

ANSI/CEA/CEDIA/InfoComm Standard

Audio, Video and Control Architectural
Drawing Symbols Standard

ANSI-J-STD-710
(CEA/CEDIA-2039)

January 2015



CEA
Consumer Electronics Association



CUSTOM
ELECTRONIC
DESIGN &
INSTALLATION
ASSOCIATION

infoComm
INTERNATIONAL®

NOTICE

Consumer Electronics Association (CEA®)/Custom Electronic Design and Installation Association (CEDIA®) Standards, Bulletins and other technical publications are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for his particular need. Existence of such Standards, Bulletins and other technical publications shall not in any respect preclude any member or nonmember of CEA/CEDIA from manufacturing or selling products not conforming to such Standards, Bulletins or other technical publications, nor shall the existence of such Standards, Bulletins and other technical publications preclude their voluntary use by those other than CEA/CEDIA members, whether the standard is to be used either domestically or internationally.

Standards, Bulletins and other technical publications are adopted by CEA/CEDIA in accordance with the American National Standards Institute (ANSI) patent policy. By such action, CEA/CEDIA does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the Standard, Bulletin or other technical publication.

This document does not purport to address all safety problems associated with its use or all applicable regulatory requirements. It is the responsibility of the user of this Standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before its use.

This document is copyrighted by the Consumer Electronics Association (CEA®)/Custom Electronic Design and Installation Association (CEDIA®)/InfoComm International® and may not be reproduced, in whole or part, without written permission. Federal copyright law prohibits unauthorized reproduction of this document by any means. Organizations may obtain permission to reproduce a limited number of copies by entering into a license agreement. Requests to reproduce text, data, charts, figures or other material should be made to CEA, CEDIA and InfoComm.

(Formulated under the cognizance of the CEA/CEDIA **R10 Residential Systems Committee.**)

Published by

©CONSUMER ELECTRONICS ASSOCIATION/CUSTOM ELECTRONIC DESIGN AND
INSTALLATION ASSOCIATION/INFOCOMM INTERNATIONAL 2015

www.CE.org

www.CEDIA.org

www.Infocomm.org

All rights reserved

The following members of the CEA/CEDIA R10WG7 Residential Systems Documentation Working Group contributed to the development of this document.

Mike Anderson, Niles Audio
Dr. Walter Black, VidCAD LLC
Thomas Chambers, ESA/Vector Security
Thomas Coffin, Simply Reliable Software
Richard Derbyshire, SM&W
Ken Erdmann, The Erdmann Group
Joe Gittens, Security Industry Association
Rich Green, Rich Green Ink
Helen Heneveld, Bedrock Learning, Inc.
R. L. Johnson, Elite Systems Solutions
Richard Locke, OpTech.net
Robert Mathews, OnePath Systems LLC.
Dave McNell, ARUP
Travis Misterek, Best Buy Co., Inc.
Budd Moseley, SYNEX Corporation
Bruce Nordman, Lawrence Berkeley National Laboratory
Rob Sabin, Electronics Design Group
Mark Stockfisch, Quantum Data, Inc.
Dale Stolzka, Analog Devices, Inc.
Peter Swanson, AMX Australia
Tameez Sunderji, Rovi Corporation
Adam Theis, OpTech.net
Dave Tkachuk, Symbol Logic
John Umina, iHome Systems
Yeqing Wang, Motorola Mobility, Inc.
Darrin Yoxtheimer, AVI-SPL
Walt Zerbe, Legrand, North America

FOREWORD

This standard was developed under the auspices of the Consumer Electronics Association (CEA[®]) R10 Residential Systems Committee, Working Group 7, and is now maintained by the joint CEA and Custom Electronic Design & Installation Association (CEDIA[®]), R10 Residential Systems Committee and InfoComm International[®].

COPYRIGHT STATEMENT

The contributor grants a free, irrevocable license to CEA to incorporate text or other copyrightable material contained in this contribution and any modifications thereof in the creation of a CEA document; to copyright and sell portions of this contribution; and at CEA's sole discretion, to permit others to reproduce in whole or in part such contributions or the resulting CEA document. The contributor will grant licenses under such copyrights to third parties on reasonable, nondiscriminatory terms and conditions, if appropriate, including the right to develop derivative works by CEA and implementers of the CEA document that incorporates this text.

