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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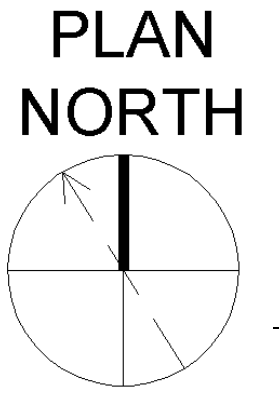
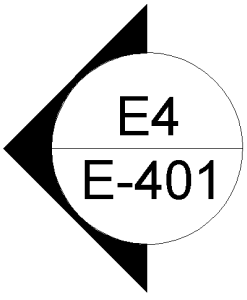
Worksheet for Statement of Substantial Conformance
U.S. National CAD Standard for Architecture, Engineering and Construction, Version 3.1, April, 2007 - NCS 3.1-07
Public Domain, PDHonline Course G210

Purchase NCS 3.1-07 from National Institute of Building Sciences, 1090 Vermont Ave, NW, #700, Washington, DC 20005-4905

Statement of Substantial Conformance - on first G-Sheet	Checklist supporting Conformance Summary - keep available for Client review	Comments and Optional Items - this worksheet only
The Design Professional responsible for issuing this set of construction documents certifies that the presentation conforms to the guidelines of the U.S. National CAD Standard to the extent indicated below. There are ten compliance categories.		A form of this statement must be provided on the first sheet of the set, typically sht G-0, with the huge project title and map.
Client Name: _____ Project Name: _____ Client Project Number: _____ Project Address: _____ Design Professional Name: _____ Design Professional Address: _____ Design Professional Phone / Fax / E-mail: __		Please re-format to suit on issued version.
Layers - Full Conformance - Partial Conformance - Non-Conformance	Layer Naming ☐ Discipline Letter, 20 permitted(*) ☐ Sub-discipline letter (see text) ☐ 4-Character main category ☐ Optional second, third categories ☐ Letter tag for existing, new, temp. etc. ☐ G-ANNO-REFR for x-ref insert ☐ G-ANNO-VPRT for viewports ☐ Layer 0 not used in issue dwgs ☐	Include only conformance statement which applies. Include full checklist with checked and un-checked items. Standard calls for file of examples and discussion of any non-conformance.
Drawing Set Organization - Full Conformance - Partial Conformance - Non-Conformance	Sheet Naming ☐ Discipline Letter, 20 permitted(*) ☐ Sub-discipline letters (see text) ☐ Sheet type number, 0-9 ☐ Combined sheets identified on index ☐ Sequence number, 01-99 ☐ Two-digit suffix for adds, rev, ref ☐ Use of common backgrounds (model files) for all disciplines ☐ Common look to all schedules ☐	
Sheet Organization - Full Conformance - Partial Conformance - Non-Conformance	☐ Standard paper size ☐ Border or trim marks ☐ Uniform sheet margins ☐ Uniform sheet division ☐ Required Title Block Information ☐ Plot data beyond left border ☐ Sheet number again at upper left ☐ Scale bar ☐ Enlarged electric rooms, do not duplicate ☐ Separate lighting and power except 1/4”=1’-0” scale ☐ Call out runs when conductor count exceeds two (*) ☐ Reference photos to plans both ways ☐	Client-driven but ISO A1 preferred . 3/4-in around with 1-1/2-in on left preferred 5(H)x6(W) for details, schedules preferred
Schedules - Full Conformance - Partial Conformance - Non-Conformance	☐ Required Components ☐ Unique identifiers ☐ Notes or comments column	

	☐ Consistent layout throughout set ☐ Consistent abbreviations, defined someplace ☐ Fit to layout modules ☐ Text size matches drawing standard ☐ Use of heavy lines and spaces for separation ☐ Layout to permit insertion or expansion ☐ Reference to and from spec; do not duplicate ☐ Verify schedule intact when OLE link broken ☐	
Plotting - Full Conformance - Partial Conformance - Non-Conformance	☐ Standard paper size	Serious problem discovered in trying to plot "Thin" and "Fine" line weights on modern laser printers and plotters. They cannot print thin, so they skip dots, "dither". See examples at end of Worksheet Attachments.
Drafting - Full Conformance - Partial Conformance - Non-Conformance	☐ "Circle Line" plan North pointing up ☐ Column grid, numbers top, letters side ☐ Details, title, unique identifier, scale ☐ Detail bubble , identifier top, sht used bot ☐ Line width for clear reproduction at sheet size to be used(e.g., reduced Bid Set) ☐ Lines join at ends, no space, no overlap ☐ Use precise dimensions or warning note ☐ Size notes, dimensions, bubbles for uniformity across set on final plot ☐ Consistent dimension for, break lines ☐ Match-lines and key plans with partial plans ☐ Dim rounding, 1-7/8"=47.6mm=48mm+/- ☐ Min text size is 3/32" or 2.4mm ☐ Existing, thin line, .25mm; new, medium, .35mm; demo, medium dashed; hidden, thin dashed ☐	acaddoc.lsp (setvar "DIMASZ" 0.125) (setvar "DIMEXO" 0.0625) (setvar "DIMTAD" 0) (setvar "DIMTVP" 1) (setvar "DIMTXT" 0.09375) (setvar "DIMTZIN" 3) (setvar "PDMODE" 0) (setvar "TILEMODE" 0) (setvar "DIMTIX" 0) (setvar "DIMTOFL" 1) (setvar "DIMTOH" 0) (setvar "DIMTIH" 0)fs
Terms and Abbreviations - Full Conformance - Partial Conformance - Non-Conformance	☐ Abbreviation List for all abbreviations used ☐ Do not abbreviate five characters or fewer ☐ Define on sht used unless multiple ☐ If used two ways in set, then spell out in full ☐ If vendor-specific, then identify vendor ☐	
Symbols - Full Conformance - Partial Conformance - Non-Conformance	☐ Letter symbols, math, subscripts per ASHRAE Handbook, Fundamentals ☐ Scale bar ☐ Detail bubble , identifier top, sht used bot ☐ "Circle Line" plan North pointing up ☐ Symbol Legend identifying all symbols used ☐ Existing, thin line, .25mm; new, medium, .35mm; demo, medium dashed; hidden, thin dashed ☐ Keynote, horizontal hex with number ☐ Custom line types, thin line, 3 or4 characters, 2.4mm or 3/32-in text ☐	

