United States National CAD Standard®- V6

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V6 Webinar Series

February 2017

CAD Layers: Why Do We Need Them?

Today's Presenter: Stephen Spangler

Stephen Spangler graduated from Virginia Tech with a Mechanical Engineering degree. He worked for NAVFACENGCOM for 2 years, then in 1992 went to work at the U.S. Army Corps of Engineers' CAD/BIM Technology Center in Vicksburg, MS. He has been involved with the U.S. National CAD Standard since Version 1.0, serving on both the Steering Committee and various other committees. Stephen is also the author of the USACE A/E/C CAD Standard and A/E/C Graphics Standard documents, both of which are based on the NCS, but add additional Department of Defense requirements. He is a big Star Trek/Star Wars fan and enjoys collecting autographs and attending science fiction conventions. His goal in life is to prove to his daughters that he does not spend his whole day at work "playing videogames and surfing the internet".

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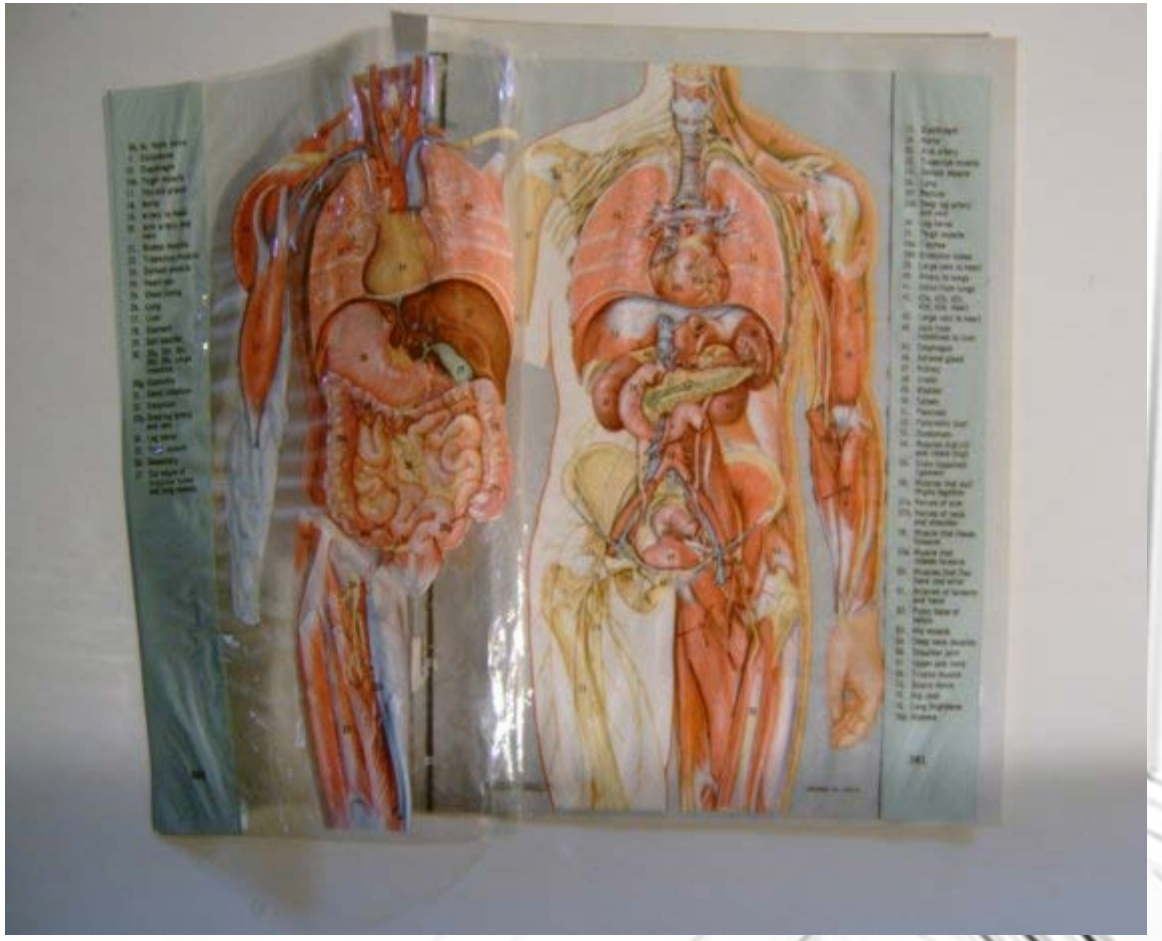
Layers