Copyright © 2015 CEA, CEDIA and InfoComm International

The J-STD-710 Audio, Video and Control Architectural Drawing Symbols Standard and the J-STD-710 Electronic Symbol Files (Symbols) are copyrighted works protected by U.S. and/or international laws and treaties. CEA, CEDIA and InfoComm International retain all rights in, title to, and ownership of the standard and the J-STD-710 Symbols. Incorporation of the Symbols, in whole or in part, into any drawing, document, or software is restricted and applies solely to the purchasing entity per the End User Agreement. No distribution or development intended for sale of these electronic Symbols is permitted without express written permission from the rights holders and a fully executed Developers Agreement.

Contents

1.	Scope	1
2.	References.....	1
2.1.	Normative References.....	1
2.1.1.	Normative Reference List.....	1
2.1.2.	Normative Reference Acquisition.....	1
2.2.	Informative References.....	1
2.2.1.	Informative Reference List.....	1
2.2.2.	Informative Reference Acquisition.....	2
2.3.	Compliance Notice	2
2.4.	Abbreviations.....	3
2.5.	Definitions	3
3.	Symbols	7
3.1.	Overview.....	7
3.2.	Categories	8
3.3.	Optional Attributes	9
3.4.	Symbol Alignment and Attribute Interference.....	9
3.4.1.	Mounting Attribute Guidelines.....	10
3.4.2.	Other Methods to Show Device Mounting.....	11
3.4.3.	Wall Leader Lines.....	11
3.4.4.	Optional Callout Tags	11
3.5.	Symbol Stretching	13
3.6.	Legends and Schedules	13
3.6.1.	Legend Guidelines	14
3.6.2.	Schedule Guidelines.....	14
3.7.	Symbols Summary	15
ANNEX A.	Symbols Table.....	17
ANNEX B.	Sample Drawings	29
ANNEX C.	Abbreviations	43
ANNEX D.	Design Principles for Symbol Usage (Normative)	54
D.1.	General Design Principles for CAD and Hand Drawings.....	54
D.1.1.	The Architectural Plan	54
D.1.2.	Other Architectural Scale Principles.....	56
D.1.3.	Drawing Paper Sizes.....	57
D.1.4.	Drawing Scale.....	57
D.1.5.	Summary of Scale Factors and Text Size for Common Paper Sizes	58
D.1.6.	Examples Using Architectural Scale Principles	59
D.1.7.	Symbol Stretch	61
D.1.8.	Symbol Insertion Base Point Guideline.....	62
D.1.9.	CAD Principles for Symbol Creation.....	63

Audio, Video and Control Architectural Drawing Symbols Standard

1. Scope

This document provides a standardized set of architectural floor plan and reflected ceiling plan symbols for audio, video and control systems, with associated technologies such as environmental control and communication networks. It also includes descriptions and guidelines for the use of these symbols.

2. References

2.1. Normative References

The following specifications and documents contain provisions that, through reference in this text, constitute normative provisions of this standard. At the time of publication, the editions indicated were valid. All specifications and documents are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the specifications and documents listed here.

2.1.1. Normative Reference List

CSI MasterFormat (2012)

ISO 13567-2: 1998, Technical product documentation – Organization and naming of layers for CAD – Part 2: Concepts, format and codes used in construction documentation

U.S. National CAD Standard, V5, Uniform Drawing System Module 3 – Schedules, Module 5 – Terms and Abbreviations, Module 6 – Symbols (2011)

2.1.2. Normative Reference Acquisition

The Construction Specifications Institute (CSI); 110 South Union Street, Suite 100, Alexandria, VA 22314; Phone: 800-689-2900; Fax: 703-236-4600; www.csinet.org

International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56 - CH-1211 Geneva 20, Switzerland; Phone: +41 22 749 01 11; Fax: +41 22 733 34 30; www.iso.org

National Institute of Building Sciences, 1090 Vermont Avenue N.W., Suite 700, Washington, DC 20005; Phone: 202-289-7000; Fax: 202-289-1092; www.nibs.org

2.2. Informative References

The following specifications and documents contain provisions that, through reference in this text, constitute informative provisions of this standard. At the time of publication, the editions indicated were valid. All specifications and documents are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the specifications and documents listed here.

