EFMD
Engineering & Facilities Management Division

CAD standards for LAWA projects

Document History

revision letter	release date	major changes	approved by
A	September 2012	new version of standards	

Contents

About this book

The standards described in this document are provided to help LAWA staff, consultants and project partners prepare CAD files for use in LAWA projects. These standards help ensure efficient exchange of information between LAWA and all authorized users of LAWA CAD data.

Relation to existing standards

These LAWA-specific standards are generally derived from version 5.0 of the United States National CAD Standard. More detailed topics such as layer guidelines also refer to the AIA standards.

Who should read this book

This book is intended for all LAWA project partners, and especially for members of their staff who prepare CAD drawings for use within a project. It is provided to promote and support effective implementation of CAD drawing standards within the airport, for the full project life-cycle.

How this book is organized

After the introduction, this book contains the following chapters and appendixes:

Chapter 2. Drawing organization

Introduces the ideas of model and sheet files, and gives the title, length and description of each component of a standard file-reference

Chapter 3. Appearances and presentation

Covers standards for lines, text, sheet organization, north arrow, drawing scale, and dimensioning.

Chapter 4. Layers

Explains how layers are used for organization in AutoCAD and gives standards – based on AIA CAD guidelines – for identifying them

Chapter 5. Symbols

Introduces the ideas of standardizing block entities

Appendix A. File type codes per discipline

List of valid file types per discipline

Related documents

The variance request form, the CAD layer assignment table and other documentation related to the CAD standards are available on the LAWA website.

Chapter 1 Introduction

The standards cover the following aspects:

Drawing organization

How graphical information about a project is organized, including how the filenames for model files and the sheet files derived from them are built up.

Using agreed conventions makes it easy to identify the designer, location, discipline and subject of any file.

Drafting conventions

How information is presented in model files and sheet files, including standards for line width and color, fonts, and text orientation.

Using agreed drafting conventions helps ensure consistency through all related files, which makes it easier to compare and exchange information.

Layer-structure

How information (including blocks) is presented consistently on the appropriate layer.

Using agreed layers makes it easy to extraction and visualize information within a file or a set of files, and makes it easier to exchange files.

Symbols

Standard symbols used on CAD files throughout the airport environment.

Using agreed symbols helps ensure consistency, and reduces the effort required to create new files.

Files submitted to LAWA electronically must meet *the LAWA Standards for Electronic Data Exchange* (LSEDE), available from the LAWA website. The individual or organization submitting the files is also responsible for ensuring files and reference file links are preserved or automatically reconstructed when data is transferred to the LAWA CAD environment.

Benefits of CAD Standards

Drawing up and implementing detailed standards for CAD files standards is intended to ensure a smooth flow of information at every stage of the project. Consistent, comparable files bring benefits that include the following:

- project partners can share information confidently and easily
- common format and comparable detail references are used for all projects within LAWA
- information is presented in the same place in each set of drawing files
- non-compliance and other errors can be quickly detected, reducing the need for change requests
- data can easily be translated between languages and file-formats; document storage and retrieval can be automated

General principles

- except for some specialized schematics, the software used to produce CAD drawings is AutoCAD (a recent version)
- the unit of measurement used for CAD architectural drawings is the inch
- the unit of measurement used for CAD civil drawings is the U.S. foot
- project codes are defined by LAWA on a project per project basis
- all civil drawings must be created in NAD 83 California State Planes, Zone V, US Foot coordinate system
- all civil drawings will identify the survey epoch used, for example NSRS 2007, CORS 96, etc..
- all architectural drawings must use positive values for coordinates
- all spatial data must be created in "Model Space"
- all graphical elements must be in "Paper Space"

Templates

Project partners and subcontractors who need to implement the CAD standards for LAWA projects can download templates to provide a working environment based on the LAWA CAD Standards. Each template (`.dwt` file) defines the layers for a specific discipline. Sample title blocks can also be downloaded.

Changes or additions

Any deviation from these standards must be approved by LAWA, in advance and in writing. Requests need to be submitted on the "Request for variance" form, available from the LAWA website http://www.lawa.org/laxdev/Handbook.aspx

Suggestions for improvements or extensions to these standards are encouraged, to meet unforeseen requirements and as a way to improve effectiveness and clarify any ambiguities.

Compliance

Having up to date, accurate, fully compliant data available to the LAWA community is an integral part of planning within any project. The aim of these standards is to ensure a smooth data transfer of information into the LAWA geospatial data base and efficient data maintenance through the complete data lifecycle. Accordingly, the terms and conditions of a LAWA contract require compliance with these standards. Failure to comply with these standards may be taken into account when inviting organizations to participate in future LAWA projects.

LAWA or a third party reviewer will perform detailed quality assurance procedures on all data submitted. Data must be submitted for review at 30% and 'As-Built'. Files containing significant errors will be rejected and returned to the submitter for correction and re-submittal. To avoid delays to project planning, LAWA maintain the right to rework and make compliant the relevant data and back-charge the supplier.

Files submitted to LAWA electronically must meet *the LAWA Standards for Electronic Data Exchange* (LSEDE), available from the LAWA website.

The individual or organization submitting the files is also responsible for ensuring that all links between drawings and reference files will be preserved and automatically reconstructed when data is transferred to the LAWA CAD environment "Reference Files", on page 14

Chapter 2   Drawing Organization

This section covers CAD model files and sheet files, naming conventions, and external reference files.

Model Space and Paper Space (Sheet files)

AutoCAD has two distinct working spaces to create drawing objects, a model space and a paper space. All drawings for LAWA should have properly organized model and paper spaces:

- model space is for creating a model or drawing composed of geometric objects

  All data representing features must be drawn in the model space

- paper space is used for plots (sheet files) of drawings created in model space

  Paper space usually contains single or multiple viewports of a model, any specified scale and orientation, a title block, a north arrow, a legend, and a scale bar. Any descriptive text for a drawing (other than dimensions or object-related notes) must be placed in a paper space view.

Naming Conventions

Naming conventions for electronic drawing files (model files and sheet files) allow users to identify the content and relevance of the drawing. They provide basic minimum information for organizing the files within a project directory and or entering them into an electronic document management system.

Naming Conventions for Model Files

Model file names are made up of four mandatory elements, which must be used in the correct sequence. These names are structured to ensure consistency among different disciplines within the project.

- the first two elements are the unique project code and the discipline designator, followed by a hyphen
- the file type is a two-character code describing the content of the file
- a project-specific code identifying the coverage of the model file
- the extension (a period or stop followed by three letters) identifying the file format, for example `.dwg`

The combination of discipline designator and file type makes it possible to locate files and identify them consistently:

- A-DT identifies a model file showing detail information related to Architecture
- E-DT identifies a model file showing detail information related to Electricity
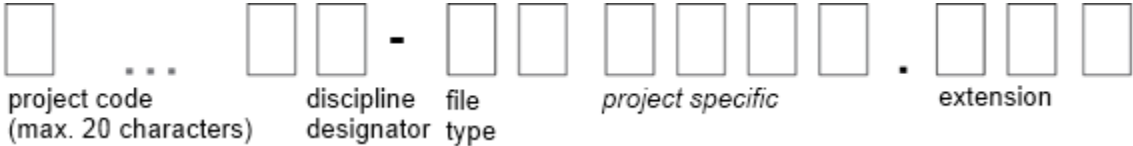
Figure 1.   Model file naming convention

Table 1. Model file names		
component	**length**	**comment**
project code	up to 20	Project codes are developed by LAWA and provided to the contractors for each project. Agreed project codes must be used in all LAWA files, to guarantee unique, consistent file names.
discipline designator	1	Model files for LAWA projects use one letter for the discipline designator. The single character discipline designator must be followed by a hyphen, separating it from the file type code. Allowable characters for the discipline designator in model files are listed in Table 2. Discipline designators for model files
file type code	2	This code identifies the content of the model file, for example DT (detail) or PR (profile). Using codes ensures consistency among different disciplines. Allowable characters for the file type code are listed in Appendix A.
project specific	4	These four-character codes are defined per project, and generally identify a zone or area; for example, Floor 1, west quadrant. Use lower case x as a placeholder for unused characters
extension	3	identifies the file format

Table 2. Discipline designators for model files			
discipline	**designator**	**discipline**	**designator**
A	Architectural	O	Operations
B	Geotechnical	P	Plumbing
C	Civil	Q	Equipment

Table 2.	Discipline designators for model files			
discipline	**designator**	**discipline**	**designator**	
D	Process	R	Resource	
E	Electrical	S	Structural	
F	Fire Protection	T	Telecommunications	
G	General	V	Survey/Mapping	
H	Hazardous Materials	W	Civil Works	
I	Interiors	X	Other Disciplines	
L	Landscape	Z	Contractor/Shop Drawings	
M	Mechanical			

Examples

P	R	O	J	E	C	T	1	A	-	F	P	F	1	x	x	.	d	w	g

project project reference (max. 20 characters)

discipline architectural

file type floor plan

project-specific first floor

P	R	O	J	E	C	T	3	F	-	F	A	F	2	x	x	.	d	w	g

project project reference (max 20 characters)

discipline fire protection

file type fire alarm/detection plan

project-specific second floor

P	R	O	J	E	C	T	1	C	-	A	F	S	8	x	x	.	d	w	g

project project reference (max 20 characters)

discipline civil

file type airfield plan

project-specific sector 8

Naming Conventions for Sheet Files

Sheet file names are made up of five mandatory elements, which must be used in the correct sequence. These names are structured to ensure consistency among different disciplines within the project.
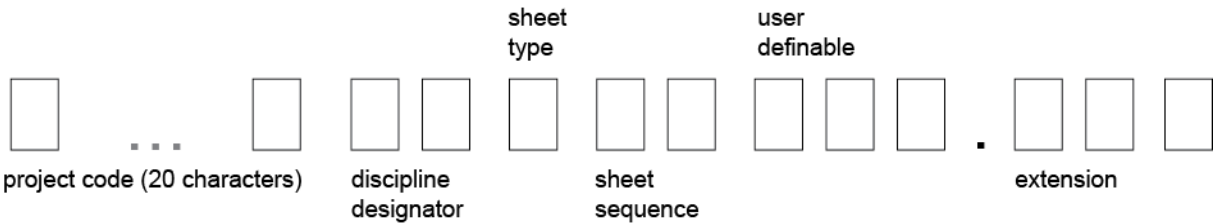
Figure 2.   Sheet naming convention

Table 3. *Sheet file names*		
component	**length**	**comment**
project code	up to 20	Project codes are developed by LAWA PMD or their authorized representative and are provided to the contractors for each project. Agreed project codes must be used in all LAWA files, to guarantee unique, consistent file names.
discipline designator	2	The discipline designator for a sheet file name identifies the discipline in detail, and normally consists of two letters. Where a product file applies to a high-level discipline with a single-letter code, the second letter is replaced with a hyphen. Allowable characters for the discipline designator in sheet files are listed in Appendix A.
sheet type code	1	A numerical character that identifies the type of information on the sheet. See Table 4. Sheet type designators
sheet sequence number	2	01 to 99 – always two digits, with a leading zero if necessary
defined per project	3	These three-character codes are defined per project, and generally identify a zone or area.

Table 4. *Sheet type designators*

Sheet Type	Designator
General (symbols legend, notes, etc.)	0
Plans (horizontal views)	1
Elevations (vertical views)	2
Sections (sectional views)	3
Large Scale Views (plans, elevations, or sections that are not details)	4
Details	5
Schedules and Diagrams	6
User Defined	7
User Defined	8
3D Representations (isometrics, perspectives, photographs)	9

Examples

P	R	O	J	E	C	T	1	A	E	1	0	2	F	1	B	.	d	w	g

project	Project reference (max 20 characters)
discipline	AE (Architectural, Elements)
sheet type	1 – plan (horizontal view)
sheet sequence	02
project-specific	F1B – first floor, quadrant B

P	R	O	J	E	C	T	1	F	A	5	0	5	F	2	C	.	d	w	g

project	Project reference (max 20 characters)
project	FA (Fire protection, Fire Alarm/Detection Plan)
sheet type	5 – details
sheet sequence	05
project-specific	F2C – second floor, quadrant C

P	R	O	J	E	C	T	1	C	-	1	1	6	A	S	8	.	d	w	g

project	Project reference (max 20 characters)
project	C- (Civil)
sheet type	plan (horizontal view)
sheet sequence	16
project-specific	AS8 – airfield sector 8

Reference Files

Using reference files is recommended and promoted in LAWA projects, because:

- they make it possible to work with smaller files
- they allow different people to work on different project drawings (for example, drawings from different disciplines) at the same time
- every time a drawing using references file is loaded, the user sees the most recent version of the drawing

IMPORTANT Drawings using reference files must be stored in the same directory/ subdirectory as the files they refer to.

External references to other CAD files may be used to manage the content of a large CAD drawing as several smaller, more efficient drawings. The use of this procedure will reduce drawing size, increase performance, improve operator efficiency and make coordination of disciplines easier.

Chapter 3   Appearance and Presentation

This chapter covers standards for lines, text, sheet organization, north arrow, drawing scale, and dimensioning.

Lines

Standards for line drawing cover:

- line weight
- line type (line style)
- line color

Line weight

Using the correct line width makes drawings more readable, by making more important information stand out.

