



**Region 5
CAD
DELIVERABLES
POLICY**

August 1, 2014

**U.S. General Services Administration
Great Lakes Region**

**Public Buildings Service
John C. Kluczynski Federal Building
230 South Dearborn Street
Chicago, IL 60604**

1. GENERAL INFORMATION

1.1 Government Ownership Statement

All drawings and related files, including specifications, shop drawings, renderings, photographs, and other materials generated by the contractor for the project, shall be the property of the General Services Administration upon their delivery to GSA, or at the termination of the contract, whichever occurs first. This applies to content as well as physical media. GSA shall have full and unlimited intellectual property rights, use, and reuse by GSA and its constituents. The government will not accept disclaimers nullifying this requirement.

1.2 Validation Procedures

The Prime A/E is responsible for ensuring that all submissions by sub-contractors meet the Deliverables Policy contained herein. The Prime A/E, prior to the start of the design phase, shall transmit sample electronic submittals to GSA to verify that their software, and that of their subs, complies with the requirements herein.

1.3 Content Integrity

PBS may provide contractors with existing CAD drawings for convenience. However, these drawings shall be used as a base reference only. Unless otherwise specified by the contract documents, the contractor is responsible for field verification of existing conditions, and ensuring that all electronic deliverables are accurate and comply with this CAD (Computer Aided Design) standard.

1.4 Contacts / Resources

Any questions regarding the Great Lakes Region's CAD Deliverables Policy shall be directed to the project team. If necessary, the project team will contact the appropriate regional staff.

This document and the drawings referenced herein are available electronically at:

<http://www.gsa.gov/greatlakescadpolicy>

The US National CAD Standard, which contains the AIA CAD Layer Guidelines, is published by the National Institute of Building Sciences: <http://www.nationalcadstandard.org/ncs5/>

2. SOFTWARE AND DELIVERABLE MEDIA

2.1 Physical Media / Transmission Methods

Files submitted to GSA shall not contain computer viruses. Label media with the project title, project number, submission stage, submission date, and any other pertinent information.

All files shall be submitted using one of the following media or transmission methods:

- **CD-R:** May be 650MB or 700MB, but must be closed (i.e. "finalized"). CDs may not contain compressed (ZIP) or self-extracting (EXE) files.
- **CD-RW:** May be 650MB or 700MB. CDs may not contain compressed (ZIP) or self-extracting (EXE) files.
- **DVD±R:** 4.7 GB single layer, single sided; must be closed (i.e. "finalized"). DVDs may not contain compressed (ZIP) or self-extracting (EXE) files.
- **DVD±RW:** 4.7 GB single layer, single sided. (Note that this does not include DVD-RAM) DVDs may not contain compressed (ZIP) or self-extracting (EXE) files.
- **Email:** Attachments shall be no more than 5 MB and comply with GSA Order PBS 3490.1A. Files may be compressed.
- **Direct file transfer via intranet (WAN), extranet, VPN, or FTP:** Any of these delivery methods must be preapproved by GSA and comply with GSA Order PBS 3490.1A.

2.2 Drawings

2.2.1 All drawings shall be readable by the latest release of AutoCAD at the time of contract award and each subsequent option, and shall be DWG files, not DXF, DWF, etc. Being "readable"

is constituted by the ability to open a file without any errors, such as proxy errors, font substitution errors, xref resolution errors, image xref resolution errors, etc., and the objects, layers, etc. in the file remaining intact. There is one exception: files that trigger the TrustedDWG message ("This DWG file was saved by a software application not developed or licensed by Autodesk.") are permitted. This allows the use of other CAD software to create DWGs, so long as the files produced meet the requirements in this standard.

2.2.2 No add-ons which create non-native object types are accepted unless approved in writing by GSA or required in supplemental policies. Special object types created by Autodesk Express Tools are permitted. If AutoCAD Architecture, previously known as ADT (Architectural Desktop), or other add-on which adds non-native objects is used, the non-native objects must be converted to native AutoCAD objects; all proxy entities must be removed. Refer to paragraph 5.12.4. If printed drawings are submitted, they must match prints produced by the electronic drawings. Sheet Set Files (DSTs) are permitted. All drawings submitted to GSA must be done so in a single directory structure as this will eliminate any duplicate file names.

2.2.3 In addition to providing the required Autocad (DWG) drawing submission, GSA PBS Facility Standard P-100 requires that construction documents be signed and sealed by the responsible design professional. To meet this requirement, the A/E shall submit a full set of 100% Final Construction Documents in .PDF format. Each drawing sheet, as well as the cover pages of the specifications, any engineering or architectural calculations, shall display the appropriate licensed professional signature and seal.

2.2.4 Drawings will be organized in folders titled "PDF" and "DWG". The Drawing Index spreadsheet shall be populated with the drawing's information for every drawing set. The Drawing Index is provided within this CAD Deliverables package.

2.3 Word Processor Documents

Word Processor documents shall be readable by Microsoft Word 2007.

2.4 Spreadsheets

Spreadsheet documents shall be readable by Microsoft Excel 2007.

2.5 Desktop Databases

Desktop database documents shall be readable by Microsoft Access 2007.

2.6 Schedules

Project Management Schedule documents shall be readable by Microsoft Project 2007. Project files shall be saved with a baseline.

