PDHonline Course G210 (3 PDH)

US National CAD Standard, NCS 3.1-07, for Electrical Design

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2020

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COURSE CONTENT

We are here to work our way through the US National CAD Standard, ver 3.1, dated April, 2007. The full standard can be purchased from National Institute of Building Sciences, 1090 Vermont Ave, NW, #700, Washington, DC 20005-4905. Future references will be to "NCS" or "the Standard". We will consciously skip the content which is almost entirely for Architects and we will skip the extensive discussion of storage of electronic files and standard blocks.

The Standard is a 960 page .pdf file (15 MB). The striking aspect is that there appear to be three unrelated documents, with partial overlap, published by three very different agencies. It is nearly impossible to find a specific chart or list by leafing through it or by using any of the Tables of Contents. There is no Index.

The flow of the content is heavily flavored with committee-based philosophy with no connection to CAD, construction documents or successfully completing facility design projects for governmental bodies. This course is about 30 pages, narrowly focused on CAD, construction documents and successfully completing facility design projects for governmental bodies.

The first author is the National Institute of Building Sciences, a quasi-governmental body created by Congress to employ politicians who lost re-election and vaguely contribute to the aims of the American Institute of Architects. Go to their website, www.**nibs**.org, to see if you can find a more charitable reason for existence.

The second author is the American Institute of Architects. Architects manage small and large facility design projects. The construction documents package that goes out for bid is their work product. If it looks good and meets the needs of the Client, the project is a success. If it looks good, but never gets built, it qualifies the lead Architect for national awards. The skills that make a good Architect include extreme attention to detail and a compulsive need to organize everything into main categories, sub-categories, down to the 15th sub-level. Leaf through the Standard to confirm this and then go to their website, http://www.aia.org .

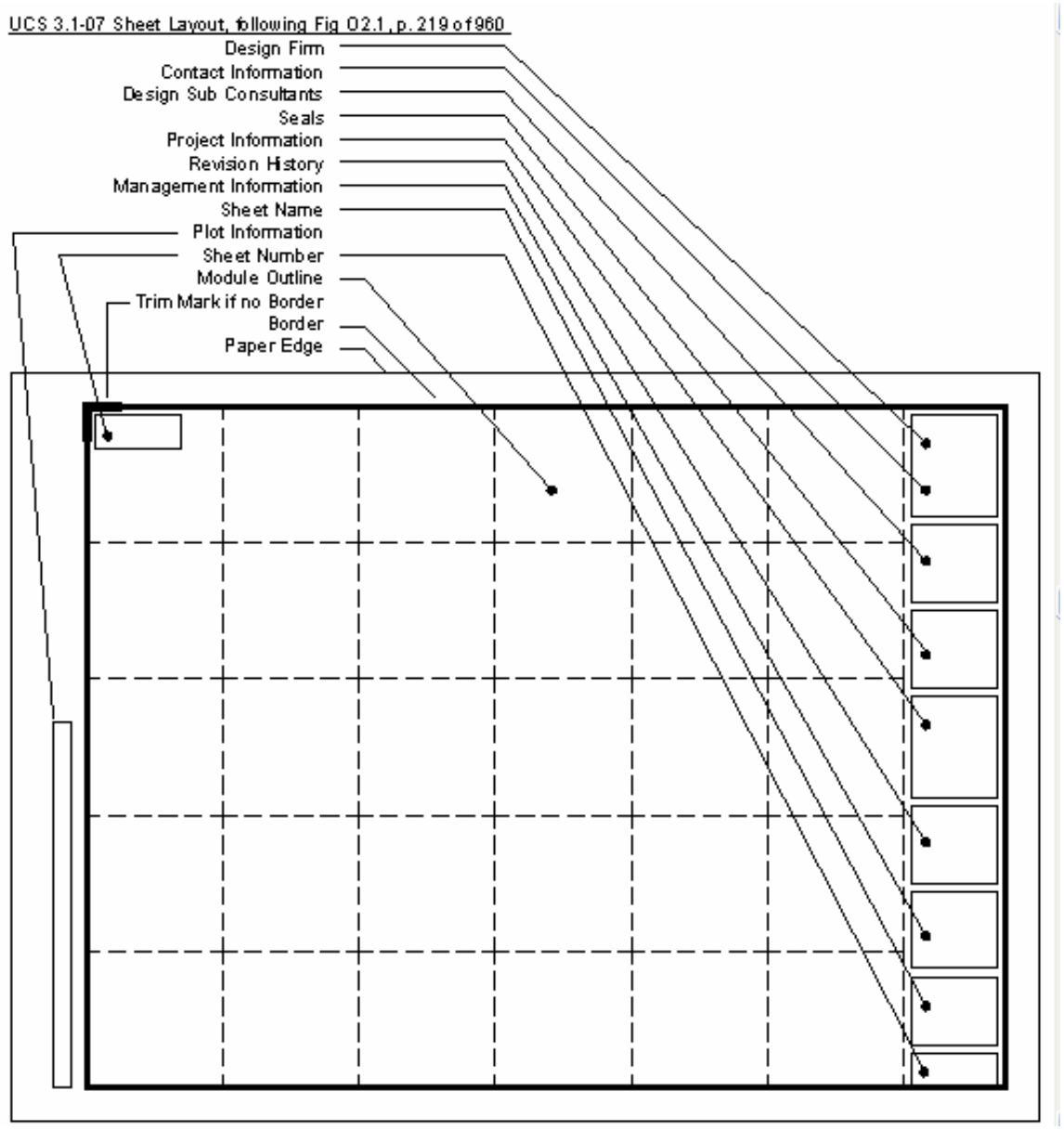
The third author is the Construction Standards Institute (CSI). CSI is owned and operated by AIA. They publish MasterSpec for AIA and are trying to turn a profit on NCS. Go to their website, http://www.csinet.org and check their mailing address against that of AIA. Look at the PDHonline course on the new 26-section MasterSpec for discussion of the historic relationship between AIA and CSI.