Notation - Full Conformance - Partial Conformance - Non-Conformance	Notes ☐ General – set ☐ Discipline general – discipline note sht ☐ Sheet general note ☐ Reference to spec section keynote ☐ Reference to detail keynote ☐	
Use of Codes - Full Conformance - Partial Conformance - Non-Conformance	☐ List of Codes applied ☐ List of jurisdictions and ordinances ☐ (Architectural design basis) ☐ Passive fire protection ☐ Accessibility ☐ Energy design criteria ☐ Structural criteria ☐ Active fire protection criteria ☐	
Design Professional Project Manager: _____		
Signature: _____ Date: _____		

Standard Plotting Line Weights, Layers and Colors

Width mm	Width in	Screening	Color	ACAD clr	MS clr	MS lnwt	Note	
0.18	0.007	none	Red	1	3	0	"Fine"	
0.25	0.010	none	Green	2	4	1	"Thin"	
0.35	0.014	none	Cyan	3	2	2	"Medium	
0.35	0.014	none	Blue	4	7	2	unreadable on black screen	
0.50	0.020	none	Magenta	5	1	3	Wide	
1.00	0.039	none	White	6	5	7	"XX Wide"	
1.40	0.055	none	Dk Gray	7	0	10	"XXX Wide"	
0.35	0.014	50%	Lt Gray	8	9	2	background	
2.00	0.079	none	Lt Gray	9	14	15	"XXXX .Wwide"	
0.18	0.007	none	Red	10	10	0		
0.25	0.010	none	Pale Vio	11	19	1		
0.20	0.010	50%	Dk Gray	250	8	1	background	
0.35	0.014	50%	Med Gray	251	200	2	background	
0.50	0.020	50%	Lt Gray	252	168	3	background	
0.70	0.028	50%	Pale Gray	253	120	5	background	
1.00	0.039	50%	White	254	56	7	background	
2.00	0.070	50%	White	255	24	5	background	

Layer Naming Format

ELECTRIC - 1 of 20 permitted categories (see text)		OPTIONAL Secondary Intifier of 9 permitted (*) (See text)	Required dash for readability	Required Main Categoty (*), Note: SERT and INST		POWR, LITE, SITE, DIAG, FIRE, DATA, COMM	OPTIONAL Second Category (*) NOTE: IDEN and ANNO		OPTIONAL Third Category (*)		OPTIONAL - NEW, EXISTING, DEMO, FUT, TEMP , M- TO BE MOVED, X- NIC, PHASE NUMBERS
E	P	-	POWR	-	BUSW	-	PLUG	-	N		

Layer First-Character Identifiers

G	-	General
V	-	Survey / Mapping
B	-	Geotechnical
W	-	Civil Works
C	-	Civil Works
L	-	Landscape
S	-	Structural
A	-	Architectural
I	-	Interiors
Q	-	Equipment
F	-	Fire Protection
P	-	Plumbing
D	-	Process
M	-	Mechanical
E	-	Electrical
T	-	Telecommunications
R	-	Resource
X	-	Other Disciplines
Z	-	Contractor / shop Drawings

O	-	Operations
Y	-	Security (see text)
P	-	Instrumentation and Controls (see text)

Secondary Identifiers for Electrical

E	-	Electrical
ES	-	Electrical Site
ED	-	Electrical Demolition
EP	-	Electrical power
EL	-	Electrical Lighting
EI	-	Electrical instrumentation (see text)
ET	-	Electrical Telecommunications
EY	-	Electrical Auxiliary systems
EJ	-	User Defined
EK	-	User Defined
EY	-	Electrical Security (see text)