2.7 Graphic Files

Graphic files other than DWGs may also be submitted. Graphic files referenced inside of drawings must also be submitted in the same directory as the drawing submittal. These may be photos, conceptual sketches, renderings, or a duplicate set of drawings in an alternate format. This is not to indicate that graphic files will be accepted in lieu of DWG files. They must be of sufficient resolution that they legibly show the content. Multipage raster files and multipage PDFs are not permitted for drawings, but are permitted for other types of documents such as word processing and spreadsheets. They may be in any of the following formats:

- TIF - uncompressed, packbits, group III, group IV, or LZW
- GIF - interlaced or noninterlaced
- JPG - standard only; no progressive; any compression level
- BMP - any
- PNG - any
- PDF - if generated from CAD files, the PDFs shall be vector files, to reduce file size and allow the text to be searchable. If the source information is not CAD, the PDFs may be raster files.
- SVG - any
- DWF - any

2.8 BIM Models

BIM Models are not specifically required by this CAD standard, but may be required elsewhere in the contract. BIM models may be submitted in addition to CAD files, but submission of a BIM model will not be accepted in lieu of DWG files, in cases where this CAD standard is a contract requirement. Refer to the GSA National 3D-4D-BIM Program's BIM Guide Series for requirements for the BIM model.

<http://www.gsa.gov/bim>

2.9 Third Party Software

A written request must be submitted to GSA and permission granted by GSA in order to submit electronic data in a format other than those specifically named above, or any AutoCAD add-on application which leaves non-native objects in the drawings. This also applies to AutoCAD-integrated applications, such as AutoCAD Architecture, (previously known as Architectural Desktop). When it is considered in the best interest of the Government, third party software may be permitted by the Contracting Officer. All third party software used which modifies or creates layers in AutoCAD shall adhere to the layering requirements in this standard.

3. DRAWING SETUP

3.1 General

Delivery stages are defined in AIA 01781. Any alternate definitions in the contract supersede that.

3.2 Cover Sheets

All submissions except for sample submissions shall have a cover sheet. The cover sheet shall include a vicinity map, location map, and drawing index. If all that information does not fit on a single sheet, it can be placed on additional informational sheets that follow the cover sheet. If there are multiple volumes, each volume shall have its own cover with drawing index.

3.3 Tolerance and Precision Drafting

- 3.3.1 **Tolerance:** If there is a stated tolerance set in the contract, use that. But if no tolerance is specified in the contract or other guidance, choose a tolerance that is sufficient to clearly define the work, allow accurate bidding and ordering of materials, and allow for acceptable fit and finish of the work. Use the most accurate source information available. If field measurements are required by contract, take field measurements accurate to the tolerance. State the tolerance used in the README. Contractors are responsible for the accuracy of all CAD drawings delivered to GSA, regardless of the accuracy of CAD drawings of previous projects furnished by GSA as a convenience to the contractor.
- 3.3.2 **Precision Drafting:** Regardless of tolerance, all CAD drawings shall be drafted using precision input. For all drawing entities, object snaps are required; line endpoints shall meet exactly, tangents intersect at a single point, vertical lines are at exactly 90°, etc.

3.4 Drawing Scales

If the building is originally built in imperial unit, the drawings shall be drawn in imperial unit. If the building is originally built in metric unit, the drawing shall be in metric unit. Follow the GSA Metric Design Guide (PBS PQ260) for all projects subject to PBS P100, which is primarily design and construction. If the unit in use is metric include an imperial equivalent in parenthesis adjacent to the metric. Imperial units are required for spatial assignment drawings. The base drawing unit for metric drawings shall be millimeter. The base drawing unit for imperial drawings shall be inch.

The following drawings shall be drawn full size (1:1); that is, all drawing elements shall be drawn to the exact dimensions of the object they represent. Drawing objects in imperial units in model space then scaling them to metric in a paper space viewport is also not acceptable. If you are working from imperial unit source CAD documents, you must scale them to full size in metric if the deliverables are required to be metric. There are special cases where unit systems may be mixed; if a project requires both design & construction drawings and spatial assignment drawings, there may be mixed units.

- Architectural Plans
- Mechanical Plans
- Electrical Plans
- Plumbing Plans
- Structural Plans
- Site Plans
- Topographical Drawings
- Industrial Engineering Drawings
- Environmental Drawings
- Waste Treatment Drawings
- Details
- Sections
- Elevations

The following types of drawings may be drawn to any scale (or no scale):

- Schedules
- Riser Diagrams
- Schematic Diagrams
- Single Line Diagrams

3.5 Title Blocks

The following is an explanation of GSA provided title blocks and Layer Seed Template, and a suggested method for setting up drawings. This method saves the time it would take to fill in all project-level information on each sheet separately, as well as ensuring consistency of spelling and nomenclature. The directions refer to AutoCAD commands and conventions, and may differ if you are using a different platform. These title blocks are compliant with PBS 3490.1A; each title block contains the disclaimer for each page, and the cover page inserts contain the disclaimer for cover pages.

3.5.1 GSA Provided Title blocks

GSA provides **SheetSize11x17.dwg**, **SheetSize18x24.dwg**, **SheetSize24x36.dwg**, **SheetSize30x42.dwg** and **SheetSize36x48.dwg** size (in inches) title blocks. Each title block file shall be inserted into the Layer Seed Template file's layout paperspace as a block. The insertion point shall be set to 0,0,0 and the scale should be set to 1,1,1. Do not explode the title block. The attributes of the drawing can then be set per project details. These can be modified later by double clicking on the title block.