The third author is the (military) Tri-Service CADD/GIS Technology Center. I have to preface their organization because I keep associating "tri-service" with floor or wall receptacles containing telephone, data and a/v jacks. The (military) Tri-Service CADD/GIS Technology Center published the first CAD/plotting standard in 1993.

The General Services Administration (GSA) is the purchasing department of the US Government. Even when they do not handle procurement, they come along afterwards and audit the effort and report to Congress. GSA was part of ver. 1.0 of NCS but is not listed with ver. 3.0 or 3,1. The Veterans Administration, however, a GSA client, is very active in requiring NCS for facility projects. The list of federal and state agencies that require compliance with the Standard grows daily. Adoption by large commercial firms has also started.

Because of the confusion built into the Standard, a good overview is invaluable and a list of frequently asked questions (faq) [and answers] would be very valuable. CSI has an excellent PowerPoint slide show providing overview of the Standard. It is available at www.csinet.org/s_csi/docs/6200/6190.ppt. A list of faq [and answers] is available at www.nationalcadstandard.org/**faq**.php.

Before we get into the form and content of the Standard, we should form a concept of the desired result. The following illustration is similar to Fig O2.1, p. 219 of 960 in the copyrighted document:



STATEMENT OF COMPLIANCE

Everything in the Standard supports the Statement of Compliance. This is a short document which is supposed to appear on the cover page of the set of construction drawings. (Please bring up the Worksheet that accompanies this course as the discussion continues.) The first item is a clear statement that the drawing set conforms to the Standard ***to the extent indicated below.*** This is followed by a block of project and contact information.

Ten categories are listed with suggested answers of "Full Compliance" or "Partial Compliance". On the Worksheet, each categories also contains "Non-Conformance", should a design firm choose to include the form but not even try to get a good grade. This is not as silly as it sounds. The Standard would force some

Architectural firms to discard peculiarities which identify their work for many decades. Such firms might well accept design fees without modifying tradition.