- What is a Layer?
- Breakdown of a Layer Name
- Recurring Questions

What is a Layer?

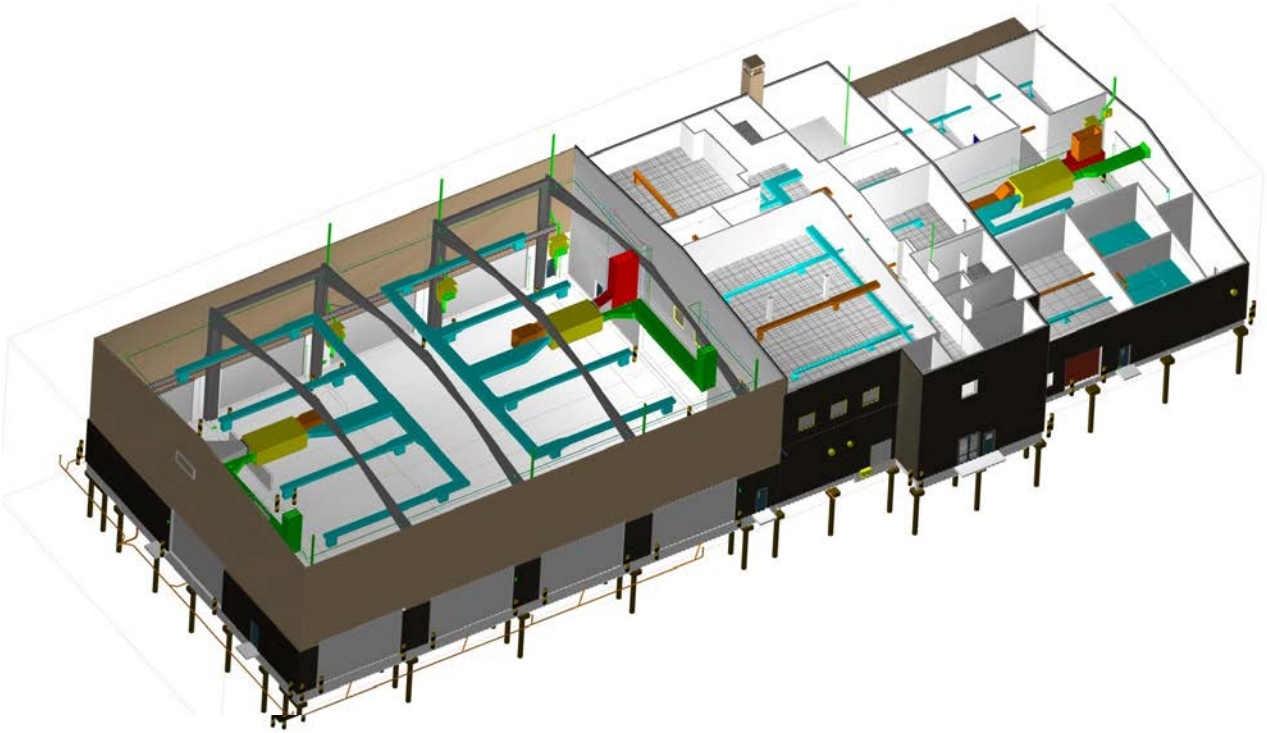
Remember Those Encyclopedia Overlays of the Human Body?

- Each body system was on a separate celluloid overlay
- You could look at an individual system to see how it functioned
- When all overlays were put together, you could see how the whole body was put together and how it functioned.



