



**Region 3
CAD
DELIVERABLES
POLICY**

October 1, 2010

**U.S. General Services Administration
Mid-Atlantic Region**

Public Buildings Service
The Strawbridge Building
20 North 8th Street
Philadelphia, PA 19107-3191

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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 Mid-Atlantic 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/midatlanticcadpolicy>

The US National CAD Standard, which contains the AIA CAD Layer Guidelines, is published by the National Institute of Building Sciences.

<http://www.buildingsmartalliance.org/index.php/ncs>

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 AutoCAD Release 2010, and shall be DWG files, not DXF, DWF, etc. Release 14 format and previous formats are not permitted. 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.

2.3 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.
- PLT - must be HP-GL/2 format
- 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

Follow the GSA Metric Design Guide (PBS PQ260) for all projects subject to PBS P100, which is primarily design and construction. 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 files, 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 A through F size title blocks in 2 unit systems and 2 orientations, and model file information blocks. For convenience, each contains a title block already inserted in the required location. Each sheet file also contains a viewport, and the following paper space layout settings were set: paper size, plot units, scale, plot area, plot offset, plot options.

TITLE BLOCK OPTIONS

Sheet System/ Size	Orientation	Metric			Imperial		
		Sheet Size	Printable Area	File Name	Sheet Size	Printable Area	File Name
ANSI A	Horiz	216 X 279	203.2 X 266.7	H-A-metric	8.5 X 11	8 X 10.5	H-A-imperial
	Vert			-			-
ANSI B	Horiz	279 X 432	266.7 X 393.7	H-B-metric	11 X 17	10.5 X 15.5	H-B-imperial
	Vert			V-B-metric			V-B-imperial
Arch C	Horiz	457 X 610	419.1 X 596.9	H-C-metric	18 X 24	16.5 X 23.5	H-C-imperial
	Vert			V-C-metric			V-C-imperial
Arch D	Horiz	610 X 914	571.5 X 889	H-D-metric	24 X 36	22.5 X 35	H-D-imperial
	Vert			V-D-metric			V-D-imperial
Arch E	Horiz	914 X 1219	889 X 1168.4	H-E-metric	36 X 48	35 X 46	H-E-imperial
	Vert			V-E-metric			V-E-imperial
Arch F	Horiz	762 X 1067	723.9 X 1016	H-F-metric	30 X 42	28.5 X 40	H-F-imperial
	Vert			V-F-metric			V-F-imperial
model	N/A	N/A	N/A	model-metric	N/A	N/A	model-imperial

Printable area was taken from the AutoCAD default. Most printers have a larger printable area, but this was used as a "safe" minimum. The horizontal A size sheet may be used for the convenience of printing a small drawing on a letter-size printer. The A size sheet may only be used for "information only" drawings, e.g. sketches. The A size sheet may not be used for official drawing submissions.

3.5.2 To Set Up a Model File Template

- Open the GSA provided model file title block with the units desired.
- Use the **DDATTE** command to edit the attributes of the information block located in paper space. Fill in the project level information; leave the drawing level information blank.
- Set up any conventions common to all model files, such as layers, layer properties, text styles, etc. You can use the seed layer templates provided by simply inserting one or more of them, and/or manually enter any additional valid AIA layers.
- Save the template as a DWG or DWT. There is no naming convention for this, as it is not a deliverable.

3.5.3 To Set Up a Sheet File Template

- Open the GSA provided title block with the units, size & orientation desired.
- Use the **DDATTE** command to edit the attributes of the title block located in paper space. Fill in the project level information; leave the drawing level information blank.
- Set up any conventions common to all sheet files, such as layers, layer properties, text styles, etc. These would typically be layers and text styles for titles and notes.
- Save the template as a DWG or DWT. There is no naming convention for this, as it is not a deliverable.

3.5.4 To Begin Drafting a Model File

- Open the template model file with the project level information filled in.
- Save the model file as a DWG according to the model file naming convention.
- Use the **DDATTE** command to edit the attributes of the information block located in paper space. Fill in the drawing level information.
- Create additional layers needed for this drawing. You can use the seed layer templates provided by simply inserting the drawing, and/or manually enter any additional valid AIA layers.

- e. Switch to model space and draft content.

3.5.5 To Begin Drafting a Sheet File

- a. Open the template sheet file with the project level information filled in.
- b. Save the sheet file as a DWG according to the sheet file naming convention.
- c. Use the **DDATTE** command to edit the attributes of the title block located in paper space. Fill in the drawing level information.
- d. Create any additional layers needed for this drawing.
- e. Switch to model space and xref in the appropriate model file. If this sheet is for tabular information, symbology, etc, the content may be drafted in model space or paper space, or xrefed in from a model file.
- f. If there is model space content, configure the paper space viewport(s).
- g. Add titles, notes, etc.