- wider lines draw attention to the part of the drawing where they are used, and place emphasis on certain elements
- screen or half-tone lines de-emphasize drawing elements

The line weights to be used for each feature type in LAWA project drawings are available on the LAWA website. Typical use for line weights from Fine to XXXX Wide are described in the next table.

line weight		width (mm)	width (inch)	usage
Fine	———	0.18	0.007	Material indications, surface marks, hatch lines, patterns
Thin	———	0.25	0.010	Dimension lines, leaders, extension lines, break lines, hidden objects, dotted lines, dashed lines, setback lines, center lines, grid lines, schedule grid lines
Medium	———	0.35	0.014	Object lines, property lines, text, lettering, terminator marks, door and window elevations, schedule grid accent lines
Wide	———	0.50	0.020	Titles, edges of interior and exterior elevations, profiling; cut lines, property lines, section cutting plane lines, drawing block borders
Extra wide	———	0.70	0.028	Minor title underlining, schedule outlines, large titles, and object lines requiring special emphasis. Match lines, large titles, footprints, title block borders,

Table 5.   *Typical line weight usage*
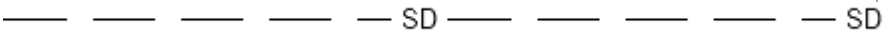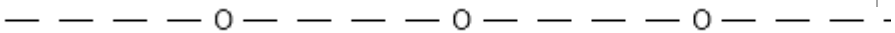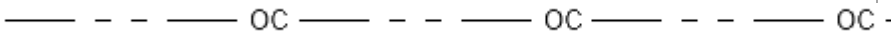
Table 5. *Typical line weight usage*

line weight		width (mm)	width (inch)	usage
				sheet borders, schedule outlines.
XX Wide	▬▬▬	1.00	0.039	Major title underlining and separating portions of designs.
XXX Wide	▬▬▬	1.40	0.055	Border sheet outlines and cover sheet line work
XXXX Wide	▬▬▬	2.00	0.079	Border sheet outlines and cover sheet line work

Line type (line style)

Line types for use in LAWA project drawings are available on the LAWA website, as AutoCAD templates `tsaec.rsc` and `tsaec.lin`. Sample line types are illustrated in the next table.

Table 6. *Samples of LAWA line types*

electric line	— — — — — — E — — — — — — E — — — — — E —
gas line	—— ·· — G —— ·· — G —— ·· — G —— ·· — G —
sewer line	▬▬ · · S · · ▬▬ · · S · · ▬▬ · · S · · ▬▬ · · S
storm drain line	—— —— —— —— — SD —— —— —— —— — SD
water line	▬▬· — · ▬ W ▬· — · ▬ W ▬· — · ▬ W
fence line	▬ X ▬ X ▬ X ▬ X ▬ X ▬ X ▬ X ▬ X ▬
jet fuel line	—— · · —— JF —— · · —— JF —— · · —— JF —— · · —
other line	— — — — O — — — — O — — — — O —
oil company line	—— – – —— OC —— – – —— OC —— – – —— OC —
ACAMS	▬ ▬ ▬ ▬ A ▬ ▬ ▬ ▬ A ▬ ▬ ▬ ▬ A ▬
telephone line	▬ ▬ ▬ – T – ▬ ▬ – T – ▬ ▬ – T – ▬
traffic signal c.	▬▬ ▬ ▬ ▬ – ▬ TS ▬▬ ▬ ▬ ▬ – ▬ TS ▬▬ ▬ ▬ –

LAWA line types are based on the standard AutoCAD line types shown in the next table.

Table 7. AutoCAD standard line types		
Description	**Example**	**AutoCAD Designator**
continuous	▬▬▬▬▬	Continuous
dotted	··················	ACAD_ISO07W100
dashed	▬ ▬ ▬ ▬ ▬ ▬	ACAD_ISO02W100
dashed spaced	▬ ▬ ▬ ▬	ACAD_ISO03W100
dashed dotted	▬ · ▬ · ▬ · ▬	ACAD_ISO10W100
dashed double-dotted	▬ · · ▬ · ·	ACAD_ISO12W100
dashed triple-dotted	N/A	ACAD_ISO14W100
chain	▬ · ▬ · ▬ · ▬	ACAD_ISO08W100
chain double-dashed	N/A	ACAD_ISO09W100

Line color

The next table lists recommendations for line colors and widths. Note that exceptions may apply.

Table 8. Examples of recommended line colors (screen values)			
color	**color no.**	**line width (mm)**	**color (RGB)**
red	1	0.18	255,0,0
yellow	2	0.25	255,255,0
green	3	0.35	0,255,0
cyan	4	0.35	0,255,255
blue	5	0.50	0,0,255
magenta	6	1.00	255,0,255
white (or black)	7	1.40	255,255,255
grey	8	0.35	128,128,128
dark red	14	0.70	153,0,0
rust	23	0.50	204,127,102
brown	36	1.40	127,63,0
dark yellow	54	0.70	153,153,0
dark green	94	0.70	0,153,0
dark cyan	134	0.70	0,153,153
dark blue	154	0.70	0,76,153
dark magenta	214	0.70	153,0,153
dark gray	250	0.25	51,51,51
med/dark gray	251	0.35	91,91,91
med/light gray	252	0.50	132,132,132

Text

Standards for text cover:

- text styles and fonts
- text size

Text styles and fonts

Different text styles and fonts are used within all LAWA project drawings to identify different types of information.

The five approved text styles are:

- monotext (AutoCAD monotext font)
- proportional (AutoCAD Romans font, with a width factor of 0.8)
- slanted (AutoCAD Romans font with Obliquing Angle set to 21.8 deg to achieve the American Standard slope of 2 in 5
- filled (AutoCAD Swiss TrueType font, with the `TEXTFILL` system variable set to 1 `arialbd.ttf` (Microsoft) can be used as an alternative
- outline (AutoCAD Sasb (Sans Serif-bold) PostScript font

Table 9. Typical uses for text styles

usage	text style
schedules, title blocks and other aligned text fields with evenly spaced characters	monotext
general notes, labels, or title blocks with proportionally spaced characters	proportional
text that needs to stand out from other text around it	slanted
titles and cover sheets	filled
major titles such as cover sheet information, when using a pen plotter for final output	outline
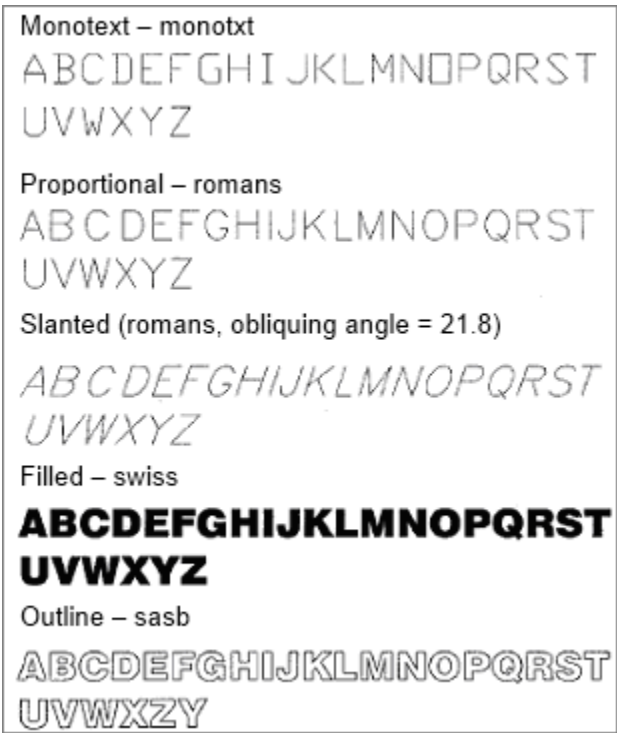
Figure 3.   Recommended AutoCAD fonts

Text sizes

All lettering in LAWA project drawings must be:

- of sufficient size (minimum height 0.20") and weight, so that it can be easily read from a print that has been reduced to half the size of the original drawing

  Specific text height requirements apply to the title block, as described under Title BlockTitle Block on page 20.

- oriented to facilitate reading from the bottom or right hand edge of the sheet

- in capital letters only (uppercase)

Note that minimum text height also depends on paper size.

Table 10. *Minimum text height, based on paper size – all measurements in inches*			
paper size	**civil**	**engineering**	**architectural**
11 x 17	0.0625	0.0625	1/16
24 x 36 or larger	0.09375	0.09375	3/32

Sheet organization

Sheet organization primarily involves sheet size and title block.

Sheet Size

All LAWA project drawings shall be 24" x 36" (D-size). The sheet medium shall be 0.4 mm thick and double matted erasable.

Common sheet sizes for other types of drawing are shown in the next table.

Table 11. Sheet sizes		
sheet size	**dimensions (inches)**	**usage**
A	8.5 x 11.0	Project book Supplemental drawings Mock-up sheets
B	11.0 x 17.0	Reduced drawings from "D" size Supplemental drawings Mock-up sheets
C	17.0 x 24.0	Small projects accommodating preferred plan scale
D+	24.0 x 36.0	Projects accommodating preferred plan scale
E+	36.0 x 48.0	Large projects accommodating preferred plan scale Mapping and GIS.

Title Block

LAWA has its own distinctive project title block, including:

- LAWA company logo
- designer identification
- project identification
- drawing issue (issue date and revision level)
- management information (all relevant meta data)
- sheet title
- sheet identification

The title block is placed horizontally. A source file for the standard title block can be downloaded from the LAWA website.

Line heights for use in the title block are fixed:

- Line 1: letter height 0.140 inches
- Line 2: letter height 0.290 inches:
- Line 3: letter height 0.200 inches
- Line 4: letter height 0.200 inches

The general rules for line widths may not always apply in title blocks.

North arrow

By default, the project North arrow symbol shall be placed beneath the extension of the top line of the title block. Exceptionally, the arrow may be placed where cartographically feasible.

Drawing scale

Every sheet shall indicate the scale of the drawing, both as a ratio and as a graphical scale bar. In order of preference, graphical scale bars shall be placed:

1 beneath the extension of the top line of the title block
2 above the title block
3 where cartographically feasible

Where a single sheet includes drawings at different scales, for example a main drawing and a detail shown at a larger scale, every drawing must have its own scale indicators.

Dimensioning

All useful measurements must be indicated as dimensions. The letter height used for dimensions must be easily readable from a print that has been reduced to half the size of the original drawing. Additionally:

- dimension figures shall be lettered parallel to and above the dimension line, and arranged to read from the bottom border or right hand border;
- within a single sheet, care must be taken to show each dimension only once, and in its proper location
- where dimensions cross the match-lines between two sheets, they shall be repeated on both sheets
- dimension styles for both architectural and site plan drawings have been created at various scales for AutoCAD. These dimension styles are included in the AutoCAD templates provided for the project.

Chapter 4   Guidelines for layers

Layers are a key organizational tool used in all LAWA projects for AutoCAD files:

- to separate graphic elements (lines, shapes, and text) according to the design discipline and feature type they represent
- to enforce line-type, color and other standards

Layer 0 is a neutral layer which should be kept 'clean', with status always thawed and on.

Layers must be identified according to the standards for LAWA projects.

Detailed standard layer tables are available on the LAWA website.

Layer Naming Convention

Layer names consist of distinct data fields, separated from one another by a hyphen. The full standard allows for five fields, but not all fields/characters have to be completed:

- where the second character of a discipline designator is not used, it is omitted
- where a Minor field or the Status field is not used, it is omitted
- where the last character or characters of a Minor field are not used, it is replaced by an underscore _
- exceptionally, the standards may define a minor 3, to be included in the layer name the same way as minor 1 and minor 2

The layers defined within these standards are based on the recommendations in *American Institute of Architects CAD Layer Guidelines*, as adopted by the NCS.

discipline designator   major   minor 1   minor 2   status
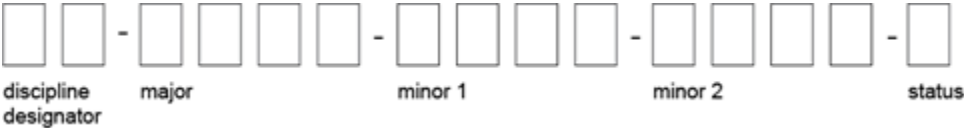
Table 12. *Layer name structure*		
component	**length**	**comment**
discipline designator	1 or 2	The first character represents the discipline, and is mandatory. The second character, which identifies the designator in more detail, is optional; the meaning depends on the first character.

component	length	comment
Table 12. *Layer name structure*		
major group	4	The major group normally identifies a building component or airport feature The major group may also be used to identify: – annotations (ANNO) – drawing views (detail DETL, elevation ELEV or section SECT) – demolition (STAT), used only in creating Existing Demolition model files
minor group 1	4	Adding minor group 1 after the major group gives more detailed information about the layer.
minor group 2	4	Adding minor group 2 after minor group 1 and the major group gives the most detailed information about the layer. Minor group 2 is not always required.
status	1	Identifies the status of work or construction phase of the data contained on the layer. Whether or not the status field is used depends on the project.

Examples

| E | - | L | I | T | E | - | S | I | G | N |

designator Electrical
major/minor 1 taxiway guidance signs

| A | - | B | A | G | S | - | I | C | N | V | - | E |

designator Architectural
major/minor 1 inbound baggage conveyor
status to remain

| A | E | - | W | A | L | L | - | F | U | L | L |

designator Architectural elements
major/minor 1 walls: full-height

G	-	A	N	N	O	-	R	E	D	L	-	T

designator General

major/minor 1 redlines

status temporary

C	-	A	I	R	F	-	A	I	D	S	-	I	L	S	_	-	F

designator Civil

major/minors Airfield Instrument Landing System

status future work

Layer assignment

In line with the AIA NCS, LAWA standards provide the following information for all discipline designators and layers used in LAWA projects:

- first character of a discipline designator
- layer name
- detailed description of each layer
- line style, line width (in mm), and color for each layer

The complete CAD layer assignment table is provided as a separate document.

To use other layers or designators, project partners must submit a "request for variance" form to the project manager. The proposed layers or designators may not be used in LAWA project drawings unless and until the project manager has approved them.

Chapter 5   Symbols/Blocks

A block in AutoCAD is a group of graphical elements logically or locationally combined to a single entity. Examples of logical blocks are windows, doors, graphic scale keys, furniture, etc. Locational blocks are made of all objects within a specified area.

The primary requirement of any type of block is that each graphical object in a block belongs to a proper layer listed in the AIA NCS. This means that each element comprising the block will, when fully exploded, be layered in conformance with established AIA NCS and LAWA standards.

Appendix A. File type codes per discipline

Disciplines (plus the discipline codes) are listed here in alphabetical order, for ease of reference.

