FAA-STD-002g
August 29, 2008

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

STANDARD

ENGINEERING

DRAWING PREPARATION & SUPPORT

FOREWORD

This standard was updated by the National CAEG Program Office (Air Traffic Control Facilities Operational Services) and has adopted the nationally accepted drawing practices of the American National Standards Institute (ANSI), the American Institute of Architects (AIA) and the Military to the extent specified herein. It will assist in developing a more efficient and effective means for management and technical data control of drawings prepared by and for the Federal Aviation Administration (FAA) and the National Airspace System (NAS) Program. This standard provides:

     a.   Drawing practices and format material for the preparation of architectural and engineering drawings.

     b.   Definitions and examples of the types of facility and standard drawings to be prepared by and for the Federal Aviation Administration.

     c.   Procedures for the creation of drawing title blocks.

     d.   Numbering, coding and identification procedures for drawings, associated lists, and documents referenced on these drawings and associated lists.

     e.   Practices applicable to Computer Aided Design and Drafting (CADD).

Changes from the previous version of this standard focus on:

     a.   Current technological trends that are gaining widespread acceptance in government and industry.

     b.   Greater use of electronic deliverables and delivery media.

     c.   Synchronization with standard industry practices.

     d.   Greater FAA-wide standardization to take full advantage of technological opportunities.

MANUAL REVISION HISTORY

DATE	VERSION	DESCRIPTION
3/11/1987	002C	
2/21/1997	002D	
9/21/1999	002E	Major rewrite to address adoption of CADD technology, also introduced standard title block and drawing numbers.
8/9/2002	002E, change 1	
1/23/2004	002E, change 2	Adopted FSEP equipment listing, modified Section 3.1.5.1 Drawing Number Structure, modified Equipment discipline, added Security Discipline, added Level/Layer sheets for NAS Equipment and Security
6/17/2005	002F	Updated due to technical advances in drafting software. Textural and illustrative clarifications.
8/29/2008	002G	Minor updates to Section 2.1 Government Documents, organized Orders and Standards list. Section 3.1.5.1 Drawing Number Structure, expanded the Non-NAS drawing number to contain up to 10 characters to accommodate the JCN number expansion. Section 4.1.3 Media Labeling, added the use of FOUO and SSI to the labeling list.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1,2,3, and 8. In block 1, both the document number and the revision letter should be given.
2. The sublimiter of this form must complete blocks 4,5,6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE	1. **DOCUMENT NUMBER** STD-002F	2. DOCUMENT DATE *(YYMMDD)*

2. DOCUMENT TITLE

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed**.**

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	**b. ORGANIZATION**	
c. ADDRESS *(Include Zip Code)*	**d. TELEPHONE** *(Include Area Code)* **(1) Commercial** **(2) AUTOVON** *(If applicable)*	**7. DATE SUBMITTED** *(YYMMDD)*

8. PREPARING ACTIVITY

a. NAME Steven Kalabokes	b. TELEPHONE *(Include Area Code)* **(1) Commercial 202.267.7411** **(2) AUTOVON**
c. Address *(Include Zip Code)* AWA Headquarters 800 Independence Avenue, SW Washington, DC 20591-0004	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:

DD Form 1426, Oct 89   *Previous editions are obsolete*   198-290

Changes to this standard may be submitted using the Standardization Document Improvement Proposal (form number DD Form 1426, Oct 89), shown above, to the CAEG Program Office. Alternately, changes may be submitted using the CAEG web site (http://caeg.faa.gov/index.cfm?content=423&navVar=8&navSubVar=84) and filling in the Document Improvement Request on-line form.

This document should be reviewed and updated every three to five years as changes in the CADD or Drawing Standards industry warrant.

1. SCOPE.

1.1 Standards.
This standard prescribes general requirements for the preparation and revision of architectural and engineering drawings that are prepared for facilities by and for the Federal Aviation Administration (FAA), using the two FAA-accepted CADD software suites, AutoDesk AutoCAD and Bentley MicroStation.

1.2 Classification.
This standard shall apply, but not be limited to the following drawing types regardless of source:

a) Construction drawings for new and existing facilities.

b) Installation drawings for electronic equipment.

c) FAA Standard engineering drawings.

2. APPLICABLE DOCUMENTS.

2.1 Government Documents.

Standards

    Military

MIL-STD-12	Abbreviations for Use on Drawings and in Specifications, Standards and Technical Documents
MIL-STD-14	Architectural Symbols
A/E/C CADD Tri-Service Standards	Tri-Service CADD/GIS Standards

Other Publications

NAS-SS-1000	Vol. 6 Facility Requirements for the National Airspace System
FAA 7350.6	Location Identifiers
FAA FSEP	Facilities, Services and Equipment Profile

Orders

DOT Order 1360.6	Graphic Standards
DOT Order 1640.5	Chapter 5, For Official Use Only Information (FOUO)
FAA Order 1000.15	Glossary
FAA Order 7340.1	Contractions
FAA Order 1800.66	Configuration Management Policy
FAA Order 1600.75	Protecting Sensitive Unclassified Information
FAA Order 6000.55A	National Facility Drawing Library Procedure

Standards

FAA-STD-058	FAA Standard Practice, Facility Configuration Management
FAA-STD-059	FAA Standard Practice, NAS Terminal Facilities Master Plan Guidelines For Existing Terminal Facilities

2.2 Commercial Documents.

Standards

ANSI/AWS A2.4	Symbols for Welding & Nondestructive Testing
ANSI/AWS A3.0	Welding Terms and Definitions
ANSI B1.1	Unified Screw Threads
ANSI/1EEE 2.16	Reference Designations for Electrical and Electronics Parts and Equipment
ANSI/1EEE 91	Graphic Symbols for Logic Functions
ANSI Y1.1	Abbreviations for use on Drawings and Text
ANSI Y14.1	Drawing Sheet Size and Format
ANSI Y14.2	Line Conventions and Lettering
ANSI Y14.5	Dimensioning and Tolerancing
ANSI Y14.6	Screw Thread Representation
ANSI Y14.7.1	Gear Drawing Standards - Part 1 for Spur, Helical, Double Helical and Rack
ANSI Y14.7.2	Gear and Spline Drawing Standards Part 2 - Bevel and Hypoid Gears
ANSI Y14.13	Mechanical Spring Representation
ANSI Y14.15	Electrical and Electronics Diagrams
ANSI Y14.15	Interconnection Diagrams
ANSI Y14.17	Fluid Power Diagrams
ANSI Y14.26.3	Dictionary of Terms for Computer-Aided Preparation of Product Definition Data
ANSI Y32.2	Graphic Symbols for Electrical and Electronic Diagrams
ANSI Y32.4	Graphic Symbols for Plumbing Fixture for Diagram used in Architecture & Building Construction
ANSI Y 32.9	Graphic Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction
AIA	CAD Layer Guidelines
National CADD Standards	Published by the National Institute of Building Standards (NIBS)

2.3 Order of Precedence.
In the event of conflict between the documents referenced in Sections 2.1 and 2.2 and the contents of this standard pertaining to standard engineering drawing practices, the contents of this standard shall be considered the superseding requirement. Any contracts let after the release date of FAA STD-002F, pertaining to standard engineering drawing practices, shall adhere to this standard. Any contracts previously awarded shall adhere to the Standard revision level approved at the time of contract award. See Manual Revision Table on page iii for FAA STD-002 approval dates.

3. DRAWING REQUIREMENTS.

3.1 Drawing Production.

3.1.1 Drawing File Format.
1. Vector drawings shall be created in native AutoCAD or MicroStation file formats (DWG or DGN). Use of Drawing Exchange Format (DXF) should be avoided. Electronic drawing deliverables from contractors shall comply with Section 4.0, Electronic Deliverables, of this standard. The preferred delivered drawing file format shall be coordinated with the local CADD Manager.
2. Only one drawing or one model shall be included in each CADD file.
3. Raster file format drawings shall be generated in Tagged Image File Format (TIFF) Group 4.
4. CADD practices to avoid: custom fonts, custom patterns, custom line types or styles (other than those depicted in Figure 3-11 and 3-12), nested blocks, nested Xrefs or nested reference files and infinite lines.

3.1.2 Creation of CADD Files.
All CADD drawing files should be created at full-scale (1-to-1). Drawing borders and text heights should be scaled to fit the full-scale drawing model. Refer to Table 3-1, Scale Factor and Text Height Conversion Chart for standard engineering, architectural and mapping scale factors and text heights to be used with full size drawings.

Text Height					
Plotted Text Height		1/10"	1/8"	5/32"	1/4"
Plotted Scale	Scale Factor				
1/32"=1'-0"	384	38.4"	4'	5'	8'
1/16"=1'-0"	192	19.2"	2'	2.5'	4'
1/8"=1'-0"	96	9.6"	12"	15"	24"
3/16"= 1'-0"	64	6.4"	8"	10"	16"
1/4"=1'-0"	48	4.8"	6"	7.5"	12"
3/8"= 1'-0"	32	3.2"	4"	5"	8"
1/2"=1'-0"	24	2.4"	3"	3.75"	6"
3/4"=1'-0"	16	1.6"	2"	2.5"	4"
1"= 1'-0"	12	1.2"	1.5"	1.875"	3"
1 1/2"=1'-0"	8	.8"	1"	1.25"	2"
3"= 1'-0"	4	.4"	.5"	.625"	1"
6"= 1'-0"	2	.2"	.25"	.3125"	.5"
12"= 1'-0"	1	.1"	.125"	.15625"	.25"
1"= 10'-0"	120	1'	1.25'	1.5625'	2.5'
1"=20'-0"	240	2'	2.5'	3.125'	5'
1"=25'-0"	300	2.5'	3.125'	3.90625'	6.25'
1"=30'-0"	360	3'	3.75'	4.6875'	7.5'
1"=40'-0"	480	4'	5'	6.25'	10'
1"=50'-0"	600	5'	6.25'	7.8125'	12.5'
1"=60'-0"	720	6'	7.5'	9.375'	15'
1"=100'-0"	1200	10'	12.5'	15.625'	25.0'
1"=200'-0"	2400	20'	25'	31.25'	50'
1"=250'-0"	3000	25'	31.25'	39.0625'	62.5'
1"=300'-0"	3600	30'	37.5'	46.875'	75'
1"=400'-0"	4800	40'	50'	62.5'	100'

1"=500'-0"	6000	50'	62.5'	78.125'	125'
1"=600'-0"	7200	60'	75'	93.75'	150'
1"=1000'-0"	12,000	100'	125'	156.25'	250'
1=10	10	1	1.25	1.5625	2.5
1=20	20	2	2.5	3.125	5
1=30	30	3	3.75	4.6875	7.5

Table 3-1, Scale Factor and Text Height Conversion Chart

3.1.2.1 Drawing Sheet Format.

FAA-approved drawing sheet formats include common drawing features such as boundary geometry, title block data, filename, pathname, zoning guides, and title block geometry. Copies of the approved sheet formats will be provided by the CAEG Program Office to both FAA and support organizations. All FAA offices and support organizations are required to use these formats. The CAEG PO will be providing a website for 002 Standard drawing borders and logos used in creation of engineering drawings for the FAA. See Table 5-1, Internet URLs.

3.1.2.2 Drawing Sizes.

The FAA standard engineering drawing paper size is ANSI D (22" X 34"). Other sizes are allowed as needed. Drawing sheet size and margins must follow the specifications shown in Table 3-2, Standard Drawing Sizes. Apply ANSI Y14.1 for any information not provided in this standard, but required on drawing sheet size.

Size Designation	Vertical	Horizontal	Top Margin and Bottom Margin	Left Margin	Right Margin
B	11"	17"	0.50"	1.50"	0.50"
D	22"	34"	0.50"	1.50"	0.50"
E	34"	44"	0.50"	1.50"	0.50"
F	28"	40"	0.50"	1.50"	0.50"

Table 3-2, Standard Drawing Sizes

3.1.2.3 Sizing Drawing Formats for Scaled Drawings.

Each facility shall be drawn in the CADD file at full size. Table 3-3, Sheet Sizes, Drawing Field and Scale Factors, provides a cross reference of plot scales to actual drawing field sizes.

Plot Scale	Drawing Field Size (H x W)		
	D (21" x 24.5")	E (33" x 34.5")	F (27" x 30.5")
1/32"=1'-0"	672' x 784'	1056' x 1104'	864' x 976'
1/16"=1'-0"	336' x 392'	528' x 552'	432' x 488'
1/8"=1'-0"	168' x 196'	264' x 276'	216' x 244'
3/16"= 1'-0"	112' x 130.7'	176' x 184'	144' x 162.7'
1/4"=1'-0"	84' x 98'	132' x 138'	108' x 122'
3/8"= 1'-0"	56' x 65.3'	88' x 92'	72' x 81.3'
1/2"=1'-0"	42' x 49'	66' x 69'	54' x 61'
3/4"=1'-0"	28' x 32.7'	44' x 46'	36'x 40.7'
1"= 1'-0"	21' x 24.5'	33' x 34.5'	27' x 30.5'
1 1/2"=1'-0"	14' x 16.3'	22' x 23'	18' x 20.3'
3"= 1'-0"	7' x 8.17'	11' x 11.5'	9' x 10.17'
6"=1'-0"	3.5' x 4.08'	5.5' x 5.75'	4.5' x 5.08'
12"=1'-0"	1.75' x 2.04'	2.75' x 2.875'	2.25' x 2.54'
1"= 10'-0"	210' x 245'	330' x 345'	270' x 305'
1"=20'-0"	420' x 490'	660'x 690'	540' x 610'
1"=25'-0"	525' x 612.5'	825' x 862.5'	675' x 762.5'
1"=30'-0"	630' x 735'	990' x 1035'	810' x 915'
1"=40'-0"	840'x 980'	1320' x 1380'	1080' x 1220'
1"=50'-0"	1050' x 1225'	1650' x 1725'	1350' x 1525'
1"=60'-0"	1260' x 1470'	1980' x 2070'	1620' x 1830'
1"=100'-0"	2100' x 2450'	3300' x 3450'	2700' x 3050'
1"=200'-0"	4200' x 4900'	6600' x 6900'	5400' x 6100'
1"=250'-0"	5250' x 6125'	8250' x 8625'	6750' x 7625'
1"=300'-0"	6300' x 7350'	9900' x 10,350'	8100' x 9150'
1"=400'-0"	8400' x 9800'	13,200' x 13,800'	10,800' x 12,200'
1"=500'-0"	10,500' x 12,250'	16,500' x 17,250'	13,500' x 15,250'
1"=600'-0"	12,600' x 14,700'	19,800' x 20,700'	16,200' x 18,300'
1"=1000'-0"	21,000' x 24,500'	33,000' x 34,500'	27,000' x 30,500'
1=10	210 x 245	330 x 345	270 x 305
1=20	420 x 490	660 x 690	540 x 610
1=30	630 x 735	990 x 1035	810 x 915

Table 3-3, Sheet Sizes, Drawing Field and Scale Factors

3.1.2.4 Appearance.

Figure 3-1, Drawing Appearance, shows the typical features as applicable for the appearance of CADD-produced drawings. The figure shows the location of these features in a construction drawing. These features are:

- Border
- Title Block
- Contractor Identification Block
- Production Location

- Drawing Field
- Notes
- Plot Stamp (Full path name, Date, Time, User name,)
- For Official Use Only/ Sensitive Security Information Text

- Key Plan
- Graphic Scales
- Configuration Management (CM) Identification

- North Arrow
- Legend
- Professional Engineering Seal

NOTE: The preferred orientation of the north arrow should be pointing toward the top or the left-hand side of the sheet.
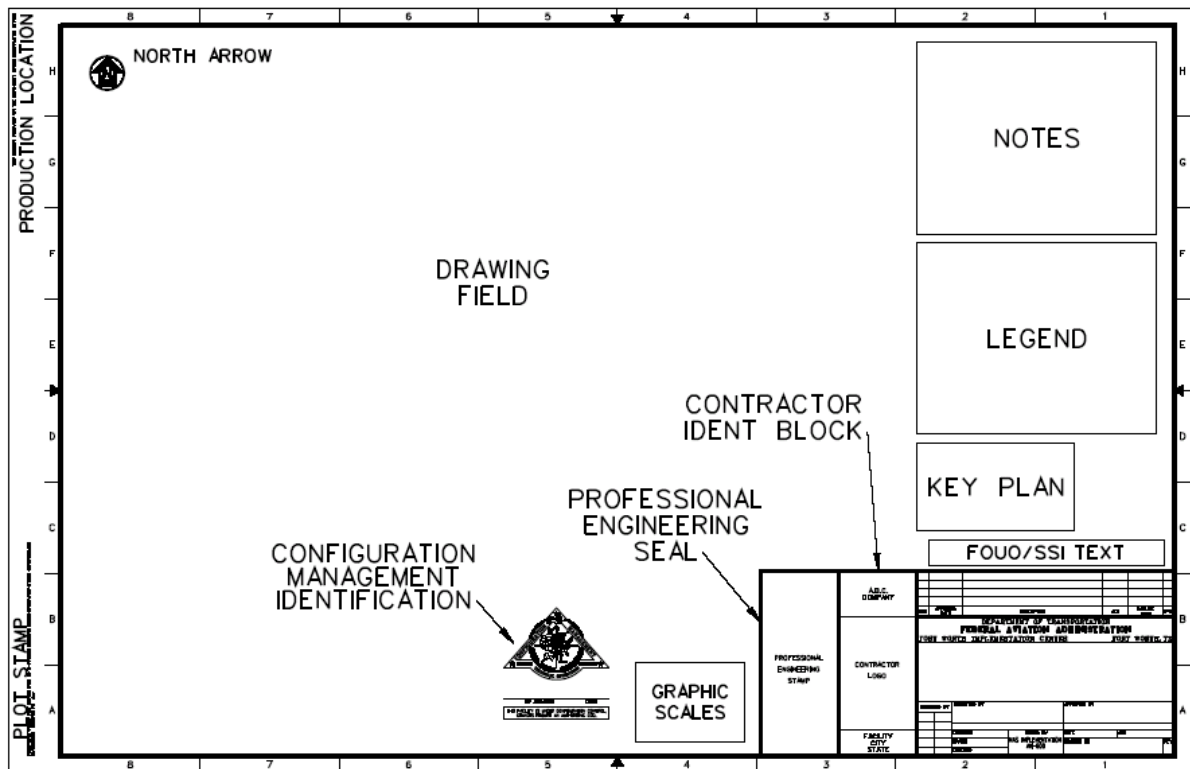
Figure 3-1, Drawing Appearance

3.1.3 Border.

The border is the rectangular frame surrounding the drawing. It contains a drawing zone system. The alphabetic characters are located on the left and right sides and the numeric characters are on the top and bottom. The zones are referred to using an alphanumeric description, such as Zone F6 depicted in Figure 3-2, Drawing Zone System.
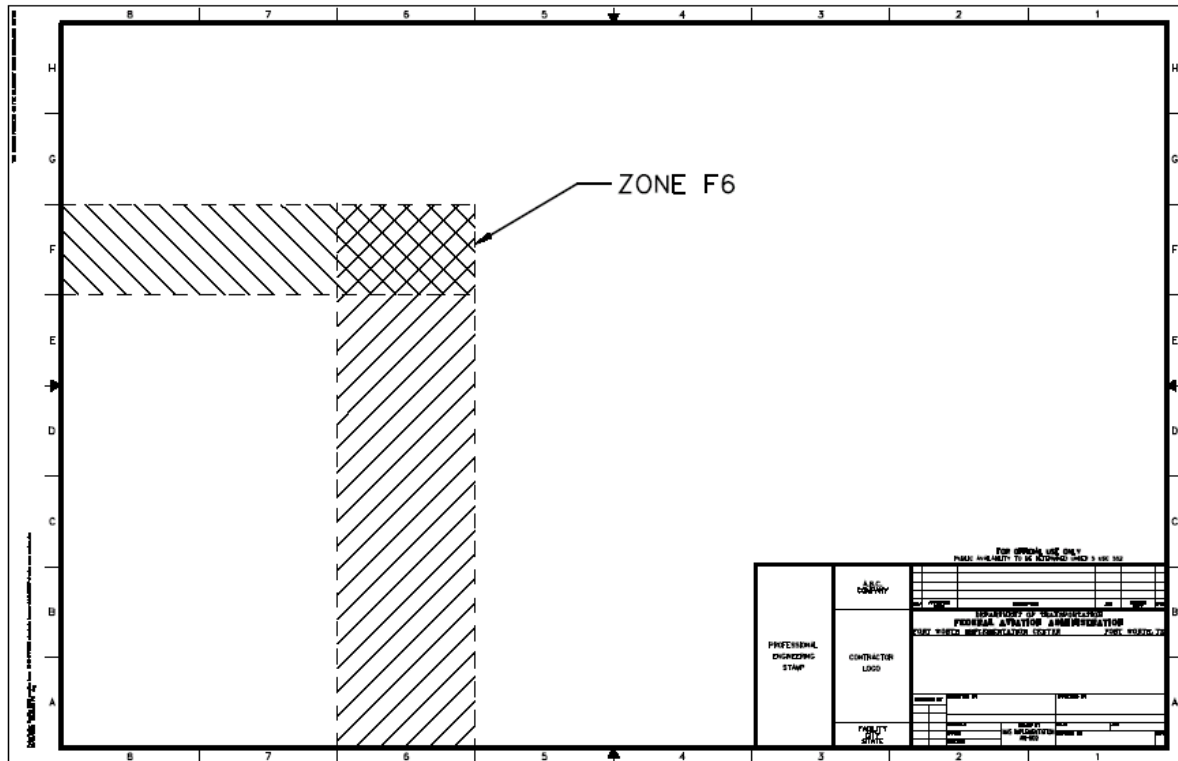
Figure 3-2, Drawing Zone System

3.1.4 Title Block.

The title block shown in Figure 3-3, Drawing Title Block, is used for recording drawing data. The title block is located in the lower right corner and just inside the drawing zone boundary. It is sub-divided into rectangular areas that contain specific text data such as drawing title, drawn by, approved by, date and drawing number. All text in the title block shall be in upper case.

The title block in Figure 3-3 is subdivided into three main sections. The revision section is located at the top. The authorizing agency section is located in the middle and the main section at the bottom. The main section of the title block contains the title, signatures, drawing identification and the issuing office. All title blocks for drawing sizes D to F must conform to Figure 3-3. The title block overall dimensions are 7-3/8" x 5-5/16".

Items labeled in Figure 3-3 are described in Table 3-4, Drawing Title Block Descriptions. The contractor logo shall be located to the left of the title block and shall not exceed 2-1/4"

in width. Any Professional Engineering seal shall be located to the left of the Contractor identification block (or to the left of the title block, if the Contractor block is absent) and shall not exceed 2-1/4" in width. The Configuration Management stamp, if needed, is to be located to the left of any graphic scales, space permitting, as shown in Figure 3-1.

Every drawing must also include the text "For Official Use Only" and "Public availability to be determined under 5 USC 552" as specified in FAA Order 1600.75, Appendix D, placed centered over the drawing title block.

When a drawing set has been selected as Sensitive Security Information (SSI) the drawing set will include text as specified in FAA Order 1600.75 Appendix E, Marking Sensitive Security Information. This text will be placed centered above the title block replacing the FOUO text.

Figure 3-3, Drawing Title Block

ITEM	BLOCK DESCRIPTION	TEXT SIZE	ITEM	BLOCK DESCRIPTION	TEXT SIZE
1	REVISION LEVEL (LETTER)	0.100	15	LATEST REVISION LEVEL	0.1563
2	REVISION APPROVED DATE	0.100	16	DRAWING NUMBER	0.1563
3	REVISION DESCRIPTION	0.100	17	SIGNATURE DATE	0.100
4	JCN AUTHORIZING REVISION	0.100	18	DIVISION ISSUED BY (ISSUING ORGANIZATION)	0.132
5	ACTUAL REDLINING DATE	0.100	19	SUBMITTER'S TITLE	0.100
6	APPROVED BY BLOCK	0.100	20	DESIGNED BY	0.080
7	DOT	0.120	21	DRAWN BY	0.080
8	FAA	0.150	22	CHECKED BY	0.080
9	ISSUING FAA OFFICE, CITY, ST	0.120	23	SUBMITTED SIGNED BY	0.075
10	AIRPORT OR LOCATION	0.100	24	REVIEWED BY/DATE	0.125
11	STATE (2 CHARACTERS)	0.125	25	CITY	0.125
12	APPROVED SIGNED BY	0.075	26	DRAWING TITLE	0.200
13	APPROVER'S TITLE	0.100	27	FACILITY TYPE	0.1875
14	INITIAL JCN	0.100	28	SECURITY STAMP TEXT	0.125/.100

Table 3-4, Drawing Title Block Descriptions

3.1.5 Drawing Numbering.
It is essential that the drawing numbering schema be one that:
- Facilitates electronic archiving, retrieval and interchange.
- Readily relates the drawing of the facility or object being represented.
- Facilitates unique identification.
- Promotes reuse of existing drawings.

3.1.5.1 Drawing Number Structure.
The drawing number structure for all engineering drawings covered by this standard shall consist of a maximum of 23 characters as shown below.   See Figure 3-4A for Drawing Number Structure.

```
XXXX-X-XXXXX[XXX]-XXXX[-XX]
```
Configuration Management (2)
Drawing Sequence Number (4)
Facility Type (2-8)
Drawing Size (1)
Location Identifier (3-4)
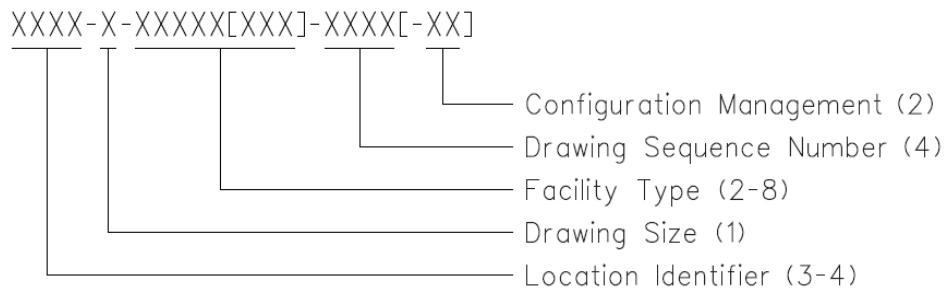
Figure 3-4A, Drawing Number Structure

The portions of the drawing number shown in square brackets ([ ]) are used as required. The brackets are for reference only and are not included in the drawing number.

The location identifier is assigned to each airport and FAA facility listed in the FAA 7350.6 Location Identifiers or Facilities, Services Equipment Profile publications. If a facility has

multiple location identifiers associated with different runways, the airport identifier shall be used in all cases.

The drawing size is indicated with an upper case letter (i.e. D, E or F).

Facilities may be co-located with another facility. More than one facility may be tied to a single Location ID. Facilities may be related to a runway. Each of the following examples addresses these unique situations.

- Facilities co-located with another facility will be assigned the major facility's facility type. An example would be a DME co-located with a GS would use the GS as the FAC type.
- Multiple facilities with the same location identifier shall have a letter appended after the facility type. An example would be SLC-D-RTRA-XXXX, SLC-D-RTRB-XXXX.
- Facilities related to runways shall append the runway number to the facility type. An example would be SLC-D-GS13L-XXXX.

NAS Equipment Drawing numbers for an ARTCC facility shall be numbered with the equipment acronym used in place of the facility type. An example would be a DMN drawing at the Seattle ARTCC would be ZSE-D-DMN-Q001.

The drawing sequence number for a construction drawing starts with an upper case letter specifying the discipline followed by a three digit sequential number. An example of a construction drawing number is ORD-D-ATCT-A001. The discipline codes are listed below:

A-architectural	G-general	Q-NAS equipment	Z-contractor/shop
C-civil	H-hazardous material	R-real estate/lease	drawing
D-demolition	L-landscape	S-structural	
E-electrical	M-mechanical	T-telecommunications	
F-fire protection	P-plumbing	Y-security	

NOTE: High voltage power connections will be shown on Electrical Discipline (E-Electrical) drawings and low voltage power connection will be shown on NAS Equipment (Q-NAS Equipment) drawings.

Any Real Estate drawings will require the use of the Real Estate discipline designation within the drawing number. Real Estate drawings will utilize levels according to the Civil discipline in Appendix A. An example of a Real Estate drawing number would be ATL-D-RCAG-R001.

The drawing number for a Configuration Management baseline drawing shall insert a "-BL" at the end of the drawing number after the Drawing Sequence Number. The drawing number for a Configuration Management end-state drawing shall insert an "-ES" in this same location. An example of a CM baseline drawing number would be ORD-D-TRACO-A001-BL.
Regional/National Standards shall reference the two-letter regional code plus the letters "SD" representing "standard" in place of the Location Identifier. An example of a national

standard drawing number would be WASD-D-ATCT-C001. The regional codes are as follows:

AL – Alaska	CE – Central	CT – Technical Center
EA – Eastern	GL – Great Lakes	NE – New England
MC – Monroney Center	NM – Northwest Mountain	SO – Southern
SW – Southwest	WA – Washington, DC	WP – Western Pacific

Refer to the FSEP web site at http://intranet.faa.gov/ats/aaf/aop/200/FSEP/index.htm to obtain facility information for the creation of a drawing number. This web site contains all of the authorized facility and equipment types used within the FAA. Drawing numbers are to be assigned using facility type acronyms, not equipment type acronyms. For example: Terminal Voice Switch (TVS) is a valid equipment type entry in FSEP. Small Tower Voice Switch (STVS) and Enhanced Terminal voice Switch (ETVS) are types of TVS equipment. However, since TVS is not a facility acronym, the associated drawing numbers would be assigned the appropriate facility type acronym (ATCT or TRACO). Subsets of the FSEP listing can be used at the regional level; however the information used must be taken from the FSEP listing. Additional facility or equipment types can be requested for inclusion into the FSEP by obtaining and filling out an electronic form from the CAEG Program Office. The CAEG PO will act as a clearing point for the FSEP office to avoid duplicate requests. Two additional facilities not listed in the FSEP will be allowed:

ALD – Airport Layout Drawing   LAAS – Local Area Augmentation System

Non-NAS facility drawings will use a slightly different number configuration. Any drawings created for these facilities will use the format LID-Project Number-Drawing Sequence Number. An example of a drawing number for the Technical center at Atlantic City would be ACT-1234567890-A001 for an architectural drawing. See Figure 3-4B, Drawing Number Structure for Non-NAS Facilities.