2.2.1. Informative Reference List

ANSI/TIA/EIA-606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, May (2002)

ANSI/ASHRAE-134-2005, Ventilating, Air-Conditioning, and Refrigerating Systems, February (2005)

BICSI ITS Dictionary, Third Edition, (2006)

CEA TechHome Planning Symbols, (2009)

IEC 60617-DB-12M – Graphical Symbols for Diagrams, May 2012

ISO 81714-1:2010 Design of graphical symbols for use in the technical documentation of products - Part 1: Basic rules

ISO 5455:1979 Technical drawings -- Scales

ISO 3098-0:1997 Technical product documentation -- Lettering.

NECA 100-2013 Symbols for Electrical Construction Drawings (ANSI)

Security Industry Association, Architectural Graphics Standard-CAD Symbols for Security System Layout Release 2.0, (2000)¹

U.S. National CAD Standard, V4, Uniform Drawing System, pg. UDS-04.34, (2007)

U.S. National CAD Standard, V5, Uniform Drawing System Module 3 and 5 – Schedules; Module 6, Div. 28 Symbols, (2011)

2.2.2. Informative Reference Acquisition

American National Standards Institute (ANSI), 25 West 43rd Street, 4th Floor, New York, NY 10036; Phone: 212-642-4900; Fax: 212-398-0023; www.ansi.org

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), 1791 Tullie Circle, N.E., Atlanta, GA 30329; Phone: 404-636-8400; Fax: 404-321-5478; www.ashrae.org

BICSI, 8610 Hidden River Parkway, Tampa, FL 33637; Phone: 813-979-1991; www.bicsi.org

Consumer Electronics Association (CEA), 1919 S. Eads St., Arlington, VA 22202; Phone: 703-907-7060; www.ce.org

IEC, IEC Webstore <http://webstore.iec.ch/>

International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56 - CH-1211 Geneva 20, Switzerland; Phone: +41 22 749 01 11; Fax: +41 22 733 34 30; www.iso.org

NEIS, NECA Order Desk at (301) 215-4504 tel, (301) 215-4500 fax, or orderdesk@necanet.org, or www.neca-neis.org/standards

Security Industry Association (SIA); 635 Slaters Lane, Suite 110, Alexandria, VA 22314; Phone: 703-683-2075; Fax: (703) 683-2469; www.siaonline.org

National Institute of Building Sciences (NIBS), 1090 Vermont Avenue N.W., Suite 700, Washington, DC 20005; Phone: 202-289-7000; Fax: 202-289-1092; www.nibs.org

2.3. Compliance Notice

As used in this document, “shall” and “must” denote mandatory provisions of the standard. “Should” denotes a provision that is recommended but not mandatory. “May” denotes a feature whose presence does not preclude compliance, and implementation of which is optional. “Optional” denotes items that may or may not be present in a compliant symbol.

¹ Reprinted from the Security Industry Association, Architectural Graphics Standard-CAD Symbols for Security System Layout Release® with permission from the Security Industry Association; SIA Copyright 2011

2.4. Abbreviations

ANSI – American National Standards Institute
BIM – Building Information Modeling
CAD – Computer Aided Design
CADD – Computer Aided Design and Drafting
CEA – Consumer Electronics Association
CEDIA – Custom Electronic Design and Installation Association
CSI – Construction Specifications Institute
ISO – International Organization for Standardization
NCS – National CAD Standard
NIBS – National Institute of Building Sciences
RCP – Reflected Ceiling Plan
SIA – Security Industry Association
UDS – Uniform Drawing System

2.5. Definitions

American National Standards Institute (ANSI) – a private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems and personnel in the United States.

Architectural Drawing – a technical drawing of a building or space that indicates structure and makeup with reference to dimensions, material types and relationships between different installed elements.

Attribute – a specific characteristic of a construction element or device that can be represented by abbreviated text placed next to the device's symbol. For example, the letter "C" could indicate a ceiling-mounted loudspeaker. In this standard, the four primary symbol attributes are: M for Mount, T for Primary Technology, T2 for Secondary Technology and X for Legend or Schedule Reference.