Table 13. Discipline designators for model files	
Architectural (A)	Landscape (L)
Civil (C)	Mechanical (M)
Civil Works (W)	*Operations (O)*
Electrical (E)	*Other disciplines*
Equipment	Plumbing (P)
Fire protection (F)	*Process*
General (G)	*Resource (R)*
Geotechnical (B)	Structural (S)
Hazardous materials (H)	Survey/Mapping (V)
Interiors (I)	Telecommunications (T)

P	R	O	J	E	C	T	1	A	-	F	P	F

    Architectural

            Floor plan

Architectural (discipline A)	
File type code	**Definition**
3D	Isometric 3D
AC	Area Calculations/Occupancy Plan
CP	Reflected Ceilinq Plan
DT	Detail
EL	Elevation
EP	Enlarqed Plan
FP	Floor Plan
LG	Legend
OP	Equipment Plan
RP	Roof Plan
SC	Section
SH	Schedule
XD	Existing/Demolition Plan

Civil (discipline C)	
File type code	**Definition**
AF	Airfield Plan
AM	Airfield Pavement Marking Plan
CP	Channel Plan
DT	Detail
EC	Erosion Control Plan
EL	Elevation
FU	Liquid Fuel Utilities Plan
GP	Grading Plan
IP	Installation Plan/Base Map
IW	Industrial Waste Water Plan
JP	Joint Layout Plan
KP	Staking Plan
LG	Legend
NG	Natural Gas Utilities Plan
PL	Project Location Map
PR	Profile
SC	Section
SH	Schedule
SP	Site Plan
SS	Sanitary Sewer Plan
ST	Storm Sewer Plan
TS	Transportation Site Plan
WA	Domestic Water Plan
XD	Existing/Demolition Plan

Electrical (discipline E)	
File type code	**Definition**
AL	Airfield Lighting Plan
AP	Auxiliary Power Plan
CP	Exterior Communication Systems Plan
DG	Diagram
DT	Detail
EU	Electrical Utilities Plan
GP	Grounding System Plan

Electrical (discipline E)

File type code	Definition
LG	Legend
LP	Lighting Plan
PP	Power Plan
SH	Schedule
SS	Special Systems Plan
XD	Existing/Demolition Plan
PC	Power & Communication

Fire Protection (discipline F)

File type code	Definition
DG	Diagram
DT	Detail
FA	Fire Alarm/Detection Plan
FP	Fire Suppression Plan
LG	Legend
LP	Life Safety Plan
SH	Schedule
XD	Existing/Demolition Plan

General (discipline G)

File type code	Definition
BS	Border Sheet
KP	Keyplan

Geotechnical (discipline B)

File type code	Definition
BL	Boring Location Plan
LB	Boring Log
LG	Legend
SH	Schedule

Interiors (discipline I)

File type code	Definition
3D	Isometric/3D
DT	Detail
EL	Elevation
EP	Enlarged Plan
LG	Legend
OP	Equipment Plan
RP	Furniture Plan
SC	Section
SH	Schedule
SP	Signage Placement Plan
WP	System/Prewired Workstation Plan
XD	Existing/Demolition Plan

Hazardous materials (discipline H)

File type code	Definition
DT	Detail
EL	Elevation
LG	Legend
PP	Pollution Prevention Plan
SC	Section
XD	Existing/Demolition Plan

Landscape (discipline L)

File type code	Definition
DT	Detail
EL	Elevation
IP	Irrigation Plan
LG	Legend
LP	Landscape Plan
SC	Section
SH	Schedule
XD	Existing/Demolition Plan

Mechanical (discipline M)

File type code	Definition
3D	Isometric/3D
DG	Diagram
DT	Detail
EL	Elevation
EP	Enlarged Plan
HP	HVAC Plan
HT	HTCW Utilities Plan
LG	Legend
MD	Machine Design Plan
MH	Material Handling Plan
PP	Piping Plan
QP	Equipment Plan
SC	Section
SH	Schedule
SP	Specialty Piping Plan
XD	Existing/Demolition Plan

Plumbing (discipline P)

File type code	Definition
DG	Diaqram
DT	Detail Elevation
EP	Enlarqed Plan
LG	Legend
PP	Piping Plan
SH	Schedule
XD	Existing/Demolition Plan

Structural (discipline S)

File type code	Definition
3D	Isometric/3D
CP	Column Plan
DT	Detail
EL	Elevation
EP	Enlarged Plan

Structural (discipline S)	
File type code	**Definition**
FP	Framing Plan
LG	Legend
NB	Non-Building Structures Plan
NP	Foundation Plan
SC	Section
SH	Schedule
XD	Existing/Demolition Plan

Survey/Mapping (discipline V)	
File type code	**Definition**
AL	Existing Airfield Lighting Plan
CP	Existing Communication Plan
EU	Existing Electrical Utilities Plan
FU	Existing Liquid Fuel Utilities Plan
HP	Hydrographic Survey Plan
HT	Existing HTCW Utilities Plan
IW	Existing Industrial Waste Water Plan
LG	Legend
NG	Existing Natural Gas Utilities Plan
PB	Project Boundary
PR	Existing Profile
SC	Existing Section
SP	Survey and Mapping Plan
SS	Existing Sanitary Sewer Plan
ST	Existing Storm Sewer Plan
WA	Existing Domestic Water Plan

Telecommunications (discipline T)	
File type code	**Definition**
DG	Diagram
DT	Detail
LG	Legend
SH	Schedule
TP	Telephone/Data Plan

Telecommunications (discipline T)	
File type code	**Definition**
XD	Existing/Demolition Plan

EFMD

Engineering & Facilities Management Division

CAD layer assignment table for LAWA projects

Document History

revision letter	release date	major changes	approved by
A	September 2012	new version of standards	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
ANNO	-	**General Information**								
A	-	ANNO	-	DIMS		Witness/extension lines, dimension terminators, dimension text	V	V	•	Make Blue for our drawings where possible
A	-	ANNO	-	KEYN		Reference keynotes with associated leaders	V	V		
A	-	ANNO	-	LEGN		Legend & Schedule	V	V	•	
A	-	ANNO	-	NOTE		General notes and general remarks	0.25	2	•	
A	-	ANNO	-	NPLT		Non-plotting graphic information	0.50	5	•	
A	-	ANNO	-	PATT		Miscellaneous patterning and hatching	0.35	8	•	
A	-	ANNO	-	REDL		Redlines	0.18	1	•	
A	-	ANNO	-	REFR		Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
A	-	ANNO	-	REVS		Revisions	0.35	4	•	
A	-	ANNO	-	SYMB		Miscellaneous symbols	1.00	6	•	
A	-	ANNO	-	TEXT		Miscellaneous text and callouts with associated leaders	0.25	2	•	
AREA	-	**Area**								
A	-	AREA	-	IDEN		Room numbers, tenant identifications, area calculations	0.25	2	•	
A	-	AREA	-	LINE		Architectural area calculation boundary lines	0.35	4	•	
A	-	AREA	-	OCCP		Occupant or employee names	0.25	2	•	
A	-	AREA	-	PATT		Area cross hatching	0.35	8	•	
BAGS	-	**Baggage Handling Equipment**								
A	-	BAGS	-	CART		Cart/Tug	0.35	V		
A	-	BAGS	-	CATW		Catwalk	0.35	V		
A	-	BAGS	-	CLMD		Claim Device	0.35	V		
A	-	BAGS	-	CONV		Baggage Conveyor	0.35	16	•	
A	-	BAGS	-	CRBS		Curbside Baggage Conveyor	0.35	V		
A	-	BAGS	-	CRSL		Baggage carousels	0.35	16	•	
A	-	BAGS	-	CTRL		Control	0.35	V		
A	-	BAGS	-	DIMM		Dimension	0.35	V		
A	-	BAGS	-	DOOR		Doors	0.35	V		
A	-	BAGS	-	ELEV		Elevation	0.35	V		
A	-	BAGS	-	EQPM		Equipment	0.35	V		

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
A	-	BAGS	-	ICNV				Inbound Baggage Conveyor	0.35	V		
A	-	BAGS	-	IOSZ				Inbound Oversized Baggage Conveyor	0.35	V		
A	-	BAGS	-	MKUP				Make-Up Device	0.35	V		
A	-	BAGS	-	MTCH				Match Lines	0.35	V		
A	-	BAGS	-	NOTE				Baggage equipment related notes	0.35	V	•	
A	-	BAGS	-	OCNV				Outbound Baggage Conveyor	0.35	V		
A	-	BAGS	-	OOSZ				Outbound Oversized Baggage Conveyor	0.35	V		
A	-	BAGS	-	RAIL				Guardrail	0.35	V		
A	-	BAGS	-	ROWY				Right-of-Way	0.35	V		
A	-	BAGS	-	SCDR				Baggage Security Doors	0.35	16	•	
A	-	BAGS	-	SCNU				Screening Unit	0.35	V		
A	-	BAGS	-	TBLK				Title Block	0.35	V		
A	-	BAGS	-	TCBC				Ticket Counter Baggage Conveyor	0.35	V		
A	-	BAGS	-	TEMP				Temporary Temporary	0.35	V		
A	-	BAGS	-	TTRY				Tilt-Tray Baggage System	0.35	V		
A	-	BAGS	-	VPRT				View Port Layer for Paper Space	0.35	V		
A	-	BAGS	-	XFER				Transfer Baggage Conveyor	0.35	V		
A	-	BAGS	-	XRAY				X-Ray Unit	0.35	V		
		CLNG	-	**Ceiling Information**								
A	-	CLNG	-	ACCS				Access panels	1.00	6	•	
A	-	CLNG	-	CTLJ				Ceiling control joints	0.25	2	•	
A	-	CLNG	-	GRID				Ceiling grid	0.18	1	•	
A	-	CLNG	-	LEVL				Level Changes	0.50	5	•	
A	-	CLNG	-	OPEN				Openings, ceiling/roof penetrations (see also A-FLOR-OVHD in Model File Type: Floor Plan)	0.35	8	•	
A	-	CLNG	-	PATT				Ceiling patterns	0.35	8	•	
A	-	CLNG	-	SUSP				Suspended elements, ceiling mounted specialties (e.g., clocks, fans, etc.)	0.50	5	•	
A-	-	CLNG	-	TEES				Main tees	0.50	5	•	
		COLS	-	**Columns**								
A	-	COLS	-	ENCL				Column enclosures/fire protection	0.35	4	•	
		DETL	-	**Detail Information**								
A	-	DETL	-	INPD				Inch-pound-specific dimensions and notes	0.25	2	•	
A	-	DETL	-	METR				Metric-specific dimensions and notes	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
		DOOR	**-**	**Doors**						
A	-	DOOR				Doors, including swing	0.25	31	•	
A	-	DOOR	-	FULL		Full height (to ceiling) door: swing and leaf	1.00	6	•	
A	-	DOOR	-	IDEN		Door number and symbol, hardware group, etc.	0.25	31	•	
A	-	DOOR	-	OVHD		Overhead coiling/Roll-up doors	0.25	31	•	
A	-	DOOR	-	PRHT		Partial height door: swing and leaf	1.00	6	•	
A	-	DOOR	-	SLDG		Sliding glass doors	0.25	31	•	
A	-	DOOR	-	SYMB		Miscellaneous door symbols (e.g., overhead, bifold, pocket, etc.)	0.18	1	•	
		ELEV	**-**	**Elevators**						
A	-	ELEV	-	CASE		Wall-mounted casework	0.35	3	•	
A	-	ELEV	-	FIXT		Miscellaneous fixtures	0.25	2	•	
A	-	ELEV	-	FNSH		Finishes, woodwork, trim	0.35	3	•	
A	-	ELEV	-	IDEN		Component identification numbers	0.25	2	•	
A	-	ELEV	-	OTLN		Building outlines	1.00	6	•	
A	-	ELEV	-	PATT		Textures and hatch patterns	0.35	8	•	
A	-	ELEV	-	PFIX		Plumbing fixtures	1.00	6	•	
A	-	ELEV	-	CASE		Wall-mounted casework	0.35	3	•	
A	-	ELEV	-	FIXT		Miscellaneous fixtures	0.25	2	•	
A	-	ELEV	-	FNSH		Finishes, woodwork, trim	0.35	3	•	
A	-	ELEV	-	IDEN		Component identification numbers	0.25	2	•	
A	-	ELEV	-	OTLN		Building outlines	1.00	6	•	
A	-	ELEV	-	PATT		Textures and hatch patterns	0.35	8	•	
A	-	ELEV	-	PFIX		Plumbing fixtures	1.00	6	•	
A	-	ELEV	-	SIGN		Signage	0.18	1	•	
		EQPM	**-**	**Equipment**						
A	-	EQPM				General equipment, ducts, mechanical shafts	1.00	6	•	
A	-	EQPM	-	ACCS		Equipment access	1.00	6	•	
A	-	EQPM	-	BELW		Equipment below Floor	0.35	4	•	
A	-	EQPM	-	CLRN		Equipment clearence	0.35	4	•	
A	-	EQPM	-	FIDS		Flight Information Display Systems	1.00	6	•	
A	-	EQPM	-	FIXD		Fixed equipment	0.35	4	•	
A	-	EQPM	-	IDEN		Equipment identification numbers	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
A	-	EQPM	-	JETB			Jet bridges	0.35	8	•	
A	-	EQPM	-	JETB	- COLS		Jet bridge columns	0.35	8	•	
A	-	EQPM	-	MOVE			Moveable equipment	1.00	6	•	
A	-	EQPM	-	NICN			Not in contract equipment	1.00	6	•	
A	-	EQPM	-	OVHD			Overhead, ceiling mounted, or suspended equipment	1.00	6	•	
A	-	EQPM	-	SECU			Security equipment	1.00	6	•	
		FLOR	-	**Floor Information**							
A	-	FLOR	-	CASE			Casework (manufactured cabinets)	0.25	31	•	
A	-	FLOR	-	CASE	- OVHD		Wall-mounted casework	0.25	31	•	
A	-	FLOR	-	ESCL			Escalators	0.35	31	•	
A	-	FLOR	-	EVTR			Elevator cars and equipment	0.35	31	•	
A	-	FLOR	-	EXPJ			Expansion and Seismic Joints	0.35	31	•	
A	-	FLOR	-	FENC			Interior fence	1.00	6	•	Linestyle may vary
A	-	FLOR	-	FURN			Furniture [Mainly for fixed benches]	0.25	31	•	
A	-	FLOR	-	HRAL			Guardrails [excluding stair handrails]	0.25	31	•	
A	-	FLOR	-	IDEN			Room name, space identification text	0.35	3	•	
A	-	FLOR	-	LEVL			Level changes, shafts, ramps, pits, breaks in construction, and depressions	0.25	31	•	
A	-	FLOR	-	MVWK			Moving Walkways	0.25	31	•	
A	-	FLOR	-	NUMB			Room/space identification number and symbol	0.35	3	•	
A	-	FLOR	-	OTLN			Floor outline/perimeter/building footprint	1.00	6	•	
A	-	FLOR	-	OTLN	- RPRM		Room perimeter shape (Interior walls)	0.25	2	•	
A	-	FLOR	-	OVHD			Overhead items (skylights, overhangs etc.)	0.35	8	•	
A	-	FLOR	-	PATT			Paving, tile, carpet patterns, & carpet edge lines	0.35	8	•	
A	-	FLOR	-	RAIS			Access (raised) flooring	0.35	3	•	
A	-	FLOR	-	SIGN			Signage	0.18	1	•	
A	-	FLOR	-	SPCL			Architectural specialties (e.g. display cases) [Toilet accessories are to go in P-FIXT]	0.35	3	•	
A	-	FLOR	-	STRS			Stairs risers/treads, ladders [Including stair and balcony handrails] and [Excluding escalators; see A-FLOR-ESCL]	0.35	31	•	
A	-	FLOR	-	TPTN			Toilet partitions	0.18	1	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
A	-	FLOR	-	WDWK			Architectural woodwork (field built cabinets and counters)	0.35	3	•	
		GLAZ	-	**Windows**							
A	-	GLAZ					Window glazing, mullions	0.25	151	•	
A	-	GLAZ	-	FULL			Full height glazed walls and partitions (see A-WALL-CWMG for curtain walls)	0.18	1	•	
A	-	GLAZ	-	IDEN			Window number and symbol	0.35	3	•	
A	-	GLAZ	-	PRHT			Windows and partial height glazed partitions	0.18	1	•	
A	-	GLAZ	-	SILL			Window sills	0.18	50	•	
		LITE	-	**Lights**							
A	-	LITE	-	CLNG			Specialty ceiling lights not shown on Electrical Lighting Plan	0.35	4	•	
		PROP	-	**Properties Information**							
A	-	PROP	-	LEAS			Lease line (interior)	1.00	6	•	
		ROOF	-	**Roof Information**							
A	-	ROOF					Roof crickets, drains, flow arrows, level changes	0.35	3	•	
A	-	ROOF	-	CRTS			Crickets flow arrows flow info	0.18	1	•	
A	-	ROOF	-	EXPJ			Expansion joints	0.50	5	•	
A	-	ROOF	-	GUTR			Roof internal gutters	0.35	8	•	
A	-	ROOF	-	HRAL			Stair handrails, nosings, guard rails	0.50	5	•	
A	-	ROOF	-	LEVL			Level changes	0.50	5	•	
A	-	ROOF	-	OPEN			Roof Open Below ('X' line symbol)	0.25	V		
A	-	ROOF	-	OTLN			Roof perimeter/edge, roof geometry	1.00	6	•	
A	-	ROOF	-	PATT			Roof surface patterns, hatching	0.35	8	•	
A	-	ROOF	-	RFDR			Roof drains	0.18	1	•	
A	-	ROOF	-	SPCL			Roof specialties, accessories, access hatches, dormers [and skylights]	0.35	3	•	
A	-	ROOF	-	STRS			Stair risers/treads, ladders	0.50	5	•	
A	-	ROOF	-	WALK			Roof walkways	0.35	3	•	
A	-	ROOF	-	WALL			Parapet walls and wall caps	0.25	2	•	
		SECT	-	**Sections**							
A	-	SECT	-	IDEN			Component identification numbers	0.25	2	•	
A	-	SECT	-	MBND			Material beyond section cut	0.50	5	•	