Note: The A size title block does not contain a blocked title block; fill in the blanks with regular text.

3.5.6 Layer Seed Drawings

Layer seed drawings have been provided for each major discipline. They contain commonly used AIA layers. You may add AIA layers by inserting any of the layer seed drawings provided, or by creating them manually. Assign colors, linetypes, lineweights, and other properties as appropriate. The following is a list of GSA provided layer seed drawings and a brief description:

layer seed arch.dwg	Architectural drawing layers
layer seed civil.dwg	Civil & Landscape drawing layers
layer seed fire.dwg	Fire protection drawing layers
layer seed interior.dwg	Interior drawing layers
layer seed mech.dwg	Mechanical drawing layers
layer seed plumb.dwg	Plumbing drawing layers
layer seed struc.dwg	Structural drawing layers
layer seed t&e.dwg	Telecommunications & Electrical layers

3.5.7 GSA Provided Cover Sheets

The following is a list of the GSA provided cover sheet drawings.

H-covr-imperial.dwg	Horizontal imperial size cover sheet drawing
H-covr-metric.dwg	Horizontal metric size cover sheet drawing
V-covr-imperial.dwg	Vertical imperial size cover sheet drawing
V-covr-metric.dwg	Vertical metric size cover sheet drawing

Insert the appropriate horizontal or vertical cover sheet drawing into a sheet file which is to serve as the cover sheet.

These are sized for E size drawings. If you are not using E size sheets, it will be necessary to scale the cover sheet to the size of the title block. When you scale the cover sheet you should use the **REFERENCE** function within the **SCALE** command to ensure that it fits properly.

3.5.8 General Title block Requirements

These requirements apply to both sheet file title blocks and model file title blocks unless otherwise noted.

- a. Each sheet file shall contain a sheet file title block in paper space.
- b. Each xref (model file) shall contain a model file information block. It shall be thawed and reside in paper space.
- c. The title block may not be submitted exploded.
- d. The block name may not be changed.
- e. The sheet file title block may not be scaled; they are sized to fit standard paper sizes.
- f. The title block may not be nested within another block or brought in as an xref.
- g. None of the attributes may be deleted or the tags renamed.
- h. The title block may not be moved to a different layer.
- i. Each drawing file may contain no more than one block insert called title block.
- j. Older versions of the Region 3 title blocks are not acceptable under this policy.
- k. The cover sheet drawing may not be xrefed in.
- l. The viewport may be deleted or altered.
- m. All viewports' display locked property shall be set to ON / YES.
- n. Viewports shall reside on a locked layer.

3.5.9 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", or the building's address. Use a descriptive name, such as "Clarkson S Fisher Courthouse".
- 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. For convenience, the title blocks provided have a field inserted to automatically fill in the file name. If using a CAD client which does not support fields, it is not required that the field be submitted; it can be submitted as plain attribute text.
- g. Do not enter values that extend beyond the edge of the title block area.

3.5.10 CAD File Information

A box on the title blocks has been created for CAD File Information; it is located next to, or below the KEY PLAN box. This box shall contain the following if they apply:

- a. The names of any xrefs used in the drawing (including nested xrefs).
- b. A list of multiple-drawings per file if the drawing file contains more than one.
- c. Any miscellaneous information necessary for GSA (drawing content information shall not be listed here).