AutoCAD® – a software program for creating 2D and 3D drawings developed and marketed by Autodesk®, Inc.

Building Information Modeling (BIM) – the process of generating and managing building data during the building's life-cycle. BIM involves representing a design as objects that carry their geometry, relations and attributes. BIM software design tools allow for extracting different views from a building model for drawing production and other uses. More than just a collection of drawings, it includes product specifications, team schedules, costing, collision detection and information for maintenance. www.nibs.org

Building Model – refers to an electronic representation of a building.

buildingSMART Alliance – an industry consensus-driven organization responsible for establishing and maintaining the U.S. National CAD Standard and U.S. National BIM Standards. They are also responsible to work with other countries in building documentation. Formerly was known as the Facilities Information Council.

Computer Aided Design (CAD) or Computer Aided Design and Drafting (CADD) – refers to the use of a computer to create design documents in fields such as engineering or architecture. The computer's graphics capabilities replace work traditionally done with pencil and paper.

Callout Tag – a shape containing abbreviated or explanatory text that references symbols or architectural details via a leader line.

Construction Documents – the drawings and written specification documents assembled to communicate project design for construction and administration of the construction contract.

Construction Specifications Institute (CSI) – an organization that maintains and advances the standardization of building information management and education of project teams to improve facility performance.

Drawing Area – refers to the portion of a drawing sheet containing the scaled representation of the model. In **AutoCAD®** this is often called a Viewport. A single drawing sheet may have several drawing areas. This technique is often used to show details and each drawing area will have its own drawing scale.

Drawing Layer – a component of CAD software that enables the user to organize information in a drawing on different virtual drawing overlays so they can be viewed separately. For example, separate layers might be made for AV equipment, light fixtures and HVAC ducts.

Drawing Program – a computer program or hand drawing where the paper size is selected and all other objects are scaled down to fit on the paper.

Drawing Scale – defines the specific ratio between the dimensions of an object or structure drawn on paper and the full-scale dimensions. The drawing scale relationship is presented as one drawing unit = one full-scale unit (e.g., ANSI: $\frac{1}{4}'' = 1' 0''$ or ISO: 1:50).

Drawing Scale Marker – a linear marker or symbol placed on a drawing to graphically show $\frac{1}{2}$, 1 and 2 times the scale based upon the drawing dimension units (e.g., mm, cm, inches or feet).

For example, when using the US Customary system (ANSI), $\frac{1}{8}'' = 1$ foot, this means $\frac{1}{8}''$ length on the drawing is equal to a one foot length in reality.

When using the metric system (ISO or SIA), 1/100 is the most common scale for architectural drawings, where one unit of length on a drawing equals 100 units of the same length in reality.

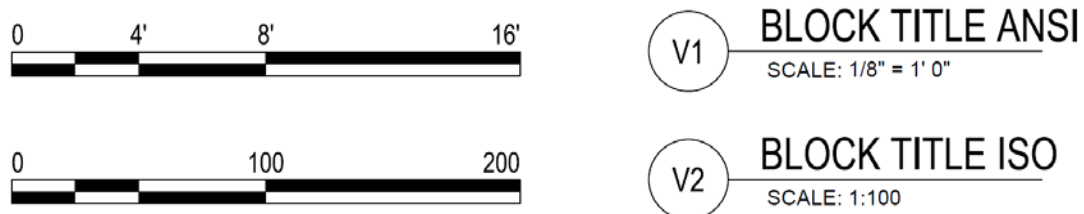


Figure 1: Drawing Scale Marker Examples

Drawing Schedule – a document identifying all the architectural drawings in a package of information for the construction of a building, system or other element. Typically the schedule will define a numbering system, titles of drawings, revision status and other core information to assist the reader in finding the drawing they wish to review.

Drawing Set – the set of drawing sheets included in the construction contract documents.

Elevation – an architectural drawing type representing a horizontal view of a vertical wall or element in a building. Typically used to indicate the height devices are mounted and specific construction details for items such as built-in furniture, windows and doors.