revision letter A

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
A	-	SECT	-	MCUT			Material cut by section	V	V		
A	-	SECT	-	PATT			Textures and hatch patterns	0.35	8	•	
		STAT	-	**Demolition (used only in existing demolition model file)**							
A	-	STAT	-	DEMO			Demolition	1.00	6	•	
A	-	STAT	-	DEMO	-	PHS1	Demolition - phase 1	0.50	203		
A	-	STAT	-	DEMO	-	PHS2	Demolition - phase 2	0.50	83		
A	-	STAT	-	DEMO	-	PHS3	Demolition - phase 3	0.50	163		
A	-	STAT	-	EXST			Existing to remain	0.35	3	•	
A	-	STAT	-	FUTR			Future work	0.25	2	•	
A	-	STAT	-	MOVE			Items to be moved	1.00	6	•	
A	-	STAT	-	NEWW			New work	0.35	4	•	
A	-	STAT	-	NICN			Not in contract	0.35	8	•	
A	-	STAT	-	PHS#			Phase numbers (#=1-9)	0.25	2	•	
A	-	STAT	-	RELO			Relocated items	0.50	5	•	
A	-	STAT	-	TEMP			Temporary work	0.35	4	•	
		WALL	-	**Walls**							
A	-	WALL	-	CAVI			Cavity wall lines	0.18	1	•	
A	-	WALL	-	CNTR			Wall centerlines	0.50	5	•	
A	-	WALL	-	CWMG			Curtain wall mullions and glass	0.18	1	•	
A	-	WALL	-	EXTR			Exterior walls	0.35	3	•	
A	-	WALL	-	FIRE			Fire wall designators (patterning)	0.25	2	•	
A	-	WALL	-	FULL	-	EXTR	Exterior full height walls	0.25	2	•	
A	-	WALL	-	FULL	-	INTR	Interior full height walls	0.35	3	•	
A	-	WALL	-	HEAD			Door and window headers (appear on Reflected	0.18	1	•	
A	-	WALL	-	IDEN			Wall identification/type text or tags	0.35	3	•	
A	-	WALL	-	INTR			Exterior walls	0.25	121	•	
A	-	WALL	-	JAMB			Door and window jambs (do not appear on Reflected Ceiling Plan)	0.18	1	•	
A	-	WALL	-	MOVE			Moveable walls/partitions	0.50	5	•	
A	-	WALL	-	PATT			Wall insulation, hatching, and fill	0.35	8	•	
A	-	WALL	-	PRHT			Partial height walls	0.18	1	•	
A	-	WALL	-	SPCL			Wall-hung/attached specialties (e.g., fixtures, grab bars (incl. handicap), telephone booths)	0.18	1	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
		ANNO	-	**General Information**							
B	-	ANNO	-	DIMS			Witness/extension lines, dimension terminators, dimension text	V	V		
B	-	ANNO	-	KEYN			Reference keynotes with associated leaders	V	V		
B	-	ANNO	-	LEGN			Legend & Schedule	V	V		
B	-	ANNO	-	NOTE			General notes and general remarks	0.25	2	•	
B	-	ANNO	-	NPLT			Non-plotting graphic information	0.50	5	•	
B	-	ANNO	-	PATT			Miscellaneous patterning and hatching	0.35	8	•	
B	-	ANNO	-	REDL			Redlines	0.18	1	•	
B	-	ANNO	-	REFR			Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
B	-	ANNO	-	REVS			Revisions	0.35	4	•	
B	-	ANNO	-	SYMB			Miscellaneous symbols	1.00	6	•	
B	-	ANNO	-	TEXT			Miscellaneous text and callouts with associated leaders	V	V		
		BORE	-	**Borings/Perc Holes**							
B	-	BORE	-	ELEV			Boring elevations	0.35	3	•	
B	-	BORE	-	FDTA			Field data	0.35	3	•	
B	-	BORE	-	HOLE			Bore/perc hole number	0.25	2	•	
B	-	BORE	-	IDEN			Component identification numbers	0.25	2	•	
B	-	BORE	-	LDTA			Laboratory data	0.18	1	•	

		Full Layer Name				Description	Line Width (mm)	Color	Modified	Notes
		AIRF	**- Airfield**							
C	- AIRF	- AHOA				Aircraft / Helicopter Operations Area	0.70	84		
C	- AIRF	- AIDC				Airfield Navigational Aid - Critical Area	0.25	2	•	
C	- AIRF	- AIDS				Airfield Navigational Aid - Site	0.25	2	•	
C	- AIRF	- AIDS	- COMM			Communications airfield navigational aides	0.25	2	•	
C	- AIRF	- AIDS	- GPS_			GPS airfield navigational aides	0.25	2	•	
C	- AIRF	- AIDS	- ILS-_			Airfield Instrument Landing System	0.25	2	•	
C	- AIRF	- AIDS	- MCWV			Microwave airfield navigational aides	0.25	2	•	
C	- AIRF	- AIDS	- OTHR			Other airfield navigational aides	0.25	2	•	
C	- AIRF	- AIDS	- RADI			Radio airfield navigational aides	0.25	2	•	
C	- AIRF	- AIDS	- RADR			Radar airfield navigational aides	0.25	2	•	
C	- AIRF	- AIDS	- RMTE			Remote airfield navigational aides	0.25	2	•	
C	- AIRF	- AIDS	- WTHR			Weather airfield navigational aides	0.25	2	•	
C	- AIRF	- APLN				Docked airplanes	0.35	8	•	
C	- AIRF	- DSRF	- BLDR			Building Restriction Line	0.35	3	•	
C	- AIRF	- DSRF	- KEYH			Key hols	0.35	3	•	
C	- AIRF	- DSRF	- NMOV			Aircraft Non-Movement Area	0.35	3	•	
C	- AIRF	- DSRF	- OFA_			Object Free Area	0.35	3	•	
C	- AIRF	- DSRF	- OFZ_			Object Free Zone	0.35	3	•	
C	- AIRF	- DSRF	- POFA			Precision Object Free Area	0.35	3	•	
C	- AIRF	- DSRF	- RPZ_			Runway Protection Zone	0.35	3	•	
C	- AIRF	- DSRF	- RSA_			Runway Safety Area	0.35	3	•	
C	- AIRF	- OBST	- LINE			Airspace obstructions - Line	0.35	3	•	
C	- AIRF	- OBST	- POLY			Airspace obstructions - Polygon	0.35	3	•	
C	- AIRF	- OBST	- PPNT			Airspace obstructions - Point	0.35	3	•	
C	- AIRF	- PROP				Airport property	0.70	84		
C	- AIRF	- SIDA				Secuirty Identification Display Area	0.70	84		
C	- AIRF	- TRKL				Flight Track Line	0.25	2	•	
C	- AIRF	- TRKP				Flight Track Point	0.25	2	•	
		AIRS	**- Airspace**							
C	- AIRS	- ISOC				Approach surface isoclines	0.25	2	•	
C	- AIRS	- OTHR				Other airspace surfaces	0.35	3	•	
C	- AIRS	- PART	- APRC			FAR Part 77 Approach Surface	0.35	3	•	
C	- AIRS	- PART	- CONL			FAR Part 77 Conical Surface	0.35	3	•	
C	- AIRS	- PART	- HORZ			FAR Part 77 Horizontal Surface	0.35	3	•	