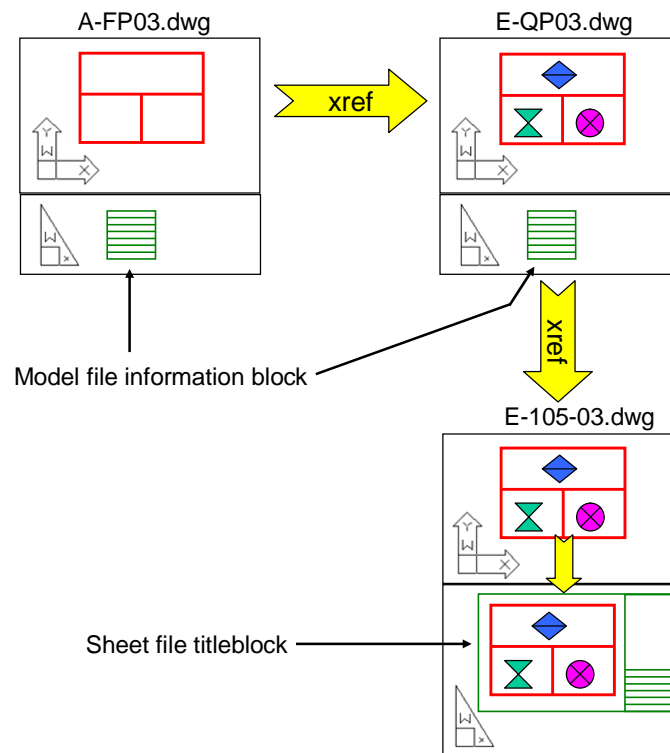
4. FILE NAMES AND STRUCTURES

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 may not be bound unless this deviation is approved by the GSA project manager, as this would destroy the required assembly model.
- 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

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

- -	-	- -
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

4.3 Model File Drawing Numbers

Model file names are comprised of a one character discipline code, followed by a two-letter drawing type, followed by a two-character floor code (if applicable). Note that model files do not use level 2 discipline designators, as sheet files do. A floor number code is not required if it is not applicable, as with a detail drawing or door schedule, for example. If a drawing shows multiple floors, leave the floor number blank.

-	- -	- -
one letter	two letters	two numbers
DISCIPLINE	DRAWING TYPE	FLOOR NO

A	FP	B1
DISCIPLINE	DRAWING TYPE	FLOOR NO

Discipline Code - Same as Level 1 Discipline Codes (see Table A) for sheet files

Table D

Drawing Type Codes – Apply to all disciplines

*-FP	Floor Plan
*-SP	Site Plan
*-DP	Demolition Plan
*-QP	Equipment Plan
*-XP	Existing Plan
*-RO	Roof plan
*-EL	Elevation
*-SC	Section
*-DT	Detail
*-SH	Schedule
*-3D	Isometric/3D
*-DG	Diagrams

Table E

Drawing Type Code - Specific to Particular Disciplines

Architectural

A-EP	Enlarged Plans
A-CP	Ceiling Plans
A-RP	Furniture Plans
A-NP	Finish Plans

Interiors

I-EP	Enlarged Plans
I-CP	Ceiling Plans
I-RP	Furniture Plans
I-NP	Finish Plans

Structural

S-FP	Framing Plans
S-NP	Foundation Plans

Mechanical

M-HP	HVAC Ductwork Plans
M-PP	Piping Plans
M-CP	Control Plans

Plumbing

P-PP	Plumbing Plans
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Fire Protection

F-KP	Sprinkler Plan
*-VP	Evacuation Plan

Electrical

E-LP	Lighting
E-PP	Power

E-GP	Grounding
E-CP	Communication

Telecommunications

T-TP	Telephone
T-DP	Data

Civil

C-RP	Roads/TOPO
C-GP	Grading
C-UP	Utility
C-EP	Environmental
C-SV	Survey

Table F
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 names
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 extension. 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 may be upper or lower case.

4.4.1 SHEET FILE NAMES:

Sheet file names shall follow this convention:

U-WXX-YY-ZZZ.DWG or UVWXX-YY-ZZZ.DWG

- U = Level 1 Discipline Code (see [Table A](#))
- or V = Hyphen* or Level 2 Discipline Code (see [Table B](#))
- W = Sheet Type Code (see [Table C](#))
- XX = Drawing Sequence (01-99)
- = Hyphen* (if anything else is to follow)
- YY = Floor Number (if applicable) (see [Table F](#))
- = Hyphen* (if anything else is to follow)
- ZZZ = User Defined Code (optional; may be more than 3 characters)

i.e. Submission Phase, Revision No., etc

*Supplemental CAD policies may require an alternate character instead of the hyphen.
A floor number code is not required if it is not applicable, as with a detail drawing, for example. If there is no floor number, but there is a user defined code, 2 hyphens shall follow the sequence number, then the user defined code.

Examples:

G-002--90.DWG	Cover sheet, 2 nd sheet, 90% submission
A-512-04-R1.DWG	First revision of 12 th Architectural details drawing of the 4 th floor
AD101-B1.DWG	Architectural Demolition Plan of the basement
AF508--R2	Second revision of the 8 th Architectural Finish Details drawing, not specific to any floor

4.4.2 MODEL FILE NAMES:

Model file names shall follow this convention:

W-XXYY-ZZZ.DWG

W	=	Level 1 Discipline Code (see Table A) (no level 2!)
-	=	Second character must be a hyphen*
XX	=	Drawing Type Code (see Table D or Table E)
YY	=	Floor Number (see Table F)
-	=	Hyphen* (if anything else is to follow)
ZZZ	=	User Defined Code (optional; may be more than 3 characters)

For example, A-FP01 would be the architectural, first floor plan. A floor number code is not required if it is not applicable, as with a detail drawing, for example.