Floor Plan – an architectural drawing representing the vertical view (from above) of the floor of a building, including indications of all walls, doors, windows and other items. Depending on the type of floor plan (General Arrangement, Partitions, etc.), portable items such as desks, chairs and the like may or may not be shown.

- Icon** – a drawing, picture or symbol resembling and representing a device, object or concept. The word icon is often interchangeable with symbol.
- International Organization for Standardization (ISO)** – a non-governmental network made up of one representative from the National Standards Institute of 148 countries. ISO publishes worldwide proprietary, industrial and commercial standards.
- J-STD 710** – refers to this standard of Audio, Video and Control Architectural Drawing Symbols, a joint standard with a set of symbols created and owned by CEA, CEDIA and InfoComm International.
- Leader** – a line or a spline (curved line) that connects a note, dimension or symbol to a point or item. A leader line **may** have an optional arrowhead.
- Legend** – a table or list on an architectural drawing identifying what each symbol represents. It often is placed in the drawing title block. A legend normally has two columns of paired information, the symbol and the description, but may also include a reference column with a link to more information located elsewhere in the drawing. A legend is also known as a key, list or index. Legends are not schedules.
- MasterFormat®** – a classification and indexing system for organizing construction data, particularly construction specifications. This master list of numbers and titles classified by work results or construction practices is used primarily to organize project manuals, detailed cost information and relate drawing notations to specification sections.
- Master Format Number** – a classification and indexing system for organizing construction data, particularly construction specifications. This master list of numbers and titles classified by work results or construction practices is used primarily to organize project manuals, detailed cost information and relate drawing notations to specification sections.
- Model Space** – refers to drawing an object or structure in AutoCAD at full-scale where one drawing unit represents the actual size unit (e.g., one inch drawing unit = one inch actual dimension). For example, a 20' x 30' (6m x 0.9m) room would be drawn using one-foot drawing units. There is no scaling within Model Space.
- Mounting Type** – the method of attaching a device and may be identified on an architectural drawing by the abbreviated text of an attribute of a symbol (e.g., W-Wall, C-Ceiling, F-Floor)
- National CAD Standard (NCS)** – a collaborative effort in the United States between the National Institute of Building Sciences (NIBS), the American Institute of Architects (AIA), and the Construction Specifications Institute (CSI). The result is a unified approach to the organization, classification and collaboration of electronic building design data integrated into CAD software and Building Information Modeling, BIM. The complete name of the NCS is the U. S. National CAD Standard for Architecture, Engineering and Construction (A/E/C).
- National Institute of Building Sciences (NIBS)** – a non-profit, non-governmental organization that successfully brings together representatives of government, the professions, industry, labor and consumer interests and regulatory agencies to focus on the identification and resolution of problems and potential problems that hamper the construction of safe, affordable structures for housing, commerce and industry in the United States.
- Paper Space** – refers to the scaled representation of an AutoCAD model on paper, known as the layout view. For example, a 20' x 30' (6m x.9m) room in Model Space (actual size) would need to be scaled down significantly to fit on E-Size --34" x 44" (860x1120 mm) paper.
- Port** – a wired interface. In a building it is usually a wall, floor or ceiling-mounted plate used for connecting external electronic equipment.

Primary Technology – an abbreviated text attribute of a symbol representing the device's most important feature or type. For example, the primary technology attribute of a loudspeaker symbol could be M for Monitor or S for Subwoofer.

Reflected Ceiling Plan (RCP) – a drawing which shows the items located on the ceiling of a room or space. It is called “reflected” because it is drawn to display a view of the ceiling as if it was reflected onto a mirror on the floor. The RCP has the same orientation as the floor plan associated with it.

Scale – the ratio of measuring units expressing a proportional relationship between a drawing and the full-size item it represents. Common drawing scales used on architectural drawings from ANSI are $1/4" = 1' 0"$ or $1/8" = 1' 0"$, and from ISO are 1:50 or 1:100.

Schedule – a grouping of related devices or materials presented in table form with a heading. The information is organized in rows and at least three columns to easily present related information. Schedules are typically placed in the General Schedules section in a drawing set or in a separate document from the drawing set. If the schedule is small, it **may** be placed directly on the drawing page.