Full Layer Name					Description	Line Width (mm)	Color	Modified	Notes
C	- AIRS	- PART	- PRIM		FAR Part 77 Primary Surface	0.35	3	•	
C	- AIRS	- PART	- TRNS		FAR Part 77 Transitional Surface	0.35	3	•	
C	- AIRS	- TERP			TERPS surfaces	0.35	3	•	
	ALGN	**- Alignments**							
C	- ALGN	- DATA			Alignment coordinates and curve data	0.35	3	•	
C	- ALGN	- LINE			Alignments	0.25	2	•	
	ANNO	**- General Information**							
C	- ANNO	- DIMS			Witness/extension lines, dimension terminators, dimension text	V	V		
C	- ANNO	- KEYN			Reference keynotes with associated leaders	V	V		
C	- ANNO	- LEGN			Legend & Schedule	V	V		
C	- ANNO	- NOTE			General notes and general remarks	0.25	2	•	
C	- ANNO	- NPLT			Non-plotting graphic information	0.50	5	•	
C	- ANNO	- PATT			Miscellaneous patterning and hatching	0.35	8	•	
C	- ANNO	- REDL			Redlines	0.18	1	•	
C	- ANNO	- REFR			Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
C	- ANNO	- REVS			Revisions	0.35	4	•	
C	- ANNO	- SYMB			Miscellaneous symbols	1.00	6	•	
C	- ANNO	- TEXT			Miscellaneous text and callouts with associated leaders	V	V		
	APRN	**- Apron**							
C	- APRN	- ACPK			Aircraft gate/stand parking area	0.35	4	•	
C	- APRN	- ANOM			Aircraft non-movement area	0.35	4	•	
C	- APRN	- CNTR			Centerlines	0.18	1	•	
C	- APRN	- CNTR	- IDEN		Centerline annotation	0.25	2	•	
C	- APRN	- DEIC			Aircraft Deicing Area	0.35	4	•	
C	- APRN	- GRND			Grounding points	0.25	2	•	
C	- APRN	- HOLD			Holding position markings	0.18	1	•	
C	- APRN	- IDEN			Annotation	0.25	2	•	
C	- APRN	- JOIN			Apron joints	0.25	2	•	
C	- APRN	- MOOR			Mooring points	0.25	2	•	
C	- APRN	- MRKG			Apron markings	0.35	4	•	
C	- APRN	- OTLN			Airfield apron - outlines	0.35	4	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
C	-	APRN	-	SECU			Security zone markings	0.18	1	•	
C	-	APRN	-	SHLD			Shoulder stripes	0.25	2	•	
		BLDG	-	**Building**							
C	-	BLDG	-	IDEN			Building and other stucture annotation	0.25	2	•	
C	-	BLDG	-	OTLN			Buildings and other structures	1.40	7	•	
C	-	BLDG	-	PATT			Building hatching and patterns	0.35	V		
		BORW	-	**Borrow Areas**							
C	-	BORW	-	IDEN			Borrow/Spoil area annotation	0.25	2	•	
C	-	BORW	-	LINE			Borrow/Spoil area	0.25	2	•	
		CHAN	-	**Channels (waterway)**							
C	-	CHAN	-	AIDS			Navigation aids and text	0.25	2	•	
C	-	CHAN	-	CNTR			Channel centerline and survey report lines	0.50	5	•	
C	-	CHAN	-	CNTR	-	IDEN	Channel centerline and survey report lines - annotation	0.50	5	•	
C	-	CHAN	-	DACL			De-authorized channel limits, anchorages, etc.	0.35	3	•	
C	-	CHAN	-	DACL	-	IDEN	De-authorized channel limits, anchorages, etc. - annotation	0.35	3	•	
C	-	CHAN	-	IDEN			Channel limits, anchorages, turning basins, disposal areas, etc. - annotation	1.00	6	•	
C	-	CHAN	-	LIMT			Channel limits, anchorages, turning basins, disposal areas, etc.	1.00	6	•	
C	-	CHAN	-	TURN			Turning points	0.25	2	•	
		DETL	-	**Detail Information**							
C	-	DETL	-	CONC			Concrete	1.00	6	•	
C	-	DETL	-	COVR			Covers and fittings	1.00	6	•	
C	-	DETL	-	ERTH			Earth	0.35	3	•	
C	-	DETL	-	FAST			Fasteners	0.18	1	•	
C	-	DETL	-	FENC			Fencing	1.00	6	•	
C	-	DETL	-	FILL			Fill	0.50	5	•	
C	-	DETL	-	GENF			General features (miscellaneous items)	V	V		
C	-	DETL	-	GRPH			Graphics, gridlines, non-text items	V	V		
C	-	DETL	-	INPD			Inch-pound-specific dimensions and notes	0.18	1	•	
C	-	DETL	-	METR			Metric-specific dimensions and notes	0.35	3	•	
C	-	DETL	-	PAVE			Pavements	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	-	DETL	-	PIPE		Piping	1.00	6	•	
C	-	DETL	-	SPCF		Special features	0.25	2	•	
C	-	DETL	-	STRC		Structural metal	1.00	6	•	
C	-	DETL	-	TANK		Tanks	0.25	2	•	
C	-	DETL	-	VLVE		Valves and fittings	0.25	2	•	
		DOMW	-	**Domestic Water**						
C	-	DOMW	-	ABND		Abandoned piping	1.00	6	•	
C	-	DOMW	-	DEVC		Connectors, faucets, reducers, regulators, vents, intake points, tanks, taps, backflow preventers, and valves	1.00	6	•	
C	-	DOMW	-	FIRE		Fire lines	0.18	1	•	
C	-	DOMW	-	FTTG		Caps, cleanouts, crosses, and tees	1.00	6	•	
C	-	DOMW	-	HYDR		Hydrants	0.18	1	•	
C	-	DOMW	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	DOMW	-	MAIN		Main domestic water piping	1.00	6	•	
C	-	DOMW	-	METR		Meters	0.35	3	•	
C	-	DOMW	-	NHYD		Non-potable hydrants/flushing hydrants	0.18	1	•	
C	-	DOMW	-	NPOT		Non-potable water piping	1.00	6	•	
C	-	DOMW	-	PITS	-	IDEN	Identifier tags, symbol modifier, and text	0.18	1	•	
C	-	DOMW	-	PUMP		Booster pump stations	1.00	6	•	
C	-	DOMW	-	REDC		Pressure reducing stations	1.00	6	•	
C	-	DOMW	-	RSVR		Reservoirs	0.18	1	•	
C	-	DOMW	-	RSVR	-	IDEN	Identifier tags, symbol modifier, and text	0.18	1	•	
C	-	DOMW	-	SERV		Domestic water service piping	1.00	6	•	
C	-	DOMW	-	SIGN		Surface markers/signs	0.18	1	•	
C	-	DOMW	-	STNS	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	DOMW	-	TANK		Water storage tanks	0.18	1	•	
C	-	DOMW	-	VENT		Vent pits	0.35	3	•	
C	-	DOMW	-	VLVE		Valve pits/vaults	0.35	3	•	
C	-	DOMW	-	WELL		Water well houses	0.18	1	•	
		DRED	-	**Dredging**						
C	-	DRED	-	LIMT		Dredge limit lines	0.35	4	•	
C	-	DRED	-	OHWM		Ordinary high water marks	0.25	2	•	
		ELEV	-	**Elevation**						
C	-	ELEV	-	FIXT		Miscellaneous fixtures	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	-	ELEV	-	IDEN			Component identification numbers	0.25	2	•	
C	-	ELEV	-	OTLN			Building outlines	1.00	6	•	
C	-	ELEV	-	PATT			Textures and hatch patterns	0.35	8	•	
C	-	ELEV	-	SIGN			Signage	0.18	1	•	
		FUEL	-	**Liquid Fuel**							
C	-	FUEL	-	ABND			Abandoned piping	1.00	6	•	
C	-	FUEL	-	DEFL			Defueling piping	1.00	6	•	
C	-	FUEL	-	DEVC			Air eliminators, filter strainers, hydrant fill points, line vents, markers, oil/water separators, reducers, regulators, and valves	1.00	6	•	
C	-	FUEL	-	FLOW			Flow direction arrows	1.00	6	•	
C	-	FUEL	-	FTTG			Caps, crosses, and tees	1.00	6	•	
C	-	FUEL	-	HYDR			Hydrant control pits	0.35	3	•	
C	-	FUEL	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	FUEL	-	JBOX			Junction boxes, manholes, handholes, test boxes	0.18	1	•	
C	-	FUEL	-	MAIN			Main fuel piping	1.00	6	•	
C	-	FUEL	-	METR			Meters	0.35	3	•	
C	-	FUEL	-	PITS	IDEN		Identifier tags, symbol modifier, and text	0.18	1	•	
C	-	FUEL	-	PUMP			Booster pump stations	1.00	6	•	
C	-	FUEL	-	SERV			Service piping	1.00	6	•	
C	-	FUEL	-	STNS	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	FUEL	-	TANK			Fuel tanks	0.35	3	•	
C	-	FUEL	-	TRCH			Fuel line trench	0.35	3	•	
C	-	FUEL	-	VENT			Vent pits	0.35	3	•	
C	-	FUEL	-	VLVE			Valve pits	0.35	3	•	
		GRAD	-	**Grade Linework**							
C	-	GRAD	-	EXST			Existing grade, ground line	1.00	6	•	
C	-	GRAD	-	FNSH			Finished grade	0.35	4	•	
		GRID	-	**Gride Lines**							
C	-	GRID	-	FRAM			Frame	0.35	4	•	
C	-	GRID	-	MAJR			Major grid lines	0.18	1	•	
C	-	GRID	-	MINR			Minor grid lines	0.35	8	•	
C	-	GRID	-	TEXT			Border text, annotation	0.25	2	•	
		HELI	-	**Heliports**							