*Supplemental CAD policies may require an alternate character instead of the hyphen.

4.4.3 OTHER FILES:

There is no specific naming convention for other file types. Refer to Section 6 - Project and Drawing Documentation. Examples:

- README.DOC Word File
- 01010.DOC Specification Word File
- ESTIMATE.XLS Excel File
- 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

a.

All drawing files shall be produced using the long form layering conventions. The most recent version is preferred, but the other versions are acceptable.

©2007 AIA CAD Layer Guidelines is a component of the US National CAD Standard v4
AIA_CADLayerGuidelines.xls is provided for your convenience.

©2005 AIA CAD Layer Guidelines is a component of the US National CAD Standard v3

©2001 AIA CAD Layer Guidelines is a component of the US National CAD Standard v2

©1997 AIA CAD Layer Guidelines is a component of the US National CAD Standard v1

b. Specify which version was used in the README file.

c. Mixing layers from different AIA layering standards is not permitted.

d. 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.

e. 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 suggested, but not required, that xrefs be placed on any REFR layer, such as G-ANNO-REFR. If using AIA 1997, REFR will be an acceptable first or second minor group for any layer. Supplemental policies may require different layers for xrefs.

5.1.5 **Layer Lineweights:** Every layer shall have an assigned lineweight, not "default". Any lineweight, any linetype, and any color may be assigned to any layer, unless prescribed by a supplemental standard.

5.1.6 **Layer Plot Style Names:** In the case of drawings that use Named Plot Styles, only the following plot style names (as defined in the standard GSA plot styles) 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 (as defined in the standard GSA plot styles) 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.
- 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

Drawings are permitted to contain digital signatures, but they are not required. Individual drawing files are not permitted to be password protected.

5.8 Drawing Fonts

- 5.8.1 Drawings shall reference only SHX fonts or TTF (True Type / Open Type) fonts on the list below. If fonts other than those listed below are to be used, permission must be granted by GSA and the font file must be included with the submission.

- 5.8.2 If there is a special non-standard font that is part of a logo or some other small amount of text, there is a workaround for including it. The text can be exploded to native entities with the TXTEXP command, if that command is available in the software used.
- 5.8.3 Plotted text must be legible at one-half the scale of the original drawing scale.

font name	font definition files
AcadEref	AcadEref.TTF
AcadEref.shx	AcadEref.shx
aehalf.shx	aehalf.shx
Agency FB	AGENCYR.TTF, AGENCYB.TTF
AIGDT	AIGDT_..TTF
Algerian	ALGER.TTF
AMDTSymbols	AMDT_Symbols.TTF
AMDTSymbols.shx	AMDTSymbols.shx
AMGDT	AMGDT_..TTF
amgdt.shx	amgdt.shx
amgdtans.shx	amgdtans.shx
Arial	arial.ttf, arialbd.ttf, arialbi.ttf, ariali.ttf
Arial Black	ariblk.ttf, ARBLI_..TTF
Arial Narrow	ARIALN.TTF, ARIALNB.TTF, ARIALNBI.TTF, ARIALNI.TTF
Arial Rounded MT Bold	ARLRDBD.TTF
Arial Unicode MS	ARIALUNI.TTF
Bakerville Old Face	BASKVILL.TTF
BankGothic Light BT	bgothl.ttf
BankGothic Medium BT	bgothm.ttf
Batang	BATANG.TTF
Bauhaus 93	BAUHS93.TTF
Bell MT	BELL.TTF, BELLB.TTF, BELLI.TTF
Berlin Sans FB	BRLNSR.TTF, BRLNSB.TTF
Berlin Sans FB Demi Bold	BRLNSDB.TTF
Bernard MT Condensed	BERNHC.TTF
Blackadder ITC	ITCBLKAD.TTF
Bodoni MT	BOD_R.TTF, BOD_I.TTF, BOD_B.TTF
Bodoni MT Black	BOD_BLAR.TTF, BOD_BLAI.TTF
Bodoni MT Condensed	BOD_CR.TTF, BOD_CB.TTF, BOD_CBI.TTF, BOD_CI.TTF, BOD_BI.TTF
Bodoni MT Poster Compressed	BOD_PSTC.TTF
bold.shx	bold.shx
Book Antiqua	BKANT.TTF, ANTQUAB.TTF, ANTQUABI.TTF, ANTQUAI.TTF
Bookman Old Style	BOOKOS.TTF, BOOKOSB.TTF, BOOKOSBI.TTF, BOOKOSI.TTF
Bookshelf Symbol 7	BSSYM7.TTF
Bradley Hand ITC	BRADHITC.TTF
Britannic Bold	BRITANIC.TTF
Broadway	BROADW.TTF
Brush Script MT Italic	BRUSHSCI.TTF
Californian FB	CALIFR.TTF, CALIFB.TTF, CALIFI.TTF
Calisto MT	CALIST.TTF, CALISTB.TTF, CALISTBI.TTF, CALISTI.TTF
Castellar	CASTELAR.TTF
Cdm.shx	Cdm.shx
CDM_NC.SHX	CDM_NC.SHX
Centaur	CENTAUR.TTF
Century	CENTURY.TTF
Century Gothic	GOTHIC.TTF, GOTHICB.TTF, GOTHICBI.TTF, GOTHICI.TTF
Century Schoolbook	CENSCBK.TTF, SCHLBKB.TTF, SCHLBKBI.TTF, SCHLBKI.TTF
Chiller	CHILLER.TTF
CityBlueprint	cityb_..ttf
Colonna MT	COLONNA.TTF

