Ratings
RBAR	Reinforcing bar
RCON	Reinforced concrete
RDFF	Return air diffusers
RDGE	Roof ridges
RDME	Read-me layer (not plotted)
REDL	Redlines
REFR	Reference, external files
RER~	Solvent-system
RETN	Return
REVC	Revision clouds
REVS	Revision indicators and text
RFDR	Roof drains
RFEQ	Rooftop equipment
RISR	Risers

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
RO~~	Reverse osmosis water-system
ROAD	Roadway
ROCK	Large rocks and rock outcroppings
ROFA	Airport runway object free area
ROOF	Roof
ROR~	Reverse osmosis reject water-system
RPIP	Recirculation piping
RPZ~	Airport runway protection zone
RRAP	Riprap
RSA~	Airport runway safety area
RSCH	Sketch line round or oval duct
RSRV	Reservation
RTWL	Retaining wall
RWAY	Right-of-way
SAFT	Safety areas
SAIR	Scavenge air
SATD	Satillite dishes

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
SAUD	Audio signal
SBCK	Setback lines
SBST	Substations
SCEX	Scrubber exhaust-system
SCHD	Schedules
SCOM	Communications signal
SCTL	Control signal
SDAT	Data signal
SDD~	Scrubber duct drains-system
SDFF	Supply diffusers
SDGA	Digital audio signal
SDGV	Digital video signal
SEAT	Seating
SECD	Secondary
SECT	Section
SEED	Seeding areas
SG~~	Specialty gas-system
SGHT	Sight distance

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
SHAD	Shadow area
SHEA	Structural bearing or shear walls
SHLD	Shoulder
SHLF	Wall-mounted shelving
SIGN	Signage
SILL	Window sills
SILT	Silt fence
SIZE	Ductwork size
SKCH	Sketch
SKLT	Skylight
SLR~	Slurry return-system
SLS~	Slurry supply-system
SLVE	Pipe sleeve
SLW~	Slurry waste-system
SMIC	Microphone signal
SMOK	Smoke detector/heat sensors
SOUN	Soundings

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
SPCL	Special/specialties
SPKL	Sprinklers
SPLY	Supply
SPOT	Spot elevations
SPRT	Sports fields
SPWR	Power signal
SRFI	RF signal
SRGB	RGB and component video signal
SSCH	Sketch line rectangular duct
SSLT	Super silt fence
SSWR	Sanitary sewer
SSYN	Sync signal
STAN	Stationing
STAT	State
STBY	Standby
STEL	Steel
STEP	Steps

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
STMP	Professional stamp
STOR	Storage
STRC	Structures
STRM	Storm Sewer
STRP	Striping
STRS	Stair treads
SUBA	Cabinet sub-assemblies, drawer boxes
SUBD	Subdivision (interior) lines
SUBS	Sub-surface areas
SULF	Sulfuric acid-system
SULR	Sulfuric acid reclaim-system
SUPT	Support
SURF	Surface areas
SUSP	Suspended elements
SVEX	Solvent exhaust-system
SVID	Video signal
SW~~	Solvent waste-system

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
SWAY	Spillway
SWBD	Switchboards
SWCH	Switches
SWF~	Solvent waste flammable-system
SWLK	Sidewalks
SWMT	Storm water management
SWNF	Solvent waste non-flammable-system
SXTS	Sixteenth section
SYMB	Reference symbols
TABL	Data tables
TAKE	Taking lines
TANK	Storage tanks
TDIR	Tempered DI return-system
TDIS	Tempered DI supply-system
TEES	Main tees
TEMP	Temporary
TEST	Test stations

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
TEXT	Text
THER	Thermostats
THIN	Thin lines 0.25 mm (0.010")
TICK	Tick marks
TITL	Drawing or detail titles
TMAH	TMAH-system
TOP~	Top
TOP1	Top group 1
TOP2	Top group 2
TOPB	Top of bank
TOWR	Towers
TPIT	Test pits
TPTN	Toilet partitions
TRAC	Tract lines
TRAK	Track
TRAL	Trail or path
TRAV	Transverse
TRAY	Cabletray and wireways

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
TREE	Trees
TROW	Tree row
TSHP	Town or township
TTLB	Border and titleblock
TURF	Lawn areas
TW~~	Tempered water-system
UCPT	Under-carpet wiring
UCTR	Under counter
UN2~	Utility nitrogen-system
UGND	Underground
UPPR	Upper
UPRW	Ultra-pure recycle water-system
UPS~	Uninterruptible power supply
UPVD	Unpaved surface
UPW~	Ultra-pure water-system
URAC	Under-floor raceways
UTIL	Utility lines

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
V~~~	Vent-system
VACU	Vacuum
VALT	Vault & pits
VALV	Valves
VEGE	Trees, shrubs, and other vegetation
VENR	Veneer
VENT	Vents
VERT	Vertical
VIEW	Triangulation view
VINE	Vines
VN2~	Venturi nitrogen-system
VOID	Void regions
W2XS	Dimension lumber
WALL	Wall
WAR~	Weld argon-system

Table 4. Minor Group Layer Names	
Minor Group Layer Name	Description
WATR	Water supply
WDWK	Architectural woodwork
WEIR	Pool weir
WELL	Well
WHIT	White paint
WIDE	Wide lines 0.50 mm (0.020")
WIRE	Wiring
WKSF	Worksurface
WOOD	Wood
XFIN	Extra fine lines 0.13 mm (0.005")
XFMR	Transformers
XTRU	Extrusion
YELO	Yellow paint
ZONE	Zoning

6.7 Status (Phase)

Example 7. A typical layer name showing the location of the optional Status field:

A	-	W	A	L	L	-	F	U	L	L	-	T	E	X	T	-	N

The status field is an optional single-character field that distinguishes the data contained on the layer according to the status of the work or the construction phase. The prescribed field codes for this field are as follows:

Table 5. Status	
Codes	Description
A	Abandoned
D	Existing to demolish
E	Existing to remain
F	Future work
M	Items to be moved
N	New work
T	Temporary work
X	Not in contract
1	Phase number 1
2	Phase number 2
3	Phase number 3
4	Phase number 4
5	Phase number 5
6	Phase number 6

Table 5. Status	
Codes	Description
7	Phase number 7
8	Phase number 8
9	Phase number 9