The ten categories relate to 1) layer names and use of layers; 2) sheet grouping and numbering; 3) content and layout of a typical sheet; 4) form of schedules (lists); 5) plotting; 6) line weights and custom line types; 7) abbreviations; 8) symbols; 9) notes, and 10) Codes.

This list, with level of claimed compliance for each category, is followed by a signature block.

We will examine each category and the measurable attributes created for this course - not part of the Standard. (The Standard trusts the Design Professional Project Manager to use repeatable judgement for largely undefined measures.)

LAYER NAMES AND USE OF LAYERS

The goal is to be able to honestly say "Full Compliance" after the category head "Layers". Note that the requirements of the Standard are worded in very optional language, using terms like, "to the extent the project permits." We have provided eight checklist items, an argument regarding disciplines recognized and an argument to reposition the "tag" to the front of the layer name to permit sorting.

Checklist Item #1 - Discipline Letter, 20 permitted (*). Attached to the Worksheet is a list of the permitted letters, with two additions. The disciplines are long-standing, though some of the letter-designations appear innovative: B for Geotechnical, Q for equipment, D for Process and Z for Shop Drawings.

Your instructor's argument is on the lack of recognized disciplines for Security and Instrumentation and Controls (I&C). Work in each of these areas is typically done by a specialty group or outside sub-contractor. Lumping them within Electrical makes sheet re-numbering after changes difficult and emphasizes the minor differences in typical drawings among the three groups. Telecommunications gets their own letter; so should Security and I&C.

The prototype drawing number, shown on the appendix to the Worksheet, has nominally 6 fields: main discipline, sub-discipline, main category, optional sub-category, optional third-category and optional tag. Permitted sub-category designators are listed on the appendix.

The second argument your instructor has with the Standard is location of the tag as the last field. The tag is normally used for N = new and E = existing. A common use in massively large projects is Phase number or Bid Package number. In such massive projects, the infra structure (boilers, chillers, cooling towers and bulk power distribution) may be designed, bid and placed on order before the interior space has been laid our or as leases are negotiated. Then, office space, maybe restaurants and shops will be designed. The space designs create bulletins or change orders on the construction already contracted or underway.

Having multiple stages taking place concurrently means that a single electrical plan drawing may be used for four or more Bid Packages concurrently. It is desirable to keep all the information on a single sheet to insure consistency of notation and co-ordination among the various wall switches, pull stations, speaker volume controls, data and telephone equipment. In an industrial job, the main conveyor may be ordered as a Bid package, the bridge rails and hoists as a package, the coolant supply and return as a package, the mist collection as a package, the machining cells as a package and the assembly tool installation as a package. Compressed air and electrical are common to all.

What does this have to do with the location of the Bid Package designator in a layer definition? If the Standard is followed, the tag is at the far-end of the layer name, it cannot be used to sort and turn off individual packages for issue. If it is moved forward, perhaps after the main discipline, means that E-

BP100-POWR-CIRC and all the E-BP100 layers will be grouped before all the E-BP200 entries. The inherent alphabetic listing of layers automatically sorts by Bid Package within the discipline.

Permitted electrical sub-discipline names are as follows: E for electrical; ES for electrical site; ED for electrical demolition; EP for electrical power; EL for electrical lighting; EI for electrical instrumentation (remember, I is reserved for interiors); ET for electrical telecommunications (though telecommunications gets its own discipline listing); EY for electrical auxiliaries; EJ for user defined and EK for user defined. There is no sub-category for security.

In the layer section, your instructor has added three good practice requirements not found in the Standard. They are: 1) G-ANNO-REFR used for insertion of external references; 2) G-ANNO-VPRT used for defining viewports; and, 3) Layer 0 not used in issue drawings. To me these are obvious requirements of good layer use and should be mandated.