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	-	HELI	-	BLST			Blast pad and stopway markings	0.18	1	•	
C	-	HELI	-	CNTR			Centerline	0.18	1	•	
C	-	HELI	-	CNTR	-	MARK	Centerline markings	0.18	1	•	
C	-	HELI	-	DISP			Displaced threshold markings	0.18	1	•	
C	-	HELI	-	DIST			Fixed distance markings	0.18	1	•	
C	-	HELI	-	FATO			Helipad FATO	0.18	1	•	
C	-	HELI	-	IDEN			Heliport numbers and letters	0.25	2	•	
C	-	HELI	-	SHLD			Shoulder markings	1.00	6	•	
C	-	HELI	-	SIDE			Side stripes	0.35	4	•	
C	-	HELI	-	TDZM			Touchdown zone markers	1.00	6	•	
C	-	HELI	-	THRS			Threshold markers	1.00	6	•	
C	-	HELI	-	TLOF			Helipad take off and landing area	0.18	1	•	
		INDW	-	**Industrial Waste Water**							
C	-	INDW	-	ABND			Abandoned piping	1.00	6	•	
C	-	INDW	-	DEVC			Grit chambers, meters, flumes, neutralizers, oil/water separators, ejectors, tanks, and valves	1.00	6	•	
C	-	INDW	-	FLOW			Flow direction arrows	1.00	6	•	
C	-	INDW	-	FTTG			Caps and cleanouts	1.00	6	•	
C	-	INDW	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	INDW	-	JBOX			Junction boxes and manholes	0.18	1	•	
C	-	INDW	-	LAGN			Lagoons	1.00	6	•	
C	-	INDW	-	LIFT			Lift stations	1.00	6	•	
C	-	INDW	-	MAIN			Main industrial waste water piping	1.00	6	•	
C	-	INDW	-	PLNT			Treatment plants	1.00	6	•	
C	-	INDW	-	RSVR	-	IDEN	Identifier tags, symbol modifier, and text	1.00	6	•	
C	-	INDW	-	SERV			Industrial waste water service piping	0.18	1	•	
C	-	INDW	-	SIGN			Surface markers/signs	0.18	1	•	
C	-	INDW	-	STNS	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
		JOIN	-	**Joints**							
C	-	JOIN	-	CNSL			Construction joints - longitudinal	1.00	6	•	
C	-	JOIN	-	CNST			Construction joints - transverse	1.00	6	•	
C	-	JOIN	-	CNTL			Contraction joints - longitudinal	0.25	2	•	
C	-	JOIN	-	CNTT			Contraction joints - transverse	0.25	2	•	
C	-	JOIN	-	EDGE			Thickened edges	0.35	4	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	-	JOIN	-	EXPN			Expansion joints	0.35	12		
		NGAS	-	**Natural Gas**							
C	-	NGAS	-	ABND			Abandoned piping	1.00	6	•	
C	-	NGAS	-	DEVC			Hydrant fill points, lights, vents, markers, rectifiers, reducers, regulators, sources, tanks, drip pots, taps, and valves	1.00	6	•	
C	-	NGAS	-	DEVC	-	IDEN	Identifier tags, symbol modifier, and text	1.00	6	•	
C	-	NGAS	-	FLOW			Flow direction arrows	1.00	6	•	
C	-	NGAS	-	FTTG			Caps, crosses, and tees	1.00	6	•	
C	-	NGAS	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	NGAS	-	MAIN			Main natural gas piping	1.00	6	•	
C	-	NGAS	-	METR			Meters	0.35	3	•	
C	-	NGAS	-	PITS	-	IDEN	Identifier tags, symbol modifier, and text	0.18	1	•	
C	-	NGAS	-	PUMP			Compressor stations	1.00	6	•	
C	-	NGAS	-	REDC			Reducing stations	1.00	6	•	
C	-	NGAS	-	SERV			Service piping	0.18	1	•	
C	-	NGAS	-	SIGN			Surface markers/signs	0.18	1	•	
C	-	NGAS	-	STNS	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	NGAS	-	VENT			Vent pits	0.35	3	•	
C	-	NGAS	-	VLVE			Valve pits/boxes	0.35	3	•	
		OVRN	-	**Overun Areas**							
C	-	OVRN	-	CNTR			Centerlines	0.18	1	•	
C	-	OVRN	-	CNTR	-	IDEN	Centerline annotation	0.25	2	•	
C	-	OVRN	-	IDEN			Airfield overrun area - annotation	0.25	2	•	
C	-	OVRN	-	JOIN			Airfield overrun joints	0.25	2	•	
C	-	OVRN	-	OTLN			Airfield overrun area - outlines	0.35	4	•	
C	-	OVRN	-	SHLD			Shoulder markings	0.35	4	•	
		PADS	-	**Pads (Arm/Disarm, Calibration, etc.)**							
C	-	PADS	-	CNTR			Centerlines	0.18	1	•	
C	-	PADS	-	CNTR	-	IDEN	Centerline annotation	0.25	2	•	
C	-	PADS	-	IDEN			Pads - annotation	0.25	2	•	
C	-	PADS	-	OTLN			Pad - outlines	0.35	4	•	
C	-	PADS	-	SHLD			Shoulders with annotation	0.25	2	•	
		PKNG	-	**Parking Lots and Minor Roads**							
C	-	PKNG	-	CARS			Graphic illustration of cars	0.25	2	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
C	-	PKNG	-	CNTR				Centerlines	0.18	1	•	
C	-	PKNG	-	CNTR	-	IDEN		Centerline annotation	1.00	6	•	
C	-	PKNG	-	CURB				Curbs and gutters	0.35	3	•	
C	-	PKNG	-	DRAN				Parking lot drainage slope indications	0.18	1	•	
C	-	PKNG	-	EQPM				Parking Equipment (I.e. booths, gates, etc.)	0.35	4	•	
C	-	PKNG	-	FIXT				Parking lot fixtures (e.g., wheel stops, parking meters)	0.25	91		
C	-	PKNG	-	IDEN				Parking lot, minor road, and curb annotation	1.00	6	•	
C	-	PKNG	-	ISLD				Parking islands	0.35	4	•	
C	-	PKNG	-	OTLN				Parking lots	0.35	4	•	
C	-	PKNG	-	STRP				Parking lot striping, handicapped symbols, pavement markings	0.25	2	•	
		PROF	-	**Profiles**								
C	-	PROF	-	CUID				Existing grade and grading cuts - annotation	0.18	1	•	
C	-	PROF	-	FILL				New work, grading fills	0.35	3	•	
C	-	PROF	-	INLT				Curb and surface inlets, catch basins	0.35	3	•	
C	-	PROF	-	MHOL				Manholes	0.18	1	•	
C	-	PROF	-	PIPE				Piping	1.00	6	•	
C	-	PROF	-	ROAD				Roads	0.25	2	•	
		PROP	-	**Property**								
C	-	PROP	-	CONS				Construction limits/controls, staging area	1.40	7	•	
C	-	PROP	-	ESMT				Easements	0.70	84		
C	-	PROP	-	IDEN				Property annotation	1.00	6	•	
C	-	PROP	-	LEAS				Lease line (exterior / ground lease)	1.00	6	•	
C	-	PROP	-	RWAY				Right of ways	1.40	7	•	
		PVMT	-	**Pavement**								
C	-	PVMT	-	ASPH				Pavement pattern - asphalt	0.35	8	•	
C	-	PVMT	-	CONC				Pavement pattern - concrete	0.35	8	•	
C	-	PVMT	-	GROV				Pavement Grooving	0.35	8	•	
C	-	PVMT	-	GRVL				Pavement pattern - gravel	0.35	8	•	
C	-	PVMT	-	IDEN				Road, parking lot, railroad, airfield pavement annotation	0.25	2	•	
C	-	PVMT	-	MRKG				Pavement markings	0.25	2	•	
C	-	PVMT	-	MRKG	-	WHIT		Roadway markings (white)	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	- PVMT	- MRKG	- YELO			Roadway markings (yellow)	0.25	2	•	
C	- PVMT	- PATT				Joint patterns, text and dimensions	0.25	2	•	
C	- PVMT	- ROAD				Roads, parking lots, railroads, airfield pavements	0.25	2	•	
C	- PVMT	- SIGN				Other signs	0.25	2	•	
	RAIL	**- Railroads**								
C	- RAIL	- CNTR				Centerlines	0.18	1	•	
C	- RAIL	- CNTR	- IDEN			Centerline annotation	1.00	6	•	
C	- RAIL	- EQPM				Railroad equipment (e.g., gates, signals)	0.25	91		
C	- RAIL	- IDEN				Railroad - annotation	1.00	6	•	
C	- RAIL	- TRAK				Railroads	0.25	2	•	
C	- RAIL	- YARD				Railroad Yard	0.25	2	•	
	ROAD	**- Major Roads**								
C	- ROAD	- CNTR				Centerlines	0.18	1	•	
C	- ROAD	- CNTR	- IDEN			Centerline annotation	1.00	6	•	
C	- ROAD	- CURB				Curbs & curb ramps	1.00	6	•	
C	- ROAD	- GRAL				Guardrails	1.00	6	•	
C	- ROAD	- IDEN				Road, curb, and guardrail annotation	1.00	6	•	
C	- ROAD	- OTLN				Roads	0.35	3	•	
	RUNW	**- Runway**								
C	- RUNW	- ARST				Runway Arresting Gear Location	0.18	1	•	
C	- RUNW	- BLST				Blast pad markings	0.18	1	•	
C	- RUNW	- CNTR				Centerline	0.18	1	•	
C	- RUNW	- CNTR	- MARK			Centerline markings	0.18	1	•	
C	- RUNW	- DISP				Displaced threshold markings	0.18	1	•	
C	- RUNW	- DIST				Fixed distance markings	0.18	1	•	
C	- RUNW	- EDGE				Airfield runway edges	1.00	6	•	
C	- RUNW	- IDEN				Runway numbers and letters	0.25	2	•	
C	- RUNW	- INTS				Runway intersection	1.00	6	•	
C	- RUNW	- LAHS				Runway land and hold short area	1.00	6	•	
C	- RUNW	- SAFT				Runway Safety Area	1.00	6	•	
C	- RUNW	- SHLD				Shoulder markings	1.00	6	•	
C	- RUNW	- SIDE				Side stripes	0.35	4	•	
C	- RUNW	- STWY				Runway stopway markings	0.18	1	•	
C	- RUNW	- TDZM				Touchdown zone markers	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	-	RUNW	-	THRS		Threshold markers	1.00	6	•	
		SECT	-	**Sections**						
C	-	SECT	-	IDEN		Component identification numbers	0.25	2	•	
C	-	SECT	-	MBND		Material beyond section cut	0.50	5	•	
C	-	SECT	-	MCUT		Material cut by section	0.35	4	•	
C	-	SECT	-	PATT		Textures and hatch patterns	0.35	8	•	
		SITE	-	**Site Improvements**						
C	-	SITE	-	EROS		Riprap, revetments/stone protection, breakwaters, dikes, jetties, and drains	0.18	1	•	
C	-	SITE	-	EROS	- IDEN	Riprap, revetment/stone protection, breakwater, dike, jetty, and drain annotation	0.35	12		
C	-	SITE	-	FENC		Fences [exterior metal barriers & bollards]	1.00	6	•	
C	-	SITE	-	FENC	- IDEN	Fence, handrail, ramp, sign, and trail annotation	1.00	6	•	
C	-	SITE	-	IDEN		Site improvement annotation	1.00	6	•	
C	-	SITE	-	IMPR		Site improvements (channel or levee features)	0.35	4	•	
C	-	SITE	-	STRC		Structures (bridges, sheds, foundation pads, footings, etc.)	0.35	22		
C	-	SITE	-	STRS		Stairs and ramps	1.00	6	•	
C	-	SITE	-	WALK		Walks, trails and bicycle paths	0.25	2	•	
		SSWR	-	**Sanitary Sewer**						
C	-	SSWR	-	ABND		Abandoned piping	1.00	6	•	
C	-	SSWR	-	DEVC		Grease traps, grit chambers, flumes, neutralizers, oil/water separators, ejectors, and valves	1.00	6	•	
C	-	SSWR	-	DEVC	- IDEN	Identifier tags, symbol modifier, and text	1.00	6	•	
C	-	SSWR	-	FILT		Filtration beds	0.35	3	•	
C	-	SSWR	-	FILT	- IDEN	Identifier tags, symbol modifier, and text	0.35	3	•	
C	-	SSWR	-	FLOW		Flow direction arrows	1.00	6	•	
C	-	SSWR	-	FTTG		Caps and cleanouts	1.00	6	•	
C	-	SSWR	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	SSWR	-	JBOX		Junction boxes and manholes	0.18	1	•	
C	-	SSWR	-	JBOX	- IDEN	Identifier tags, symbol modifier, and text	0.18	1	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	-	SSWR	-	LAGN			Lagoons	0.35	3	•	
C	-	SSWR	-	LEAC			Leach field	0.35	3	•	
C	-	SSWR	-	MAIN			Sanitary sewer piping	1.00	6	•	
C	-	SSWR	-	NITF			Nitrification drain fields	0.35	3	•	
C	-	SSWR	-	PLNT			Treatment plants	1.00	6	•	
C	-	SSWR	-	PUMP			Booster pump stations	1.00	6	•	
C	-	SSWR	-	RSVR	-	IDEN	Identifier tags, symbol modifier, and text	0.35	3	•	
C	-	SSWR	-	SERV			Sanitary sewer service piping	0.18	1	•	
C	-	SSWR	-	SIGN			Surface markers/signs	0.18	1	•	
C	-	SSWR	-	STNS	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
C	-	SSWR	-	TANK			Septic tanks	0.35	3	•	
		STAT	-	**Demolition (used only in existing demolition model file)**							
C	-	STAT	-	DEMO			Demolition	1.00	6	•	
C	-	STAT	-	DEMO	-	PHS1	Demolition - phase 1	0.50	203		
C	-	STAT	-	DEMO	-	PHS2	Demolition - phase 2	0.50	83		
C	-	STAT	-	DEMO	-	PHS3	Demolition - phase 3	0.50	163		
C	-	STAT	-	EXST			Existing to remain	0.35	3	•	
C	-	STAT	-	FUTR			Future work	0.25	2	•	
C	-	STAT	-	MOVE			Items to be moved	1.00	6	•	
C	-	STAT	-	NEWW			New work	0.35	4	•	
C	-	STAT	-	NICN			Not in contract	0.35	8	•	
C	-	STAT	-	PHS#			Phase numbers (#=1-9)	0.25	2	•	
C	-	STAT	-	RELO			Relocated items	0.50	5	•	
C	-	STAT	-	TEMP			Temporary work	0.35	4	•	
		STRC	-	**Structures**							
C	-	STRC	-	IDEN			Bridges, piers, breakwaters, docks, floats, etc. - annotation	0.25	2	•	
C	-	STRC	-	OTLN			Bridges, piers, breakwaters, docks, floats, etc. - outlines	0.35	4	•	
C	-	STRC	-	TOWR			Tower	0.35	4	•	
		STRM	-	**Storm Drains**							
C	-	STRM	-	ABND			Abandoned piping	1.00	6	•	
C	-	STRM	-	AFFF			AFFF lagoon/detention pond	0.35	3	•	
C	-	STRM	-	CHUT			Chutes and concrete erosion control structures	0.18	1	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	- STRM	- CULV				Culverts	0.35	3	•	
C	- STRM	- DEVC				Downspouts, flumes, oil/water separators, and flap gates	1.00	6	•	
C	- STRM	- DRAN	- IDEN			Identifier tags, symbol modifier, and text	0.35	3	•	
C	- STRM	- EROS				Erosion control (riprap)	0.50	5	•	
C	- STRM	- FLOW				Flow direction arrows	1.00	6	•	
C	- STRM	- FMON				Flow monitoring station	1.00	6	•	
C	- STRM	- FTTG				Caps and cleanouts	1.00	6	•	
C	- STRM	- HDWL				Headwalls and endwalls	1.40	7	•	
C	- STRM	- IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
C	- STRM	- INLT				Inlets (curb, surface, and catch basins)	0.35	3	•	
C	- STRM	- LAGN				Lagoons, ponds, watersheds, and basins	0.35	3	•	
C	- STRM	- MAIN				Storm sewer piping	1.00	6	•	
C	- STRM	- MHOL				Manholes	0.18	1	•	
C	- STRM	- PUMP				Pump stations	1.00	6	•	
C	- STRM	- ROOF				Roof drain line	0.35	3	•	
C	- STRM	- RSVR	- IDEN			Identifier tags, symbol modifier, and text	0.35	3	•	
C	- STRM	- SERV				Storm sewer service piping	0.18	1	•	
C	- STRM	- SIGN				Surface markers/signs	0.18	1	•	
C	- STRM	- STNS	- IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
C	- STRM	- STRC				Storm drainage, headwalls, inlets, manholes, culverts, and drainage structures	0.35	4	•	
C	- STRM	- SUBS				Subsurface drain piping	0.35	3	•	
	SURV	**- Survey Lines**								
C	- SURV	- DATA				Survey data (benchmarks and horizontal control points or monuments)	1.00	6	•	
C	- SURV	- IDEN				Survey, baseline, and control line annotation	1.00	6	•	
C	- SURV	- LINE				Survey, baseline, and control lines	0.35	4	•	
	TAXI	**- Taxiways**								
C	- TAXI	- CNTR				Taxiway centerline	0.18	1	•	
C	- TAXI	- CNTR	- IDEN			Centerline annotation	0.25	2	•	
C	- TAXI	- CNTR	- MARK			Centerline markings	0.18	1	•	
C	- TAXI	- EDGE				Edge markings	0.35	4	•	
C	- TAXI	- HOLD				Holding lines	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
C	-	TAXI	-	IDEN			Annotation	0.25	2	•	
C	-	TAXI	-	JOIN			Taxiway joints	0.25	2	•	
C	-	TAXI	-	OTLN			Taxiway - outlines	0.35	4	•	
C	-	TAXI	-	SHLD			Shoulder transverse stripes	0.25	2	•	
		TOPO	-	**Topography**							
C	-	TOPO	-	AUCO			Noise Complaint	1.00	6	•	
C	-	TOPO	-	AUST			Noise Monitoring Station	1.00	6	•	
C	-	TOPO	-	AUZN			Noise Contour/Zone	1.00	6	•	
C	-	TOPO	-	BKLN			Breaklines	1.40	7	•	
C	-	TOPO	-	BORE			Boring locations	1.00	6	•	
C	-	TOPO	-	COOR			Coordinate grid ticks and text	0.35	122		
C	-	TOPO	-	DTMP			DTM points	1.00	6	•	
C	-	TOPO	-	DTMT			DTM triangles	0.35	22		
C	-	TOPO	-	FLZN			Flood Zone	1.00	6	•	
C	-	TOPO	-	MAJR			Major contours	0.25	2	•	
C	-	TOPO	-	MAJR	-	IDEN	Major contours - annotation	0.25	2	•	
C	-	TOPO	-	MINR			Minor contours	0.35	3	•	
C	-	TOPO	-	MINR	-	IDEN	Minor contours - annotation	0.35	3	•	
C	-	TOPO	-	RTWL			Retaining wall	1.40	7	•	
C	-	TOPO	-	SHOR			Shorelines, land features, and references	0.35	4	•	
C	-	TOPO	-	SLOP			Cut/fill slopes	0.25	2	•	
C	-	TOPO	-	SLOP	-	FILL	Cut/fill slopes	0.25	2	•	
C	-	TOPO	-	SLOP	-	IDEN	Cut/fill slope, top/toe slope annotation	0.25	2	•	
C	-	TOPO	-	SLOP	-	TOPT	Top/toe slopes	1.00	6	•	
C	-	TOPO	-	SLTP			Top/toe slopes	1.00	6	•	
C	-	TOPO	-	SOUN			Soundings	0.18	150		
C	-	TOPO	-	SPOT			Spot elevations	0.25	2	•	
		TRAF	-	**Traffic**							
C	-	TRAF	-	IDEN			Airfield traffic area annotation	0.25	2	•	
C	-	TRAF	-	TYPA			Type A traffic area	0.35	4	•	
C	-	TRAF	-	TYPB			Type B traffic area	0.35	4	•	
C	-	TRAF	-	TYPC			Type C traffic area	0.35	4	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
AIRF		**-**	**Airfield**							
E	-	AIRF	-	DEVC		Capacitors, voltage regulators, motors, buses, ▯ generators, meters, grounds, and markers	0.50	23		
E	-	AIRF	-	DUCT		Ductbanks	0.50	83		
E	-	AIRF	-	JBOX		Junction boxes, pull boxes, manholes, pedestals, splices handholes,	0.50	23		
E	-	AIRF	-	VALT		Airfield lighting vaults	0.35	3	•	
ALRM		**-**	**Fire Alarm / Detection Equipment**							
E	-	ALRM	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	ALRM	-	SYMB		Miscellaneous alarm system symbols	0.5	203		
ANNO		**-**	**General Information**							
E	-	ANNO	-	DIMS		Witness/extension lines, dimension terminators, dimension text	V	V		
E	-	ANNO	-	KEYN		Reference keynotes with associated leaders	V	V		
E	-	ANNO	-	LEGN		Legend & Schedule	V	V		
E	-	ANNO	-	NOTE		General notes and general remarks	0.25	2	•	
E	-	ANNO	-	NPLT		Non-plotting graphic information	0.50	5	•	
E	-	ANNO	-	PATT		Miscellaneous patterning and hatching	0.35	8	•	
E	-	ANNO	-	REDL		Redlines	0.18	1	•	
E	-	ANNO	-	REFR		Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
E	-	ANNO	-	REVS		Revisions	0.35	4	•	
E	-	ANNO	-	SYMB		Miscellaneous symbols	1.00	6	•	
E	-	ANNO	-	TEXT		Miscellaneous text and callouts with associated leaders	V	V		
BCNS		**-**	**Beacons**							
E	-	BCNS	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	BCNS	-	MISC		Miscellaneous navaids - windcones and beacons	0.50	203		
E	-	BCNS	-	STRB		Strobe beacons	0.50	203		
BELL		**-**	**Bell System**							
E	-	BELL	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	BELL	-	SYMB		Bell system symbols	0.50	203		

