



## PBS CAD STANDARDS

Introduction: The intended audience for the PBS CAD Standards is architects/engineers (A/Es) (or other contractors) preparing CAD deliverables for GSA, along with GSA staff requesting and reviewing CAD deliverables. Direct any questions to the GSA Contracting Officer (CO) or Contracting Officer's Representative (COR). Paragraph numbers below are for ease of reference. The PBS CAD Standards and a list of PBS CAD managers are available at [www.gsa.gov/cad](http://www.gsa.gov/cad) or [www.gsa.gov/cifm](http://www.gsa.gov/cifm). It is the A/E's responsibility to obtain its own copy of the United States National CAD Standard® (NCS) [www.nationalcadstandard.org](http://www.nationalcadstandard.org).

1. GSA has adopted the NCS. A/Es preparing CAD deliverables for GSA, including design and construction and spatial data management (SDM) drawings, must comply with NCS Version 6. The purpose of the PBS CAD Standards is to set the following additional requirements. GSA Regions or other programs may have further requirements.
2. GSA will not waive NCS or PBS CAD Standards requirements under any circumstances, including when A/Es use building information modeling (BIM). CAD drawings exported from the building information model must comply with NCS and PBS CAD Standards requirements.
3. A/Es must submit CAD drawings in DWG file format. The DWG files must meet GSA's "no error" requirement, which means that GSA must be able to open the file in its current version of AutoCAD without being prompted with any error messages. Some examples of error messages include font not found, xrefs not found, image xref resolution errors, and proxy object errors. The "no error" requirement does not mean files must be authored in "out of the box" AutoCAD only. A/Es may use the following exceptions with advance approval and confirmation in writing from the GSA CO or COTR:
  - A/Es may author files using all the advanced features (including the 3-D features) of Autodesk AutoCAD Architecture and AutoCAD MEP.
  - A/Es may use an AutoCAD third-party add-on, if the A/E provides GSA with a fully supported and free object enabler.
  - A/Es may use other vendor CAD applications as long as NCS and PBS CAD Standards requirements are met.
  - A/Es may choose to use more recent software versions than GSA is using, but the A/E must provide the more recent version files and a set of files saved as a version usable by GSA.
4. The A/E must include the following items with each drawing submission:
  - A signed cover letter on A/E firm letterhead (in Adobe PDF file format) stating:

To the best of my knowledge, the DWG files submitted meet GSA’s “no error” requirement when opened. And, without the need for any add-on software, GSA can view and manipulate all drawing entities and plot drawings from the DWG files submitted that accurately reproduce the PDF files and paper drawings submitted. Further, the contents of the DWG files represent all drawing entities, plot drawings, and configuration settings necessary to accurately reproduce the PDF files and paper drawings.

- The completed and signed NCS Statement of Substantial Conformance form (in PDF file format) (see NCS Appendix A for a blank copy of the form).
  - One self-contained file representing each single drawing sheet, with reference files inserted. If using AutoCAD, the appropriate command is Bind using the Insert selection. Do not explode result. Bound layers must maintain NCS layer names.
  - All project files (such as detail, model, sheet, and reference files) used to produce the paper drawing sheets. A/Es must make certain to include all base drawings, custom fonts, line types, pen tables, etc., used to produce the drawing submission. AutoCAD has an express tool command called etransmit that can create a package of all reference files.
  - List of files and reference relationships (in a Microsoft ReadMe.doc or ReadMe.xls file).
  - One full-size set of the drawing sheets (as PDF files) capable of producing a paper drawing set.
5. The A/E is responsible for ensuring that all submissions by any subcontractors comply with the “no error” requirement and other NCS and PBS CAD Standards requirements. Before the start of the project design phase, the A/E must submit sample electronic files to GSA to verify that its software (and that of its subcontractors) complies. Any CAD drawing submission that does not substantially comply will be rejected and appropriate contract action, including withholding of payment, noting on contractor past performance reports, and/or other remedies, may be taken by GSA.
  6. Electronic files and media submitted to GSA must not contain computer viruses. The A/E must label media with the contract/order number, project title, project number, submission stage, submission date, and security imprint at a minimum (see Item 8 below for more information). The A/E must submit all files on GSA-readable CDs or DVDs, which may not contain compressed (ZIP) or self-extracting (EXE) files. GSA must be able to read all submitted media and without being prompted with error messages.
  7. All digital files, associated data, and other products generated under any GSA design and construction contract become the property of the Government.
  8. The A/E must comply with GSA Order PBS 3490.1A Document Security for Sensitive but Unclassified Building Information, dated June 1, 2009. The imprint specified in the order is required on the cover sheet and each drawing sheet, stating the required secure handling of federal building information. The A/E must include the imprint on the disc label as well.
  9. The A/E must name model files using the format below.

A-AA-UU-OOOOO.EXT or AAAA-UU-OOOOO.EXT	Discipline designator (Level 1 or 2)-model file type-GSA floor number code-optional suffix for A/E use.file extension
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10. The A/E must name sheet file names using the format below.

A-NNN-UU-00000.EXT or AANNN-UU-00000.EXT	Sheet type or designator sheet sequence number-GSA floor number code-optional suffix for A/E use.file extension
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11. The A/E must name any other project files delivered to GSA using the format below.

NN-NNNNN-UU-00000.EXT	OmniClass table number-MasterFormat item number-GSA floor number code-optional suffix for A/E use.file extension
NN-ANNNN-UU-00000.EXT	OmniClass table number-UniFormat item number-GSA floor number code-optional suffix for A/E use.file extension

12. GSA does not use the NCS suggestion for naming detail files and schedule files. The A/E should use the format above in Item 11.

13. The A/E does not have to submit its library files to GSA, such as blocks; only those files from its library used on the GSA project need to be submitted.

14. GSA has added the following discipline designators below to those already in the NCS. GSA discourages the use of the discipline designator “ET” for electrical telecommunications. The A/E must use “T-” or its own T Level 2 designator instead.

Roof and roofing	Public spaces, green roofs, antennas, etc.	AR
Skin or envelope	Energy performance determinant elements	AE
Walls and partitions	Nonload-bearing space defining objects	AW
Space assignment	GSA BIM Guide Series 02 – BIM Guide for Spatial Program validation, rent bill management	AS
Doors, frames, and hardware		AD
Transportation systems		AT

15. GSA floor number codes must be only two characters. Most floors will be designated 01 through 99.

R1, R2, R3, ...R9	Roof level, higher number is higher up
P1, P2, P3, ...P9	Penthouse, not a full floor plate
M1, M2, M3, ...M9	Mezzanine
01 (or GF), 02, 03, ...99	Floor 1 (or ground floor), then floors 2 to 99
L1, L2, L3, ...L9	Lower level, a floor partially below ground, higher number is further down
B1, B2, B3, ...B9	Basement floor fully underground, higher number is further down
SB	Subbasement, not full building footprint
SP	Site plan
LT	Loft, a level with two or less exterior walls
K1, K2, K3, ...K9	Parking, higher number is higher up
NN	More than one floor, used for floor stacking in large building model files, exterior elevations, etc.
XX	No floors, used for G series, most details

16. GSA requires that the A/E use one additional model file type to manage antennas and green roofs.

RO	Roof plan
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17. The A/E must use the sheet type designators below.

0	General
1	Plans
2	Elevations, no cutting plane
3	Sections with cutting plane
4	Large-scale views
5	Details that are to scale
6	Schedules, diagrams, and details that are not to scale
7	3-D representations to scale such as axonometric drawings
8	Other, such as photographs, scanned images, animation stills, multimedia, etc. Also, <b>not</b> generated from the building information model.
9	3-D representations not to scale. Also, generated from the building information model.

18. Although not required to be used, all file names may have an Optional Suffix (-00000) (five characters shown for example only) for A/E use. However, the Optional Suffix:

- Must start with a single dash.
- Must not exceed 25 characters in length.
- Must not include spaces, periods, or underscores.
- Must not include glyph characters from Asian and Cyrillic alphabets.

19. Model files must include a model file information block with, at a minimum, the GSA project title, building number, project number, and contract number. The sheet file title block must contain the following information at a minimum and if applicable:

- GSA contract/order number, project title, and project number
- GSA building name, building number, and street address
- Submission date, stage, and percent (for example, 100 percent construction documents)
- A/E firm name(s)
- Certifications (signatures and seals) (DWGS do not need to display)
- Key plan and North arrow
- Graphic scale
- Drawing date and revision dates
- Drawing title (type of drawing and contents) and drawing number
- Drawing scale (plot scale of sheet file) and sheet size

20. The A/E must comply with the following requirements:

- Draw models life size using architectural units. One drawing unit equals 1 millimeter or 1 inch.
- Use the Metric Design Guide (PBS PQ-260) for projects subject to the Facilities Standards for the Public Buildings Service (P100).
- Use sheet files to create views to scale of the model for plotting as a sheet.
- Do not use a single file for multiple sheets. Use one file per sheet. This applies to DWG and PDF file formats.

- Accurately represent actual building dimensions within 1 inch of exterior and half an inch of interior field measured conditions.
- Use precision input and object snaps.
- Ensure that line endpoints meet exactly, tangents intersect at a single point, and vertical lines are at exactly 90°.
- Create entities within blocks on Layer 0 and avoid use of nested blocks.
- Define objects' layers and line types by layer unless inside a complex block definition.
- Put hatch patterns on their own layer.
- Use PATT to modify any major or minor group in the layer list. Do not explode.
- Limit use of ANNO as a minor group field.
- Include any A/E-defined hatch patterns, line types, and colors with drawing submission.
- Ensure that plotted text does not appear smaller than one-eighth of an inch height (one-sixteenth of an inch on half-size drawings).
- Purge drawings of unreferenced blocks, layers, and line types. If using AutoCAD, audit as well.
- Delete objects outside drawing limits and zoom to drawing extents.
- All external reference files must use a common insertion point.

21. GSA may provide the A/E with existing CAD drawings for convenience. However, these drawings must be used as a base reference only. Unless otherwise specified by the contract documents, the A/E is responsible for field verification of existing conditions and ensuring that all electronic deliverables are accurate and comply with NCS and PBS CAD Standards requirements.

22. Construction documents must be signed and sealed by the responsible design professional. To meet this requirement, the A/E must submit a full set of 100 percent final construction documents as PDF files. Each drawing sheet, as well as the cover pages of the specifications and any engineering calculations, must display the appropriate signatures and seals.