Secondary Technology – an abbreviated text attribute of a symbol representing the device's second most important feature or type. For example, the secondary technology attribute of a loudspeaker symbol could be P for Powered or WLS for Wireless.

Security Industry Association (SIA) – a trade association representing the manufacturers, service providers and integrators of electronic physical security equipment.

Symbol – a graphical representation of a device or object by association, resemblance or convention used in a diagram or architectural drawing.

Symbol Model Size – refers to the floor plan symbol which has been scaled In Model Space (where $1" = 1"$ or 25.4mm x 25.4mm) using the scaling factor so that the symbol will be $1/4" \times 1/4"$ (6.35mm x 6.35mm) in paper space [e.g., in $1/8"$ scale, the symbol is scaled by 96X and 96Y (@1:100, the symbol is scaled by 100X and 100Y)].

Symbol Stretch – refers to adjusting the Floor Plan Symbol to appear more closely to the actual shape or size of the object the symbol represents, along either the X or Y plane, or both the X and Y planes.

Tag – an abbreviated way to communicate additional properties for a drawing object on an architectural drawing. The tag is normally a square, hexagon or circle shape with three attributes plus a leader line connecting the tag to the drawing object.

Text Height – the height of the text in a symbol block or shape on a printed architectural drawing. Dependent upon the selected drawing software and the font type, printed text height will vary. For example, in Visio CAD software, an Arial Standard 9 pt font gives the text height of $3/32"$.

Title Block Area – the portion of a drawing sheet containing project, client, designer, sheet identification, sheet revision and sheet management information. The title block area is normally on the right side border of the sheet.

Uniform Drawing System (UDS) – a uniform set of standards made up of eight interrelated modules consisting of standards, guidelines and other tools for the organization and presentation of drawing information used for the planning, design, construction and operation of facilities. UDS includes such information as title blocks, drawing naming, schedules, line widths and terms/abbreviations.

Visio® – a Microsoft Windows software program that uses vector graphics to create 2D technical diagrams.

3. Symbols

3.1. Overview

Standardized symbols offer a simple, yet powerful, way to communicate technologies in architectural drawings for use by architects, designers, builders, integrators and installation contractors. Symbols were created to be hand-drawn and implemented in CAD or BIM software.

Architects, designers and installation contractors should use these symbols to indicate device locations on all floor plan and reflected ceiling plan documentation. Sample plans are included in this standard to demonstrate use of the symbols.

Manufacturers should incorporate symbols in their documentation and training where applicable.

Manufacturer user manuals should indicate the use of symbols and reinforce this standard.

It is recognized that while a set of symbols is included in this standard, there may be circumstances in which the defined symbols are inappropriate for project requirements. This type of situation may relate to technologies developed after this standard's release or to particular approaches to project documentation in a given region, country, project or design process.

In such circumstances, it is acceptable to use alternative symbol representations, provided the following guidelines defined in this standard regarding Scale, Scaling, Attributes, Tags, Legends and Schedules are followed.

Some existing symbols from the National CAD Standard (NCS)² are included as a service to the audio/video industry to provide a baseline of commonly used symbols from affiliated industries. New symbols in this standard were designed based on the following criteria:

- Compliant with the National CAD Standard
- Simple and recognizable shapes
- Easily CAD-drawn, and hand-drawn for use in the field
- Flexible text attributes to allow for an unlimited number of device variations
- Flexible callout tags to allow for extensive installation information
- Use of common industry terms and abbreviations

A symbol consists of a circle, square or distinctive shape. All distinctive shaped symbols **must** fit within the boundaries of a 3/8" (10mm) circle.

See **Annex D** for additional information on use of symbols in CAD software.

All symbols, line weights and text, as identified in **Figure 2** below, **must** appear at these specifications when drawn or printed at the original drawing scale.

Dependent upon the selected drawing software and the font type, printed text height will vary. For example, in Visio CAD software, an Arial Standard 9 point font gives the text height of 3/32".

Symbols and text height **must** conform to the following parameters as shown in **Figure 2**.

² Reprinted from the United States National CAD Standard® with permission from the National Institute of Building Sciences; NIBS Copyright 2011