Standard Paper Sizes

ANSI		ISO		Architectural		Use
A	216x279	A	210x297	A	229x305	
	(8.5x11)		(8.3x11.7)		(9x12)	
B	279x432	A3	297x420	B	305x457	
	(11x17)		(11.7x16.5)		(12x18)	Reduced Set
C	432x559	A2	420x594	C	457x610	Government
	(17x22)		(16.5x23.4)		(18x24)	Projects
D	559x864	A1	594x841	D	610x914	Government
	(22x34)		(23.4x33.1)		(24x35)	Projects
E	864x1118	A0	841x1189	E	914x1219	Mapping and
	(34x44)		(33.1x46.8)		(36x48)	GIS
-	-	-	-	F	762x1067	
	-		-		(30x42)	

Title Block Requirements

Designer Info	includes subs and seals
Project Info	includes ref nos and location
Issue Info	revision marks and dates
Management Info	approvals and dates
Sheet Info	discipline and description
Sheed ID	number and sequence number

Plot Block Infomration

Time/date stamp
Full file path
Plotter used
Plotter control file
Optional - Default settings
Optional - Plotter commands
Optional - Overlay controls
Optional - External references
Optional - Layers plotted
Optional - Production hours

Schedule Components
Heading
Minimum three columns
Identifier column (Mark)
Description
Characteristic #1
Characteristic #2, etc
Comments

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	

Electric Discipline Designator List from a Major US Manufacturer, following NCS Format

ELECTRICAL LAYERS				
New Layer Name (Required)	Description	Color No.	Line Type	Line Weight (in)
E-ABAN	Abandoned Electrical	80	CONTINUOUS	0.012
E-ABAN-PATT	Abandoned hatch pattern	80	CONTINUOUS	0.012
E-ABAN-TEXT	Abandoned equipment text	7	CONTINUOUS	0.008
E-ANNO-DIMS	Annotation: Dimensions	7	CONTINUOUS	0.008
E-ANNO-LEGN	Annotation: Symbol list, legend	7	CONTINUOUS	0.008
E-ANNO-NOTE	Annotation: Construction notes, key notes	7	CONTINUOUS	0.008
E-ANNO-NPLT	Annotation: Non-plotting information, construction lines	7	CONTINUOUS	0.008
E-ANNO-REDL	Annotation: Redline comments	1	CONTINUOUS	0.008
E-ANNO-REVC	Annotation: Revision clouds	94	CONTINUOUS	0.024
E-ANNO-REVS	Annotation: Revision notes, triangle	3	CONTINUOUS	0.012
E-ANNO-SCHD	Annotation: Schedules	3	CONTINUOUS	0.012
E-ANNO-SECT	Annotation: Section graphics	41	CONTINUOUS	0.020
E-ANNO-TEXT	Annotation: Text	7	CONTINUOUS	0.008
E-DEMO	Demolition work	11	HIDDENX2	0.012
E-DEMO-PATT	Demolition hatch pattern	11	CONTINUOUS	0.012
E-DEMO-TEXT	Demolition text	7	CONTINUOUS	0.008
E-DETL	Detail graphics	3	CONTINUOUS	0.012
E-DETL-PATT	Detail hatch pattern	31	CONTINUOUS	0.005
E-DETL-TEXT	Detail text	7	CONTINUOUS	0.008
E-GRPH-HIDN	Hidden Line Graphics	7	HIDDEN	0.005
E-AUXL-BRBD-N	Auxiliary Systems: communication lines - broadband	135	CONTINUOUS	0.020
	Auxiliary Systems: circuits (cables, raceway, junction and pull			
E-AUXL-CIRC-N	Auxiliary Systems: circuits (cables, raceway, junction and pull boxes)	135	CONTINUOUS	0.020
E-AUXL-CLOK-N	Auxiliary Systems: clock system	4	CONTINUOUS	0.012
E-AUXL-CLOK-TEXT-N	Auxiliary Systems: clock system associated text	7	CONTINUOUS	0.008
E-AUXL-COMM-CIRC-N	Auxiliary Systems: communication circuits	122	CONTINUOUS	0.020
E-AUXL-COMM-N	Auxiliary Systems: communication devices (outlets, etc.)	121	CONTINUOUS	0.016
E-AUXL-DEVC-N	Auxiliary Systems: devices	121	CONTINUOUS	0.016
E-AUXL-EMSY-N	Auxiliary Systems: Energy Management System	191	CONTINUOUS	0.020
E-AUXL-EMSY-TEXT-N	Auxiliary Systems: Energy Management System text	7	CONTINUOUS	0.008
E-AUXL-INTC-N	Auxiliary Systems: intercom system	4	CONTINUOUS	0.012
E-AUXL-INTC-TEXT-N	Auxiliary Systems: intercom associated text	7	CONTINUOUS	0.008
E-AUXL-LANX-N	Auxiliary Systems: communication lines - LAN	135	CONTINUOUS	0.020
E-AUXL-SCHD-N	Auxiliary Systems: schedule (line work)	7	CONTINUOUS	0.008
E-AUXL-TELE-N	Auxiliary Systems: communication lines - telephone	135	CONTINUOUS	0.020
E-AUXL-TEXT-N	Auxiliary Systems: text	7	CONTINUOUS	0.008
E-AUXL-TVAN-N	Auxiliary Systems: TV Antenna/Satellite Systems	191	CONTINUOUS	0.020
E-AUXL-TVAN-TEXT-N	Auxiliary Systems: TV Antenna/Satellite Systems text	7	CONTINUOUS	0.008
E-COMM-PANL-N	Auxiliary Systems: communication panels	122	CONTINUOUS	0.020
E-CTRL-DEVC-N	Control Systems: devices	191	CONTINUOUS	0.020
E-CTRL-N	Control Systems: electrical control systems	121	CONTINUOUS	0.016
E-CTRL-PANL-N	Control Systems: electrical control panels	191	CONTINUOUS	0.020
E-CTRL-PROC-N	Control Systems: process control and monitoring	121	CONTINUOUS	0.016
E-CTRL-SCHD-N	Control Systems: schedules (Line Work)	7	CONTINUOUS	0.008
E-CTRL-TEXT-N	Control Systems: text	7	CONTINUOUS	0.008
E-CTRL-WIRE-N	Control Systems: wiring	23	CONTINUOUS	0.020
E-DATA-N	Auxiliary Systems: Data outlets	80	CONTINUOUS	0.012
E-GRND-N	Power: ground system	41	CONTINUOUS	0.020
E-GRND-TEXT-N	Power: ground system text	7	CONTINUOUS	0.008
E-LITE-CIRC-N	Lighting: circuits (conduits, j box and wire counts)	135	CONTINUOUS	0.020
E-LITE-CIRC-NUMB-N	Lighting: circuit numbers	7	CONTINUOUS	0.008
E-LITE-CLNG-N	Lighting: ceiling mounted (surface or recessed) lights	23	CONTINUOUS	0.020