SHEET GROUPING AND NUMBERING

The goal is to be able to honestly say "Full Compliance" after the category head "Drawing Set Organization", which is really sheet grouping and numbering. The requirements here are, again, somewhat variable, since Clients often mandate drawing numbers to fit their filing system. Beyond that, the Standard says that a set is made up of sheets having numbers with a rational assignment. The form is as follows: 1) Discipline Letter from the 20 permitted; 2) Sub-discipline Letter; 3) Sheet Type Number, 0-9; 4) Sequence Number, 0-99; and, 5) Two-digit suffix for adds, revisions, reference, etc.

The Discipline and Sub-discipline letters are the same as used for layer names. Missing is a category for Security and one for Instrumentation and Control, as with the layer names. Sheet Type Numbers are as follows: 0 = General, cover sheet, symbols, abbreviations, notes; 1 = Plans (problems here to be discussed below); 2 = Elevations; 3 = Sections; 4 = Large-Scale Views; 5 = Details; 6 = Schedules and Diagrams; 7 = User Defined; 8 = User Defined; 9 = 3-D Views.

The problem with plans is that 99 sheets within a discipline is tight. The other most commonly sheet numbering standard has all 100-series drawings be views of the first-floor. 200-series are the second floor. Then, A-101 is the overall first-floor Architectural view, used as a background for mechanical, electrical, piping, security, etc. Each has an overall first-floor view, M-101, E-101, P-101, ES-101 (sic). The sheet are comparable and the sheet numbers indicate this and tell the drafter where to find the right background.

Limiting the total discipline set to 100 plan sheets forces conflicts for disciplines that need many blown-up details, as mechanical. It also restricts the number of "reserved for future use" drawing numbers. If 100-199 are for the first floor, then 11-19 can be reserved when the project starts. With only 1-99, within a discipline assignment will have trouble and between-discipline coordination can be forgotten.

The Standard requires an index, usually on sheet G-0 and enough description of individual sheet content to identify sheets with combined content, such as a schedule, detail, or vendor-illustration that is on a plan for ease of construction communication.

Two other requirements are included in this part of the Standard, common backgrounds and common look to all schedules. Remember, the UCS is a standard, so compliance means doing it their way. They want a little bit of backgrounds and schedules in the set category.

"Common backgrounds" is easy to describe, but hard to evaluate on a pass-fail basis. Common backgrounds should have the column numbers and letters in the same size and displayed on every plan. Common backgrounds should be uniformly screened so that construction required from the contractor is emphasized. All screening for all disciplines should be 50% with a .14-in line weight. Furniture should be consistently turned off or turned on in mechanical, electrical, piping, fire protection, security, etc. sheets. The viewport should be consistently visible or not-visible.

"Common look to all schedules" means common text style and height between disciplines with a single border line width and section-separator line width. Usually, a sample in the internal drafting standard communicates well to the designers.

CONTENT LAYOUT OF A TYPICAL SHEET

The goal is to be able to honestly say "Full Compliance" after the category head "Sheet Organization". There are twelve measurable aspects in the Standard. They are, 1) Standard paper size; 2) Border or trim marks; 3) Uniform sheet margins; 4) Uniform sheet division; 5) Required title block information; 6) plot data beyond the left border; 7) Sheet number again in the upper left; 8) Scale bar; 9) Enlarged electric rooms with content not duplicated on floor plans; 10) Separate lighting and power sheets except when using 1/4" = 1'-0" scale; 11) Call out runs when conductor count exceeds two (*); and, 12) Reference photos identified by detail or section call-out and as legend on photo.

Standard paper size is a good question, but the Standard offers no answer. The Standard lists 16 paper sizes, including metric and Imperial. We really ought to be able to agree on a standard Large, Medium and Small, with small being 11x17 for reproduction on copy machines. Metric is fine by me for Large and Medium - most people plot from 36-in rolls and trim, anyway.

The border or trim marks item is a non-issue. If the Standard called out a specific line weight, it would mean something. The Standard accepts "very arty" firm standards with no border, but trim marks.