Comic Sans MS	comic.ttf, comicbd.ttf
Commercial Pi BT	compi.ttf
Commercial Script BT	comsc.ttf
complex.shx	complex.shx
Copper Black	COOPBL.TTF
Copperplate Gothic Bold	COPRGTB.TTF
Copperplate Gothic Bold Light	COPRGTL.TTF
CountryBlueprint	counb____.ttf
Courier New	cour.ttf, courbd.ttf, courbi.ttf, couri.ttf
Curlz MT	CURLZ____.TTF
dim.shx	dim.shx
Dutch 801 Extra Bold BT	dutcheb.ttf
Dutch 801 Roman BT	dutch.ttf, dutchi.ttf, dutchbi.ttf, dutchb.ttf
Edwardian Script ITC	ITCEDSCR.TTF
Elephant	ELEPHNT.TTF, ELEPHNTI.TTF
Engravers MT	ENGR.TTF
Eras Bold ITC	ERASBD.TTF
Eras Demi ITC	ERASDEMI.TTF
Eras LightITC	ERASLGHT.TTF
Eras Medium ITC	ERASMD.TTF
Estrangelo Edessa	estre.ttf
EuroRoman	eur____.ttf, euro____.ttf
exthalf2.shx	exthalf2.shx
extslim2.shx	extslim2.shx
Felix Titling	FELIXTI.TTF
Footlight MT Light	FTLTLT.TTF
Forte	FORTE.TTF
Franklin Gothic Book	FRABK.TTF, FRABKIT.TTF
Franklin Gothic Demi	FRADM.TTF, FRADMIT.TTF
Franklin Gothic Demi Cond	FRADMCN.TTF
Franklin Gothic Heavy	FRAHV.TTF, FRAHVIT.TTF
Franklin Gothic Medium	framd.ttf, framdit.ttf
Franklin Gothic Medium Cond	FRAMDCN.TTF
Freestyle Script	FREESCPT.TTF
French Script MT	FRSCRIPT.TTF
g12f13.shx	g12f13.shx
g13f12d.shx	g13f12d.shx
g13f12w.shx	g13f12w.shx
Garamond	GARA.TTF, GARABD.TTF, GARAIT.TTF
Gautami	gautami.ttf
gbeitc.shx	gbeitc.shx
gbenor.shx	gbenor.shx
gdt.shx	gdt.shx
GENISO.SHX	GENISO.SHX
geniso12.shx	geniso12.shx
GENLTSHP.SHX	GENLTSHP.SHX
GENPRESE.SHX	GENPRESE.SHX
Georgia	georgia.ttf, georgiab.ttf, georgiaz.ttf, georgiai.ttf
Gigi	GIGI.TTF
Gill Sans MT	GIL____.TTF, GILB____.TTF, GILBI____.TTF, GILI____.TTF
Gill Sans MT Condensed	GILC____.TTF
Gill Sans MT Ext Condensed Bold	GLSNECB.TTF
Gill Sans Ultra Bold	GILSANUB.TTF
Gill Sans Ultra Bold Condensed	GILLUBCD.TTF
Gloucester MT Extra Condensed	GLECB.TTF
gothice.shx	gothice.shx
gothicg.shx	gothicg.shx