XXXX-XXXXXXXXXX-XXXX

Drawing Sequence Number (4)
Project Number (10)
Location Identifier (3-4)
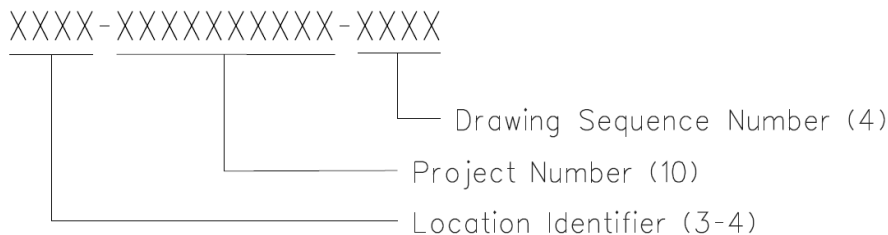
Figure 3-4B, Drawing Number Structure for Non-NAS Facilities

3.1.6 Arrangement of Drawings.

3.1.6.1 Construction Drawing Sets.
The drawings in a construction drawing set are listed by discipline in Table 3-5, Construction Drawing Set. These drawings are commonly used in identifying a complete set of drawings for the construction of a new facility. Drawing sets for the construction of a

facility modification must consist of a subset of the drawings listed in this table.
Construction drawing sets shall be arranged by discipline in the following order.

DISCIPLINE	CODE	DRAWING DESCRIPTION
General	G	Cover, Index, Abbreviations, Symbols, Staging and Safety Plans
Real Estate/Lease	R	Property Boundaries and Legal Descriptions
Civil	C	Legend
Civil	C	Site
Civil	C	Boring Log
Civil	C	Under Slab Drainage
Civil	C	Building Site Plan
Civil	C	Grading Plan
Civil	C	Utility Plan
Civil	C	Details, Elevations and Sections
Civil	C	Site Improvements
Civil	C	Structural Canopy Details
Civil	C	Layout, Grading, Draining and Landscaping
Civil	C	Structural Details
Demolition	D	Removal of Existing Construction
Hazardous Materials	H	Hazardous Materials
Landscaping	L	Legend, Symbols and Abbreviations
Landscaping	L	Irrigation Plan
Landscaping	L	Planting
Landscaping	L	Irrigation and Planting Details
Architectural	A	Legend, Symbols and Abbreviations
Architectural	A	Floor Plan
Architectural	A	Reflected Ceiling Plan
Architectural	A	Roof Plan
Architectural	A	Elevations
Architectural	A	Sections
Architectural	A	Details
Architectural	A	Millwork
Architectural	A	Equipment
Architectural	A	Furniture
Structural	S	Legend, Symbols and Abbreviations
Structural	S	Structural Foundation Plan
Structural	S	Framing And Decking Plan
DISCIPLINE	CODE	DRAWING DESCRIPTION
Structural	S	Roof Framing Plan
Structural	S	Structural Details
Structural	S	Structural Steel Grounding
Structural	S	Erection Drawings

DISCIPLINE	CODE	DRAWING DESCRIPTION
Mechanical	M	Legend, Symbols and Abbreviations
Mechanical	M	Equipment Schedule
Mechanical	M	Elevations
Mechanical	M	Generator and Fan Room Plan
Mechanical	M	Chiller Room Plan
Mechanical	M	Mechanical Room Plan
Mechanical	M	Roof Plan
Mechanical	M	Sections and Details
Mechanical	M	Details
Mechanical	M	Hot and Cold Piping Diagrams
Mechanical	M	Miscellaneous
Mechanical	M	Steam Piping Systems
Mechanical - HVAC	M	Under Floor Plan
Mechanical - HVAC	M	Floor Plan (Room Area)
Mechanical - HVAC	M	Ceiling Plan
Plumbing	P	Legend, Symbols and Abbreviations
Plumbing	P	Foundation Plan
Plumbing	P	Piping Plan
Plumbing	P	Riser Diagram
Plumbing	P	Sanitary Riser Diagram
Plumbing	P	Storm Riser Diagram
Plumbing	P	Roof Drain System
Plumbing	P	Details
Electrical	E	Legend, Symbols and Abbreviations
Electrical	E	1st Floor Lighting Plan
Electrical	E	Power and Communications Plan
Electrical	E	Grounding Plan
Electrical	E	Security Plan
Electrical	E	Equipment
Electrical	E	Miscellaneous
Electrical	E	Details
Electrical	E	Single Line Diagrams
Electrical	E	Panel Schedules
NAS Equipment	Q	Refer to Table 3-6, Installation Drawing Number List
Telecommunications	T	Legend, Symbols and Abbreviations
Telecommunications	T	Communications Plan
Telecommunications	T	Details
Telecommunications	T	Manhole and Cable Diagrams
Security	Y	Closed-circuit TV
Security	Y	Security Cameras
DISCIPLINE	**CODE**	**DRAWING DESCRIPTION**
Security	Y	Communication
Security	Y	Electrical
Security	Y	Sensor Locations
Security	Y	Equipment Details
Security	Y	Miscellaneous Alarm System

Fire Protection	F	Legend, Symbols and Abbreviations
Fire Protection	F	Sprinkler System
Fire Protection	F	Alarm Systems
Fire Protection	F	Fire Fighting Equipment
Fire Protection	F	Stand Pipe System
Contractor	Z	Shop Drawings

Table 3-5, Construction Drawing Set

3.1.6.2 Installation Drawing Sets.

NAS electronic installation drawings shall cover the requirements for installation of NAS mission equipment in facilities. Refer to Table 3-6, Installation Drawing Number List, for arrangement and numbering of installation drawings at ATCT and TRACON facilities. Smaller facilities may use the Q designator with three sequential numerals for the drawing number, for example, -Q001, -Q002, -Q003 in a similar order as the Drawing Discipline column in Table 3-6.

DRAWING DISCIPLINE	SEQUENCE NO.	SEQUENCE NO. RANGE
Floor Plans		**-Q001 to –Q049**
Floor Plan	-Q001 through -Q009	
Floor Plan Rack Layout (overhead)	-Q010 through -Q019	
Floor Plan Cable Tray/Power Duct Layout	-Q020 through -Q029	
Power Routing Plans	-Q030 through -Q039	
Phone/Data Jack Layout	-Q040 through -Q049	
Distribution Cabling System		**-Q050 to –Q069**
Block Diagram		(sequential as needed)
CDF Front View		
CDF Rear View		
IDF Front View		
IDF Rear View		
MDF Front View		
MDF Rear View		
Phone/Data IDF Front View		
Phone/Data IDF Rear View		
Equipment Rack Elevations		**-Q070 to –Q119**
		(sequential as needed)

DRAWING DISCIPLINE	SEQUENCE NO.	SEQUENCE NO. RANGE
Controller Position Layouts		**-Q120 to –Q149**
Plan View	-Q120 through -Q125	
Console Layout	-Q126 through -Q149	
Controller Position Demarc Blocks		**-Q150 to –Q174**
Block Interconnection Layouts	-Q150 through -Q174	

Communications		**-Q175 to –Q499**
RCL/Bandwidth Manager	-Q175 through -Q199	
Fiber Optics	-Q200 through -Q399	
Voice Switch (ETVS/RDVS/STVS)	-Q400 through -Q419	
DVRS and Time Code Displays/Generator	-Q420 through -Q429	
Radio Control Equipment	-Q430 through -Q439	
Air-Ground Radio System, Antenna Systems	-Q440 through –Q459	
Emergency Communications Systems (VSBP/-VTABS/XCVR/etc.)	-Q460 through –Q469	
Telco (LINCS/FTI/DMN)	-Q470 through -Q499	
Radar		**-Q500 to –Q599**
Primary Radar (ASR/ARSR)	-Q500 through –Q539	
Secondary Radar (ATCBI/Mode-S)	-Q540 through -Q569	
ASDE	-Q570 through -Q599	
Radar Automation		**-Q600 to –Q649**
ARTS/STARS/DBRITE	-Q600 through –Q649	
Data Automation		**-Q650 to –Q699**
FDIO	-Q650 through -Q659	
ETMS	-Q660 through –Q669	
IDS-4/ACE-IDS/ERIDS	-Q670 through -Q689	
TDLS/D-ATIS	-Q690 through -Q699	
NAVAIDS & Weather		**-Q700 to –Q919**
ILS	-Q700 through -Q739	
RVR System	-Q740 through -Q755	
Lighting Aids (ALSF/PAPI/VASI)	-Q756 through –Q795	
CCCS	-Q796 through –Q810	
LLWAS/SAWS/Wind Speed/Direction Equip.	-Q811 through –Q839	
DASI	-Q840 through -Q849	
TDWR/WSP/WARP	-Q850 through -Q889	
ASOS	-Q890 through -Q909	
WCAM	-Q910 through -Q919	
PBX System		**-Q920 to –Q999**
System Block Diagram	-Q920 through -Q959	
System Drawings	-Q960 through -Q999	

Table 3-6, Installation Drawing Number List

3.1.7 Typical Sheets and Layouts for Construction Drawing Sets.

Nearly all construction drawing sets will use one of the following six standard sheets and layouts described in the following six subsections. All the sheets depicted in this section are D-size drawings.

3.1.7.1 Cover Sheet.

Each construction drawing set should have a cover sheet that clearly identifies the drawing set. The cover sheet must have a title block containing all of the information about the drawing set. See Figure 3-5, Cover Sheet Layout.

If the Cover Sheet is part of a set of drawings that will be delivered outside of the FAA the text as specified in FAA Order 1600.75 Appendix D, Marking FOUO Information, will also be included centered above the title block. In addition a back sheet must be included with text as specified in FAA Order 1600.75, Appendix D, Marking FOUO Information. The FOUO text on the back sheet must be placed so that when a bound drawing set is placed with the Cover Sheet face down the text is visible.
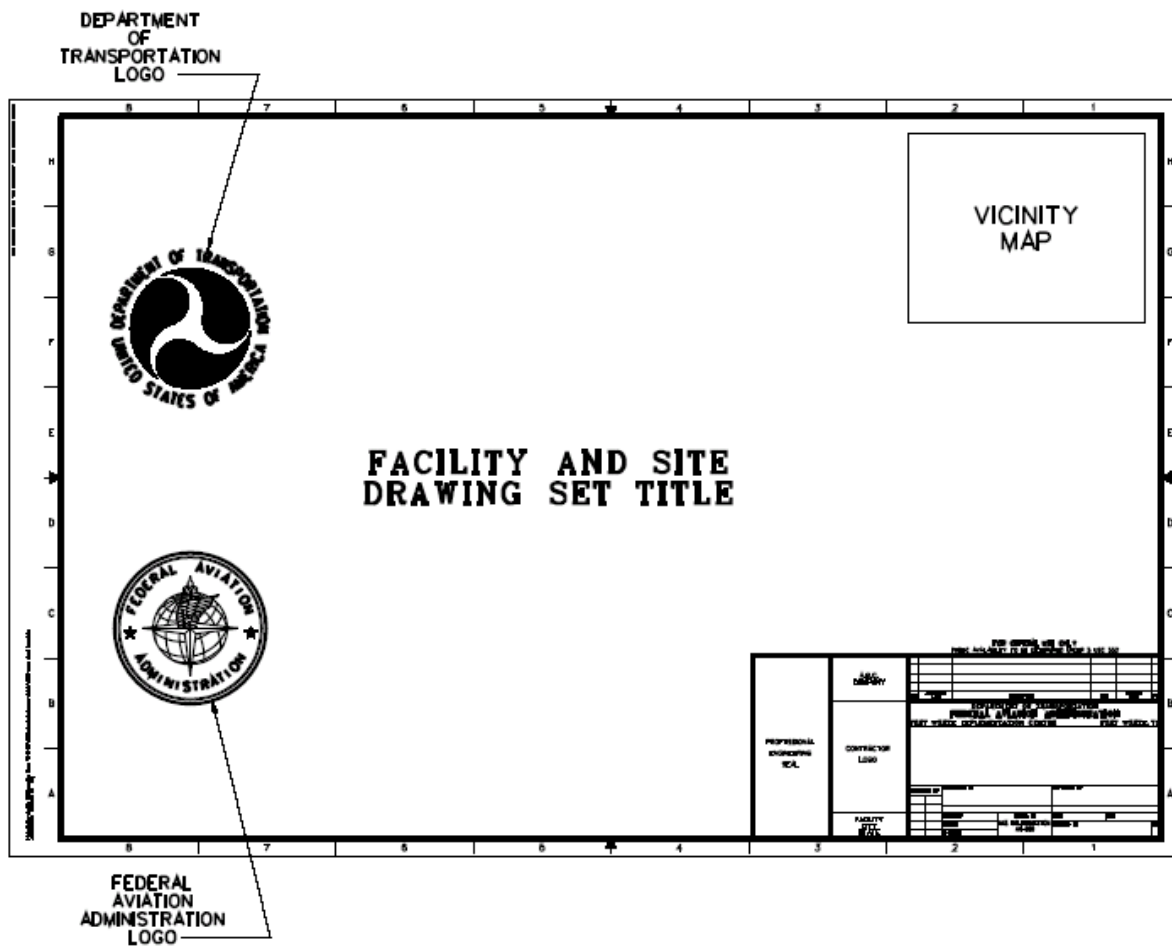
Figure 3-5, Cover Sheet Layout

3.1.7.2 DOT/FAA Logo.
The CAEG Program Office will provide the following electronically formatted logos to be included in CADD products: Department of Transportation (DOT), Configuration Management (CM) and Federal Aviation Administration (FAA).

3.1.7.3 Index Sheet.
The second sheet of each drawing set shall be the drawing index sheet. This lists every drawing contained in the drawing set. An example is shown in Figure 3-6, Index Sheet. NOTE: If a project consists of 15 drawings or less, the drawing index may be placed (centered) on the Cover Sheet below the Drawing Set Title.