3.5.2 Layer Seed

The **Layer Seed Template.dwt** file has been provided by GSA. This template contains commonly used GSA layers that have been slightly modified compared against the official AIA Layers. You may add AIA layers by creating them manually. The colors, linetypes, lineweights, and other properties have been assigned, no modification is required. Make sure to save the file as a .dwg and not overwrite the .dwt file.

3.5.3 General Title block Requirements

- a. Each sheet file shall contain a sheet file title block in paper space.
- b. The title block may not be submitted exploded.
- c. The sheet file title block may not be scaled; they are sized to fit standard paper sizes.
- d. The title block may not be nested within another block or brought in as an xref.
- e. None of the attributes may be deleted or the tags renamed.
- f. The title block may not be moved to a different layer.
- g. Each drawing file may contain no more than one title block.
- h. The cover sheet drawing may not be xrefed in.
- i. The viewport may be deleted or altered.
- j. All viewports' display locked property shall be set to ON / YES.
- k. Viewports shall reside on a locked layer.

3.5.4 Requirements for Title Block Attribute Values

- a. Fill in all attributes which are known and applicable. If an attribute has no value, make it blank; do not leave the default value.
- b. Do not include a hyphen or a space in the GSA project number. If there is no GSA project or lease number assigned to the project, ask the GSA Project Manager what to use.
- c. Do not enter more than one building number into each building number attribute. Building numbers shall be 6 digits, (not 8), with no spaces or hyphens, and with letters capitalized.
- d. For the building name attribute in the title blocks and model file information blocks, do not use a non-descript name, such as "US Courthouse & Federal Building", or "Federal Office Building". Use a descriptive name, such as "John C. Kluczynski FB" or the building's address. Abbreviate common terms such as Courthouse and Federal Building.
- e. There is no restriction on how the floors are named in the drawing title, but use the floor number codes for the floor number attribute. Enter only floor number. If the drawing refers to multiple floors or does not pertain to floors, leave it blank.
- f. Include the extension (.DWG) with the file name.
- g. Do not enter values that extend beyond the edge of the title block area.

3.6 Document Security

The following mark must be affixed to the cover or first page of any document (such as the cover page on a set of construction drawings) containing pages marked as required:

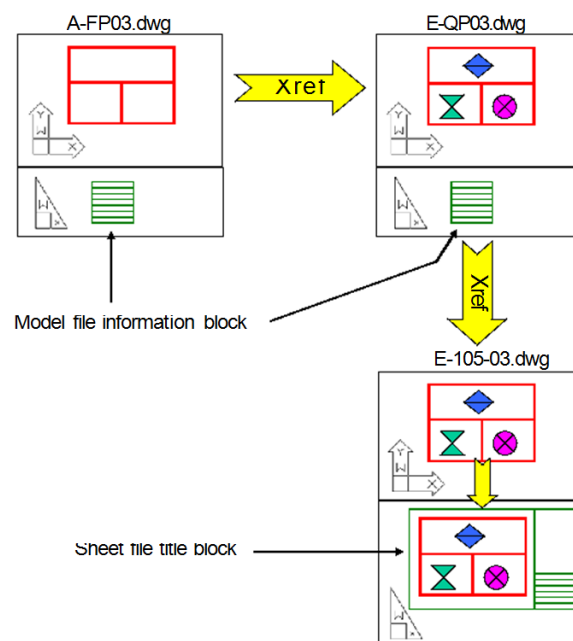
SENSITIVE BUT UNCLASSIFIED (SBU)
PROPERTY OF THE UNITED STATES GOVERNMENT
COPYING, DISSEMINATION, OR DISTRIBUTION OF THIS DOCUMENT TO UNAUTHORIZED RECIPIENTS IS
PROHIBITED
Do not remove this notice
Properly destroy or return documents when no longer needed

The previous statement must be prominently labeled in bold type in a size appropriate for the document or portable electronic data storage device or both, if applicable. The SBU markings must be used regardless of the medium through which the information appears or is conveyed. The GSA provided Sheet Templates has the SBU markings already placed on the sheet.

4. FILE NAMES AND STRUCTURES

4.1 Xref Assembly

- 4.1.1 Drawings are required to utilize xrefs and be assembled in a particular way. “Sheet file” drawings are the “complete” drawings, which are plotted, as opposed to “model file” drawings, which are xrefed into the sheet files. The xrefs, (model files), contain the drawing content, (the floor plans), drawn full size in model space.
- 4.1.2 There may be zero, one, or more model files for each sheet file. Special purpose sheets with no graphical content, such as the cover or a lighting schedule, do not require model files. Sheets with graphical content, like floor plans, require one or more model files.
- 4.1.3 Content from different disciplines may be grouped in a single model file or separated into different model files. In the case where disciplines are in separate files, drawings shall utilize a nested assembly model. A nested assembly model has a model file of one discipline xrefed into a model file of another discipline, and that is xrefed into the sheet. It is permitted have 2 or more model files xrefed directly into the same sheet when the information does not overlay. For example, the first and second floor plans could be shown in the same sheet; they would each be xrefed in from a separate model file. In cases where the content is overlaid, the model files shall be nested.
- 4.1.4 Model file(s) are xrefed into the sheet file at full size, into model space. The objects are then scaled through one (or more) paper space viewport(s), and seen in paper space at the size they will have on the printed page.
- 4.1.5 The drawing shall be plotted from paper space at a scale of 1 to 1, in the units the drawing was drawn in. For example, if the drawing is in metric, it shall be plotted from paper space at a scale of 1 drawing unit = 1 mm on paper, not 1 drawing unit = 1 inch on paper. (There may be a special type of assembly used for assignment drawings, and additional requirements will be issued if that formatting is required.)
- 4.1.6 Include the model file title block in all model files (xrefs).
- 4.1.7 Model files shall be bound.
- 4.1.8 The sheet file title block and the model file information block shall reside in paper space.
- 4.1.9 The following diagram illustrates the nested assembly model:



- 4.1.10 Xrefs shall be submitted in the same file directory as the sheet file(s) which reference them.
- 4.1.11 Xrefs shall not include a path (relative or absolute).
- 4.1.12 Xref assemblies shall not have circular references.
- 4.1.13 Xrefs shall not be nested more than 5 levels deep.
- 4.1.14 Either type of xref (attachment or overlay) may be used.
- 4.1.15 Model files shall be saved with tiled model space (TILEMODE = 1) as the current view.
Sheet files shall be saved with paper space (TILEMODE = 0 and PSPACE) as the current view, not floating model space.

4.2 Sheet File Drawing Numbers

- 4.2.1 All sheet file drawings shall be numbered using the following convention: (Also, all files names must correspond to their respective drawing numbers.)

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one or two letters	one number	two numbers
DISCIPLINE	SHEET TYPE	SEQUENCE

Table A

Discipline: shall be a one or two character discipline code from the table below that most aptly describes the work shown on the drawing. Permission must be granted by GSA before using the user defined disciplines, and they must be documented in the README.

Level 1 Discipline Codes	Code
General (including cover sheets)	G
Hazardous materials	H
Civil	C
Landscape	L
Structural	S
Architectural	A
Interiors	I
Equipment	Q
Fire Protection	F
Plumbing	P
Mechanical	M
Electrical	E
Telecommunications	T
Resource	R
Other disciplines	X
Contractor/shop drawing	Z
Survey/mapping	V
Civil work	W
Geotechnical	B
Process	D
Operations (includes facility and assignment drawing)	O (not zero)

Table B
Level 1 and 2 Discipline Codes:

Level 1	Level 2	Description	Content
A		Architectural	All or any portion of subjects included in Level 2
	AS	Architectural Site	
	AD	Architectural Demolition	Protection and removal
	AE	Architectural Elements	General Architectural
	AI	Architectural Interiors	
	AF	Architectural Finishes	
	AG	Architectural Graphics	
	AJ		User Defined
	AK		User Defined
C		Civil	All or any portion of subjects included in Level 2
	CD	Civil Demolition	Structure removal and site clearing
	CS	Civil Site	Plats, dimension control
	CG	Civil Grading	Excavation, grading, drainage, erosion control
	CP	Civil Paving	Roads, driveways, parking lots
	CI	Civil Improvements	Pavers, flagstone, exterior tile, furnishings, retaining walls, and water features
	CT	Civil Transportation	Waterways, wharves, docks, trams, railways, people movers
	CU	Civil Utilities	Water, sanitary sewer, storm sewer, power, communications, fiber optic, telephone, cable television, natural gas, and steam systems
	CJ		User Defined
	CK		User Defined
W		Civil Works	All or any portion of subjects included in Level 2
	WJ		User Defined
	WK		User Defined
Z		Contractor/Shop Drawings	All or any portion of subjects included in Level 2
	ZJ		User Defined
	ZK		User Defined
E		Electrical	All or any portion of subjects included in Level 2
	ES	Electrical Site	Utility tunnels, site lighting
	ED	Electrical Demolition	Protection, termination, and removal
	EP	Electrical Power	
	EL	Electrical Lighting	
	EI	Electrical Instrumentation	Controls, relays, instrumentation, and measurement devices
	ET	Electrical Telecommunications	Telephone, network, voice and data cables
	EY	Electrical Auxiliary Systems	Alarms, nurse call, security, CCTV , PA , music, clock, and program
	EJ		User Defined
	EK		User Defined
Q		Equipment	All or any portion of subjects included in Level 2
	QA	Athletic Equipment	Gymnasium, exercise, aquatic, and recreational
	QB	Bank Equipment	Vaults, teller units, ATMs, drive-through
	QC	Dry Cleaning Equipment	Washers, dryers, ironing, and dry cleaning
	QD	Detention Equipment	Prisons and jails
	QE	Education Equipment	Chalkboards, library
	QF	Food Service Equipment	Kitchen, bar, service, storage, and processing
	QH	Hospital Equipment	Medical, exam, and treatment
	QL	Laboratory Equipment	Science labs, planetariums, observatories
	QM	Maintenance Equipment	Housekeeping, window washing, and vehicle servicing
	QP	Parking Lot Equipment	Gates, ticket and card access
	QR	Retail Equipment	Display, vending, and cash register
	QS	Site Equipment	Bicycle racks, benches, playgrounds
	QT	Theatrical Equipment	Stage, movie, rigging systems
	QV	Video/Photographic Equipment	Television, darkroom, and studio
	QY	Security Equipment	Access control and monitoring, surveillance
	QJ		User Defined