ELECTRICAL LAYERS				
New Layer Name (Required)	Description	Color No.	Line Type	Line Weight (in)
E-LITE-EMER-N	Lighting: emergency lights	10	CONTINUOUS	0.016
E-LITE-EMER-PATT-N	Lighting: emergency, exit and night light shading	1	CONTINUOUS	0.008
E-LITE-EXIT-N	Lighting: exit lights	96	CONTINUOUS	0.020
E-LITE-EXTR-N	Lighting: exterior wall mounted lighting	90	CONTINUOUS	0.016
E-LITE-FLOR-N	Lighting: floor mounted lighting	151	CONTINUOUS	0.020
E-LITE-IDEN-N	Lighting: identification and text	7	CONTINUOUS	0.008
E-LITE-INSP-N	Lighting: Inspection, Finesse Polish Lighting	170	CONTINUOUS	0.016
E-LITE-OPEN-N	Lighting: open (non-ceiling) mounted light fixtures	231	CONTINUOUS	0.020
E-LITE-OTLN-N	Lighting: lighting outline for background	9	CONTINUOUS	0.005
E-LITE-PANL-N	Lighting: lighting panels	122	CONTINUOUS	0.020
E-LITE-PANT-N	Lighting: paint lighting systems	170	CONTINUOUS	0.016
E-LITE-ROOF-N	Lighting: roof lighting	23	CONTINUOUS	0.020
E-LITE-SCHD-N	Lighting: Lighting schedule (Line work)	7	CONTINUOUS	0.008
E-LITE-SPCL-N	Lighting: special lights	90	CONTINUOUS	0.016
E-LITE-SWCH-N	Lighting: switches and contactors	23	CONTINUOUS	0.020
E-LITE-TEXT-N	Lighting: Lighting text	7	CONTINUOUS	0.008
E-LITE-WALL-N	Lighting: wall or column mounted light fixtures	3	CONTINUOUS	0.012
E-LTNG-N	Lightning protection: Lightning protection systems	151	CONTINUOUS	0.020
E-LTNG-TEXT-N	Lightning protection: text	7	CONTINUOUS	0.008