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
		CABL	**-**	**Cable System**						
E	-	CABL	-	COAX		Coax cable	0.50	83		
E	-	CABL	-	FIBR		Fiber optics cable	0.50	83		
E	-	CABL	-	IDEN		Cable identifiers	0.25	2	•	
E	-	CABL	-	MULT		Multi-conductor cable	0.50	83		
E	-	CABL	-	TRAY		Cable trays and wireways	0.50	203		
		CABL	**-**	**Cathodic Protection System**						
E	-	CATH	-	ANOD		Sacrificial anode system	0.50	83		
E	-	CATH	-	CURR		Impress current system	0.50	83		
E	-	CATH	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	CATH	-	TEST		Test stations	0.50	83		
		CATV	**-**	**Cable TV System**						
E	-	CATV	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	CATV	-	SYMB		Cable television system symbols	0.50	203		
		CCTV	**-**	**Cable TV System**						
E	-	CCTV	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	CCTV	-	SYMB		Closed-circuit television system symbols	0.50	203		
		CIRC	**-**	**Circuits**						
E	-	CIRC	-	CTRL		Control and monitoring circuits	0.50	163		
E	-	CIRC	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	CIRC	-	MULT		Multiple circuits	0.50	23		
E	-	CIRC	-	SERS		Series circuits	0.50	203		
		CLOK	**-**	**Clock System**						
E	-	CLOK	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	CLOK	-	SYMB		Clock system symbols	0.50	203		
		COMM	**-**	**Communications**						
E	-	COMM	-	EQPM		Other communications distribution equipment	0.50	23		
E	-	COMM	-	JBOX		Communication junction boxes, pull boxes, manholes, handholes, pedestals, splices	0.50	23		
E	-	COMM	-	OVHD		Overhead communications/telephone lines	0.35	4	•	
E	-	COMM	-	OVHD	- IDEN	Identifier tags, symbol modifier and text	0.25	2	•	
E	-	COMM	-	UNDR		Underground communications/telephone lines	0.35	4	•	
E	-	COMM	-	UNDR	- IDEN -	Identifier tags, symbol modifier and text	0.25	2	•	

Full Layer Name			Description	Line Width (mm)	Color	Modified	Notes
E - COMM	- VALT		Communications vault	0.25	21		
DETL	**- Detail Information**						
E - DETL	- GRPH		Graphics, gridlines, non-text items	V	V		
E - DETL	- INPD		Inch-pound-specific dimensions and notes	0.25	2	•	
E - DETL	- METR		Metric-specific dimensions and notes	0.25	2	•	
DIAG	**- Diagram Information**						
E - DIAG	- GRPH		Graphics, gridlines, non-text items	V	V		
E - DIAG	- IDEN		Identifier tags, symbol modifier and text	0.25	2	•	
E - DIAG	- INPD		Inch-pound-specific dimensions and notes	0.25	2	•	
E - DIAG	- METR		Metric-specific dimensions and notes	0.25	2	•	
DICT	**- Central Dictation System**						
E - DICT	- IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E - DICT	- SYMB		Central dictation system symbols	0.50	203		
DICS	**- Other Discipline Information**						
E - DISC	- INFO		Clearances and working space information (NEC code, etc.)	0.35	3	•	
DUCT	**- Underground Duct Bank (to be used when multiple systems are in one ductbank system)**						
E - DUCT	- MULT		Ductbank	0.50	83		
E - DUCT	- MULT	- IDEN	Identifier tags, symbol modifier and text	0.25	2	•	
ELEC	**- Electrical Support Equipment**						
E - ELEC	- DEVC		Capacitors, voltage regulators, motors, buses, generators, meters, grounds, and markers	0.50	23		
E - ELEC	- JBOX		Junction boxes, pull boxes, manholes, handholes, pedestals, splices	0.50	23		
E - ELEC	- SUBS		Other substation equipment	0.50	23		
E - ELEC	- SWCH		Fuse cutouts, pole mounted switches, circuit breakers, gang operated disconnects, reclosers, cubicle switches	0.50	23		
E - ELEC	- VALT		Vaults	0.25	21		
EMCS	**- Energy Monitoring Control Systems**						
E - EMCS	- IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E - EMCS	- SYMB		Energy monitoring control system symbols	0.50	203		
EMER	**- Emergency Equipment**						
E - EMER	- EMER		Emergency systems equipment	0.35	4	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
		FLOR	**-**	**Floor Information**						
E	-	FLOR	-	IDEN		Room name, space identification text (copied from Architectural - Floor Plan model file)	0.35	3	•	
E	-	FLOR	-	NUMB		Room/space identification number and symbol (copied from Architectural - Floor Plan model file)	0.35	3	•	
		GRND	**-**	**Ground System**						
E	-	GRND	-	CIRC		Circuits	0.35	4	•	
E	-	GRND	-	DIAG		Ground system diagram	0.50	163		
E	-	GRND	-	EQUI		Equipotential ground system	0.50	83		
E	-	GRND	-	REFR		Reference ground system	0.50	23		
		INTC	**-**	**Intercom/Publlic Address System**						
E	-	INTC	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	INTC	-	SYMB		Intercom/PA system symbols	0.50	203		
		LITE	**-**	**Lights**						
E	-	LITE	-	APPR		Approach lights	0.50	203		
E	-	LITE	-	APRN		Apron Lighting	1.00	6	•	
E	-	LITE	-	CIRC		Lighting circuits (including crosslines and homeruns)	0.50	83		
E	-	LITE	-	CIRC	- NUMB	Lighting circuit numbers (e.g., panel/circuit number, wire/conduit size)	0.25	2	•	
E	-	LITE	-	CLNG		Ceiling mounted (surface/pendant) fixtures	0.50	203		
E	-	LITE	-	CONS		Constant Current Regulators	0.50	V		
E	-	LITE	-	DIST		Distance and arresting gear markers and lights	0.50	203		
E	-	LITE	-	EMER		Emergency fixtures (outline of light (if ceiling mounted) should go on E-LITE-CLNG)	0.50	23		
E	-	LITE	-	EXIT		Exit fixtures (outline of light (if ceiling mounted) should go on E-LITE-CLNG)	0.50	203		
E	-	LITE	-	EXTR		Exterior lights	0.50	203		
E	-	LITE	-	EXTR	- IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	LITE	-	FLOR		Floor mounted fixtures (e.g., stage)	0.50	203		
E	-	LITE	-	IDEN		Light fixture identifier tags	0.25	2	•	
E	-	LITE	-	JBOX		Junction boxes	0.50	83		

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
E	-	LITE	-	LANE			Hoverlane, taxilane, and helipad lights	0.50	203		
E	-	LITE	-	OBST			Obstruction lights	0.50	203		
E	-	LITE	-	PANL			Main distribution panels, switchboards, lighting panels	0.35	4	•	
E	-	LITE	-	RNWY	-	GARD	Runway guard lights	0.50	V		
E	-	LITE	-	ROOF			Roof lighting	0.50	203		
E	-	LITE	-	RUNW	-	CNTR	Runway Centerline lights	0.50	203		
E	-	LITE	-	RUNW	-	DTGS1	Runway Distance to go lights	1.00	6	•	
E	-	LITE	-	RUNW	-	EDGE	Runway edge lights	0.50	203		
E	-	LITE	-	RUNW	-	TDZN	Runway Touchdown Zone lights	0.50	203		
E	-	LITE	-	SIGN			Taxiway guidance signs	0.50	203		
E	-	LITE	-	SPCL			Special fixtures	0.50	203		
E	-	LITE	-	SWCH			Lighting contactors, photoelectric controls, low-voltage lighting controls, etc.	0.50	163		
E	-	LITE	-	TAXI	-	CNTL	Taxiway centerline lights	0.50	203		
E	-	LITE	-	TAXI	-	EDGE	Taxiway edge lights	0.50	V		
E	-	LITE	-	THRS			Threshold lights	0.50	203		
E	-	LITE	-	WALL			Wall mounted fixtures	0.50	203		
		LTNG	-	**Lightning Protection System**							
E	-	LTNG	-	COND			Lightning protection conductors	0.50	203		
E	-	LTNG	-	TERM			Lightning protection terminals	0.50	203		
		NURS	-	**Nurse Call / Paging System**							
E	-	NURS	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	NURS	-	SYMB			Nurse call/paging system symbols	0.50	203		
		POLE	-	**Utility Poles**							
E	-	POLE	-	GUYS			Guying equipment	0.50	203		
E	-	POLE	-	GUYS	-	IDEN	Guying equipment identifier tags, symbol modifiers, and text	0.25	2	•	
E	-	POLE	-	IDEN			Utility pole identifier tags, symbol modifier, and text	0.25	2	•	
E	-	POLE	-	UTIL			Utility poles	0.50	203		
		POWR	-	**Power**							
E	-	POWR	-	BUSW			Busways and wireways	0.50	203		
E	-	POWR	-	CABL			Cable trays	0.50	203		

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
E	-	POWR	-	CIRC			Power circuits (including crosslines and homeruns)	0.50	83		
E	-	POWR	-	CIRC	- NUMB		Power circuit numbers (e.g., panel/circuit number, wire/conduit size)	0.25	2	•	
E	-	POWR	-	CLNG			Ceiling outlets (receptacles and switches)	0.50	83		
E	-	POWR	-	FEED			Feeders	0.50	203		
E	-	POWR	-	GENR			Generators and auxiliary equipment	0.35	4	•	
E	-	POWR	-	JBOX			Junction boxes	0.50	83		
E	-	POWR	-	MOTR			Motors and utilization equipment	0.35	4	•	
E	-	POWR	-	PANL			Panelboards, switchboards, MCC, unit substations	0.35	4	•	
E	-	POWR	-	SWCH			Disconnect switches, motor starters, contactors, etc.	0.50	163		
E	-	POWR	-	URAC			Underfloor raceways	0.50	203		
E	-	POWR	-	WALL			Wall/floor outlets (receptacles and switches)	0.50	83		
		PRIM	-	**Primary Electrical Cables**							
E	-	PRIM	-	OVHD			Overhead electrical utility lines	0.35	4	•	
E	-	PRIM	-	OVHD	- IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	PRIM	-	UNDR			Underground electrical utility lines	0.35	4	•	
E	-	PRIM	-	UNDR	- IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
		SECD	-	**Secondary Electrical Cables**							
E	-	SECD	-	OVHD			Overhead electrical utility lines	0.50	163		
E	-	SECD	-	OVHD	- IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	SECD	-	UNDR			Underground electrical utility lines	0.50	163		
E	-	SECD	-	UNDR	- IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
		SERT	-	**Security Systems**							
E	-	SERT	-	ACCS			Access control system symbols	0.50	23		
E	-	SERT	-	BURD			Buried sensors	0.50	23		
E	-	SERT	-	CLNG			Ceiling mounted sensors	0.50	23		
E	-	SERT	-	FLOR			Floor mounted sensors	0.50	23		
E	-	SERT	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
E	-	SERT	-	UNDR			Buried sensors	0.50	23		
E	-	SERT	-	WALL			Wall mounted sensors	0.50	23		
		SOUN	-	**Sound Systems**							

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
E	- SOUN	- IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
E	- SOUN	- SYMB				Sound system symbols	0.50	203		
	SPCL	**- Special Systems**								
E	- SPCL	- IDEN				Special systems (UMCS, EMCS, CATV, etc.) identifier tags, symbol modifier, and text	0.25	2	•	
E	- SPCL	- JBOX				Junction boxes	0.50	83		
E	- SPCL	- PANL				Panelboards, backing boards, patch panel racks	0.35	4	•	
E	- SPCL	- SRFS				Surface Sensor System	0.50	V		
E	- SPCL	- SYST				Special systems (UMCS, EMCS, CATV, etc.)	0.50	203		
E	- SPCL	- TRAF				Traffic signal system	0.50	203		
E	- SPCL	- TRAF	- IDEN			Traffic signal identifier tags, symbol modifier, and text	0.25	2	•	
	STAT	**- Demolition (used only in existing demolition model file)**								
E	- STAT	- DEMO	- PHS1			Demolition - phase 1	0.50	203		
E	- STAT	- DEMO	- PHS2			Demolition - phase 2	0.50	83		
E	- STAT	- DEMO	- PHS3			Demolition - phase 3	0.50	163		
	TRAN	**- Transformers**								
E	- TRAN	- PADM				Pad mounted transformers	0.50	23		
E	- TRAN	- PADM	- IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
E	- TRAN	- POLE				Pole mounted transformers	0.50	23		
E	- TRAN	- POLE	- IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
	TVAN	**- TV Antenna System**								
E	- TVAN	- IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
E	- TVAN	- SYMB				TV antenna system symbols	0.50	203		

