



CAD Standards, Today & Tomorrow

Introduction:

Survey of Disciplines:

Overview:

- **Reasons to Use an Internal CAD Standard**
- **How to Develop and Maintain a CAD Standard**
- **Using the Client's Cad Standards**
- **Problems with Most CAD Standards**
- **A Practical Review of Two CAD Standards Used Today**

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Common Reasons to Use a CAD Standard

Efficiency, Speed, Accuracy – SAVE TIME & MONEY\$

- **Bring new employees up to speed faster.**
 - *Ease of transferring work between employees.*
 - *Hit by a bus or Lotto theory – the work must continue even as employees change.*
- **Speed projects to completion with greater accuracy.**
 - File, System, and Entity Identification
 - Clean Controlled Environment = Less Crash or Fatal Errors
 - Consistency = Templates, Automation and QC routines
- **Facilitate more effective data exchange with clients and collaborating firms.**

Developing & Implementing a CAD Standard

- Begin with the NCS
 - National CAD Standards – 410\$ for single License (978 page PDF doc) – any version of NCS will be a good place to start.
 - The Architect's Guide to the U.S. National CAD Standard – Book can be found for about 50\$ on Amazon
- Gather Opinions from Team Users
- Review and Compare other CAD Stnds Docs
- Develop Draft and Review with all Team Users
 - Keep Circulating Revisions until 80% Sign off is reached
- Publish in a Public Location as a '*Living*' Doc
 - A CAD standard needs to remain open ended and flexible to adapt to new technologies and updated software.
 - At minimum, standards should be updated twice a year.
 - At Maximum, standards should not be changed more than four times a year.

Why the client wants you to follow their CAD Standard.

Companies with Large Real Estate holdings have many needs for concurrent drawings of all buildings and site systems.

- **These Companies are (most likely) Maintaining concurrent Building & Site(s) libraries for...**
 - Seat and Space Management
 - IT & Asset Management
 - Building & Site Maintenance – all disciplines
 - Security & ERP way finding and navigation
 - Future Expansion or Consolidation Prospects
 - Event & Collaboration planning
- **Maintaining Client Standards reduces as-built and consultant costs as well as providing assurance of Intellectual Capital.**

Problems with most CAD Standards and suggested solutions.

Make it Brief

Too much information vs. a few brief guidelines.

Example: Things you need to know when working with **MS CAD Standards** –
in order of priority



"HEY - 'YOU FINISHED WITH THE IN-HOUSE STANDARDS MANUAL FOR EFFICIENT CAD USE?'"

- Files must be **2d Version 2000 “.dwg”** format
- Maintain **DMF/DSF xref file structure** with Drawing Master **model at 1:1 scale.**
- File Names, Layer Names and Layer Colors should be to MS CAD Standard (similar to NCS)
- All **sheet files** must be **submitted in .dwg & image** format (PFD/DWF)
- No Dynamic or Negative UCS scaled blocks

This list provides search terminology as well as concise points of mandatory compliance.

Problems with most CAD Standards and suggested solutions. (Continued)

- **Make a Hard Copy and Electronic Copy for easy search reference.**
 - The definition of a good tool is one that is used often. **Create hard copy as well as electronic CAD Manual with hyperlinks for better reference. Make your notice updates as BREIF as possible**
- **Standards are perceived as too hard to follow or hard to read.**
 - Eliminate reading, create a Video
 - 5 Min rule of explanation – if it can't be done in five min it's too complicated or not automated enough.
 - Give incentive – 5\$ Starbucks cards, 20\$ Best Buy for anyone who aces a quiz on new standards
 - Provide a batch CAD Checker tool which provides reports of specific issues and grades of compliance.
- **Standards force users to work in a way that's uncomfortable for them.**
 - Can you follow your own standards? If not, you need more automation, programming, or whatever tools are needed in order not to slow users down.
 - Suggestion Box where users can contribute ideas. Team input can lead to the best standard
- **Even good standards sometimes aren't supported by management.**
 - **Nazi Enforcement vs Apathy & Renegades - look for balance.**
 - Call in your senior management and ask for help in enforcement. Be ready to show increased efficiency, lower error rates, and smoother processes as a result.
 - REPEAT THIS MANTRA -**CAD standards are simply a way to get everyone in sync, cut errors, and save the company valuable time and money.**

A Practical Look at Examples of CAD Standards

Microsoft[®]

CAD Standards

www.mspkc.com

Plus:

- Detailed Graphic examples of DMF/DSF xref file structure
- Graphic examples of all blocks per discipline
- Reference Sources, List of Components, and Glossary of terms

Minus:

- No Hyperlinks to referenced sections of this 153 page doc
- No reference to addendums; ERP and Security standards not included.
- Outdated Contact & Resources information for Q&A
- Inaccurate Deliverables Requirements – (image files, vR14)
- Incomplete Layer list for new Disciplines..ie Digital Signal lines, Wireless
- Incomplete filename description –DMF assigned SITE NAME? floor 102? DSF names for 102?
- Incorrect Section Markers from Sect 5 forward (footer)
- Limit of one model, one TB, per dwg – Layout?
- No Confirmed Compliance or Graded QC Feedback
- No Standards for metric drawings
- No description of MSPKC and BMA – Project Knowledge Center and Building Master Archive for self service of examples

A Practical Look at Examples of CAD Standards (Continued)

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http://www.upo.harvard.edu/CampusProjects/Std/Csg_2006.pdf

Plus:

- Brief and easy to follow; 22 pages in PDF or Word format
- Direct contact information for immediate Q&A
- QC check list (WOW!)
 - A signed copy of the Electronic File Quality Assurance Checklist found in section one of this document must also be submitted with CAD drawings and scans being delivered during the closeout phase of CAPS projects. When an Electronic Quality Assurance Checklist has been signed and submitted, the vendor (architect, engineer, contractor, etc.) is assuring that all materials adhere to the standards and guidelines set forth in this document.
- Disclaimer embedded in Title Block
- Confirmed Compliance or Graded QC Feedback provided by
“Property Information Resource Center” www.upo.harvard.edu
“Regardless of affiliation, all new users must make an appointment with the PIRC for an orientation.”

Minus:

- Limit of one model, one TB per dwg – Layout?
- User assigned pen weights and colors for alternate disciplines
- No Standards for metric drawings

A Practical Look at Examples of CAD Standards (Continued)

Other Standards Available for Consideration....

- **IU National CAD Standards Layer Matrix (International)**

http://www.connect802.com/download/techpubs/2005/cad_standards.pdf

- **The University of Chicago Hospitals**

http://facilities.uchicago.edu/doclib/public/uofc_cad_standard.pdf

- **University of Alaska Fairbanks – Facilities Services
Division of Design and Construction**

<http://www.uaf.edu/fs/documents/cadstandards.pdf>

- **UTAH TRANSIT AUTHORITY – Standard CAD Procedures**

<http://www.rideuta.com/files/cadstandards.pdf>

- **City of Grand Rapids (MI) – 2008 CAD Standards**

http://www.grcity.us/download_upload/binary_object_cache/engineering_GR%202008%20CAD%20Standards.pdf

http://www.grcity.us/index.pl?page_id=1511

- **US ARMY CORPS of ENGINEERS**

<http://www.lrh.usace.army.mil/ct/cad/>

Thank You,

Questions?

- Other Resources

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



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http://www.upo.harvard.edu/CampusProjects/Stds/Csg_2006.pdf

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