gothici.shx	gothici.shx
Goudy Old Style	GOUDOS.TTF, GOUDOSB.TTF, GOUDOSI.TTF
Goudy Stout	GOUDYSTO.TTF
greekc.shx	greekc.shx
greekc.shx	greekc.shx
Haettenschweiler	HATTEN.TTF
hand1.shx	hand1.shx
Harlow Solid Italic Italic	HARLOWSI.TTF
Harrington	HARNGTON.TTF
High Tower Text	HTOWERT.TTF, HTOWERTI.TTF
iges1001.shx	iges1001.shx
iges1002.shx	iges1002.shx
iges1003.shx	iges1003.shx
Impact	impact.ttf
Imprint MT Shadow	IMPRISHA.TTF
Informal Roman	INFROMAN.TTF
ISO.SHX	ISO.SHX
isocp.shx	isocp.shx
isocp2.shx	isocp2.shx
isocp3.shx	isocp3.shx
ISOCPEUR	isocpeur.ttf, isocpeui.ttf
isocp.shx	isocp.shx
isocp2.shx	isocp2.shx
isocp3.shx	isocp3.shx
ISOCTEUR	isocteur.ttf, isocteuui.ttf
italic.shx	italic.shx
ITALIC8.SHX	ITALIC8.SHX
italicc.shx	italicc.shx
italict.shx	italict.shx
Jokeman	JOKERMAN.TTF
Juice ITC	JUICE __.TTF
Kristen ITC	ITCKRIST.TTF
Kunstler Script	KUNSTLER.TTF
Latha	latha.ttf
Lucida Bright	LBRITE.TTF, LBRITED.TTF, LBRITEDI.TTF, LBRITEI.TTF
Lucida Calligraphy Italic	LCALLIG.TTF
Lucida Console	lucon.ttf
Lucida Fax Regular	LFAX.TTF, LFAXD.TTF, LFAXDI.TTF, LFAXI.TTF
Lucida Handwriting Italic	LHANDW.TTF
Lucida Sans Regular	LSANS.TTF, LSANSI.TTF, LSANSDI.TTF, LSANSI.TTF
Lucida Sans Typewriter Regular	LTYPE.TTF, LTYPEB.TTF, LTYPEBO.TTF, LTYPEO.TTF
Lucida Sans Unicode	l_10646.ttf
Magneto Bold	MAGNETOB.TTF
Maiandra GD	MAIAN.TTF
Mangal	mangal.ttf
Matura MT Scrupt Capitals	MATURASC.TTF
Microsoft Sans Serif	micross.ttf
Mistral	MISTRAL.TTF
Modern No. 20	MOD20.TTF
Monospace 821 BT	monos.ttf, monosb.ttf, monosbi.ttf, monosi.ttf
monotxt.shx	monotxt.shx
MONOTXT8.SHX	MONOTXT8.SHX
Monotype Corsiva	MTCORSVA.TTF
MS Mincho	MSMINCHO.TTF
MS Reference Sans Serif	REFSAN.TTF
MS Reference Specialty	REFSPCL.TTF
MT Extra	mtextra.ttf