E-PGNG-N	Auxiliary Systems: paging system	40	CONTINUOUS	0.012
E-PGNG-TEXT-N	Auxiliary Systems: Paging System text	7	CONTINUOUS	0.008
E-POWR-BUSW-MEDM-N	Power: medium voltage busway	122	CONTINUOUS	0.020
E-POWR-BUSW-N	Power: busway and associated tap boxes	122	CONTINUOUS	0.020
E-POWR-BUSW-PLUG-N	Power: bus plugs	122	CONTINUOUS	0.020
E-POWR-CABL-N	Power: cable trays	231	CONTINUOUS	0.020
E-POWR-CIRC-N	Power: circuits, conduit, wire counts, junction and pull boxes	191	CONTINUOUS	0.020
E-POWR-CIRC-NUMB-N	Power: circuit numbers	7	CONTINUOUS	0.008
E-POWR-CLNG-N	Power: ceiling outlets and receptacles	80	CONTINUOUS	0.012
E-POWR-DEVC-FLOR-N	Power: floor mounted devices	30	CONTINUOUS	0.012
E-POWR-DEVC-N	Power: devices (receptacles and switches)	4	CONTINUOUS	0.012
E-POWR-DEVC-WALL-N	Power: column or wall mounted devices (receptacles and switches)	4	CONTINUOUS	0.012
E-POWR-EQPM-CAPY-N	One-line: equipment capacity	7	CONTINUOUS	0.008
E-POWR-EQPM-COLM-N	Power: column mounted equipment	23	CONTINUOUS	0.020
E-POWR-EQPM-N	Power: equipment (xfmr, substations, switchboards, MCCs); switches, ckt. breakers, capacitor banks, generators, UPS units, load tap changers/voltage regulators, point of common coupling, tap boxes	130	CONTINUOUS	0.016
E-POWR-FELV-N	Power: feeders to distribution equipment; One-line: low voltage feeders	135	CONTINUOUS	0.020
E-POWR-FEMV-N	Power: utility owned power feeders; One-line: medium voltage feeders	122	CONTINUOUS	0.020
E-POWR-FEUT-N	Power: medium voltage power feeders; One-line: Utility feeders	135	CONTINUOUS	0.020
E-POWR-IDEN-MEDM-N	Power: medium voltage power equipment identifier	7	CONTINUOUS	0.008
E-POWR-IDEN-N	One-line: equipment designations, normal operating state	7	CONTINUOUS	0.008
E-POWR-IDEN-N	Power: equipment designator	7	CONTINUOUS	0.008
E-POWR-IDEN-RATG-N	One-line: equipment ratings, load ratings, relay type, fuse type	7	CONTINUOUS	0.008
E-POWR-LABL-MEDM-N	Power: medium voltage power label	7	CONTINUOUS	0.008
E-POWR-LABL-N	One-line: asset tag numbers	7	CONTINUOUS	0.008
E-POWR-LABL-N	Power: label	7	CONTINUOUS	0.008
E-POWR-OTLN-N	Power: outline for backgrounds	9	CONTINUOUS	0.005
E-POWR-OTLN-N	One-line: room and equipment delineation	7	CONTINUOUS	0.008
E-POWR-PANL-N	Power: Power Panels	151	CONTINUOUS	0.020
E-POWR-PANL-WALL-N	Power: wall and column mounted panels	122	CONTINUOUS	0.020
E-POWR-ROOF-N	Power: roof mounted power equipment	191	CONTINUOUS	0.020
E-POWR-SCHD-N	One-line: schedule (line work)	7	CONTINUOUS	0.008
E-POWR-SCHD-N	Power: schedule	7	CONTINUOUS	0.008

ELECTRICAL LAYERS

New Layer Name (Required)	Description	Color No.	Line Type	Line Weight (in)
E-POWR-TEXT-ENGR-N	Oneline: available short circuit, momentary interrupting rating, CT's, PT's, transformer insulation media, medium voltage protective device, protective device, relay type	7	CONTINUOUS	0.008
E-POWR-TEXT-IMPD-N	One-line: Short Circuit Analysis (ETAP) impedance values	7	CONTINUOUS	0.008
E-POWR-TEXT-LOAD-N	One-line: load flow data	7	CONTINUOUS	0.008
E-POWR-TEXT-MANF-N	One-line: equipment manufacturer and model number	7	CONTINUOUS	0.008
E-POWR-TEXT-MEDM-N	Power: medium voltage power text	7	CONTINUOUS	0.008
E-POWR-TEXT-N	One-line: miscellaneous annotation	7	CONTINUOUS	0.008
E-POWR-TEXT-N	Power: text	7	CONTINUOUS	0.008
E-POWR-TEXT-SCKT-N	One-line: short circuit data	7	CONTINUOUS	0.008
E-POWR-TEXT-SETG-N	One-line: protective device settings	7	CONTINUOUS	0.008
E-POWR-UCFW-N	Power: under carpet flat wire	96	CONTINUOUS	0.020
E-POWR-URAC-N	Power: underfloor raceways	170	CONTINUOUS	0.016
E-POWR-WELD-N	Power: Welders – ped Single Pt Press (See Process)	30	CONTINUOUS	0.012
E-SERT-CIRC-N	Auxiliary Systems: security circuits	30	CONTINUOUS	0.012
E-SERT-DEVC-N	Auxiliary Systems: security card readers, motion detectors, etc.	30	CONTINUOUS	0.012
E-SERT-IDEN-N	Auxiliary Systems: security identifier	7	CONTINUOUS	0.008
E-SERT-PANL-N	Auxiliary Systems: security panel	30	CONTINUOUS	0.012
E-SITE-COMM-ABGR-N	Electrical Site: Communications, Vault, Manhole, pedestal. Etc.	23	CONTINUOUS	0.020
E-SITE-COMM-UNDR-N	Communication lines underground	23	COMMUNICATIONS1	0.020
E-SITE-FIBER-OVHD-N	overhead fiber communication	23	COMMUNICATIONS2	0.020
E-SITE-FIBER-UNDR-N	underground communication	96	COMMUNICATIONS1	0.020
E-SITE-LITE-N	site lighting and perimeter lighting fixtures	41	CONTINUOUS	0.020
E-SITE-POLE-N	Electrical/Communication/Light poles and towers	122	CONTINUOUS	0.020
E-SITE-POWR-ABGR-N	Manholes, handholes, at grade junction boxes, padmounted transformers. etc.all grade mounted elec equipment	151	CONTINUOUS	0.020
E-SITE-POWR-OVHD-N	overhead power cables	23	ELECTRICAL2	0.020
E-SITE-POWR-UNDR-N	underground primary power cables, ductbanks	122	ELECTRICAL1	0.020
E-SITE-SECP-OVHD-N	Overhead secondary power cables	23	ELECTRICAL2	0.020
E-SITE-SECP-UNDR-N	underground secondary power cables	231	ELECTRICAL1	0.020
E-SITE-UTIL-N	Public Utility Lines	40	CONTINUOUS	0.012