Level 1	Level 2	Description	Content
	QK		User Defined
F		Fire Protection	All or any portion of subjects included in Level 2
	FA	Fire Detection and Alarm	
	FX	Fire Suppression	Fire extinguishing systems and equipment
	FJ		User Defined
	FK		User Defined
G		General	All or any portion of subjects included in Level 2
	GI	General Information	Drawing index, code summary, symbol legend, orientation maps
	GC	General Contract	Phasing, schedules, contractor staging areas, fencing, haul routes, erosion control, temporary and special requirements
	GR	General Resource	Photographs, soil borings
	GJ		User Defined
	GK		User Defined
B		Geotechnical	All or any portion of subjects included in Level 2
	BJ		User Defined
	BK		User Defined
H		Hazardous Materials	All or any portion of subjects included in Level 2
	HA	Asbestos	Asbestos abatement, identification or containment
	HC	Chemicals	Toxic chemicals handling, removal or storage
	HL	Lead	Lead piping or paint removal
	HP	PCB	PCB containment and removal
	HR	Refrigerants	Ozone depleting refrigerants
	HJ		User Defined
	HK		User Defined
I		Interiors	All or any portion of subjects included in Level 2
	ID	Interior Demolition	
	IN	Interior Design	
	IF	Interior Furnishings	
	IG	Interior Graphics	Murals and visuals
	IJ		User Defined
	IK		User Defined
L		Landscape	All or any portion of subjects included in Level 2
	LD	Landscape Demolition	Protection and removal of existing landscaping
	LI	Landscape Irrigation	
	LP	Landscape Planting	
	LJ		User Defined
	LK		User Defined
M		Mechanical	All or any portion of subjects included in Level 2
	MS	Mechanical Site	Utility tunnels and piping between facilities
	MD	Mechanical Demolition	Protection, termination, and removal
	MH	Mechanical HVAC	Ductwork, air devices, and equipment
	MP	Mechanical Piping	Chilled and heating water, steam
	MI	Mechanical Instrumentation	Instrumentation and controls
	MJ		User Defined
	MK		User Defined
O		Operations	All or any portion of subjects included in Level 2
	OJ		User Defined
	OK		User Defined
X		Other Disciplines	All or any portion of subjects included in Level 2
	XJ		User Defined
	XK		User Defined
P		Plumbing	All or any portion of subjects included in Level 2
	PS	Plumbing Site	Extension and connections to Civil Utilities
	PD	Plumbing Demolition	Protection, termination, and removal
	PP	Plumbing Piping	Piping, valves and insulation
	PQ	Plumbing Equipment	Pumps and tanks
	PL	Plumbing	Domestic water, sanitary and storm drainage, fixtures

Level 1	Level 2	Description	Content
	PJ		User Defined
	PK		User Defined
D		Process	All or any portion of subjects included in Level 2
	DS	Process Site	Extension and connection to civil utilities
	DD	Process Demolition	Protection, termination and removal
	DL	Process Liquids	Liquid process systems
	DG	Process Gases	Gaseous process systems
	DP	Process Piping	Piping, valves, insulation, tanks, pumps, etc.
	DQ	Process Equipment	Systems and equipment for thermal, electrical, materials handling, assembly and manufacturing, nuclear, power generation, chemical, refrigeration, and industrial processes
	DE	Process Electrical	Electrical exclusively associated with a process and not the facility
	DI	Process Instrumentation	Instrumentation, measurement, recorders, devices and controllers (electrical and mechanical)
	DJ		User Defined
	DK		User Defined
R		Resource	Data furnished without warrant as to accuracy
	RC	Resource Civil	Surveyor's information and existing civil drawings
	RS	Resource Structural	Existing facility structural drawings
	RA	Resource Architectural	Existing facility architectural drawings
	RE	Resource Electrical	Existing facility electrical drawings
	RJ		User Defined
	RK		User Defined
S		Structural	All or any portion of subjects included in Level 2
	SD	Structural Demolition	Protection and removal
	SS	Structural Site	
	SB	Structural Substructure	Foundations, piers, slabs, and retaining walls
	SF	Structural Framing	Floors and roofs
	SJ		User Defined
	SK		User Defined
V		Survey Mapping	All or any portion of subjects included in Level 2
	VA	Aerial	
	VF	Field	
	VI	Digital	
	VU	Combined Utilities	
	VJ		User Defined
	VK		User Defined
T		Telecommunications	All or any portion of subjects included in Level 2
	TA	Audio Visual	Cable, music, and CCT systems
	TC	Clock and Program	Time generators and bell program systems
	TI	Intercom	Intercom and public address systems
	TM	Monitoring	Monitoring and alarm systems
	TN	Data Networks	Network cabling and equipment
	TT	Telephone	Telephone systems, wiring, and equipment
	TY	Security	Access control and alarm systems
	TJ		User Defined
	TK		User Defined

Table C

Sheet Type: shall be a code from the table below that most aptly describes the type of drawing.

SHEET TYPE	CODE
General (cover sheets, symbols, legends, notes, etc.)	0 (zero)
Plans (horizontal views)	1
Elevations (vertical views)	2
Sections (sectional views)	3
Large Scale (plans, elevations, or sections that are not details)	4
Details	5
Schedules and Diagrams	6
User Defined	7
User Defined	8
3D Views (isometric, perspectives, photographs)	9

Drawing Sequence: shall be a two-digit number indicating the sequence of drawings within a series, 01 through 99. "00" is not valid. For drawing numbers 1 through 9, a 0 shall be the first digit.