Mv Boli	mvboli.ttf
Myriad Condensed Web	myriadc.ttf, myriadci.ttf
Myriad Web	myriad.ttf, myriadb.ttf, myriadi.ttf
Niagara Engraved	NIAGENG.TTF
Niagara Solid	NIAGSOL.TTF
OCR A Extended	OCRAEXT.TTF
Old English Text MT	OLDENGL.TTF
Onyx	ONYX.TTF
Palace Script MT	PALSCRI.TTF
Palatino Linotype	pala.ttf, palab.ttf, palabi.ttf, palai.ttf
PanRoman	panroman.ttf
Papyrus	PAPYRUS.TTF
Parchment	PARCHM.TTF
Perpetua	PER____.TTF, PERB____.TTF, PERBI____.TTF, PERI____.TTF
Perpetua Titling MT Light	PERTILI.TTF, PERTIBD.TTF
Playbill	PLAYBILL.TTF
PmingLiU	PMINGLIU.TTF
Poor Richard	POORICH.TTF
Pristina	PRISTINA.TTF
Raavi	raavi.ttf
Rage Italic	RAGE.TTF
Ravie	RAVIE.TTF
Rockwell	ROCK.TTF, ROCKB.TTF, ROCKBI.TTF, ROCKI.TTF
Rockwell Condensed	ROCC____.TTF, ROCCB____.TTF
Rockwell Extra Bold	ROCKEB.TTF
romanc.shx	romanc.shx
romand.shx	romand.shx
romans.shx	romans.shx
romant.shx	romant.shx
Romantic	romantic.ttf, romab____.ttf, romai____.ttf
SansSerif	sanss____.ttf, sanssb____.ttf, sanssbo____.ttf, sansso____.ttf
Script MT Bold	SCRIPTBL.TTF
scriptc.shx	scriptc.shx
scripts.shx	scripts.shx
Showcard Gothic	SHOWG.TTF
Shruti	shruti.ttf
Simplex.shx	simplex.shx
SIMPLEX8.SHX	SIMPLEX8.SHX
SimSun	SIMSUN.TTF
Snap ITC	SNAP____.TTF
spec_bar.shx	spec_bar.shx
spec_sl.shx	spec_sl.shx
Stencil	STENCIL.TTF
Stylus BT	stylu.ttf
SuperFrench	supef____.ttf
Swiss 721 Black BT	swissk.ttf, swisski.ttf
Swiss 721 Black Condensed BT	swissck.ttf, swisscki.ttf
Swiss 721 Black Extended BT	swissek.ttf
Swiss 721 Black Outline BT	swissko.ttf
Swiss 721 Bold Condensed Outline BT	swisscbo.ttf
Swiss 721 Bold Outline BT	swissbo.ttf
Swiss 721 BT	swiss.ttf, swissb.ttf, swissi.ttf, swissbi.ttf
Swiss 721 Condensed BT	swissc.ttf, swissci.ttf, swisscbi.ttf, swisscb.ttf
Swiss 721 Extended BT	swisse.ttf, swisseb.ttf
Swiss 721 Light BT	swissl.ttf, swissli.ttf
Swiss 721 Light Condensed BT	swisscl.ttf, swisscli.ttf

Swiss 721 Light Extended BT	swissel.ttf
syastro.shx	syastro.shx
Sylfaen	sylfaen.ttf
symap.shx	symap.shx
symath.shx	symath.shx
Symbol	symbol.ttf
symeteo.shx	symeteo.shx
symusic.shx	symusic.shx
Tahoma	Tahoma.ttf, tahomabd.ttf
Technic	technic_.ttf
TechnicBold	techb_.ttf
TechnicLight	techl_.ttf
Tempus Sans ITC	TEMPSITC.TTF
Times New Roman	times.ttf, timesbd.ttf, timesbi.ttf, timesi.ttf
times.shx	times.shx
timesout.shx	timesout.shx
Trebuchet MS	trebuc.ttf, trebucbd.ttf, trebucbi.ttf, trebucit.ttf
Tunga	tunga.ttf
Tw Cen MT	TCMI____.TTF, TCB____.TTF, TCBI____.TTF, TCM____.TTF
Tw Cen MT Condensed	TCCM____.TTF, TCCB____.TTF
Tw Cen MT Condensed Extra Bold	TCCEB.TTF
txt.shx	txt.shx
Universal Math 1 BT	umath.ttf
Verdana	verdana.ttf, verdanab.ttf, verdanaz.ttf, verdanai.ttf
Viner Hand ITC	VINERITC.TTF
Vineta	vinet.ttf
Vivaldi Italic	VIVALDII.TTF
Vladimir Script	VLADIMIR.TTF
Webdings	webdings.ttf
Wide Latin	LATINWD.TTF
WingDings	wingding.ttf
Wingdings 2	WINGDNG2.TTF
Wingdings 3	WINGDNG3.TTF

Big fonts are extended character sets that can be assigned to supplement SHX fonts. Only the following big fonts may be used:

bigfont.shx
chineset.shx
extfont.shx
extfont2.shx
gbcbig.shx
special.shx
spec_bar.shx
spec_sl.shx
whgdtxt.shx
whgtxt.shx
whtgtxt.shx
whtmtxt.shx

5.9 Fonts for Other Software

Other types of documents shall contain only the TTF (True Type / Open Type) fonts listed above. In addition, Monotype Grotesque 1 (aka Grotesque MT - the official GSA font) may be used.

5.10 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. GSA's STB styles allow screening, whereas the CTB styles do not.
- 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.

5.11 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 and the following settings. It is not required that electronic drawings display seals or signatures shown on the hard copy drawings.