Electric Discipline Designator List from a Major US Manufacturer, following NCS Format

ELECTRICAL		ex: 1507 05895- EP 1 - 01
E-	**Electrical**	Include project title, project location, code data, drawing index, piping legend, symbols list, abbreviations, equipment schedules and general notes. For small project sheet files with mixed discipline designator content.
E	*Electrical Building Sections*	Electrical building sections.
EB	**Electrical Secondary Power**	Low voltage power equipment not fed directly from unit substations such as distribution transformers, lighting panels, receptacle panels, motors and receptacles.
ED	**Electrical Demolition**	Protectio, termination, and removal (Use with Project sheet files only)
EG	**Electrical Grounding**	Grounding and lighting protection systems
EP	**Electrical Primary Power**	Primary distribution equipment, unit substations, and low voltage power equipment directly fed from unit substations including busways and power distribution panels.
EP	*Electrical Schedules*	MCC motor starter, power panel, receptacle panel and lighting panel schedules
EP	*Power One Line Diagrams*	Primary distribution one lines, unit substation one lines, busway onelines and power distribution panel one line diagrams
EP	*Power Details*	Show all typical and special non-typical conditions. Include mounting details, elevation changes, building entrance sections, cabinets, details, etc.
EL	**Electrical Lighting**	Lighting fixtures, conduit, modular wiring, control equipment and egress/emergency lighting
EL	*Lighting Schedules*	Lighting fixture schedules and lighting control schedules
EL	*Lighting Details*	Show all typical and special non-typical conditions. Include mounting details, cabinets, details, etc.
ES	**Electrical Site**	Primary system manholes & duct banks, low voltage & telephone duct banks & handholes, direct buried conduit, lighting and pole type and base
ES	*Electrical Site Details*	Electrical site related details including ductbank, lighting standard and pole foundation details.
EI	**Electrical Instrumentation**	Controls, relays, instrumentation, measurement devices, and control conduit
EY	**Electrical Auxiliary Systems**	Alarms, security, CCTV, PA, music, clock and program
EY	*Auxiliary System Details*	Show all typical and special non-typical conditions. Include mounting details, elevation changes, building entrance sections, cabinets, details, etc.

Line Weight / Plotter Test

An AutoCAD test drawing was prepared, drawing everything in Layer 0. Arial font was used because it reproduces best on published material - however, RomanS font is specified by NCS 3.1-07 and is required by most design firms, because it uses much less file storage space. Test text was changed to RomanS and sample lines and circles were added. The Arial text was scaled to 3/32" . The converted RomanS was not checked for text height.

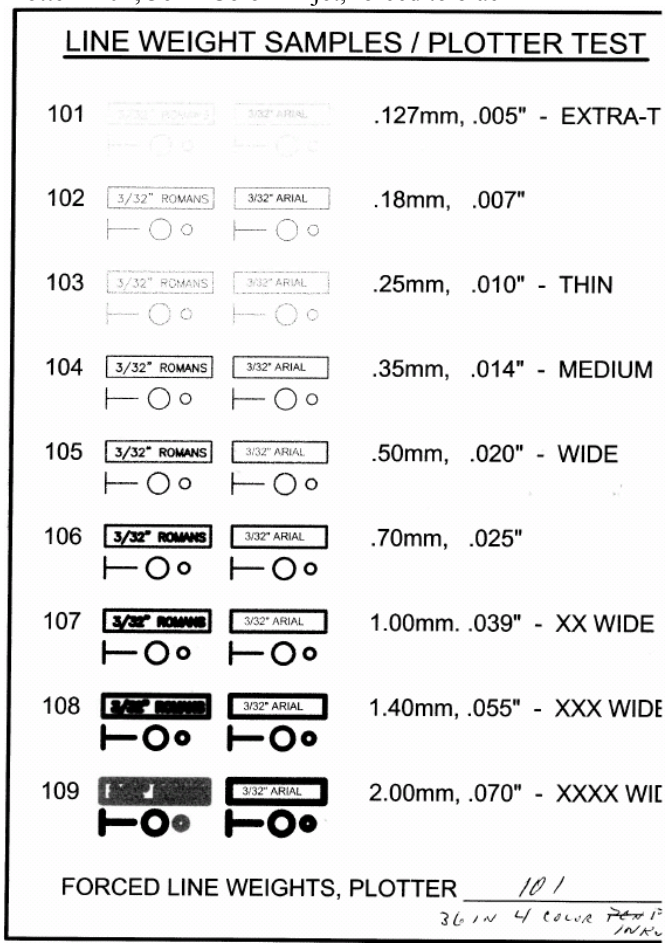
Note that NCS line weights .25mm and less appear to be less than the physical line weight produced by the printers and plotters. They simulate the narrower line by dithering, that is, skipping intermediate dots on the line.

An unexplained confounding variable is the difference in plotting .125mm when forced into Color 1 and when forced into Color 101. "1" is red and the early 100 series are shades of green. They plot differently at the "1-level" and at the "100-level".

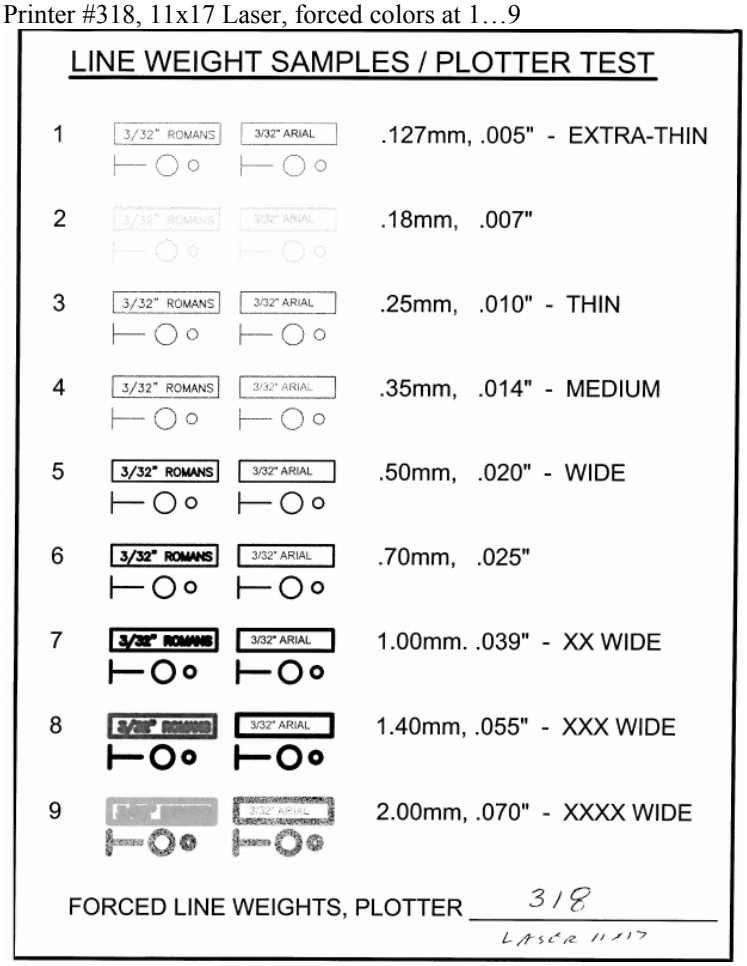
The original plots are nominally 8-1/2"x11", scanned to .pdf, then screen shots are inserted in a WORD document. The word document is electronically converted into the .pdf file you are reading.

A large number of printers and plotters were checked, with similar, but not identical results.

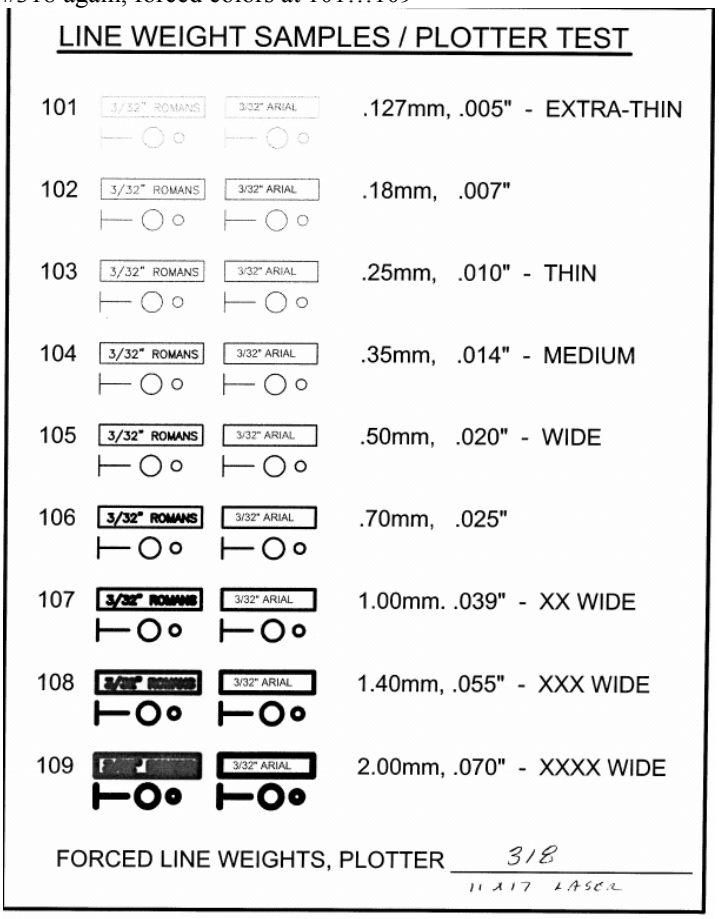
Plotter #101, 36-in Color Inkjet, forced to black



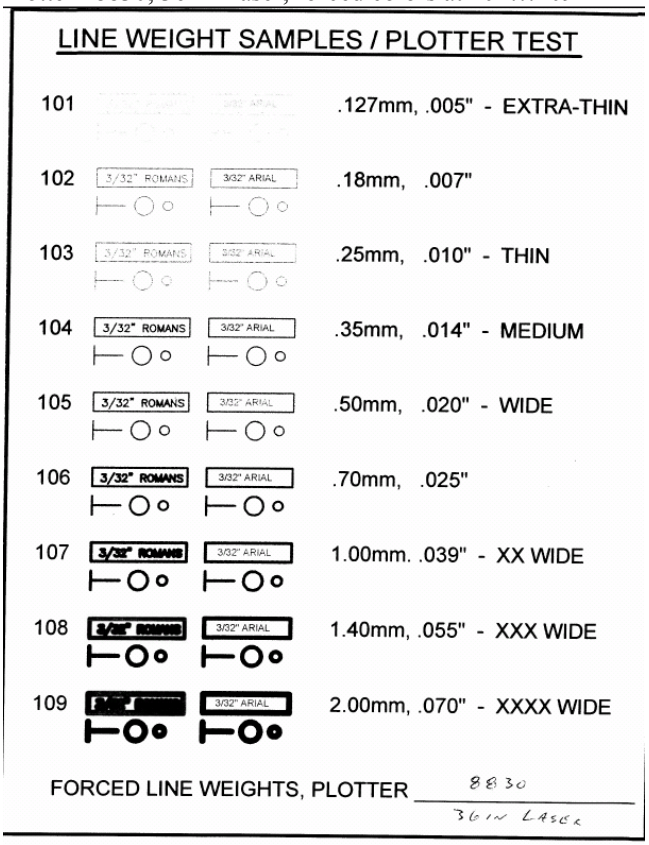
Printer #318, 11x17 Laser, forced colors at 1…9



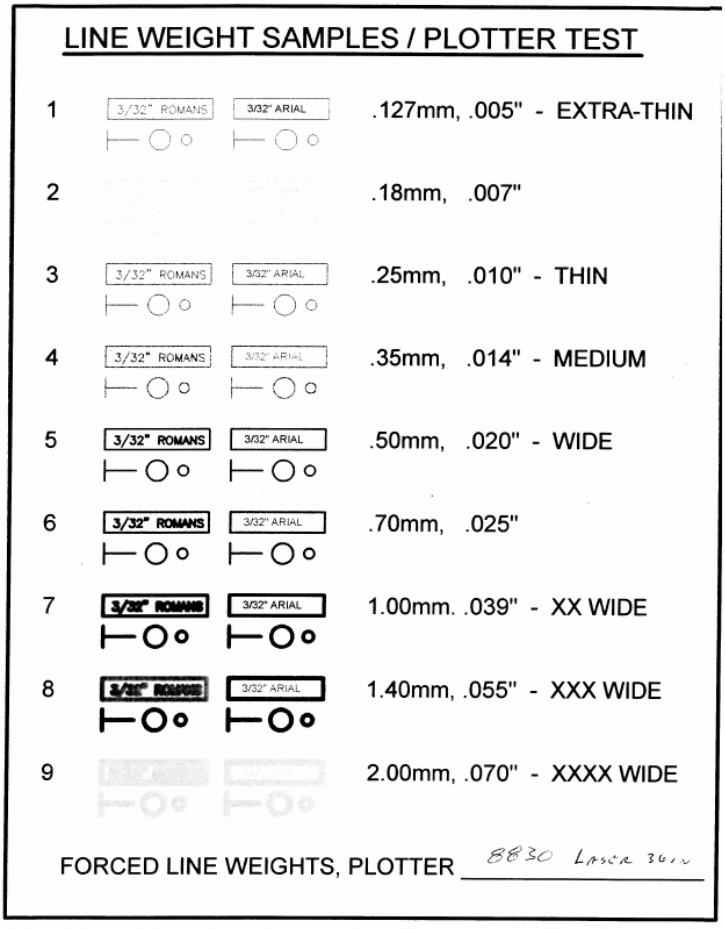
#318 again, forced colors at 101…109



Plotter #8830, 36-in Laser, forced colors at 101…109



#8830 again, forced colors at 1…9



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