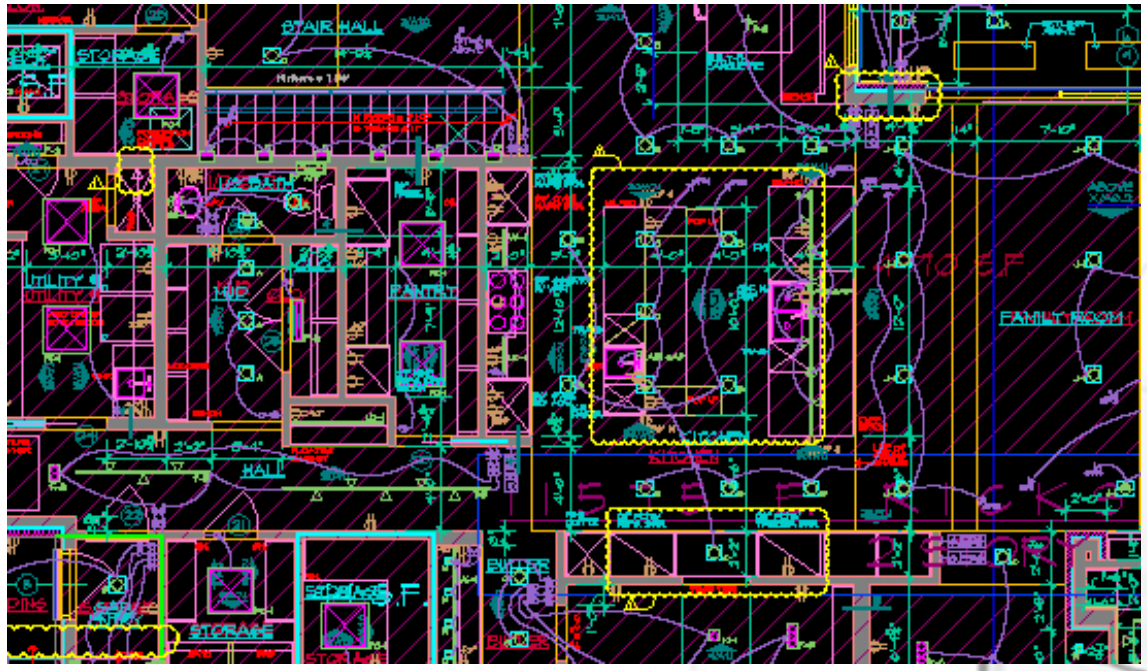
A Building is Very Similar to a Human Body!

- Has a respiration system (HVAC)
- Has a circulatory system (Plumbing)
- Has a skeletal system (Structural)
- Has skin (Architectural).



Layers Are a Way to Break Out Building/Site Information

- Just think if all building systems and objects were only on one layer?
- With multiple layers, you can break out items into separate systems
- Layers can then be turned on and off to differentiate between systems.



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Breakdown of a Layer Name

A Sample Layer Name

AE – WALL - FULL – EXTR - D

Discipline Designator, Level 1

A – WALL - FULL – EXTR - D

- The Discipline Designator “denotes the category of subject matter contained on the specified layer”
- Level 1 Discipline Designators are strictly one character, followed by a hyphen
- Mandatory: Yes

Discipline Designator, Level 2

AE – WALL - FULL – EXTR - D

- The Level 2 Discipline Designator further defines the Discipline Designator. In this case, AE stands for “Architectural Elements”
- Mandatory: No

- Spangler recommendation: Use File Naming to further differentiate within Disciplines. Adding an additional character to layer names really isn’t required and could cause confusion.