- 5.11.1 **GSA Provided Plot Styles:** It is required that one of the following plot styles be able to accurately reproduce the drawing sheets: **standard r2000 b&&w.ctb**, **standard r2000 color.ctb**, **standard-mono.stb**, or **standard-color.stb**. Release 14 pen tables (**standard r14 b&&w.ctb** and **standard r14 color.ctb**) are only provided since some of the background drawings GSA provides may be in r14 or earlier, although submissions of release 14 drawings and use of those 2 plot styles for new drawings are not permitted under this policy. They are:

standard r14 b&&w.ctb	for plotting monochromatic r14 drawings without screening in r2000 & later
standard r14 color.ctb	for plotting color r14 drawings without screening in r2000 & later
standard r2000 b&&w.ctb	for plotting monochromatic r2000 & later drawings without screening in r2000 & later
standard r2000 color.ctb	for plotting color r2000 & later drawings without screening in r2000 & later
standard-mono.stb	for plotting monochromatic r2000 & later drawings with screening in r2000 & later
standard-color.stb	for plotting color r2000 & later drawings with screening in r2000 & later

(the "&&" will appear as "&" in the pop list)

Specify the plot style used in the README file. The same plot style may be used for the entire set, but this is not required.

5.11.2 R2000 and Later Plotting Parameters

Scale lineweights when making half size drawings so that the line weights are not exaggerated. (Scale Lineweights has no effect when the plot scale is 1:1, as it should always be, except in the case of half size drawings.) Make sure the Plot with Plot Styles option is checked in the Plot dialog box.

Set plot style table settings as follows:

Style Table Parameter	Setting
plot color	For B&W plots: set all to 7 For color plots: set all to use object color
dither	off
grayscale	off
pen number	automatic (unless required by your plotter)
virtual pen	automatic (unless required by your plotter)
screening	For CTB plot styles: 100 For STB plot styles: ##% Screening or Normal
linetype	use object linetype
adaptive	on
lineweight	use object lineweight
line end style	use object end style
line join style	use object join style
fill style	use object fill style

5.12 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".

- a. From a machine that recognizes the non-native entities as proxy entities, (not the application that created them), initiate the WBLOCK command. Do not select the "entire drawing" option. Select objects, then when prompted to select objects, type "ALL",

[enter], and OK. If it asks if you want to include other information, pick No. Note that you only get the entities in the space from which the WBLOCK command is issued. If there are objects in spaces (layouts), they must be WBLOCKed separately and reassembled. You can also use Copy and Paste.

- b. Save the drawing down to a r12 DWG or DXF, then close the drawing, reopen the r12 version, then save back up to the current release. It may be necessary to revert to an older version of AutoCAD just to perform this operation. Note that you will also lose any aspects of the drawing that did not exist in r12.
- c. If using ADT 3.3, use the AECObjExplode command. If using ADT 2004 or later, use the AecExportToAutoCAD2000 or AecExportToAutoCAD2004 command. Fully read Autodesk's documentation before using these commands, as there are different options and ramifications.
- d. -ExportToAutoCAD (note the leading hyphen)
- e. AECToAcad

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; or MasterFormat2010Update is preferred.

6.2 README.DOC File

Every submission of electronic drawings shall include a README.DOC, which shall be readable by MS Word.

The README.DOC file shall include the following documentation:

- Project Documentation and Drawing Form (appendix at the end of this document)
- Inventory list of all sheet drawing file names, their xrefs, their drawing titles. Note any drawings which are to be plotted in color.

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 3 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.
- 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 NCS Statement of Substantial Conformance

On June 1, 2010 the GSA Public Building Service's Department of Design and Construction officially adopted the US National CAD Standard v4. Therefore every submission of electronic drawings shall include the US National CAD Standard v4 requirement to provide a Statement of Substantial Conformance.

NCS4_StatementOfSubstantialCompliance.pdf is provided for your convenience.

APPENDIX A

7. PROJECT DOCUMENTATION and DRAWING FORM

PROJECT INFORMATION

BUILDING NAME:	
BUILDING ADDRESS:	
BUILDING NUMBER (S):	
GSA PROJECT CONTROL NUMBER:	
PROJECT TITLE:	
SUBMITTAL STAGE:	
SUBMITTAL DATE:	
GSA PROJECT MANAGER:	
PRIME A/E FIRM:	
A/E's CONTRACT NO.:	

DRAWING INFORMATION

VERSION OF CAD POLICY USED:	
VERSION OF AIA LAYERING STANDARD USED:	
PLOT STYLE USED:	
CAD SOFTWARE AND VERSION:	
THIRD PARTY SOFTWARE AND VERSION:	
TOLERANCE:	

List any user-defined layers, non-standard fonts, or deviations from CAD policy: