

IT22017

# New and Improved – How the National CAD Standard is Adapting to Industry Trends

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## Learning Objectives

- Identify and locate new content within the NCS V6
- Understand why the new content is relevant
- Learn how to extend the NCS with custom content by understanding the framework
- Learn how to implement new content into existing standards and processes

## Description

The United States National CAD Standard® (NCS) released Version 6 after its members delivered a consensus vote agreeing on an unprecedented amount of content. The magnitude of change in content can be daunting, but this class will simply categorize the changes to get users up to speed quickly. The class will feature a panel of subject-matter experts who developed content for V6. Attendees will gain a perspective of not only what is in the new version, but also why it is important, and how they can implement the changes. Don't be fooled by the word CAD in the name. The NCS is the foremost graphical and drawing set standard in the United States, and the content applies to many types of software platforms. The class is applicable to first-time or long-time users of the NCS, and will provide a baseline of information for developing or updating organizational standards.





## Panel Experts

### *Johnny Fortune*

Johnny Fortune serves as the BIM director at Bullock Tice Associates in Pensacola, Florida where he has led the complete transition from CAD to BIM production for the firm and directs the company's overall BIM strategies, standards, technology operations, and integration with external team members. He is currently a member of several national committees, including the National CAD Standards Project Committee, the United States National BIM Standard Project Committee, and the United States Army Corps of Engineers / Industry BIM CIM Consortium. Additionally, he is chair of the buildingSMART alliance® Board of Direction and is a contributing author for several national and federal standards documents. He has often presented on the topic of BIM/CAD workflows and standards at venues such as Autodesk University, National Institute of Building Sciences Building Innovation 2014 Conference and Expo, GeoBuiz, and various Society of American Military Engineer and Construction Specification Institute chapter events.

### *Ed Lowe*

Ed Lowe is a CAD Coordinator with Burgess & Niple, Inc., a multidiscipline engineering and architectural firm in Painesville, Ohio. Ed has over 30 years' experience in the production of construction drawings including extensive use and support of AutoCAD for the past 25 years. As CAD coordinator, Ed oversees CAD production for a wide variety of projects. His responsibilities also include class instruction, standards development, enterprise-wide installation and CAD/BIM related IT support. He is a contributing writer to some of our leading industry publications. Ed serves as the Chairman of the United States National CAD Standard (NCS) Project Committee and is also a member of the National BIM Standard-US Project Committee.

### *Sasha Reed*

As Vice President of Strategic Development at Bluebeam, Inc., Sasha Reed collaborates with leaders in the architecture, engineering and construction industry to build awareness of digital collaboration advancements using the PDF open file format and leverages these relationships to guide Bluebeam's partnerships and long-term strategic goals. She joined the company in 2007 and co-created the Concierge Approach, a distinctly branded process of customer engagement, product feedback and solution delivery to which much of Bluebeam's success is attributed, and which today is replicated at every organizational level. Sasha is known industry-wide as a "conversation facilitator," creating platforms for exchanges necessary to digitally advance the industry, including StrXur and the BD+C Magazine Digital COM Blog, which she authors and manages. She's been a featured presenter at numerous national and international conferences including the 2014 Design-Build Institute of America (DBIA), Federal Project Delivery Symposium and NTI Danish BIM Conference. Sasha is an Advisor and founding member of the Construction PDF Coalition, a grassroots effort to provide a common industry framework from which to create and maintain construction PDF documents. She also served on the City College of San Francisco BIM Industry Council and is Advisor to the Board of Direction for the buildingSMART alliance, council to the National Institute of Building Sciences.

## Getting Started

### A quick-start to finding content

The United States National CAD Standard (NCS) released an unprecedented amount of content in Version 6. Before we have a discussion about what is new, why it is important, and how to implement it, let's start with some background information.

### Gaining Access

Some larger organizations have enterprise licenses. Many people may have access and not realize it. Check with your organization to see if you already have enterprise license access. If not, the NCS is available for purchase from the National Institute of Building Sciences.

<https://www.nationalcadstandard.org>





NCS WEBSITE

## Content Overview

### Content Delivery

The NCS is delivered primarily as online content. Printing is available and the number of permissible printed copies vary per license type purchased. Some modules contain additional downloadable information in the form of DWG or Excel files. Look for these symbols:

 = Section contains downloadable DWG files

 = Section contains a downloadable Microsoft Excel document

### Content Origination

The NCS has developed over the years with contributions from SMACNA, USCG, GSA, DOD, AIA, & CSI as well as many other organizations and volunteers. Today the NCS is updated each revision cycle by a balloting process and consensus vote of its members.

### Content Orientation

The NCS has the following Main Sections

- Introduction
- AIA CAD Layer Guidelines
- Uniform Drawing System
- BIM Implementation
- Plotting Guidelines
- Appendices



## What's New?

### Understand what's new, why it's important, and how to implement

Revisions to the Standard are marked throughout. To denote changes from version 5 to version 6, we have placed a delta ( $\Delta$ ) where material has been deleted and ~~red~~ [ORANGE actually] text where material has been added or revised.

An executive summary of the major changes is found in the foreword:

<https://www.nationalcadstandard.org/ncs6/ncs/foreword.php>

### Revisions Summary

Below are highlights of the major changes per section of the NCS.

#### Introduction

No substantial changes to this section.

#### AIA CAD Layer Guidelines

This section contains its own appendices. The appendixes for Discipline Designators, Major and Minor Groups, and Layer Lists have been updated to provide additional support for the following:

- Survey/Mapping: This section received two new Discipline Designators VB for Survey/Mapping Boundary and VL for Survey Mapping Land. This will extend the survey section of both the layer list and the Sheet naming list available to users.
- Major Groups added: Airport groups (e.g., helipads and taxilanes) were added for this version. Graywater systems group were also added.
- Minor Groups added: New minor groups were added for airport areas and objects such as parking, obstacle free zones, and jetbridges. Clarifications were made to minor groups for line weights to align with the NCS line weights previously established.
- Provided new examples into the layer example area for Graywater systems and others.

#### Uniform Drawing System

The Uniform Drawing System is made up of several modules.

- Module 1 - Drawing Set Organization: this section was updated with a new "Campus Setting" discipline code revision for sheet naming. Now we have an alternative for sheet naming when one project has multiple buildings or campuses. The level 2 discipline designator can be replaced on the sheet naming with a Building designation.
- An new means to properly identify multi-story building. A great example showing multiple floors, mezzanines and multiple floors below grade has been added in with explanations of usage.
- Module 2 - Sheet Organization: No substantial changes to this section.
- Module 3 – Schedules: No substantial changes to this section.
- Module 4 - Drafting Conventions: No substantial changes to this section.
- Module 5 - Terms and Abbreviations: There were many new terms added from the audio visual field. Digital Audio Signals, Video Signals, Automatic External Defibrillator, as well as many others.
- Module 6 – Symbols: A task team reviewed over 1300+ symbols and updated them to use imperial units and created dwg examples. They established guidelines for creating symbols for the future to make sure everything was well documented. Symbols are categorized by MasterFormat and identified as ID,



line, material, object, or reference types. 72 new symbols were added and 40 received additional revisions. Two new chapters were added in “How to create symbols” and “Using color in symbols”. Symbols classification was important to tying information back the BIM section.

- Module 7 – Notations: Font characteristics were better spelled out for size, Sans Serif, italics, width factor and fonts.
- Module 8 - Code Conventions: No substantial changes to this section.

### Plotting Guidelines

No substantial changes to this section – stay tuned. The future integration section of this class will go into detail about what is planned for this section.

### Appendices

- No substantial changes to this section. Some items in appendices, may have been updated but do not readily appear to denote how things have changed. In example, Appendix D – Members of NCS Project Committees list all members for the current version and there is no correlation to members of previous versions.
- Appendix I – Implementation Guidelines: Although nothing was changed in this section it is worth noting this is a critical part of the NCS. It shows an outline for implementing the NCS from Owner buy-in to 100% adoption over a multi-year / multi-phased approach. This is one time where reading the last chapter first pays off.

### BIM Implementation

This section is completely new. Much of the building industry still requires and relies upon CAD-based and sheet-centric project information delivery. Even BIM projects often have a contractual requirement to be NCS compliant and the NCS contains a lot of content that is still applicable in a BIM workflow environment. National Building Information Modeling Standard-United States ® (NBIMS-US™) doesn't define graphical standards, so the NCS is an indispensable reference standard for the foreseeable future.

The BIM Implementation Section clarifies the applicability of other NCS content as well as provides new Basic BIM Guidelines. Along with a basic introduction, references that create a strong link to NBIMS-US™, and a summary; below are the subsections of the BIM Implementation Section along with some rationale and examples of the content.

#### Clarifications

NCS wasn't originally written for BIM workflow so obviously there are some topics therein that will not apply or are problematic for BIM. This subsection provides general guidance for implementing and complying with NCS.

*Sheet Organization: The sheet organization module can be implemented as-is for BIM use. No exceptions or clarifications are necessary.*

*Symbols: ...drafting or annotation symbols ...are all applicable. Model elements [FFE]... need not be symbolized [as] they could vary from actual component type used.<sup>1</sup>*

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<sup>1</sup> Source: <http://www.nationalcadstandard.org>



### Basic BIM Guidelines

In addition to clarifications, the section provides some high-level basic BIM guidelines that are divided into two categories – guidelines pertaining to *Authoring Content* and *Model Coordination and Delivery*. Below are two samples from the subsections.

*Authoring Content: Dimensions should not be overridden. Once a project progresses past schematic/conceptual phase, use real-world dimensions for components, not nominal dimensions.*

*Model Coordination and Delivery: Model(s) should be purged, cleaned, and audited prior to distribution to other team members or project stakeholders*

## Coming Soon!

### What is being planned for the next version?

Before the ink dried on NCS V6 publication, task team members were already talking about additional revisions and new content that the NCS needs. The BIM Implementation Section was limited in its initial version due to schedule and time constraints so it was realized even during development that there was much more content that was needed. Expect that the next version will include a substantial expansion to this section. Additionally, more updates to the Symbols library by providing Revit content, integration with other standards, and a revamp of the Plotting Guidelines to incorporate the work of the Construction PDF Coalition are slated for the next release.

### Symbols Content

Much discussion has occurred about adding NCS library content. Many organizations and agencies have created content and it resides within their company libraries and templates. There is high value anticipated for having ready-to-use templates and content that is NCS compliant (especially for Revit). Several Federal Agencies in particular are interested in combining and migrating content they've already created to a single authorized source.

### bSa Integration

NCS is a product the buildingSMART alliance® (bSa). bSa also produces NBIMS-US™, COBie, and the National BIM Guidelines for Owners. So there are several opportunities for integration with other standards. bSa is made up of several subcommittee working on industry standards, below are two that will have a direct impact going forward.



buildingSMART alliance®  
a council of the National Institute of Building Sciences



### NBIMS Integration

#### buildingSMART alliance—Information Standards Subcommittee

The Information Standards Subcommittee will spend this year focusing on the creation of a higher-level plan for organizing the many "moving parts" of the **National BIM Standard (NBIMS-US™ V3)** and related or interconnected activities (e.g., COBie, NCS).



To serve this goal, we anticipate pursuing the following activities in the form of a “Master Plan.

To learn more click [here](#).

### Crowd Sourcing Best Practices and Software Competency buildingSMART alliance—Proven Practice Subcommittee

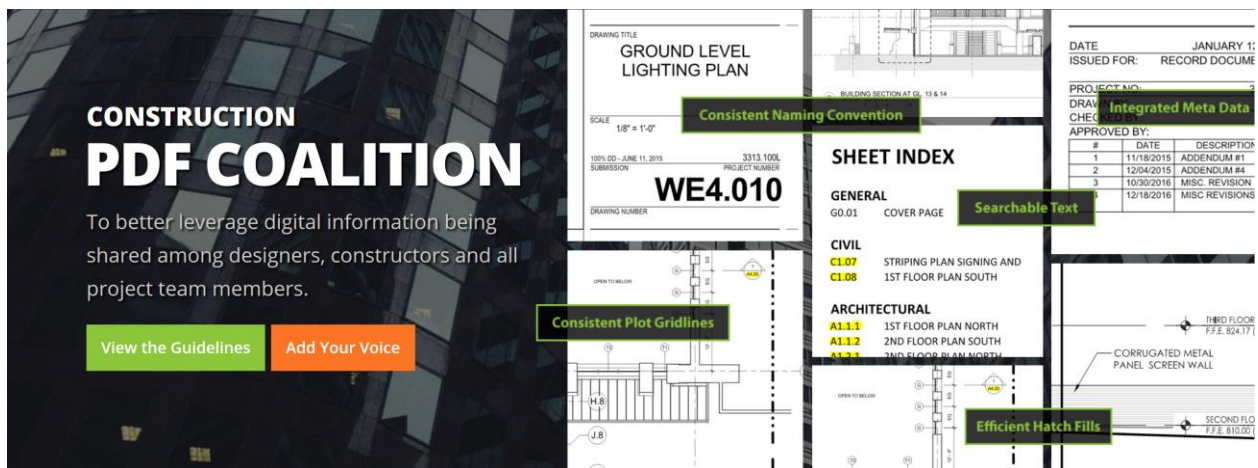
The Proven Practices Subcommittee is focused on the identification, validation and dissemination of Proven Practices related to information technology implementation and adoption.

To learn more click [here](#).

### Plotting Guidelines Revamp? YES

#### Construction PDF Coalition

**Grassroots effort to standardize the output of digital documentation based on consensus between Owner, Designer and Contractor**



The image shows a promotional graphic for the Construction PDF Coalition on the left and a sample drawing with annotations on the right. The graphic includes the text "CONSTRUCTION PDF COALITION" and "To better leverage digital information being shared among designers, constructors and all project team members." with buttons for "View the Guidelines" and "Add Your Voice". The drawing is a "GROUND LEVEL LIGHTING PLAN" (WE4.010) with annotations: "Consistent Naming Convention" pointing to the drawing title, "Consistent Plot Gridlines" pointing to the grid lines, "Efficient Hatch Fills" pointing to the hatch patterns, and "Searchable Text" pointing to the drawing title and sheet index.

#	DATE	DESCRIPTION
1	11/18/2015	ADDENDUM #1
2	12/04/2015	ADDENDUM #4
3	10/30/2016	MISC. REVISION
3	12/18/2016	MISC REVISIONS

Over the last 4 years Contractors have solicited feedback from Owners and Designers to produce a set of guidelines intended to improve the production of digital documents for construction. They’ve recently published a web based version allowing teams to customize the guidelines into project specific standards to be implemented at the time of project set up. Teams are encouraged to use the Guidelines alongside BIM execution plans (PxP).

Many owners have begun incorporating the Guidelines into their project documentation requirements. The CPCoalition is currently engaging with the National CAD Standards group to see if inclusion in a future update is in order, modernizing the current plotting standards to accurately represent current best practices.

To learn more click [here](#).



## **Wrap-up Next Steps**

Adoption and development of these consensus-based standards are only possible with support from industry representatives like you. We encourage you to use the Implementation Guidelines as a roadmap for implementing the standards for your organization (see additional class materials). Also, get involved with a committee or task group where you are most interested.

NCS

<https://www.nationalcadstandard.org/ncs6/getinvolved.php>

Construction PDF Coalition

<http://cpcoalition.com/>

buildingSMART alliance ®

<http://buildingsmartalliance.org>