SOME EXAMPLES:

This drawing number indicates a continuation (second sheet) of the cover sheet, perhaps for drawing legends or other general drawing information:

G	0	02
DISCIPLINE	SHEET TYPE	SEQUENCE

This drawing number indicates the twelfth drawing in a series of architectural details.

A	5	12
DISCIPLINE	SHEET TYPE	SEQUENCE

This drawing number indicates the second drawing in a series of utilities work drawings:

C	1	02
DISCIPLINE	SHEET TYPE	SEQUENCE

Table D

Floor Number

Floor Number Code	Description
01 - 99	First to 99 th floor
GF	Ground Floor
LT	Loft
M1, M2, M3...M9	Mezzanine 1, 2, 3...9
P1, P2, P3...P9	Penthouse 1, 2, 3...9 and Parking 1, 2, 3...9 If a building has both, start penthouse numbering where parking leaves off to avoid redundant file
B1, B2, B3...B9	Basement 1, 2, 3...9
L1, L2, L3...L9	Lower Level 1, 2, 3...9
R1, R2, R3...R9	Roof Level 1, 2, 3...9
SB	Sub-Basement

4.4 File Names

All drawing file names shall correspond to their respective drawing number. The file names of other file types, such as spreadsheets or specifications, shall indicate the content of the file. All file names shall be no more than 32 characters plus the dot and 3 character extensions. Supplemental CAD policies may require an alternate character instead of the hyphen. No two files in the same submission set may have the same name. File names should be upper case.

4.4.1 Drawing File Title:

All drawing files shall be titled using the following convention: (Also, all files names must correspond to their respective drawing numbers.)

BUILDING ID	PROJECT NO.	DISCIPLINE+SHEET NUMBER	FLOOR ID	FILE EXTENSION
6 Characters	8 Characters	1 or 2 Letters + 2 or 3 Characters	2 Characters	.pdf or .dwg
Ex: IL0233	Ex: RIL95025	Ex: A103	Ex: B1	Ex: .pdf

Separate each attribute of the file name with hyphens (-)

Example: IL0233-RIL95025-A103-B1.pdf

4.4.2 Other Files:

There is no specific naming convention for other file types, but make sure to include the Building ID and Project Number on the title. Include these documents within a folder titled by the Building ID and Project Number Refer to Section 6 - Project and Drawing Documentation. Examples:

- IL0233-RIL95025-README.DOC Word File
- ##%Spec01010.DOC Specification Word File
- IL0233-RIL95025-ESTIMATE.XLS Excel File
- IL0233-RIL95025-SCHEDULE.MPP Project File

4.5 Layouts

4.5.1 Suggested Layout Naming Convention: It is suggested, but not required, that layouts of sheet files be named with the drawing number. If there is a reduced size layout, it is suggested that an identifier such as "full size" or "half size" follow the drawing number. Layout names may be upper or lower case.

4.5.2 Multiple Drawings Per File: Multiple sheets within a single drawing file is prohibited except where specifically allowed by the GSA project manager.

4.5.3 Reduced Size Drawings: Separate layouts may be used for plotting different sizes of the same drawing within the same sheet file, such as half size drawings.

4.5.4 Unused Layouts: Do not leave any unused layout tabs.

5. DATA STRUCTURE

5.1 Layers

5.1.1 Layering Systems

All drawing files shall be produced using the **Layer Seed Template.dwt** file, provided by GSA. This template contains commonly used GSA layers that have been slightly modified compared against the AIA CAD Layer Guidelines: US National CAD Standard v5. You may add AIA layers by creating them manually. **NCS5_AIA_CAD_Layer_Guidelines.xls** file is included in the Policy Zip Folder.

- a. Specify which version was used in the README file.

- b. Do not use major or minor groups in conjunction with disciplines under which they are not listed. For example, E-WALL is not a valid layer name; use A-WALL.
 - c. There are non-compliant layers listed in AIA 2005; these may not be used. Page CGL-4 limits the number of characters to 19, but there are layers that exceed 19 characters, such as L-ANNO-CURV-TABL-BRDR.
- 5.1.2 Special Acceptable Layers: Layers "G-ANNO-TTLB-TEXT" and "G-ANNO-TTLB-SYMB" are acceptable as they are referenced in the title block. In addition, layers "0" and "DEFPOINTS" are acceptable since they are part of AutoCAD. Layer 0 is a special layer which can be used to draw block definition entities on. Since the AIA Layer Guidelines do not define any use for layer 0, do not place any objects on layer 0, unless required to do so by a supplemental policy document. The "DEFPOINTS" layer is automatically created by AutoCAD when dimensioning is used.
- 5.1.3 Agency Layers: The 4-digit agency/bureau code may be used as the first or second minor group in any AIA layer. These special agency layers can be used to group text, furniture, etc., associated with agencies.
- 5.1.4 Xref and Viewport Layers: Viewports shall reside on a locked layer. It is suggested, but not required, that viewports be placed on G-ANNO-NPLT. It is required, that xrefs layers are changed to layers with in the Layer Seed Template file.
- 5.1.5 Layer Lineweights: The **Layer Seed Template.dwt**'s colors, linetypes, lineweights, and other properties have been assigned, no modification is required
- 5.1.6 Layer Plot Style Names: In the case of drawings that use Named Plot Styles, only the following plot style names may be assigned to layers: Normal, 90% Screen, 80% Screen, 70% Screen, 60% Screen, 50% Screen, 40% Screen, 30% Screen, 20% Screen, 10% Screen. Normal is 100% screening, or solid.
- 5.1.7 Case: Layer names may be upper or lower case.
- 5.1.8 Custom Layers: If you would like to include custom user-defined layers, permission must be granted by GSA, and a list and description of such layers must be submitted to GSA along with the drawing submission.

5.2 Object Properties

- 5.2.1 Any color, linetype, and lineweight may be assigned to any graphical entity. They may be **BYLAYER**, but do not have to be.
- 5.2.2 In the case of drawings that use Named Plot Styles, only the following plot style names may be assigned to objects: ByLayer, ByBlock, Normal, 90% Screen, 80% Screen, 70% Screen, 60% Screen, 50% Screen, 40% Screen, 30% Screen, 20% Screen, 10% Screen. Normal is 100% screening, or solid.

5.3 Blocks

- 5.3.1 Use of Blocks: It is suggested, but not required, that any group of entities that occurs repeatedly in a drawing should be made into a block, as it is good drafting practice. But the following is required: Do not block the entire drawing or large portions of the drawing.
- 5.3.2 Block Layering: Draw objects used to create blocks on layer 0. The title block is an exception. Do not insert blocks on layer 0; insert them on the layer appropriate to their content.
- 5.3.3 Nested Blocks: Nested blocks are blocks inside other blocks. It is preferred that nested blocks not be used, but if deemed necessary, they shall be documented in the README.DOC file. Nested xrefs are permitted. Bind all xrefs to the .dwg file.
- 5.3.4 Block Insertion Points: Block insertion points shall be located on the block at an intersection, end point, or mid-point, or, for circles, at the center or a quadrant.

5.4 Dimensioning

Associative dimensioning is preferred, but not required. (In this case, “associative” means “self-correcting”, not “linked to model space objects from paper space”; that type of associative dimensioning is also permitted.)

5.5 Hatching

Hatching shall be on its own layer(s), which shall have a “**PATT**” as the first or second minor group. Do not explode hatch, as this increases file size. User-defined hatch patterns shall not be used. If user-defined are to be used, permission must be granted by GSA and the definition file must be included with the submission.

5.6 Object Linking and Embedding (OLE)

- 5.6.1 Raster images may be incorporated into drawings to display renderings, maps, logos, etc. Images may be brought in with the **IMAGEATTACH** command (which produces a link, much like and xref), or by the **INSERTOBJ** command, which can produce a linked or embedded OLE object, or by the **PASTE** command, which produces an embedded OLE object.
- 5.6.2 Linked files shall be submitted in the same file directory as the drawing(s) to which they are linked.

5.7 Internal Drawing Security

Final Drawings (100% Construction, As-Built or Record Drawings) are required to contain digital signatures. Individual drawing files are not permitted to be password protected.

5.8 Drawing Fonts

- 5.8.1 Use only Font style of Standard and the Romans.shx AutoCAD font.
- 5.8.2 The minimum plotted text size for all full size drawings shall be 1/8". The text style standard will be included in the **Layer Seed Template.dwt** file.

5.9 Drawing Variables

Drawing variables shall be set as follows:

- GRIDMODE shall be set to 0
- SNAPMODE shall be set to 0
- PDMODE shall be set to 0
- PDSIZE shall be set to 0
- QTEXTMODE shall be set to 0
- ATTMODE shall be set to 1
- PSTYLEMODE shall be set to 1 if the drawing is to be plotted with CTB plot styles; PSTYLEMODE shall be set to 0 if the drawing is to be plotted with STB plot styles.
- For metric drawings, set LUNITS to 2. For imperial drawings, set LUNITS to 4.
- ISAVEPERCENT shall be set to 0; (this is a system variable, and is only set once per installation)

Note: PSTYLEMODE indicates whether a drawing plots in a color-dependent mode using CTB plot styles, or in a named plot style mode using STB plot styles. This variable cannot be changed directly. To change PSTYLEMODE from 0 to 1, use the CONVERTPSTYLES command. To change PSTYLEMODE from 1 to 0, use the CONVERTCTB command, then the CONVERTPSTYLES command.

5.10 Plotting Parameters

Submitted hard copies are not required to be plotted from AutoCAD, but the electronic drawings are required to be able to accurately reproduce those hard copies when plotted from AutoCAD using HDI drivers. It is not required that electronic drawings display seals or signatures shown on the hard copy drawings.

5.11 Efficiency and Usability

5.12.1 Internal Errors: Audit the drawings to ensure that there are no internal errors.

5.12.2 Purge the drawings of unused block definitions, layers, linetypes, etc. (except for special layers which may be required for assignment drawings in supplemental CAD policies) to keep file size to a minimum.

5.12.3 Remove any extraneous data outside the drawing extents to keep file size to a minimum. (This does not include entities created to position the title block on the paper.)

5.12.4 3-dimensional objects are permitted, but confine all objects to the Z=0 plane unless 3 dimensional drawings are specifically required by GSA. 3-dimensional drawings can cause incorrect distance measurements, due to the difference in elevation, which the person measuring may not be aware of, and can also make the drawing unnecessarily large.

5.12.5 Purging Non-Native Entities

Non-native objects cause proxy errors in AutoCAD and other CAD clients. Drawings that contain non-native entities are not permitted, because they cause errors, usually don't display properly, and usually can't be edited. They can be purged by different methods, depending on the client used. Some of these methods are listed below. These methods will not necessarily work on all types of non-natives. Note that these methods may strip out a substantial amount of encoded information, including but not limited to: groups, embedded ADE information, certain dictionaries, etc. GSA is not responsible for the safety or effectiveness of these procedures. Back up the files and consult the documentation before attempting these procedures, as they may produce undesirable results. After using any of these procedures: Check to make sure that the drawing still looks the same; graphical non-native entities may be missing entirely. If this happens, the procedure should be repeated after those entities are exploded, or if AutoCAD will not allow that, redrawn using native AutoCAD entities, or "primitives".

5.12.6 Programs: Approval is required from the GSA project manager to embed macros in DWGs or submit DVB or LSP files.

5.13 Sheet Set Files

Sheet Set Files (DSTs) are permitted, but all drawings referenced in each sheet set file must reside in the same directory as the sheet set file, to ensure the viability of the references when the files are transmitted. If the drawings were associated with a sheet set, either the sheet set must be included with the submission, or the association to the sheet set must be purged from each drawing prior to submission, to avoid the lost set association error. To remove the association, open the drawing in the absence of the sheet set file, and select remove on the **Lost Set Association** dialog, and save.

5.14 Fields

Fields are permitted. Also, fields may be embedded inside the attribute values of the title block. If fields are used, all DWGs must be saved prior to submission, so that all current field values are cached inside the drawing files, to ensure that pre-r2005 viewers can read the current field values, and to ensure that the current field values can be read in the absence of the sheet set file. The **Resave All Sheets** command in the sheet set manager provides a convenient method for doing this.

6. PROJECT AND DRAWING DOCUMENTATION

6.1 General

At the Contracting Officer's discretion, a submission containing one or more drawing files that do not meet the standard may be rejected. Note: Specifications shall be the current version of CSI MasterFormat at the time of contract award.

6.2 README.DOC and Drawing List.xlsx Files

Every submission of electronic drawings shall include a README.DOC and a Drawing List.xlsx, which shall be readable by MS Word and MS Excel.

The Drawing List.xlsx file includes the drawing set index and all of the drawing's attributes, which is used to tag the drawing with metadata once it is stored in GSA's file management system.

The README.DOC file shall include the following documentation:

- Project Documentation and Drawing Form (appendix at the end of this document)

Other documentation that must be included (if applicable) in the README.DOC file:

- Any deviations from this policy that were approved by GSA. This includes nonstandard fonts, user-defined hatch patterns, nonstandard plot styles, etc.
- List any user-defined layers
- List any user-defined codes in drawing file names
- Any third party software used to create the files
- Other Project Files: List all non-DWG files that are part of the submission. Such files include:
 - Specifications
 - Cost Estimates
 - Project Schedules
 - Photographs
 - BIM model

6.3 Drawing Audit Checklist

For convenience, a checklist of items to verify before submission is provided:

- Ensure Region 5 provided title blocks / information blocks are in all sheet and model files
- AUDIT the drawing to ensure it is free of internal errors
- PURGE drawing of unused blocks, layers, linetypes, etc. (except for special layers which may be required for assignment drawings in supplemental CAD policies)
- Delete any extraneous objects outside the title block unless they are there to position the title block on the paper.
- Nothing is on layer 0 unless it is required to be.
- Delete any unused layout tabs.
- Bind all xrefs.
- Delete any xref paths.
- GRIDMODE shall be set to 0
- SNAPMODE shall be set to 0
- PDMODE shall be set to 0
- PDSIZE shall be set to 0
- QTEXTMODE shall be set to 0
- ATTMODE shall be set to 1
- PSTYLEMODE shall be set to 1 if the drawing is to be plotted with CTB plot styles; PSTYLEMODE shall be set to 0 if the drawing is to be plotted with STB plot styles
- For metric drawings, set LUNITS to 2. For imperial drawings, set LUNITS to 4.
- ISAVEPERCENT shall be set to 0; (this is a system variable, and is only set once)
- Set the current space of model files to tiled model space, and current space of sheet files to paper space
- ZOOM to EXTENTS and save drawing

- If deviations are approved by GSA, include all drawing reference files, such as nonstandard fonts, user-defined hatch patterns, nonstandard plot styles, etc. AutoCAD has commands (which vary from release to release) which assist in identifying and collecting reference files. It is not necessary to include fonts which are listed in this policy, plot styles which are listed in this policy, or standard hatch patterns, etc.
- Create a README.DOC
- Scan all media using current virus scanning software prior to submission

6.4 Drawing Standard Check with .DWS file

Provided in the policy package, GSA has shared the **GSA R5 STANDARDS.dws** file that can be uploaded to a drawing which will review Layers, Fonts, DIM style compliance. This feature can also correct the errors encountered. Through the AutoCAD's menu bar option **Tools**, you can select the **CAD Standards** tool, to **Check** for potential discrepancy from the required R5 CAD Deliverables Policy. You will be prompted to upload the **GSA R5 STANDARDS.dws** to be used as the basis for these criteria. Before submitting drawings to GSA, it is required that contractors run this file through their drawings for compliance of GSA standards.

6.5 NCS Statement of Substantial Conformance

Every submission of electronic drawings shall include the US National CAD Standard v5 requirement to provide a Statement of Substantial Conformance. **Statement of Substantial Compliance.pdf** is provided for your convenience.