Major Group

AE – **WALL** - FULL – EXTR - D

- The Major Group identifies a major building system (e.g., Walls, Doors, HVAC, Power, Site, Roads, etc.)
- Always 4 characters and all 4 characters have to be used. Unused characters are filled with the “~” character
- Mandatory: Yes

Minor Groups

AE – WALL - FULL – EXTR - D

- Minor Groups further define Major Groups. In the above example, FULL = Full height and EXTR = Exterior
- Always 4 characters and all 4 characters have to be used. Unused characters are filled with the “~” character
- Second Minor Group does not have to be used if the first Minor Group is used
- Mandatory: No

Status (Phase)

AE – WALL - FULL – EXTR - D

- The Status (Phase) character breaks out layers according to the status of the work or construction phase (e.g., D for “Demolition”, F for “Future Work”).
- Always 1 character
- Mandatory: No

Spangler recommendation: Use sparingly. Adding status to layers increases the number of layers per drawing. Consider using linetypes or lineweights to differentiate status.

So Where Can I Find the Discipline Designator, Major Group, Minor Group and Status Lists?

AIA CAD Layer Guidelines,
4.0 Appendix A

4.2 MAJOR GROUPS

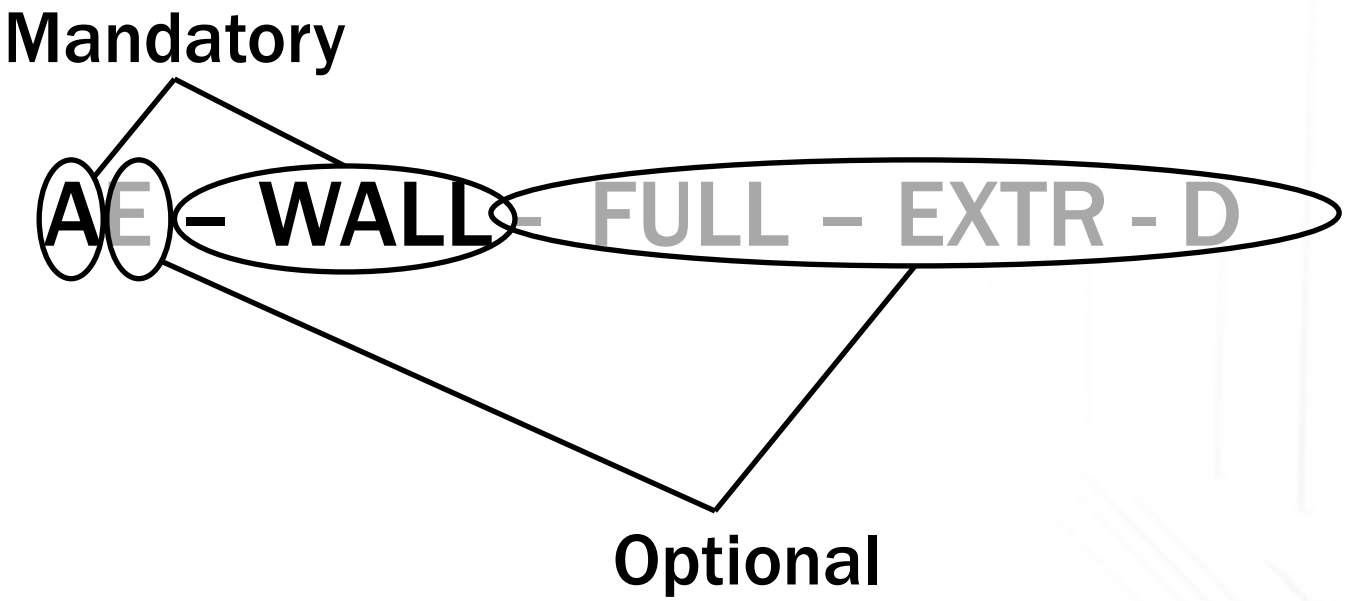
Major Group Layer Name	Description
ACCS	Access
ACID	Acid waste systems
AERI	Aerial Survey
AFFF	Aqueous film-forming foam system
AFLD	Airfields
AIR~	Air
AIRS	Airport Airspace related features
ALGN	Alignment
ALRM	Alarm system
ANNO	Annotation
APRN	Apron related features
AREA	Area