Uniform sheet margins of 3/4-in are required, which is interesting, because I always trim to 1/2-in. Well, now you know.

Uniform sheet division is something you have seen but probably never thought about. The Standard calls for division of the sheet into 30 blocks, 6-wide by 5-high. You may draw the boundaries on a non-plotting layer or leave them public. Library details must be sized to drop into a module. Schedules must be created to fit one, or two or more modules. Sheet notes should be in the same (top right) module for all disciplines. Many Architects have been doing this for years, but it has not been common for mechanical, electrical and piping.

Required title block information may require revision of firm standards. The Standard wants contact information for both the project and for the Design Professional. They mention websites and e-mail, but don't emphasize them. Layout of the title block is loose and matches the components required on conventional title blocks - revision information, design sub-contractors, seals, etc. The title block must be vertical, on the right.

Plot data beyond the left border is the plot stamp presently provided by some CAD programs and some plotters. Note however, that the Standard wants a lot more information, time/date stamp, full file path, plotter used and plotter control filename (layer definition). They optionally demand plotter setup, plotter commands used, overlay controls, list of external references, layers plotted and production hours invested. Be warned - the way of standards is that optional items in the current release become mandatory later!

Sheet number again in the upper left corner is not in the Standard. I added it because recently I have been using scanned drawings that cut off the title block. Many governmental bodies require the sheet number again in the upper left corner, so you know immediately if you have an electrical or mechanical sheet, even with the title block gone.

Scale bar is a graphic representation of the scale used on the plan or detail. It is superior to a text scale because it stays right when the drawing is reduced and it is very usable on the screen for electronic files. You are compliant with text scale but a scale bar is strongly recommended (by your instructor).

Enlarged electric rooms with content not duplicated on floor plans. Standard floor plans are at a 1/8" = 1'-0" scale and cannot show the dense packing in an electric room in a readable form. The Standard is clear.

Do an enlarged plan and do not duplicate the panels and transformers, etc, on the floor plan. There are similar requirements for dense Architectural and piping areas.

Separate lighting and power sheets except when using 1/4" = 1'-0" scale. There is nothing in the standard about power to HVAC terminal units, data or security. I have issued separate sheets for each with good results. Careful use of layers and external references or multiple layout views makes this easy and very readable to the Contractor.

Call out runs when conductor count exceeds two (*). This is directly from the Standard and makes good sense for single phase circuits. I always try to run three-phase circuits for lighting and receptacles and define an unlabeled homerun on the symbol legend as 3-#12, #12G-3/4"C unless noted otherwise. I strongly disagree with the Standard, but compliance means doing it their way. (I really hate it when Architects, Project Managers and School Administrators do electrical design.)

Reference photos must be identified by detail or section call-out and as legend on photo. This is non-trivial. The designer is often so close to the project that things appear obvious which are not. This is especially true for demolition drawings, where the subject matter will be gone when the pictures are looked at later. Call-outs and legends have always been good design practice.

FORM OF SCHEDULES (LISTS)

The goal is to be able to honestly say "Full Compliance" after the category head "Schedules". This has been appended here with "lists" for persons who persist in associating time-of-occurrence with schedules. The Standard is very clear that two column constitute a list, whereas three or more columns are a schedule.

The standard has eleven measurable items for this category. They are 1) Required components; 2) Unique identifiers; 3) Notes or comments column; 4) Consistent layout throughout set; 5) Consistent abbreviations, defined someplace; 6) Layout consistent with sheet modules; 7) Text size matches that used in the rest of the package; 8) Use of heavy lines and spaces for separation; 9) Layout to permit insertion or expansion; 10) Reference to and from the specification but do not duplicate; 11) Verify the schedule is intact when the OLE link is broken.

There are seven required components. They are heading, minimum three columns, identifier column (mark), description column, characteristic columns, identified units and a comment column.

It is usually valuable to provide a little more information in the heading than the minimum. The schedule may be copied from the sheet and given to a purchasing agent or counter person at the supplier's place of business. For instance, say, "BP200 480V Distribution Panels", even though the sheet identifies BP200 several places.