Figure 3-6, Index Sheet

3.1.7.4 Floor Plan Layout.

The Floor Plan Layout sheet is intended for all plan type drawings regardless of discipline.
See Figure 3-7, Floor Plan Layout.
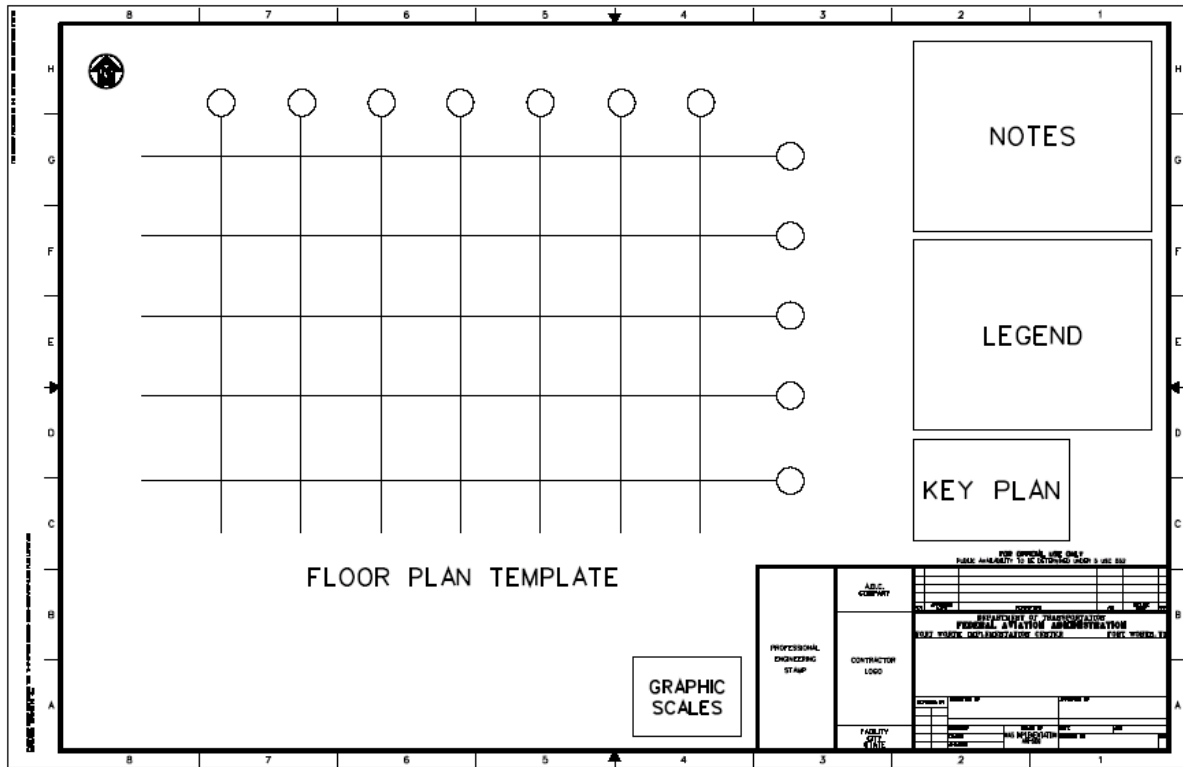
Figure 3-7, Floor Plan Layout

3.1.7.5 Elevation and Section Plan Drawing Layout.

The elevations are stacked in the upper half of the drawing field. The bottom of the drawing field is available for details when the detail sheet is full. See Figure 3-8, Elevation and Section Plan Drawing Layout.
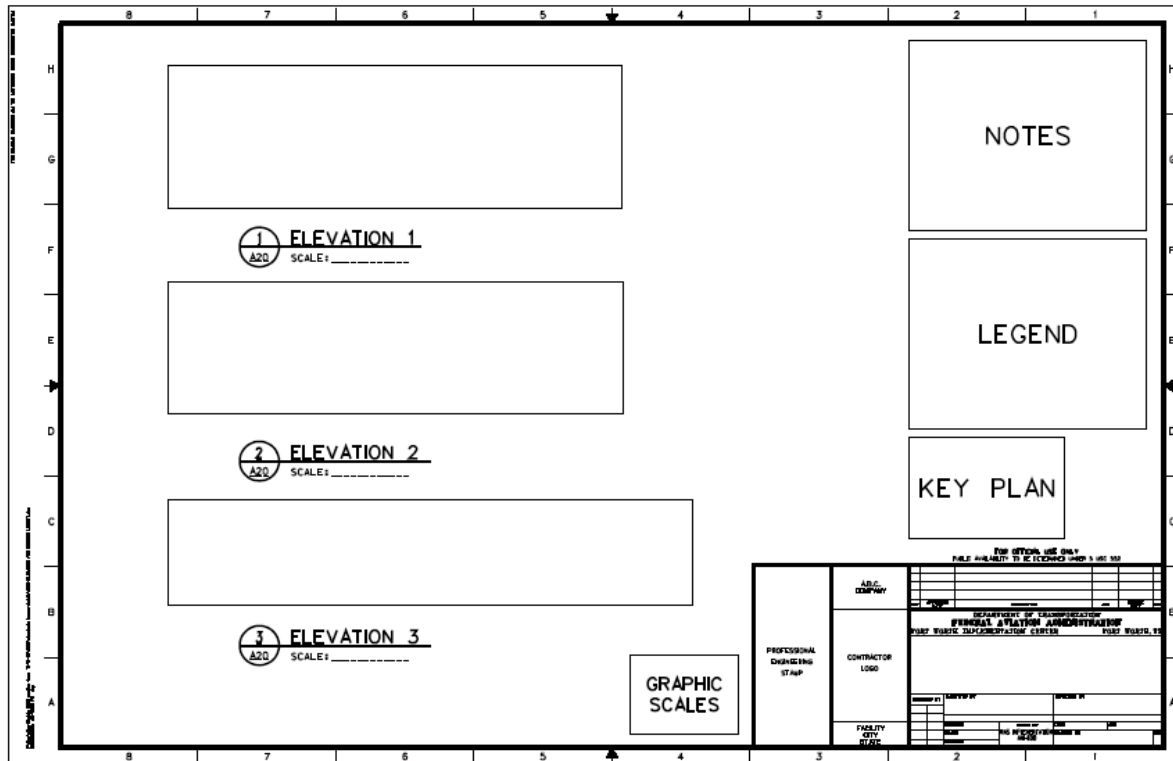
Figure 3-8, Elevation and Section Plan Drawing Layout

3.1.7.6 Detail Sheet Layout.
The detail sheet layout is a collection of details that clarify construction or installation details that cannot be shown at a smaller scale. The detail will cross-reference the detail with the drawing sheet from which it was taken. The normal layout has six columns, including Notes area, and four rows. When the scale calls for a larger detail block, use surrounding blocks. Try to keep the details in square shaped blocks. Identify the blocks as shown in Figure 3-9, Detail Sheet Layout. Details shall start with the first detail in the upper left-hand corner and move across the top of the sheet. Continue to create rows for new details below the first row of details. The Notes area shall be on the right side of the sheet.

Detail sheets with multiple scales shall be scaled according to the primary detail on the sheet or, if there is no primary detail, according to the scale that represents the majority of the details. The remaining details should be self-referenced into the drawing at the correct scale.
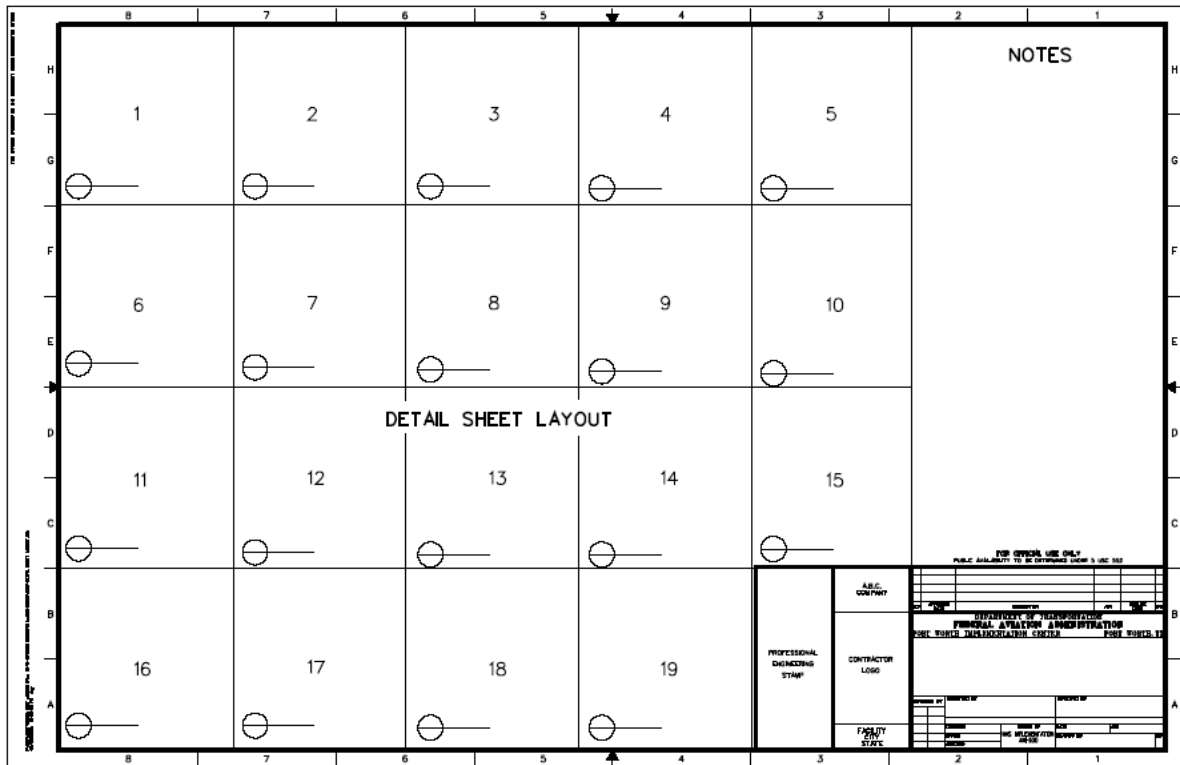
Figure 3-9, Detail Sheet Layout

3.1.7.7 Schedule/Diagram Sheet Layout.

Figure 3-10, Schedule/Diagram Sheet Layout, shows the format for schedules and diagrams that are frequently used in drawing sets for electrical, plumbing, and mechanical drawings. The drawing field may extend above the title block, as long as the notes or legends can be relocated on the sheet as shown.
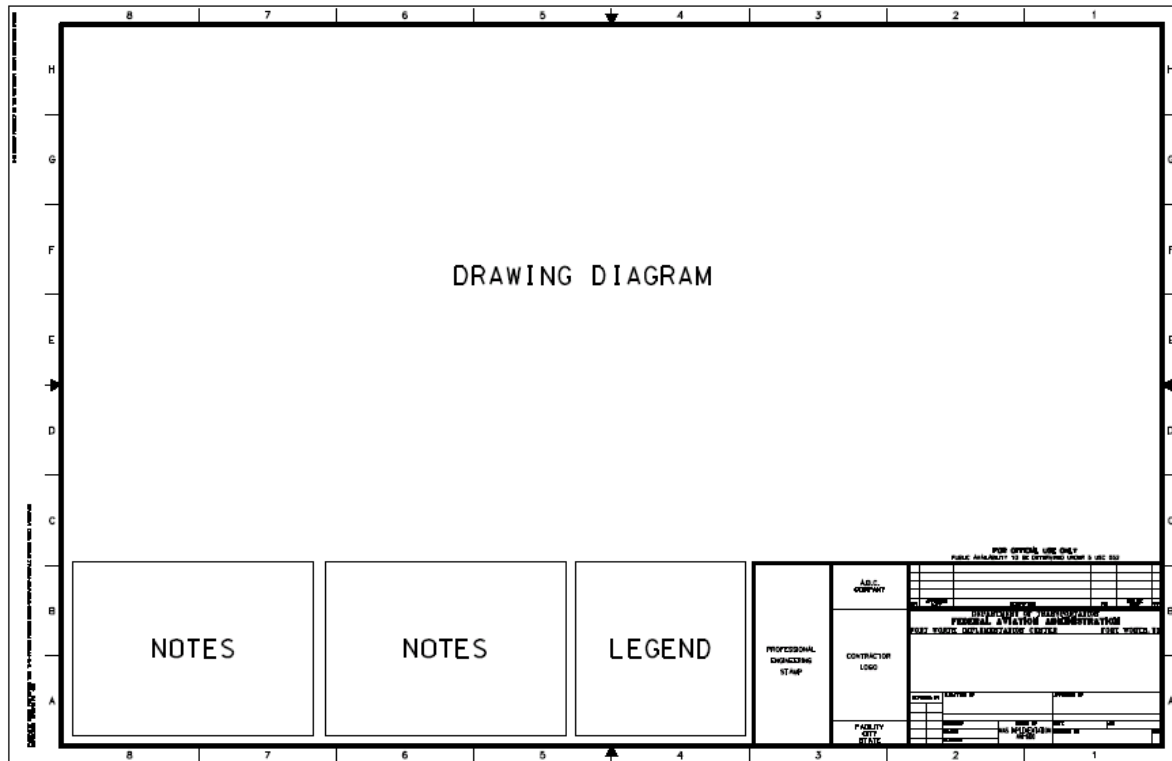
Figure 3-10, Schedule/Diagram Sheet Layout

3.1.8 Layers/Levels.

CADD layers (AutoCAD)/levels (MicroStation) are analogous to overlays in manual drafting systems and serve to separate graphic elements according to the design discipline they represent. AutoCAD and MicroStation allow an unlimited number of layers/levels to be identified with names. The layers/levels defined within this standard are based on those set forth in the American Institute of Architects' publication, "CAD Layer Guidelines." The AIA "Group" categories were used to develop the Layer/Level Naming Scheme found in Appendix A.

The Real Estate Discipline (R-Real Estate) will not contain any layer/level designations in Appendix A. Any layers/levels required to define any Real Estate features within a drawing can be found under the Civil Discipline layer/level scheme located in Appendix A.

3.1.9 Text Styles/Fonts.

Customized text fonts and True Type Fonts (TTF) shall not be used. All drawing text shall be in upper case, except for special case abbreviations such as "dB", "MHz", and "NiCd". Abbreviations shall comply with MIL-STD-12 and abbreviations shall not be followed with a period unless that abbreviation spells another word. General use of abbreviations shall be avoided. There shall be no stacked fractions, that is, fractions shall be shown with a slash, e.g. 1/4. Contrasting text styles or fonts are to be used within a drawing to delineate types of information. Fonts used within FAA drawings shall be restricted to those shown in Table 3-7, Comparison of Font Types. See Table 3-8, Text Heights and Line Widths, and Section 3.1.10, Line Weights, for appropriate line weights for text. The Annotation Table in Appendix A defines appropriate levels for text used in FAA drawings.

FAA	AutoCAD Font	MicroStation Font
Proportional Font	RomanS	Working
Monotext Font	Monotxt	Engineering
Standard Font	Txt	Standard
Roman Triplex Font	RomanT	Fancy
Slanted Font	RomanS (obliquing angle 21.8)	Italics
Greek Font	GreekS	Greek

Table 3-7, Comparison of Font Types

- Proportional font - appropriate for general notes or labels. This font creates text where the characters are proportionally spaced. In AutoCAD, use the "RomanS" font with a width factor of 1.0. In MicroStation use Font #1, "Working" font. Also appropriate for subtitles.

- Monotext font – appropriate when text fields need particular justifications such as in schedules or title blocks. This font creates text characters that are evenly spaced. In AutoCAD, use the "Monotxt" font, and in MicroStation, use Font #3, "Engineering" font.

- Standard font – appropriate for notes, callouts, etc. In AutoCAD, use the "Txt" font. In MicroStation use Font #0, "Standard" font.

- Roman Triplex font – appropriate for titles and subtitles. In AutoCAD, use the "RomanT" font. In MicroStation use Font #2, "Fancy" font.

- Slanted font – appropriate where certain text needs to be distinguished from other text, such as bodies of water. This font can be created in AutoCAD by using the "RomanS" font with the Obliquing Angle set to 21.8 degrees to achieve the American Standard slope of 2:5 (68.2 degrees). In MicroStation use Font #23, "Italics" font.

- Greek font. This font provides special characters for use in labeling electronic components. In AutoCAD use the "GreekS" font with a width factor of 1.0. In MicroStation use Font #26, "Greek" font.

NOTE**:** For purposes of this standard, only those fonts which are most compatible (nearly identical in appearance and size) between MicroStation and AutoCAD are defined. It should be understood that these fonts do not translate perfectly and some cleanup may be required after any translation between systems.

APPLICATION	TEXT HEIGHT (IN INCHES)	LINE WIDTH
Titles	0.25	Medium
Subtitles	0.156	Medium
Notes; Callouts; etc.	0.125 (preferred) or 0.10	Thin

Table 3-8, Text Heights and Line Widths

3.1.10 Line Widths.
The five line widths defined in Table 3-9, CADD Line Weights and Associated Plotted Widths, are sufficient for the majority of A/E/C drawings and shall not be expanded unless an appreciable improvement in drawing clarity or contrast can be realized. Any deviation shall be coordinated with the local CADD Manager. Typical usage for the line widths is described below:

- Fine (0.15 mm). Fine lines should be used for depicting dimension lines, extension lines, leader lines, object lines "seen in the distance", hidden lines, grid lines and patterning.

- Thin (0.30 mm). Thin lines should be used for depicting minor object lines, including existing object lines, line terminators (arrowheads, dots, and slashes), dimension text, text for notes and callouts, and text inside schedules.

- Medium (0.475 mm). Medium lines should be used for depicting schedule boxes and charts, most object lines, including new object lines, text for titles and underlining.

- Wide (0.65 mm). Wide lines should be used for object lines requiring special emphasis and separating portions of drawings.

- Extra wide (0.825 mm). Extra wide lines should be used for the border only.

Line Thickness	Plotted Line Width (mm)	Plotted Line Width (in)	AutoCAD Line Weight (mm)	MicroStation Line Weight
Fine	0.15	0.006	0.18	0
Thin	0.30	0.012	0.25	1
Medium	0.475	0.019	0.50	2
Wide	0.65	0.026	0.60	3
Extra Wide	0.825	0.032	0.80	5

Table 3-9, CADD Line Weights and Associated Plotted Widths

3.1.11 Color Usage.
The use of color in CADD files is for on-screen visualization and design aid. Default color assignments are delineated in Appendix A, Layer/Level Naming Scheme. The use of other colors is allowed to provide an appreciable improvement in drawing clarity or contrast. The color yellow is reserved for highlighted graphic entities. Since the current supported versions of AutoCAD no longer require color to map to plotted line weight, line weight shall be used to map to plotted line width. AutoCAD drawings shall not use color to map to plotted line width. The use of color mapping in AutoCAD drawings to represent line width is discouraged.

3.1.12 Line Types.
The line styles applicable to this standard are represented in Figure 3-11, Standard Line Types. Additionally, typical custom line types are represented in Figure 3-12, Typical Custom Line Types.

DESCRIPTION	EXAMPLE	MICROSTATION DESIGNATOR	AUTOCAD DESIGNATOR
CONTINUOUS	————————————	0	CONTINUOUS
DOTTED	· · · · · · · · · · · · · · · · · · ·	1	ACAD_ISO07W100
DASHED	— — — — — — — —	2	ACAD_ISO02W100
DASHED SPACED	—— —— —— ——	3	ACAD_ISO03W100
DASHED DOTTED	— · — · — · — ·	4	ACAD_ISO10W100
DASHED DOUBLE-DOTTED	— · · — · · — · · — · ·	6	ACAD_ISO12W100
DASHED TRIPLE-DOTTED	—— · · · —————— · · · ——	*	ACAD_ISO14W100
CHAIN	—— · ——— · ——— · ——	7	ACAD_ISO08W100
CHAIN DOUBLE-DASHED	—— — — ——— — — ——	**	ACAD_ISO09W100

* This line style is available in the MicroStation resource file LSTYLE.RSC as "DASHED TRIPLE-DOT".
** This line style is available in the MicroStation resource file ACADLSTY.RSC as "PHANTOM".

Figure 3-11, Standard Line Types
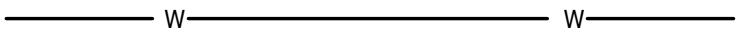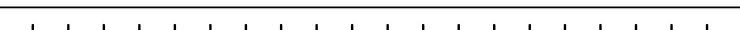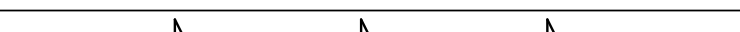
TYPE	EXAMPLE
Contour Line	
Property Line	
Cable	
Fence	
Water	
Gas	
Telephone	
Sanitary Sewer	
Storm Sewer	
Power	
Railroad	
Break	

Figure 3-12, Typical Custom Line Types

3.1.13 Drawing Origins.
Consistent origins shall be used to ensure ease of translation and attaching of reference files in both software packages.

3.1.13.1 AutoCAD Working Units and Drawing Origin.
AutoCAD has an infinite design plane, eliminating limitations to the space available for drawing. Working units should be selected according to the discipline of the drawing: architectural (feet and inches), engineering (feet and tenths), or decimal (metric). AutoCAD models should utilize real-world coordinates. AutoCAD layouts should position the origin in the lower left corner of drawings at the Cartesian coordinate point of 0,0,0.

3.1.13.2 MicroStation Working Units and Global Origin.
The global origin shall be positioned in the center of the design plane to avoid loss of data exceeding the design plane. Working units shall be set to those shown in Table 3-10, MicroStation Working Units.

Units	MU	SU	PU
Imperial (A/E/C)	1 (ft)	12 (in)	8000
Imperial (Civil/Site, Civil Works, Geotechnical, Survey/Mapping)	1 (ft)	100	10

Table 3-10, MicroStation Working Units

NOTE: Working units of 96,000 per foot equals the 12:8000 MU/SU/PU listed above.

3.1.14 Externally Referenced Files.

The use of externally referenced files by AutoCAD and MicroStation allows for the viewing of all or part of a drawing file from another drawing file (host file). Only full-scale drawing files shall be utilized as references. Nesting of reference files shall be avoided. As files are created and referenced, reference filenames shall not be changed, as it will result in the inability of the host file to find its reference files. All reference files shall be included with file transfers to and from the FAA. Merge all reference files into the final drawing package when any of the following criteria is met:

- Prior to archiving old revisions of drawing files.
- The drawings are obsolete.

3.1.14.1 Specific Use of AutoCAD Reference Files.

All files referenced in the host file shall use the "Attach" option within the XREF command. AutoCAD users ***SHALL NOT*** use the "Save Path" method when attaching drawing files for reference. When reference files are merged into the final drawing package, AutoCAD users shall use the "Bind" option.

3.1.14.2 Specific Use of MicroStation Reference Files.

MicroStation users ***SHALL NOT*** use the "Save Full Path" method when attaching drawing files for reference. When reference files are merged into the final drawing package, MicroStation users shall use the "Merge Into Master" method.

3.1.15 Patterning.

Do not create customized patterns; use the patterns supplied with the CADD software. Use associative locks when using MicroStation, unless a pattern boundary/border is not desired.

3.1.16 Dimensioning.

The labeling units for all A/E/C drawings shall be units of feet and inches and fractions of an inch, with the smallest fraction normally being 1/8" or as decimals in feet, inches, and hundredths of an inch. Dimensions of less than a foot must be shown in inches or fractions of inches. Survey units may be used as required on specific projects.

Refer to the ANSI Y14.5M for additional dimensioning information not provided in this standard. The distance from the object for the first dimension is 1/2" and each additional dimension is 3/8" further apart. See Figure 3-13, Dimensioning Styles and Directions, and Figure 3-14, Dimension and Extension Line Spacing, for dimension examples. There shall be a 1/10" space between the object and the extension line as shown in Figure 3-14.
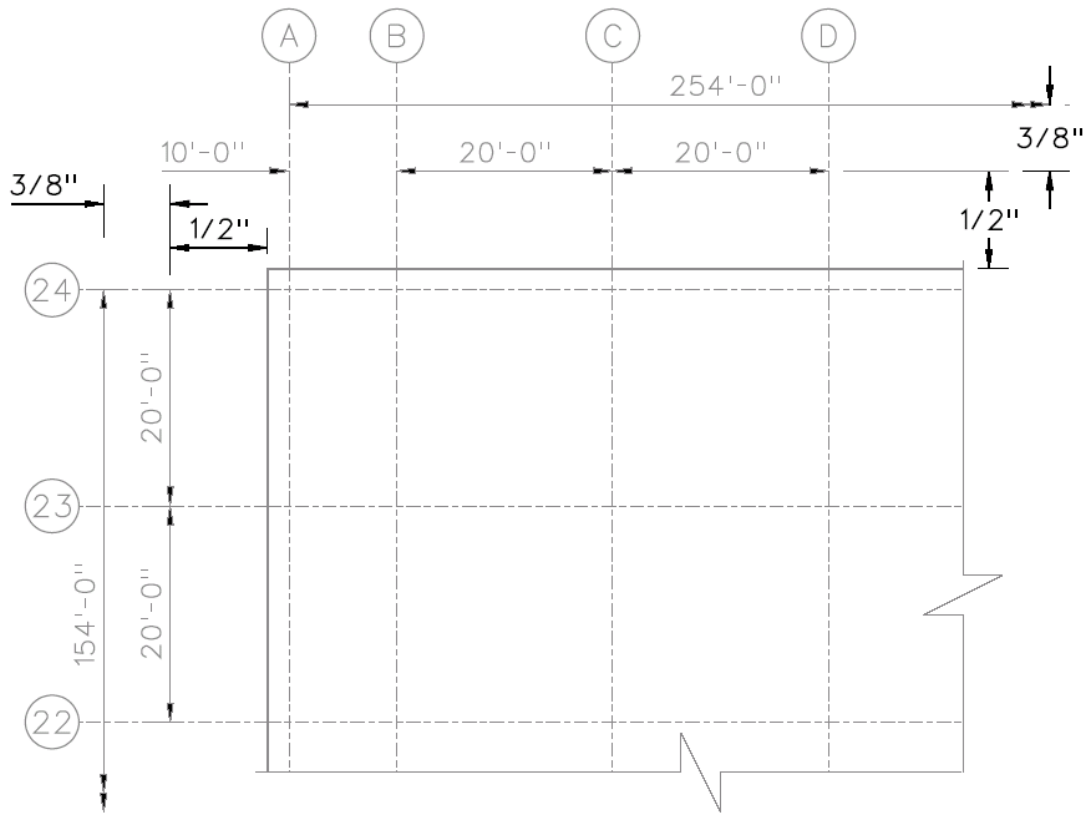
Figure 3-13, Dimensioning Styles and Directions
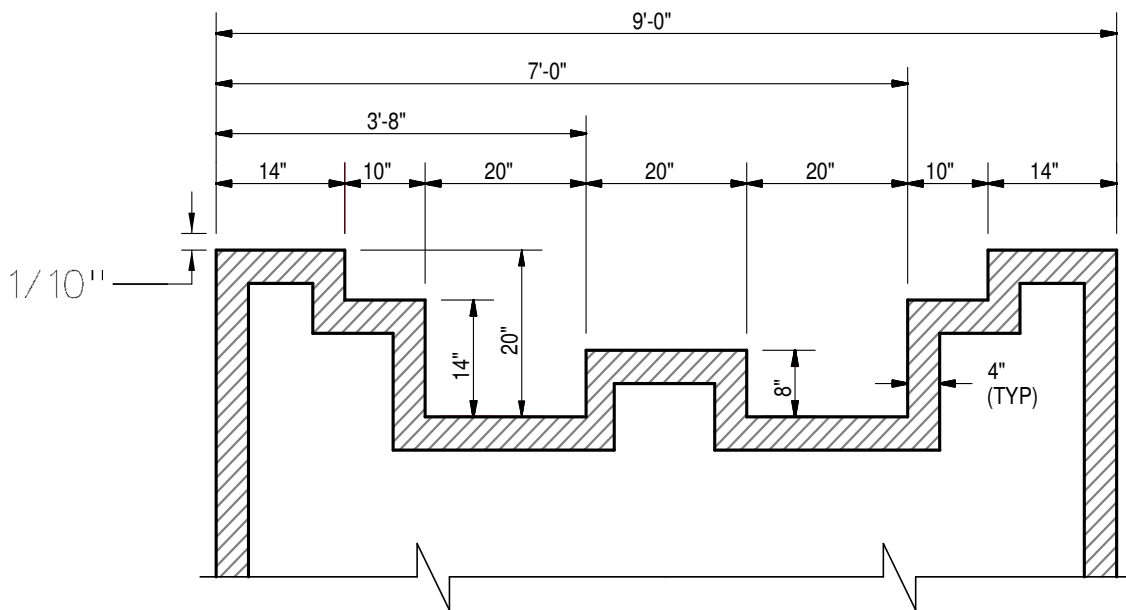
Figure 3-14, Dimension and Extension Line Spacing

3.1.16.1 Dimension Text Size and Font Style.

All dimensioning text must be placed into the dimension layer/level. The font and size of dimension text is the same as the drawing field text (no smaller than 1/10" height, with 1/8" being preferable). Refer to Table 3-1, Scale Factor and Text Height Conversion Chart, for scaling factors and text height.

3.1.16.2 Positioning Dimensions.

See Figure 3-13, Dimensioning Styles and Directions, for examples. Avoid crossing dimension lines. Centerlines may be extended and used as extension lines. Longer dimensions shall be placed outside of shorter ones. Do not cover dimensions with patterns in sectioned areas. Whenever possible, arrange dimensions so they can be read easily on one continuous line. Dimensions are always placed on the drawing so that the text may be read from the bottom or the right. Locate dimension lines so that they do not cross extension lines. If it is necessary to dimension at an angle, that angle should be in quadrant between the horizontal and vertical; so that the text may be read between 0 and 90 degrees. All text must be located above or centered on the dimension lines. The location of text on the dimension line shall be consistent throughout the drawing set. Fractions must be located on one line with a space between the whole inch and fraction. Make fractions with a slant bar with numbers the same height as text, for example, 1/4". All dimension and extension lines shall be created using the "fine" line weight. Arrowheads and dimension text shall be created using the "thin" line weight. See Table 3-9, CADD Line Weights and Associated Plotted Widths, for line weight definitions.

3.1.16.3 Leaders.

When a note or dimension cannot be placed close to an object, a leader may be used. A leader consists of a short horizontal line, an angled line and a terminator. See Figure 3-16, Placement of Leader. When a leader points to an object, the angled line must terminate with an arrowhead at its first object line. When the information refers to (applies to, or points to) a surface of an object, use a small filled dot or tilde. When the information refers to a bundle or grouping of wires or cables, use a lasso. An example of this is shown in Figure 3-15, Typical Leaders. All leader lines shall be created using the "fine" line weight and arrowheads and other line terminators shall be created using the "thin" line weight. See Table 3-9, CADD Line Weights and Associated Plotted Widths, for line weight definitions.

Figure 3-15, Typical Leaders

Figure 3-16, Placement of Leader

3.1.16.4 Arrowheads.

Arrowheads denote termination of dimensions and leader lines and show direction. Arrowheads should be filled, and must be the same size and style as the arrowheads used elsewhere in the drawing. Arrowhead size should be a 3:1 ratio for length to width, and in proportion to any associated text.

3.1.17 Symbols.

Symbols used in drawings should comply with the National CAD Standard, Army Corp of Engineers, or ANSI at the discretion of the local CADD Managers. All symbols used in a drawing must be indicated in a legend.

3.1.18 Drawing Titles.

Titles should be used on drawings with more than one subtitle to logically group associated drawing components. Titles must also be used on drawings with a multiple views when title block information is inadequate and additional identification is required.

3.1.18.1 Drawing Subtitles.

Subtitles must be used on drawings with more than one view or when sections or details are required for clarity. Subtitles must also be used on drawings with a single view when title block information is inadequate and additional identification is required. Subtitles are always located below and centered on the view to which they apply, except for detail drawings where the subtitle shall be located to the lower left. Subtitles for plans, standard details, typical details, etc., which are not referenced in other views, consist of two lines of text. The first line of text shows the exact title of the view or detail. The second line of text indicates the scale of the view or detail. The line dividing the first and second lines of text shall begin with one character space and extend one character space beyond the text of the first line. Both lines of text shall be center justified. See Figure 3-17, Standard Subtitle Annotation. For Detail Subtitles see Section 3.1.19.2 in this standard.
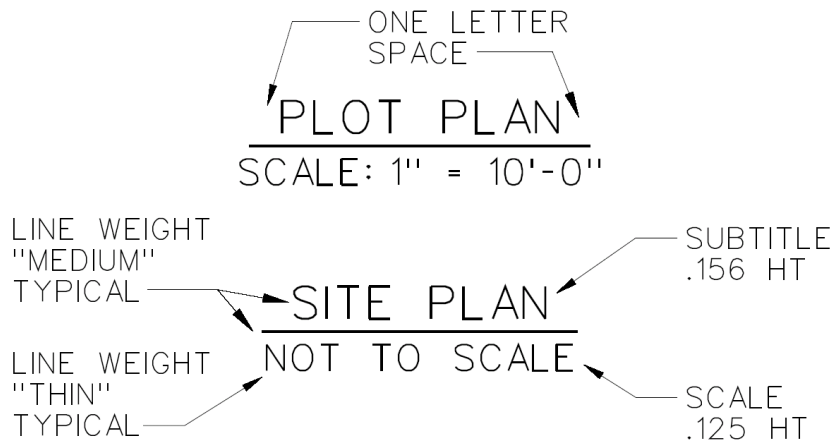
Figure 3-17, Standard Subtitle Annotation

3.1.19 Sections and Details.

3.1.19.1 Sections.
Sections must be drawn whenever additional clarification is warranted. Sections must be drawn using the drafting standards shown in Figure 3-18, Standard Section Annotation, Building Section. When space is limited on a drawing an alternate section marker may be used as shown in Figure 3-19, Alternate Section Annotation, Wall Section or Elevation.

The three types of section indicators to be used are short sections, extended sections, offset sections. These are shown in Figure 3-21, Short Sections, Extended Sections, Offset Sections and Alternate Sections. The use of alternate section symbols is also demonstrated.

All sections must be cut toward the top or left side of the drawing except in unusual situations. In some cases, it may be necessary to cut a short section reading from the left, but this should be avoided if possible. Sections should appear on the same drawing on which they are cut. If the section cannot be drawn on the same drawing, it must appear on a separate drawing reserved for sections. Under no circumstances are sections to be scattered indiscriminately throughout the set of drawings.

Sectional cuts shall be lettered in alphabetical order on each drawing. The letter in the top half of the circle marker must indicate the section letter. The alphanumeric number in the lower half of the circle marker must indicate the drawing on which the section is shown. Any text used within the circle marker must remain horizontal. Heavy dark lines located in the position where the section is cut must indicate the location of the cutting plane. Offset sections may be used only when section clarity requires adjustment of a portion of the cutting plane. The limits of extended or offset section cuts must be indicated by a circular marker at both ends of the cutting plane. The limits of short section cuts must be indicated by a circular marker at one end and by an arrowhead at the opposite end, as shown in Figure 3-21. Sectional cuts shall refer to a detail location on only one sheet in the lower half of the circular marker. Other references to the detail in the drawing set shall be handled with a callout and notes. See Figure 3-20, Standard Section Subtitle With Specifications, for the creation of section subtitles.
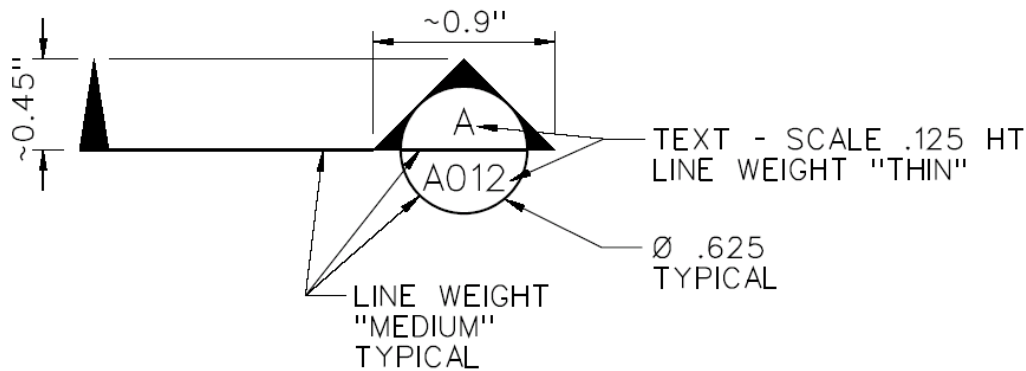
SECTION SYMBOL WITH SPECIFICATIONS

Figure 3-18, Standard Section Annotation, Building Section

NOTE: To create the section symbol shown in Figure 3-18 in MicroStation follow these steps:

- Set "Place Text" to create the standard text height of .125" (plotted).
- Open the Drafting Tools tool box by selecting "Tools", "Annotation", "Drafting Tools"
- Open the Drafting Tools Properties dialog box by selecting [P] from the Drafting Tools tool box.
- In the Drafting Tools Properties dialog box set the follow values:
  - Detail Bubble, Size Factor: 2.5
  - Detail Bubble, Color: Bylevel
  - Detail Bubble, Style: 0
  - Detail Bubble, Weight: 2
  - Text/Titles, Size Factor: 1.0
  - Text/Titles, Color: Bylevel
  - Text/Titles, Text Wt.: 1
  - Level: ANNO-SYMB
- Create the symbol using the "Place Arrow Marker" command on the "Drafting Tools" tool box

Figure 3-19, Alternate Section Annotation, Wall Section or Elevation

Figure 3-20, Standard Section Subtitle with Specifications

Figure 3-21, Short Sections, Extended Sections, Offset and Alternate Sections

3.1.19.2 Detail Drawings.

Detail drawings must be created whenever additional clarification is required and a section cannot be readily cut. The detail must either be a plan view, an elevation, or an enlargement. Details must have a numeric designation in the upper half of the circle marker. The alphanumeric number in the lower half of the circle marker must indicate the sheet number on which the detail resides. The text within the circle marker must remain horizontal. See detail Figure 3-22, Standard Detail Symbol and Detail Subtitle. When a detail appears more than once on the same drawing, extend a line off the detail marker, abbreviate the word typical (TYP), and indicate the quantity in parentheses.
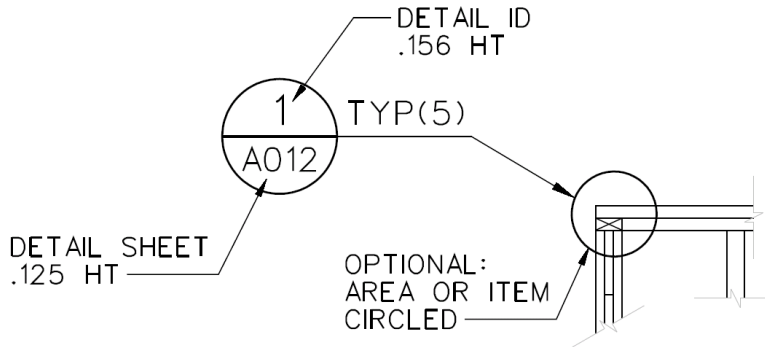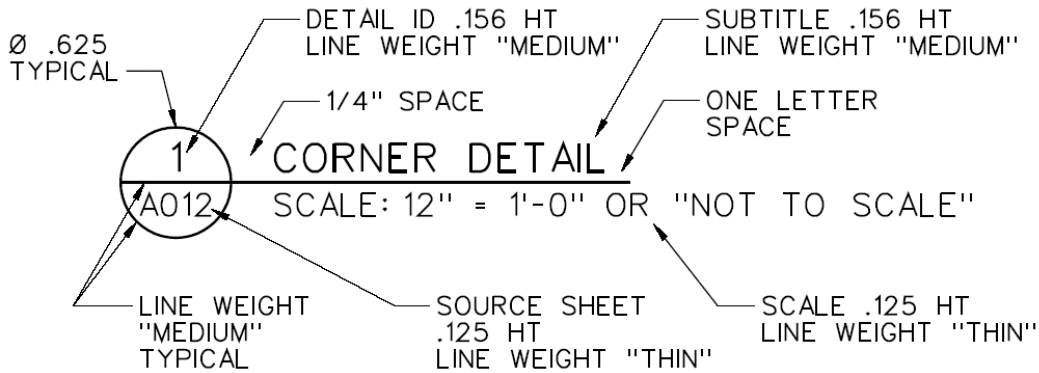
Figure 3-22, Standard Detail Symbol and Detail Subtitle

3.1.20 Revision of Drawings.

3.1.20.1 Revision Methods.
Revisions shall be made by the addition or deletion of information on the drawing.
In the case of "As-Built" drawings, graphics may not require modifications. Drawings
under Configuration Management shall be revised in accordance with FAA Order 1800.66,
FAA-STD-058 and FAA-STD-059. These documents provide the guidance that needs to be
adhered to when work is being completed on a facility under Configuration Management.
Changes to baselined facilities under Configuration Management are required to be
identified and approved using the NAS Change Proposal (NCP) process.

3.1.20.1.1 Required Revisions.
After a drawing is signed or revision approved, any subsequent changes shall be recorded as
the next revision.

3.1.20.1.2 Drawing Practices.
When revising an existing drawing the most recently approved graphic symbols,
abbreviations, and drawing practices shall be used for any changes or revisions. Superseded
symbology, etc., already appearing in the drawing and in accordance with formerly
approved standards, may remain unchanged provided the interpretation is clear and
unambiguous. Drawing entities that do not adhere to an FAA approved standard should be
updated to comply with current standards.

3.1.20.2 Identifying Revisions on Drawings.
Revisions to the drawing shall be identified in the revision description area and the revision
letter area in the title block. The most current revision letter shall be placed in the "latest
revision level" portion of the title block, to the right of the drawing number, as shown in
Figure 3-3, Drawing Title Block.

3.1.20.2.1 Revision Letters.
Uppercase letters shall be used in alphabetical sequence, excluding the letters "I", "O", "Q",
"S", "X" and "Z". Revision letters shall not exceed one character and numbers shall not be
used. The first release or initial issue of a drawing does not require the use of a revision
letter. The first revision to a drawing shall be assigned the letter "A". When a drawing
exceeds the letter revision "Y", refer to Section 3.1.20.4, Redrawn or Replaced Drawings,
within this standard.

3.1.20.2.2 Multiple Changes.
The same revision letter shall identify all changes to a drawing that are incorporated at the
same time.

3.1.20.3 Revision Block.
The revision block size and format shall conform to Figure 3-23, Identifying Revision
Locations. Only up to the four most recent revisions shall be shown in the revision block.
Each revision shall be recorded in the revision block in accordance with the following:

a.   The identifying letter pertaining to the revision shall be entered in the "REV" column.

b.   The date the revision is approved shall be entered in the "APPROVED DATE" column.

c.   A brief description of the change shall be entered in the "DESCRIPTION" column. The description may contain the drawing zone changed. Alternatively, the description shall refer to the identity number of the document authorizing the change (e.g. CCD, JON, etc.).

d.   The job control number (JCN) authorizing the revision shall be entered in the "JCN" column.

e.   The date of the actual redline changes is entered in the "REDLINE DATE" column.

f.   Initials of the approving official shall be entered in the "APVD" column.

REV	APPROVED DATE	DESCRIPTION	JCN	REDLINE DATE	APVD
E	09/08/1998	ZONE A8 THRU H3 CUSTOMER MODIFICATIONS	1928374	07/30/1998	BAR
D	10/15/1997	AS-BUILT (PER ENGINEER'S NAME; JON: 1234567)	9876543	09/08/1997	DNK
C	06/20/1996	ZONE G7, ADDED WIRING DIAGRAM AND DETAIL B	6789123	04/18/1996	EAT
B	05/11/1995	ZONE F6 ENGINEER REVISION	1234567	04/05/1995	ICU

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FEDERAL AVIATION ADMINISTRATION
FAA OFFICE   CITY, STATE

Figure 3-23, Identifying Revision Locations

3.1.20.4 Redrawn or Replaced Drawings.

When manual drawings are converted to CADD; when there are extensive changes to a CADD file or when the revision letter reaches "Y", the original drawing shall be superseded. The new drawing shall contain a note referencing the superseded drawing. The note shall be located above the revision block on the new drawing stating: "DRAWING _____, DATED _____ SUPERSEDES DRAWING _____, REVISION___, DATED _____." Subsequent revisions to the new drawing shall start with the letter "A", regardless of the revision letter of the drawing being superseded. A note shall also be located above the revision block on the superseded drawing stating: "DRAWING _____, REVISION___, DATED _____ SUPERSEDED BY DRAWING _____, DATED _____." The statements shall be in letters .125 inch high. See Figure 3-24, Revision Block Example for Superseding Drawings.

DRAWING ATL-D-GS17R-C023, DATED 04/01/1999, SUPERSEDES DRAWING
ATL-D-LOC17R-C011, REVISION C, DATED 06/20/1996

FOR OFFICIAL USE ONLY
PUBLIC AVAILABILITY TO BE DETERMINED UNDER 5 USC 552

NEW DRAWING

REV	APPROVED DATE	DESCRIPTION	JCN	REDLINE DATE	APVD

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| | | DRAWN | NAS IMPLEMENTATION ANI-600 | DRAWING NO | | REV |
| | | CHECKED | | ATL-D-GS17R-C023 | | |

NEW DRAWING ATL-D-GS17R-C023, DATED 04/01/1999

DRAWING ATL-D-LOC17R-C011, REVISION C, DATED 06/20/1996, SUPERSEDED
BY DRAWING ATL-D-GS17R-C023, DATED 04/01/1999

FOR OFFICIAL USE ONLY
PUBLIC AVAILABILITY TO BE DETERMINED UNDER 5 USC 552

EXISTING SUPERSEDED DRAWING

REV	APPROVED DATE	DESCRIPTION	JCN	REDLINE DATE	APVD
C	06/20/1996	ZONE G7, ADDED WIRING DIAGRAM AND DETAIL B	6789123	04/18/1996	EAT
B	05/11/1995	ZONE F6 ENGINEER REVISION	1234567	04/05/1995	ICU

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

FAA OFFICE   CITY, STATE

| | | DRAWN | NAS IMPLEMENTATION ANI-600 | DRAWING NO | | REV |
| | | CHECKED | | ATL-D-LOC17R-C011 | | C |

EXISTING ATL-D-LOC17R-C011, REVISION C, DATED 06/20/1996

Figure 3-24, Revision Block Example for Superseding Drawings

3.2 Drawing Support.

3.2.1 File Naming.
Duplicate filenames shall not be used. Conventions for file naming must be implemented to ensure that each drawing is uniquely identified. The file naming convention shall be based on the drawing numbering convention in Section 3.1.5.1, Drawing Number Structure.

See Figure 3-25, File Naming Convention, for the format of CADD file names. The portions of the file name shown in square brackets ([ ]) are used as required. The brackets are for reference only and are not included in the file name. The revision level of the drawing is indicated at the end of the drawing number within the filename, separated from the drawing number with a "dash" character.

The "Drawing Size" field for model files (reference files) shall be filled with the letter "M". Revision letters do not apply to model files.

```
XXXX-X-XXXXX[XXX]-XXXX[-XX][-X].XXX
```

CADD File Extension (3)
Revision Letter (1)
Configuration Management (2)
Drawing Sequence Number (4)
Facility Type (2-8)
Drawing Size (1)
Location Identifier (3-4)
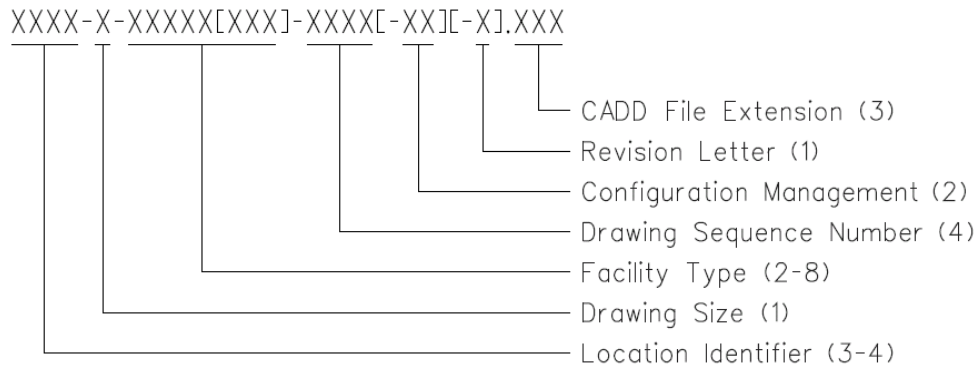
Figure 3-25, File Naming Convention

3.2.2 Drawing Configuration Management (CM).
For guidelines on the handling of drawings under configuration management control, see configuration management documents listed in Section 2.1, Government Documents, in this standard.

4.0 ELECTRONIC DELIVERABLES.

4.1 General.
The need to exchange electronic drawing or data files, between the FAA and the A/E/C community, necessitates the requirements stated in this section.

4.1.1 Electronic Delivery Media.
Electronic delivery media shall be coordinated with the FAA CADD Manager to ensure compatibility with the FAA's hardware. Accepted media or file transfer methods:

- CD-R (Joliet for Windows);
- high-density disk, i.e., Iomega, Zip (Jazz not acceptable);
- establishment of a secure FTP site with support contractors;

- magnetic tape cartridge;
- 1.44MB floppy (for file transfers of less than 1.44MB only)

4.1.2 Compression Software.

Compression methods shall be coordinated with the FAA CADD Manager to ensure the FAA's ability to accommodate the compression method used. File compression should be used when transferring bundles of files to an FTP site or if files extend beyond the storage capacity of a single diskette and can be compressed to fit on a single disk. File compression shall not be used when writing to electronic media other than floppy diskettes and FTP sites. Compression files shall not span multiple diskettes.

4.1.3 Media Labeling.

All media shall have a label containing, but not limited to:

1. Preparation date of the media.
2. The project description.
3. Contractor name and contract reference.
4. Contract transmittal number.
5. Quantity of files.
6. Operating System and version, and application software used to create the files.
7. The utility or command used to write the files to the media.
8. File shall have FOUO label on all copies of media.
9. Files marked SSI shall be labeled as such and shall be hand delivered, not mailed to the requesting organization in accordance with FAA Order 1600.75.

4.1.4 Electronic File Preparation.

All electronic files shall be delivered in the formats described in Section 3.1.1, Drawing File Format, of this standard. Deliverable file format shall be coordinated with the FAA CADD Manager to ensure the FAA's ability to use the delivered files. Before a file is placed on the electronic delivery media, the following procedures shall be performed:

1. Drawing files shall be in their native format, not DXF, or other neutral format.
2. Only one drawing or one model shall be included in each CADD file.
3. Remove all unnecessary graphics outside the drawing border area and set the active parameters to a standard setting of those in the seed or prototype file.
4. Ensure all external reference files are attached without device or directory specifications. Refer to Section 3.1.14.1, Specific Use of AutoCAD Reference Files and Section 3.1.14.2, Specific Use of MicroStation Reference Files.
5. Include a list of files included in the deliverable in a text document on the media.
6. All deliverables shall be certified virus-free.

4.1.5 Documentation.

All drawing packages submitted to the FAA shall include, but not be limited to, a transmittal containing the same information as on the external media label, and:

1. A hardcopy list of files included in the deliverable.
2. A full size hard copy plot of each drawing file submitted on the media.
3. Person designated as point of contact.

4. Certification in the form of a signed statement, that the delivery data is free of known computer viruses, including the name(s) and release date(s) of the virus scanning software used to check the media.

4.1.6 Ownership.

A statement similar to the following should be included in each contract with electronic drawing deliverables:

The FAA shall have *UNLIMITED RIGHTS* under this contract to all information and materials developed under this contract and furnished to the FAA and documentation thereof, reports and listings, and all other items pertaining to the work and services pursuant to this agreement including any copyright. Unlimited rights under this contract are rights to use, duplicate, or disclose data and information, in whole or part in any manner and for any purpose whatsoever without compensation to or approval from Contractor. The FAA will at all reasonable times have the right to inspect the work and will have access to and the rights to make copies of the above-mentioned items. All digital files and data, and other products generated under this contract shall become the property of the FAA.

4.2 Quality Assurance.

This section lists the requirements for the inspection and submittal of drawings, and the engineering data quality assurance system for contractors.

4.2.1 Responsibility for Inspection.

The contractor is responsible for providing quality assurance checking of drawings, CADD files and deliverables according to this standard prior to providing the deliverable to the FAA.

The FAA CADD Manager is responsible for assuring that the electronic files are in compliance with FAA standards. This check would examine files for entities placed in the proper layer or level, proper drawing and plot parameters, completed and correct title blocks, and verification that the drawing is free of unwanted entities.

5. GENERAL.

5.1 Drawing Definitions.

The following sections define general A/E/C drawing types.

5.1.1 Engineering Drawings.

Engineering Drawings are formal representations used to convey the physical and functional end product design and/or installation requirements of an item. They may include pictorial, graphical, schematic or textual presentations.

5.1.2 Construction Drawings.

Construction Drawings are engineering drawings, which show the design of buildings, structures, or the related construction, and are normally associated with the architectural, construction and civil engineering operations. Construction drawings establish all the interrelated elements of the pertinent services, equipment, utilities and other engineering skills.

5.1.3 Installation Drawings.

Installation drawings are engineering drawings, which show the installation requirements of NAS mission equipment in facilities.

5.1.4 National Standard Drawings.
National standard drawings may be either construction or installation drawings generated for or by Washington Headquarters Program Offices and depict standard design and installation requirements.

5.1.5 Regional Standard Drawings.
Regional standard drawings are generated and maintained by the Regional Offices, Aeronautical Center and Technical Center, and are intended for their exclusive use.

5.2 Glossary.
The following are definitions of terms used in this standard.

AutoCAD—AutoCAD is a full-featured CADD tool produced by AutoDesk Inc. that handles both 2D and 3D design. The native file format is DWG and AutoCAD also reads and writes DXF files.

CADD—Computer Aided Design & Drafting. Graphic software used by engineers and drafters to create and modify drawings in 2D and 3D.

CAEG—Computer Aided Engineering Graphics. The FAA's technical graphics initiative, CAEG, includes Computer Aided Design & Drafting (CADD), Computer-Aided Engineering (CAE), and Geographical Information Systems (GIS). The National CAEG Program Office is structured within the Air Traffic Control Facilities Operational Services organization.

DGN—MicroStation's native CADD file format.

Drawing Sheet Format—The sheet boundary lines, zoning system and title block geometry used to record administrative information about the CADD file.

Drawing Sheet Sizes—Standard sheet sizes are determined by the American National Standards Institute. Alphabetic characters name sheet sizes such as: D, E and F.

Drawing Zone System—Boundary information that sub-divides a sheet for easy referencing in a revision block.

DWG—AutoCAD's native CADD file format.

DXF—AutoCAD drawing exchange format for CADD files.

Job Control Number (JCN)—A unique number assigned to each project and tracked by the Regional Tracking Program (RTP).

MicroStation—MicroStation is a full-featured CADD tool produced by Bentley Systems Inc. that handles 2D and 3D design. The native file format is DGN and MicroStation also reads and writes DWG and DXF files.

Model File—Model files are to be used to describe the facility's physical layout and components. This includes the building's walls, doors, windows, structural system, mechanical system, etc. All model files are drawn at full size (1-to-1). Model files can be 2D or 3D.

Model Space—AutoCAD Model Space is where the user creates a 2D or 3D full size (1-to-1) drawing. Model file types are created in Model Space.

Paper Space/Layouts—AutoCAD Paper Space/Layouts is where the user organizes different layouts for the purpose of plotting to an appropriate English or Metric drawing scale.

Plot Stamp—Plots of CADD drawing files should include a plot stamp, which should include the file name and path, date, time and the user name.

Raster—A digital image process producing lines made of rectangular dots. Examples of raster formats are TIFF, JPG, BMP, GIF, etc.

Reference File—A CADD software capability that allows vector or raster files to be attached to CADD files and displayed, plotted and (in the case of reference design files) used for construction purposes. This capability is generally used as a project organization tool to segregate the sources of project drawing files. Additionally, it allows designers to share drawing information electronically.

Revised Drawing—A drawing that has been replaced by a newer revision.

Sheet File—MicroStation sheet files are to be used to assemble model files, text, title block and other information for plotting purposes. Each sheet file represents one plotted drawing. Generally sheet files are plotted at a 1-to-1 scale.

TIFF—Tagged Image File Format. Raster graphics format developed by a committee chaired by Aldus Corporation, with contributions from Microsoft and Hewlett-Packard. The FAA standard format is TIFF Group 4.

Vector—Computer graphics represented by points, lines and other geometric entities.

Workflow—The automatic routing of documents to the users responsible for working on them.

5.3 Acronyms and Abbreviations.
The following are definitions of acronyms and abbreviations used in this standard:

2D—Two Dimensional

3D—Three Dimensional

A/E/C—Architectural, Engineering and Construction

AIA—American Institute of Architects

CCD—Configuration Control Decision

CIFM—Computer Integrated Facilities Management

CM—Configuration Management

CD-R—Compact Disc-Recordable

CSI—Construction Specifications Institute

DAT—Digital Audio Tape

DLT—Digital Linear Tape

EC—Engineering Center

EDMS—Engineering Drawing Management System

GIS— Geographical Information Systems

GSA—General Services Administration

IC—Implementation Center

JCN—Job Control Number

JON—Job Order Number

NCP—NAS Change Proposal

NIBS—National Institute of Building Sciences

OS—Operating System

PBS—Public Buildings Service

PDF—Portable Document Format

RTP—Regional Tracking Program

UDS—Uniform Drawing System

5.4 FAA, Standards and CADD Web Sites.

FAA	http://www.faa.gov/
FAA National CAEG	http://caeg.faa.gov/
FAA National CAEG Logos	http://caeg.faa.gov/caeglogos/index.cfm
FAA Standards	http://caeg.faa.gov/index.cfm?content=7&navVar=7
FAA Acronyms	http://www.cmd.faa.gov/LRS/TERMS/ACRONYMS.htm
FAA NAS Implementation	http://www.ani.faa.gov/
AIA CAD Layer Guidelines	http://www.e-architect.com/
ANSI	http://www.ansi.org/
AutoCAD	http://www.autodesk.com/
CSI Uniform Drawing System	http://www.csinet.org/
GSA PBS CAD/CIFM Standard	http://www.gsa.gov/Portal/gsa/ep/programView.do?pageTypeId=8195&ooid=12330&programPage=%2Fep%2Fprogram%2FgsaDocument.jsp&programId=8433&channelId=-12935
MicroStation	http://www.bentley.com/
NIBS National CADD Standard	http://www.nationalcadstandard.org/
CADD / GIS Technology Center	https://tsc.wes.army.mil/

Table 5-1, Internet URLs

APPENDIX A
LAYER/LEVEL Naming Scheme

Preface.

This alphabetical appendix addresses the usage of MicroStation levels and AutoCAD layers by disciplines. The associated MicroStation and AutoCAD color numbers listed in the following tables shall be used. Please note, the first table, Annotation, is not associated with a particular discipline and is included for the usage of text and user-defined elements. Additions to the level/layer structure are allowed as required to the User Defined levels/layers only.

Annotation.

The following AutoCAD layers/MicroStation levels shall be used to structure Annotation in Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	#	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
ANNO-DIMS	5	Dimensions and Dimensional Leaders	160	17
ANNO-IDEN	12	Identification Tags: Door #s; Hardware group; Window #s; Equipment Id #s; Furniture #s; Component Id.#s	7	0
ANNO-KEYN	9	Key Notes	7	0
ANNO-LABL	11	Identification Labels: Room #s, Floor #s, Tenant Identification, Area Calculations, Occupant or employee names, Elevation Id.#s	7	0
ANNO-LEGN	4	Legends and Schedules	4	7
ANNO-NOTE	7	Notes	7	0
ANNO-NPLT	8	Non-Plotting Graphic Information	8	9
ANNO-REDL	2	Redlines	1	3
ANNO-REVS	10	Revisions	4	7
ANNO-SYMB	3	Symbols: Bar Scales; North Arrow; Section Symbols; Detail Markers	4	7
ANNO-TEXT	1	Text and Text Note Leaders	7	0
ANNO-TITL	13	Drawing Component Titles; Detail Titles; Section Titles; Elevation Titles	3	2
ANNO-TTLB	6	Border and Title Block	30	6
VIEWPORTS	14	AutoCAD viewport clip window	2	NA
DEFPOINTS	15	AutoCAD dimensioning definition points for associative dimensioning	NA	NA
User Defined	16	User Level 1	User Defined Layer / Level	
User Defined	17	User Level 2	User Defined Layer / Level	
User Defined	18	User Level 3	User Defined Layer / Level	
User Defined	19	User Level 4	User Defined Layer / Level	
User Defined	20	User Level 5	User Defined Layer / Level	

Architectural.

The following AutoCAD layers/MicroStation levels shall be used to structure Architectural Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name #		Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
A-CLNG	30	Ceiling information; Ceiling grid; Ceiling/roof penetrations; Main tees; Suspended elements; Ceiling access	1	3
A-COLS	31	Columns	1	3
A-CONV	32	Conveying Systems	4	7
A-DOOR	33	Doors: Full-height (to ceiling) doors, swing and leaf	4	7
A-ELEV	34	Elevations	1	3
A-EQPM	35	Equipment; Fixed or Moveable; Equipment access; Appliances	1	3
A-FLOR-EVTR	36	Elevator cars and equipment	4	7
A-FLOR-OTLN	37	Floor or building outlines	4	7
A-FLOR-RAIS	38	Raised floors	1	3
A-FLOR-TPTN	39	Toilet partitions; Architectural specialties (toilet room accessories, display cases)	1	3
A-FLOR-WDWK	40	Architectural woodwork (field-built cabinets and counters); Casework (manufactured cabinets); Finishes, woodwork, trim, wall-mounted casework	1	3
A-FURN-FREE	41	Furniture: freestanding (desks, credenzas, etc.), chairs and other seating, file cabinets, plants, furniture elevations	5	1
A-FURN-PNLS	42	Furniture: system panels and work surface components, storage components, system furniture power designations, finish treatments	1	3
A-GLAZ	43	Windows; Full and partial-height glazed walls and partitions; Windowsills; Glazing and mullions - elevation views	4	7
A-GRID	44	Planning grid or column grid	1	3
A-HVAC	45	Supply diffusers; return air diffusers	1	3
A-LITE	46	Light fixtures	1	3
A-PATT	47	Wall insulation and surfaces; Fire wall patterning; Paving, tile, carpet and ceiling patterns; Elevation textures and hatch patterns	160	17
A-ROOF	48	Roof, roof outline, level changes, roof surfaces	4	7
A-SIGN	49	Signage	1	3
A-WALL	50	Full and partial height walls; Door and Window headers and jambs; Overhead items (skylights, overhangs, usually dashed lines)	4	7

Civil.

The following AutoCAD layers/MicroStation levels shall be used to structure Civil Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
C-AFLD	60	Airfields; General Outline of Airports	8	9
C-ATNA	61	Antenna (Comm / Radar) - antenna towers and antennas	1	3
C-BLDG	62	Proposed building footprints, primary structures	4	7
C-BLIN	63	Baseline	4	7
C-BORE	64	Test Borings	1	3
C-BRDG	65	Bridge	4	7
C-CEME	66	Cemetery	8	9
C-CHAN	67	Navigable Channels, Rivers, Lakes, Bodies of Water	22	22
C-COMM	68	Site communications, (Overhead and Underground); telephone poles, boxes, towers	1	3
C-CTRL	69	Control Points	4	7
C-DFLD	70	Drain Fields	1	3
C-DTCH	71	Ditches or Washes	22	22
C-EROS	72	Erosion and Sediment Control, Ripap	4	7
C-FENC	73	Fences	160	17
C-FIRE	74	Fire protection: hydrants, connections; underground lines	1	3
C-FUEL	75	Fuel Gas	80	11
C-NGAS	76	Natural gas - manholes, meters, storage tanks, underground lines	1	3
C-PATT	77	Patterns	160	17
C-PKNG	78	Parking lots, islands, curbs, striping, handicapped symbols, drainage slope indications	1	3
C-POWR	79	Power: (Overhead and Underground); Poles; boxes, towers	1	3
C-PROP	80	Property lines, survey benchmarks, retaining walls	4	7
C-PROP-BRNG	81	Bearings and distance labels	7	0
C-PROP-ESMT	82	Easements, rights-of-way, setback lines, runway approach zones	1	3
C-RAIL	83	Railroad	4	7
C-ROAD	84	Roadways, runways, taxiways, curbs, Center lines	4	7
C-SSWR	85	Sanitary sewer -manholes, pumping stations, underground lines	1	3
C-STEM	86	Steam Systems	1	3
C-STRM	87	Storm drainage catch basins, manholes, underground lines	1	3
C-TINN	88	Triangulated Irregular Network	1	3
C-TOPO	89	Contour lines and elevations, spot elevations	5	1
C-WALL	90	Noise Barrier, Retaining Wall	4	7
C-WATR	91	Domestic water: manholes, pumping stations, storage tanks, underground lines	1	3

Contractor/Shop.

The following AutoCAD layers/MicroStation levels shall be used to structure Contractor/ Shop Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
Z-CTR	100	Contractor and shop drawings	1	3

Demolition.

The following AutoCAD layers/MicroStation levels shall be used to structure Demolition Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	#	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
D-COMM	110	Telephone and data lines, outlets	1	3
D-ELEC	111	Wiring, outlets, fixtures, lighting, equipment	1	3
D-FLOR	112	Floors, stairs, rails, woodwork, casework, trim	1	3
D-HVAC	113	HVAC equipment, ductwork, diffusers	4	7
D-PATT	114	Patterns	160	17
D-PLBG	115	Plumbing fixtures, equipment, drainage and piping, hot and cold water supply pipes and equipment	1	3
D-SITE	116	Site features, retaining walls, plants, trees, signs, fences	4	7
D-WALL	117	Full and partial height walls, structural walls, door and window headers and jambs, partitions	4	7

Electrical.

The following AutoCAD layers/MicroStation levels shall be used to structure Electrical Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	**MicroStation**
E-1LIN	120	One-line diagram	4	7
E-ALRM	121	Electrical alarm system	1	3
E-AUXL	122	Auxiliary System	12	12
E-COMM	123	Telephone, communications outlets	1	3
E-CTRL	124	Control systems devices and wiring	1	3
E-DATA	125	Data outlets	1	3
E-GRND	126	Ground system, counterpoise, ground rods	4	7
E-INTC	127	Intercom, sound/PA system	1	3
E-JBOX	128	Junction box	4	7
E-LEGN	129	Legend of symbols	4	7
E-LITE	130	Lighting, special lighting, ceiling-mounted lighting, wall-mounted lighting, floor-mounted lighting, lighting outline for optional background lighting, roof lighting, lighting circuits, emergency and exit lighting, site lighting	4	7
E-LTNG	131	Lightning protection system	4	7
E-PATT	132	Patterns	160	17
E-POWR-CABL	133	Underfloor raceways, cable trays, busways	1	3
E-POWR-EQPM	134	Power panels, equipment, switchboards	4	7
E-POWR-RECP	135	Power: wall and ceiling outlets and receptacles	4	7
E-RISR	136	Riser diagram	1	3
E-SWCH	137	Lighting switches	1	3
E-TVAN	138	TV antenna system	1	3

NOTE: High voltage power connections will be shown on Electrical Discipline (E-Electrical) drawings and low voltage power connection will be shown on NAS Equipment (Q-NAS Equipment) drawings.

Fire Protection.

The following AutoCAD layers/MicroStation levels shall be used to structure Fire Protection Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	#	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
F-AFFF	150	Aqueous Film-Forming Foam System	120	12
F-CO2S	151	CO2 sprinkler piping and equipment	1	3
F-HALN	152	Halon piping and equipment	1	3
F-IGAS	153	Inert gas equipment and piping	1	3
F-PATT	154	Patterns	160	17
F-PROT	155	Fire system equipment (fire hose cabinet extinguishers), fire alarm, smoke detectors/heat sensors	1	3
F-SPRN	156	Fire protection sprinkler system, sprinkler piping, sprinkler heads, sprinkler standpipes, fire protection systems	1	3

General.

The following AutoCAD layers/MicroStation levels shall be used to structure General Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	#	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
G-ACCS	160	Access Plan	1	3
G-EVAC	161	Evacuation Plan	1	3
G-PATT	162	Patterns	160	17
G-PLAN	163	Key Plan	1	3
G-VCTY	164	Vicinity Map	1	3

Hazardous Material.

The following AutoCAD layers/MicroStation levels shall be used to structure Hazardous Material Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	#	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
H-HZMT	170	Hazardous materials on floor and/or site plan	4	7
H-PATT	171	Patterns	160	17

Landscaping.

The following AutoCAD layers/MicroStation levels shall be used to structure Landscape Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
L-IRRG	180	Irrigation systems, sprinklers, piping, equipment, coverage	1	3
L-PATT	181	Patterns	160	17
L-PLNT	182	Plant and landscape materials; Trees; Ground covers and vines; Rock, bark, and other landscaping beds; Planting beds	1	3
L-SITE	183	Site improvements, fencing, walls, steps, decks, bridges, pools, spas, sports fields, play structures, furnishings, walkways	1	3

Mechanical.

The following AutoCAD layers/MicroStation levels shall be used to structure Mechanical Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
M-CMPA	190	Plant compressed air systems, equipment and piping	4	7
M-CONT	191	Thermostats, controls and instrumentation	1	3
M-CONT-WIRE	192	Low voltage control wiring	1	3
M-CWTR	193	Chilled water system, piping and equipment	4	7
M-DUST	194	Dust and fume collection system, equipment and ductwork	4	7
M-ELHT-EQPM	195	Electric heat equipment	1	3
M-ENER	196	Energy management system, equipment and wiring	1	3
M-EXHS	197	Exhaust system, equipment and ductwork, roof exhaust equipment	1	3
M-FUEL-GAS	198	Fuel system tanks, piping, gas process piping, fuel gas general piping	1	3
M-FUEL-NGAS	199	Natural gas systems, equipment and piping	4	7
M-FUEL-OIL	200	Fuel oil process tanks, piping and general piping	1	3
M-HOTW	201	Hot water heating system, equipment piping	4	7
M-HVAC	202	HVAC system, HVAC ductwork and equipment	4	7
M-HVAC-DFF	203	HVAC ceiling diffusers, other diffusers, suppy diffusers, return air diffusers	4	7
M-MACH	204	Machine shop equipment	1	3
M-PATT	205	Patterns	160	17
M-PROC	206	Process/instrument air piping and equipment	4	7
M-RCOV	207	Energy recovery system, equipment and piping	1	3
M-REFG	208	Refrigeration systems, equipment and piping	4	7
M-SPCL	209	Special systems, equipment and piping	1	3
M-STEM	210	Steam systems: Steam systems condensation piping and equipment; Low pressure steam piping; Medium pressure steam piping; High pressure steam piping	1	3
M-TEST	211	Test equipment	1	3

NAS Equipment.

The following AutoCAD layers/MicroStation levels shall be used to structure NAS Equipment Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
Q-CABL	220	Cables and Trays (Low voltage)	1	3
Q-CNSL	221	Console	1	3
Q-DTLS	222	Equipment details	4	7
Q-ELEV	223	Equipment elevations	1	3
Q-MNTS	224	Equipment mounts	4	7
Q-PATT	225	Patterns	160	17
Q-PLAN	226	Equipment plans	4	7
Q-POWR	227	Low voltage power connections	1	3
Q-RACK	228	Rack Details	1	3
Q-SCHM	229	Schematic and Block wiring diagram	4	7

NOTE: High voltage power connections will be shown on Electrical Discipline (E-Electrical) drawings and low voltage power connection will be shown on NAS Equipment (Q-NAS Equipment) drawings.

Plumbing.

The following AutoCAD layers/MicroStation levels shall be used to structure Plumbing Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	**MicroStation**
P-DOMW	240	Domestic hot and cold water systems and piping	1	3
P-FIXT	241	Plumbing fixtures and equipment	1	3
P-PATT	242	Patterns	160	17
P-SANR	243	Sanitary drainage and piping, floor drains and piping, sanitary risers and equipment	1	3
P-STRM	244	Storm drainage system, storm drain piping and risers	1	3
P-STRM-RFDR	245	Roof drains	8	9
P-WAST-OIL	246	Waste oil systems and piping	1	3

Real Estate.

The following AutoCAD layers/MicroStation levels shall be used to structure Real Estate Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name #	Layer / Level Description	Layer / Level Color	
		AutoCAD	MicroStation
FOR REAL ESTATE LAYER/LEVELS SEE THE CIVIL DISCIPLINE LAYER/LEVEL SCHEMA			

Security.

The following AutoCAD layers/MicroStation levels shall be used to structure Security Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	#	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
Y-ALRM	250	Miscellaneous alarm system	1	3
Y-CAMS	251	Security cameras	4	7
Y-CCTV	252	Closed-circuit TV	1	3
Y-COMM	253	Security communication	1	3
Y-DTLS	254	Security equipment details	4	7
Y-ELEC	255	Security electrical	1	3
Y-PATT	256	Patterns	160	17
Y-SNSR	257	Security sensor locations	4	7

Structural.

The following AutoCAD layers/MicroStation levels shall be used to structure Structural Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	**MicroStation**
S-BEAM	260	Beams	4	7
S-BRAC	261	Bracing	4	7
S-COLS	262	Columns	4	7
S-DECK	263	Structural floor deck	1	3
S-FNDN	264	Foundation, piles, drilled piers	1	3
S-FNDN-RBAR	265	Foundation reinforcing; Slab reinforcing; Anchor bolts	1	3
S-GRID	266	Column grid outside building, inside building, grid dimensions, grid tags, columns	1	3
S-JNTS	267	Joints	4	7
S-JOIS	268	Joists	4	7
S-METL	269	Miscellaneous metal	1	3
S-PATT	270	Patterns	160	17
S-PROP	271	Property Lines	4	7
S-SLAB	272	Slab; Edge of slab; Slab control joints	1	3
S-STRS	273	Stair treads, escalators, ladders; Stair risers, balcony handrails, guard rails	1	3
S-TRUS	274	Trusses	4	7
S-WALL	275	Structural bearing or shear walls	4	7
S-ABLT	276	Anchor Bolts	8	9
S-GRAT	277	Grates	250	8
S-RBAR	278	Reinforcing Bar	22	22

Telecommunications.

The following AutoCAD layers/MicroStation levels shall be used to structure Telecommunications Drawings. The associated AutoCAD and MicroStation color numbers will be used as a standard.

Layer / Level Name	Level #	Layer / Level Description	Layer / Level Color	
			AutoCAD	MicroStation
T-1LIN	290	One-line diagram	4	7
T-ALRM	291	Alarm system	1	3
T-CABL	292	Cable systems: coax cable, fiber optics cable, multi-conductor cable, cable tray and wireway	1	3
T-CATV	293	Cable television system	4	7
T-CCTV	294	Closed-circuit TV	1	3
T-DATA	295	Data/LAN system	80	11
T-ELEC	296	Electrical system, telecom plan	1	3
T-EQPM	297	Equipment	4	7
T-FIRE	298	Fire alarm, fire extinguishers	1	3
T-JBOX	299	Junction box	4	7
T-PATT	300	Patterns	160	17
T-PHON	301	Telephone system	1	3
T-RISR	302	Riser diagram	4	7
T-SERT	303	Security system	1	3
T-SOUN	304	Sound/PA system	120	12
T-TVAN	305	TV antenna system	11	19