Sample Layer List

A□-WALL	Walls
A□-WALL-CAVI	Walls: cavity
A□-WALL-CNTR	Walls: center
A□-WALL-CURT	Walls: curtain
A□-WALL-FIRE	Walls: fire protection
A□-WALL-FULL	Walls: full-height
A□-WALL-FULL-EXTR	Walls: full-height: exterior
A□-WALL-FULL-INTR	Walls: full-height: interior
A□-WALL-HEAD	Walls: door and window headers
A□-WALL-JAMB	Walls: door and window jambs
A□-WALL-MESH	Walls: mesh or wire
A□-WALL-MOVE	Walls: moveable
A□-WALL-PATT	Walls: texture and hatch patterns
A□-WALL-PRHT	Walls: partial-height

Note: These are “commonly used” layers

Summary: Mandatory vs. Optional



What about things like text and dimensions?

** – ANNO - ****

- Items that do not represent physical aspects of a structure would be placed on an Annotation Major Group level
- Annotation covers things like dimensions (DIMS), text (TEXT), title blocks/borders (TTLB), and revisions (REVS)
- For example, dimensions for an Architectural sheet would go on A-ANNO-DIMS (or AE-ANNO-DIMS if you are using Level 2 Discipline Designators)
- Mandatory: Yes

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Recurring Questions

Which layers in the NCS do I have to use?

- Just like going to Burger King, you can “Have it your way” with the NCS.
- You can use as many layers or as few layers in the NCS as you want
- It all depends on how detailed you want to sort out your building/site components
- Keep in mind, the more layers you use, the harder it is to find the particular layer you are looking for!

Or another way of looking at it...

Can I create my own layers?

- Going back to the burger analogy, at Fuddruckers you can build whatever burger you want. So it is with the NCS layers.
- The NCS is not intended to be all inclusive. You could run across systems or components where an NCS Major/Minor Group is not available (e.g., “Burgers” could be “BURG” or “BRGR”)
- In these instances, you may develop your own Major/Minor Groups. However, you are not allowed to use an already existing NCS Major or Minor Group.

Can I create my own layers?

- Spangler recommendation: If you do create new layers, be sure to document them in some way. That way, those layers won't be a surprise to the recipient of the CAD files.

In the Annotation layers, what is the difference between NOTE and TEXT?

- Good question! Going to the NCS: *-ANNO-NOTE is defined as “Notes” and *-ANNO-TEXT is defined as “Text”

- Spangler recommendation: Since these are both technically “text” in a drawing, here is how I determine which layer to put these on. Stand-alone text in the drawing (not including title text, since that would go on *-ANNO-TITL) would go on *-ANNO-TEXT. Text in a list of notes or text with leaderlines associated to the drawing go on *-ANNO-NOTE.

What about going from BIM to CAD?

- Another good (yet controversial) question! There still are a lot of customers that, while they ask for BIM models, are still focused on CAD drawings as the primary deliverable.
- The problem: The more layers in a CAD Standard, the harder it is to do a 100% translation from BIM to CAD. This is because BIM is comprised of objects that know what they are, while CAD drawings are graphics that use layers to describe what they are.
- Sometimes you spend more time trying to translate from BIM to CAD, than you do in creating the BIM models! Having to break down objects into many layers.

What about going from BIM to CAD? (cont.)

- NCS V6 began to address this question. For BIM use: “the required Level 1 discipline designator and Major group can and should be employed whereas the optional Level 2 Discipline designator, minor and status groups need not be implemented if technically problematic to achieve”
- Meaning: for translating a door object from BIM to CAD, you could potentially stop at A-DOOR for the layer name.