Architects use identifier marks more than electrical designers, but it is a good idea. A unique identifier for each item ensures that persons talking on the phone are referring to the same thing. They help the installer do it right the first time also.

Identified units means metric or Imperial. Say, "Inches" or "mm", or whatever.

The comment column seems superfluous - until it is needed. Including it is part of the later requirement to accept insertions and expansions, certainly additional description of the needs.

Consistent layout throughout the set means that Architectural, mechanical and electrical sheets should looks similar. If a good sheet from a previous project is made available to all the designers, it goes a long way towards promoting consistency. Inter-departmental checksets are required by many firms. That is too late to correct inconsistencies.

Back to the problem of the designer being too close to the subject matter, explanation of abbreviations is necessary. This is true throughout the contract document set, but especially true for schedules which are likely to take on a life of their own during the procurement stage.

We say again, minimum text size 3/32-in for 2.4mm, consistent throughout the set. Schedules are very frequently prepared in an external computer application. Many standards require that they be placed in Paper Space so that the size cannot be adjusted through the viewport zoom ration. If the schedules are to comply with the Standard, they must have text consistent with the rest of the set.

One obvious way of providing uniformity of schedules among disciplines is consistent use of heavy lines (.50mm) and spaces when separating columns, etc. Always have two blanks before data starts and two blanks after data before the separator (for instance).

Layout the schedule to permit later insertion or expansion. Too many times, I have done as-built revisions and had to shrink the entire schedule x.95 because the original totally filled the sheet. This is avoidable.

The Standard does not recommend on-sheet schedules over in-spec schedules. But, it does forbid duplication. Because specifications seldom reach the construction foreman and never reach the installer, on-sheet schedules have an advantage.

Back to the use of external computer programs to generate the schedule. The intricacies of MicroSoft, AutoCAD and MicroStation are beyond your instructor, but sometimes Excel tables disappear when the drawing is opened on another machine. The Standard does not address this, but it is a good thing to check when you are checking a set before release. Just try the CD on a laptop.

SAMPLE ELECTRICAL DISTRIBUTION SCHEDULE

The Standard contains many, many sample schedules. The worst is the Electrical Distribution Panel Schedule on p 319 of 960. The following version is NOT a very close copy, but demonstrates the schedule components required by the Standard. Deviations from the sample within the Standard are discussed following the illustration.

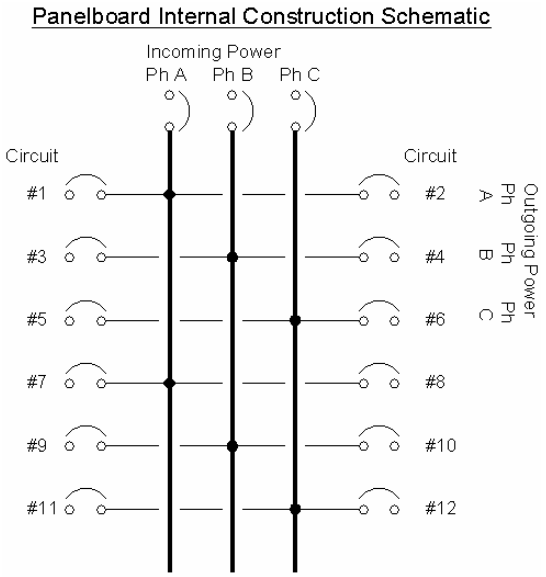
Electrical Schedule per Standard (sic)

Tag	**Distribution Panelboard Schedule**		Location	
Volts / Phase	Bus Rating, Poles	Main Rating, Type	NEMA Cabinet, Mounting	
Fed from	Source Feeder	Short-Circuit Rating	Notes: (Lock option)	
				Load Amps
No. / Note	Trip	Load, Area Served	HP, KW	Wire and Conduit(*)	PhA PhB PhC
1(A)					___ / *** / ***
3					*** / ___ / ***
5					*** / *** / ___
7					___ / *** / ***
9					*** / ___ / ***
11					*** / *** / ___
		...			
					PhA PhB PhC
				Total Amps	
				Demand Amps	

The first problem with the NCS Panelboard Schedule is that it does not identify the panel being defined. I have added a tag designation and location. The next deficiency is that it does not distinguish between the bus rating and the main circuit breaker rating. I have worked jobs where there is a separate panelboard schedule which lists all the panelboards and al their ratings. This is helpful for procurement but not helpful for field verification.

The third problem is the inclusion of wire size for the feeder to the panel and wire size for circuits to the loads. This is very valuable information. This is a good place to put it for verifying sizing criteria for a checker or Plans Reviewer, but it duplicates information on the plans. It is undesirable to duplicate information at multiple points in a drawing set because one gets revised and the other missed and a field request for information or field request for Change Order money results.

The fourth, inexcusable error is counting 1-2-3. This is good for Architects but bad for electrical designers and construction workers. We always count 1-3-5 for panelboards. This results from the construction of the panel. The three busses are vertical, with cross busses to the individual breakers, per the illustration, below:



A questionable component of the NCS version is the KW / HP column. I have worked jobs where this was in the standard panel schedule, but much more frequently it is included in the load description.

The next inexcusable error is lack of breakdown of loads by phase. The panelboard schedule exists, primarily, for two reasons, to size the main and to size the load breakers. The main is sized by comparing the sum of the loads on each phase with 80% of the size of the main. If we don't list the load broken down by phase amps, the comparison cannot be performed. (By the way, over half of the electrical designers now working do not understand this. Wanna fight?)

Obviously, if the objective is sum phase amps, we should have a space for sum phase amps.

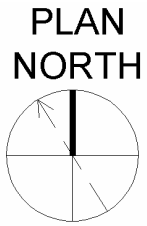
PLOTTING

The truth is that all of the good things that could be listed in plotting have been taken in other categories. The only clear requirement in this section from the Standard is use of standard paper size, out of the sixteen offered.

LINE WEIGHTS AND CUSTOM LINE TYPES

The goal is to be able to honestly say "Full Compliance" after the category head, "Drafting". There are many requirements in the drafting section, but line weights and custom line types are prominent. There are thirteen measurable criteria. They are: 1) "Circle Line" plan North pointing up; 2) Column grid number top and letters side; 3) For details, title, unique identifier, scale; 4) Detail bubble with identifier on top, sheet shown on the bottom; 5)Line width provides clear reproduction at sheet size to be used (e.g., reduced Bid Set); 6) Lines join at ends, no space, no overlap; 7) Use precise dimensions or warning note; 8) Size notes, dimensions, bubbles for uniformity across the set on the final plot; 9) Consistent dimensioning and break-lines; 10) For partial plans, provide match-lines and key plans; 11) Round dimensions uniformly, as 1-7/8" = 47.6mm = 48mm+/-; 12) Minimum text size is 3/32-in or 2.4mm. 13) Existing, thin line, .25mm; new, medium, .35mm, demo, medium dashed; hidden, thin dashed.

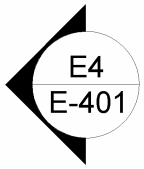
The "circle line" plan North pointing up looks like this: It has been in use for many decades, so it is unlikely that the symbol is copyrighted . The un-marked arrow is magnetic north or true north, or some such thing. Interestingly, in Mexico down is a common plan north. At least, they are not metric.



A column grid is not an innovation, but including it on every plan drawing may be. The standard calls for numbers along the top and letters along the side. The bottom and otl optional and choice of size and font is discretionary, but must be consistent throughout the set.

Form of details is not prescribed but there are many restrictions, starting with use of the sheet modules, described previously. Also, each detail must have a title, a unique identifier and scale bar or nts notation (for which the Standard prefers, "SCALE: NONE".)

The detail bubble is identical to that used for many decades and looks like this: The identifier is unique within the set, not just on the page, and the sheet number Below is where the detail or section or elevation can be found.



Line widths are called out by the standard (below) but the criterion is that the work be readable on the final prints, as on a reduced Bid Set.

The Standard requires that lines join at ends, with no space and no overlap. This is called OSNAP in AutoCAD. Compliance is obvious. Just zoom in a long way and check a few intersections. Drafters who still work "by eye" will leave traces.

Use precise dimensions or a warning note. Precise dimensions means to 1/8-in for most facility construction. If the presentation is schematic, please so note. It is always good to include a note, "Do not scale dimensions". (That was intended as a joke. The Contractor and supplier are going to scale off quantities, no matter what you say.)

Size notes, dimensions, bubbles for uniformity across the set on final plot. This means text height, but some designers get very artistic with character width and slant. Don't.

Consistent dimensions and break lines. The Standard says that both Architects and electrical designers must use tic-marks for dimensions or arrows. Break lines for piping must be the same symbol as break lines for conduits.

Sheets with partial plans must have match-lines calling out the sheet containing continuation of the work and a key plan.

Dimension rounding can be to two places or fewer if warning is provided. The example given is 1-7/8" = 47.6mm = 48mm+/-.

Minimum text size, no exceptions, is 3/32-in or 2.4mm.

Line weights to be used areas follows: for existing work, use thin = .25mm; for new work, use medium = .35mm; for demolition, use medium dashed; for hidden, use thin dashed.

Custom line types are discussed under "Symbols".

TERMS AND ABBREVIATIONS

The goal is to be able to honestly say "Full Compliance" after the category head, "Terms and Abbreviations". There are five measurable criteria. They are: 1) Provide an abbreviations list for all abbreviations used; 2) Do not abbreviate something with five characters or fewer; 3) Just define the term

on the sheet unless it is used on other sheets; 4) If an abbreviation is used in two ways in the set, then spell it out in full; 5) If the term is vendor-specific, then identify the vendor.

There isn't much more to say about this.

SYMBOLS

The goal is to be able to honestly say "Full Compliance" after the category head, "Symbols". The Standard has eight measurable criteria. They are: 1) Letter symbols, math and subscripts must follow the style demonstrated in the ASHRAE Handbook – Fundamentals; 2) A scale bar is required with every plan and scaled detail, section or elevation. 3) The detail bubble is as described previously. 4) The "Circle Line" plan North, pointing up, as discussed previously; 5) Lines weights, existing work, thin line- .25mm; new work, medium line = .35mm; demolition, medium dashed; hidden, think dashed; as described previously; 6) Keynotes must be called out using a horizontal hex polygon with a number.; 7) Custom line types must be a thin line with 3 or 4 characters in 2.4mm or 3/32-in text.

NOTATION

The goal is to be able to honestly say "Full Compliance" after the category head, "Notation". There are five types of notes identified. Use is optional, but any use must comply with the Standard. The types are: 1) General for the entire set, on sheet G-0; 2) Discipline general, as sheet E-0; 3) Sheet general note, as "1. All work must be done in accordance with OSHA, NFPA 70E and the National Electric Code." 4) Reference to a specification section. (There are details on how to do this, but I have never done it and never expect to), and, 5) Reference to a detail keynote, as discussed in the Symbols section.

USE OF CODES

The goal is to be able to honestly say "Full Compliance" after the category head, "Use of Codes". This is an exclusively Architectural responsibility, but it is good to know what is required of the Architect. There are eight identifiable criteria. The Standard says they are optional, but I think it really means that if the project has a sprinkler system, then the Architect must give the active fire protection criteria on his lead sheet.

The criteria are: 1) List of Codes applied (e.g., IEC or NEC); 2) List of jurisdictions and ordinances; 3) The Architectural design basis); 4) Description of passive fire protection; 5) Accessibility; 6) Numerical energy design criteria; 7) Structural criteria; and, 8) Active fire protection criteria.