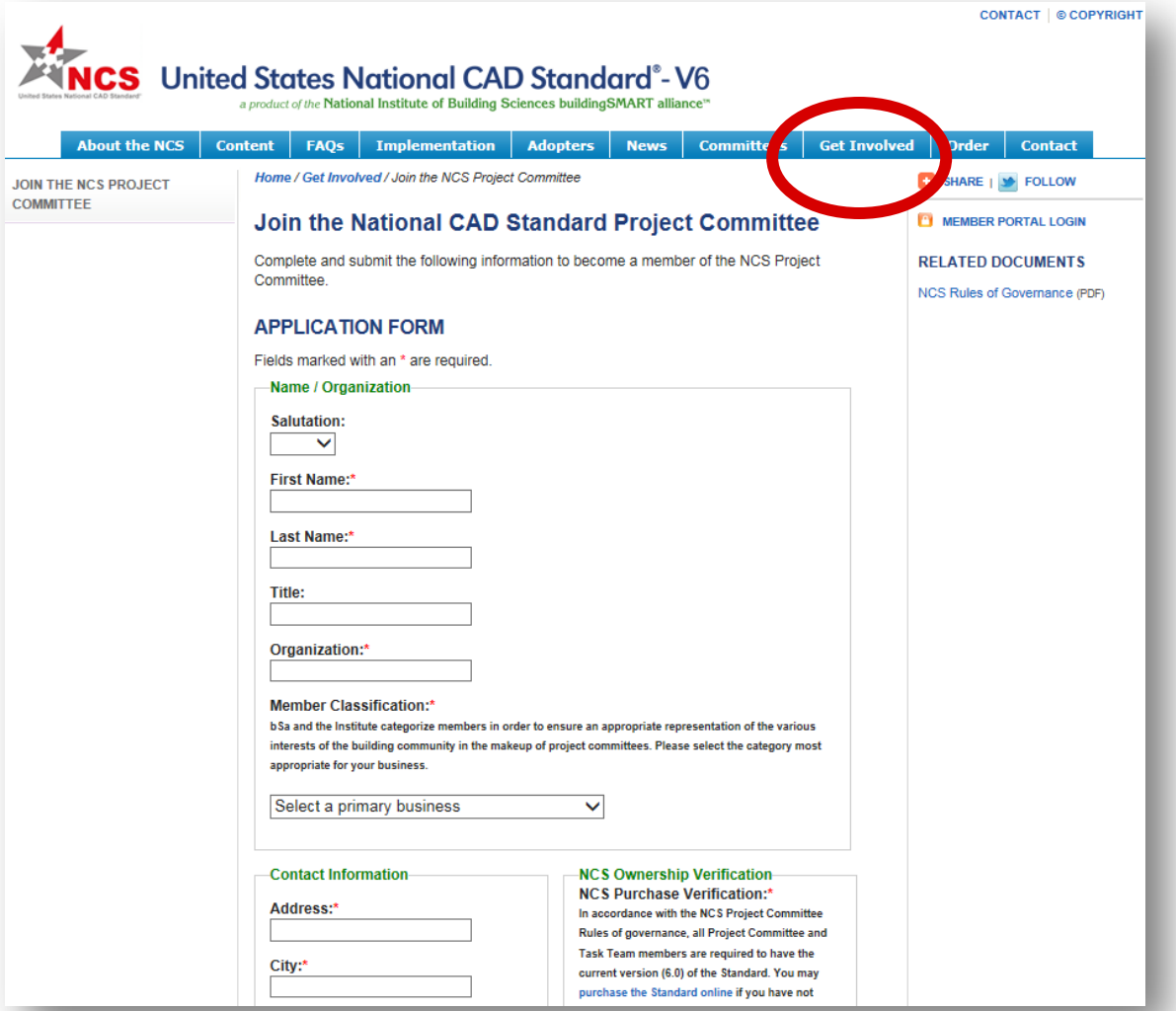
- Spangler comment: I agree this is a step in the right direction. I would also argue that the discipline character becomes unnecessary, since file naming takes care of this, but that is an argument for another time… Ultimately, it is going to come down to a breaking of the CAD mindset when using BIM.

Questions?

Get Involved!

- Join the NCS Project Committee
- Membership Open to Everyone
- Requirement:
  - Ownership of NCS V6
- Online Application at:

  www.nationalcadstandard.org



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Interested in purchasing the NCS V6?

- 10% discount for attendees
- Use the discount code: NCSWS117
- Discount valid through March 9, 2017

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For More Information…

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Thank You!