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
	AFFF	-	**Aqueous Film Forming Foam System**							
F	- AFFF	-	EQPM			Equipment	0.35	82		
F	- AFFF	-	PIPE			Piping	0.35	82		
	ALRM	-	**Fire Alarm / Detection Equipment**							
F	- ALRM	-	DTCT			Smoke/heat/other detectors	0.50	23		
F	- ALRM	-	INDC			Indicating appliances	0.50	83		
F	- ALRM	-	MANL			Manual fire alarm pull stations	0.50	23		
F	- ALRM	-	PHON			Fire service or emergency telephone stations	0.18	1	•	
	ANNO	-	**General Information**							
F	- ANNO	-	DIMS			Witness/extension lines, dimension terminators, dimension text	V	V		
F	- ANNO	-	KEYN			Reference keynotes with associated leaders	V	V		
F	- ANNO	-	LEGN			Legend & Schedule	V	V		
F	- ANNO	-	NOTE			General notes and general remarks	0.25	2	•	
F	- ANNO	-	NPLT			Non-plotting graphic information	0.50	5	•	
F	- ANNO	-	PATT			Miscellaneous patterning and hatching	0.35	8	•	
F	- ANNO	-	REDL			Redlines	0.18	1	•	
F	- ANNO	-	REFR			Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
F	- ANNO	-	REVS			Revisions	0.35	4	•	
F	- ANNO	-	SYMB			Miscellaneous symbols	1.00	6	•	
F	- ANNO	-	TEXT			Miscellaneous text and callouts with associated leaders	V	V		
	CO2S	-	**CO2 Sprinkler System**							
F	- CO2S	-	EQPM			Equipment	1.00	6	•	
F	- CO2S	-	PIPE			CO2 piping or CO2 discharge nozzle piping	1.00	6	•	
	CTRL	-	**Control Panels**							
F	- CTRL	-	PANL			Control panels	0.50	23		
	DETL	-	**Detail Information**							
F	- DETL	-	GRPH			Graphics, gridlines, non-text items	V	V		
F	- DETL	-	INPD			Inch-pound-specific dimensions and notes	0.25	2	•	
F	- DETL	-	METR			Metric-specific dimensions and notes	0.25	2	•	
	FLOR	-	**Floor Information**							

      revision letter A

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
F	-	FLOR	-	IDEN				Room name, space identification text (copied from Architectural - Floor Plan model file)	0.35	3	•	
F	-	FLOR	-	NUMB				Room/space identification number and symbol (copied from Architectural - Floor Plan model file)	0.35	3	•	
		HALN	-	Halon System								
F	-	HALN	-	EQPM				Halon equipment	0.35	22		
F	-	HALN	-	PIPE				Halon piping	0.35	22		
		IGAS	-	Inert Gas								
F	-	IGAS	-	EQPM				Inert gas equipment	0.35	162		
F	-	IGAS	-	PIPE				Inert gas piping	0.35	162		
		LITE	-	Lights								
F	-	LITE	-	EMER				Emergency fixtures	0.50	23		
F	-	LITE	-	EXIT				Exit fixtures	0.50	203		
		LSFT	-	Egress Requirements								
F	-	LSFT	-	EGRE				Egress requirements designator	1.00	6	•	
F	-	LSFT	-	OCCP				Occupant load for egress capacity	1.00	6	•	
F	-	LSFT	-	TRVL				Maximum travel distances	1.00	6	•	
		PROT	-	Fire Protection / Supression Equipment								
F	-	PROT	-	CABN				Fire hose cabinets	0.25	2	•	
F	-	PROT	-	EXTN				Fire extinguishers and fire extinguisher cabinets	0.25	2	•	
F	-	PROT	-	HOSE				Fire hoses	0.25	2	•	
		RATE	-	Fire Ratings								
F	-	RATE	-	DOOR				Door fire ratings	0.35	4	•	
F	-	RATE	-	WALL				Wall fire ratings	0.35	4	•	
		SMOK	-	Smoke/Pressurization Control								
F	-	SMOK	-	DAMP				Dampers	0.35	22		
		SPRN	-	Sprinkler System								
F	-	SPRN	-	CLHD				Sprinkler - ceiling heads	0.35	122		
F	-	SPRN	-	COMB				Combination system	0.18	1	•	
F	-	SPRN	-	OTHD				Sprinkler - other heads	0.35	122		
F	-	SPRN	-	OTHR				Sprinkler - other	0.35	3	•	
F	-	SPRN	-	PEND				Sprinkler - pendant	0.35	3	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
F	- SPRN	- PIPE				Sprinkler piping	0.35	4	•	
F	- SPRN	- STAN				Standpipe system	0.25	2	•	
	STAT	- **Demolition (used only in creating Existing Demolition model files)**								
F	- STAT	- DEMO				Demolition (Note: comprehensive demolition is handled in Model File Type: Demolition Plan)	1.00	6	•	
F	- STAT	- DEMO	- PHS1			Demolition - phase 1	0.50	203		
F	- STAT	- DEMO	- PHS2			Demolition - phase 2	0.50	83		
F	- STAT	- DEMO	- PHS3			Demolition - phase 3	0.50	163		
F	- STAT	- EXST				Existing to remain	0.35	3	•	
F	- STAT	- FUTR				Future work	0.25	2	•	
F	- STAT	- MOVE				Items to be moved	1.00	6	•	
F	- STAT	- NEWW				New work	0.35	4	•	
F	- STAT	- NICN				Not in contract	0.35	8	•	
F	- STAT	- PHS#				Phase numbers (#=1-9)	0.25	2	•	
F	- STAT	- RELO				Relocated items	0.50	5	•	
F	- STAT	- TEMP				Temporary work	0.35	4	•	
	WATR	- **Water Supply and Distribution**								
F	- WATR	- CONN				Fire department connections	0.35	122		
F	- WATR	- HYDR				Hydrants	0.35	122		
F	- WATR	- PIPE				Piping	0.35	4	•	
F	- WATR	- PUMP				Fire pumps	0.35	122		

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
ANNO	-	**General Information**								
G	- ANNO	- LEGN				Legend & Schedule	V	V		
G	- ANNO	- NPLT				Non-plotting graphic information	0.50	5	•	
G	- ANNO	- PATT				Miscellaneous patterning and hatching	0.35	8	•	
G	- ANNO	- REDL				Redlines	0.18	1	•	
G	- ANNO	- REFR				Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
G	- ANNO	- REVS				Revisions	0.35	4	•	
G	- ANNO	- SYMB				Miscellaneous symbols	1.00	6	•	
G	- ANNO	- SYMB	- NARW			[Plan North Arrow]	0.35	12	•	
G	- ANNO	- SYMB	- NARW	- DN		[Plan North Arrow Down]	0.35	12	•	Extra minor
G	- ANNO	- SYMB	- NARW	- LT		[Plan North Arrow Left]	0.35	12	•	Extra minor
G	- ANNO	- SYMB	- NARW	- UP		[Plan North Arrow Up]	0.35	12	•	Extra minor
G	- ANNO	- SYMB	- SCAL			[Scale symbol]	0.35	12	•	
G	- ANNO	- SYMB	- SCAL	- ATTR		[Scale symbol Attributes]	0.35	3	•	Extra minor
G	- ANNO	- TEXT				Miscellaneous text and callouts with associated leaders	V	V		
G	- ANNO	- TITL				[Floor Plan Titles & adjacent scale]	0.35	3	•	
G	- ANNO	- TTLB				[Titleblock layer]	0.35	4	•	
G	- ANNO	- TTLB	- ATTR			[Titleblock layer]	0.35	3	•	
G	- ANNO	- TTLB	- DATE	- STMP		[Titleblock layer]	0.18	1	•	Extra minor
G	- ANNO	- TTLB	- LOGO			[Titleblock layer]	0.53	7	•	
G	- ANNO	- TTLB	- PATT	- LAX		[Titleblock layer]	0.53	7	•	Extra minor
G	- ANNO	- TTLB	- PATT	- ONT		[Titleblock layer]	0.53	7	•	Extra minor
G	- ANNO	- TTLB	- PATT	- PMD		[Titleblock layer]	0.53	7	•	Extra minor
G	- ANNO	- TTLB	- PATT	- VNY		[Titleblock layer]	0.53	7	•	Extra minor
G	- ANNO	- VRPT				Paperspace viewport	0.35	8	•	
GRID	-	**Grid Lines**								
G	- GRID	- EXTR				Column grid outside building	0.50	5	•	
G	- GRID	- IDEN				Column grid tags	0.18	1	•	
PLAN	-	**Floor Information**								
G	- PLAN	- OTLN				Floor outline/perimeter/building footprint	1.00	6	•	
SITE	-	**Site Information**								
G	- SITE	- OTLN				Site plan - key map	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
		ANNO	-	**General Information**						
H	-	ANNO	-	DIMS		Witness/extension lines, dimension terminators, dimension text	V	V		
H	-	ANNO	-	KEYN		Reference keynotes with associated leaders	V	V		
H	-	ANNO	-	LEGN		Legend & Schedule	V	V		
H	-	ANNO	-	NPLT		Non-plotting graphic information	0.50	5	•	
H	-	ANNO	-	PATT		Miscellaneous patterning	0.35	8	•	
H	-	ANNO	-	REDL		Redlines	0.18	1	•	
H	-	ANNO	-	REVS		Revisions	0.35	4	•	
H	-	ANNO	-	SYMB		Reference bubbles, matchlines and breaklines	1.00	6	•	
H	-	ANNO	-	TEXT		Detail title text, text and associated leaders, notes	V	V		
		BLDG	-	**Buildings**						
H	-	BLDG	-	IDEN		Annotation	0.25	2	•	
H	-	BLDG	-	OTLN		Command posts, information centers	0.25	2	•	
		DECN	-	**Decontamination**						
H	-	DECN	-	EQPM		Decontamination equipment	0.18	1	•	
H	-	DECN	-	IDEN		Annotation	1.00	6	•	
		DETL	-	**Detail Information**						
H	-	DETL	-	GRPH		Graphics, gridlines, non-text items	V	V		
H	-	DETL	-	INPD		Inch-pound-specific dimensions and notes	0.18	1	•	
H	-	DETL	-	METR		Metric-specific dimensions and notes	0.35	3	•	
		DISP	-	**Disposal Areas**						
H	-	DISP	-	HAZW		Hazardous waste	0.50	5	•	
H	-	DISP	-	IDEN		Annotation	1.00	6	•	
H	-	DISP	-	MUNT		Munitions	0.50	5	•	
H	-	DISP	-	TANK		Spill containment tanks	1.00	6	•	
		FIXT	-	**Emergency Fixtures**						
H	-	FIXT	-	EYEW		Emergency eyewashes	0.35	3	•	
H	-	FIXT	-	SHOW		Emergency showers	0.35	3	•	
		MNST	-	**Monitoring Stations**						
H	-	MNST	-	AIRQ		Air quality	0.35	3	•	
H	-	MNST	-	GWTR		Ground water	0.35	3	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
H	-	MNST	-	IDEN		Annotation	0.35	3	•	
H	-	MNST	-	LAND		Landfill gas	0.35	3	•	
H	-	MNST	-	SOIL		Soil gas	0.35	3	•	
H	-	MNST	-	SWTR		Surface water	0.35	3	•	
		POLL	-	**Pollution Areas**						
H	-	POLL	-	CONC		Polluted area of concern	0.25	2	•	
H	-	POLL	-	IDEN		Annotation	0.25	2	•	
H	-	POLL	-	ORIG		Point of pollution origin	0.25	2	•	
H	-	POLL	-	POTN		Potential spill, emission, or release source	0.25	2	•	
		SAMP	-	**Sample Points**						
H	-	SAMP	-	AIRS		Air samples	0.18	1	•	
H	-	SAMP	-	BIOL		Biological samples	0.18	1	•	
H	-	SAMP	-	GWTR		Ground water samples	0.18	1	•	
H	-	SAMP	-	IDEN		Annotation	0.18	1	•	
H	-	SAMP	-	MAGN		Magnetometer location points	0.18	1	•	
H	-	SAMP	-	SEDI		Sediment samples	0.18	1	•	
H	-	SAMP	-	SOIL		Soil samples	0.18	1	•	
H	-	SAMP	-	SOLI		Solid material samples	0.18	1	•	
H	-	SAMP	-	SWTR		Surface water samples	0.18	1	•	
H	-	SAMP	-	WAST		Waste samples	0.18	1	•	
		SECT	-	**Sections**						
H	-	SECT	-	IDEN		Component identification numbers	0.25	2	•	
H	-	SECT	-	MBND		Material beyond section cut	0.50	5	•	
H	-	SECT	-	MCUT		Material cut by section	0.35	4	•	
H	-	SECT	-	PATT		Textures and hatch patterns	0.35	8	•	
		STAT	-	**Demolition (used only in creating Existing Demolition model files)**						
H	-	STAT	-	DEMO	- PHS1	Demolition - phase 1	0.50	203		
H	-	STAT	-	DEMO	- PHS2	Demolition - phase 2	0.50	83		
H	-	STAT	-	DEMO	- PHS3	Demolition - phase 3	0.50	163		
		STOR	-	**Storage Facilities**						
H	-	STOR	-	HAZM		Hazardous materials	1.00	6	•	
H	-	STOR	-	HAZW		Hazardous waste	1.00	6	•	
H	-	STOR	-	IDEN		Annotation	1.00	6	•	

Full Layer Name								Description	Line Width (mm)	Color	Modified	Notes
ANNO - General Information				
I	-	ANNO	-	DIMS				Witness/extension lines, dimension terminators, dimension text	V	V		
I	-	ANNO	-	KEYN				Reference keynotes with associated leaders	V	V		
I	-	ANNO	-	LEGN				Legend & Schedule	V	V		
I	-	ANNO	-	NOTE				General notes and general remarks	0.25	2	•	
I	-	ANNO	-	NPLT				Non-plotting graphic information	0.50	5	•	
I	-	ANNO	-	PATT				Miscellaneous patterning	0.35	8	•	
I	-	ANNO	-	REDL				Redlines	0.18	1	•	
I	-	ANNO	-	REVS				Revisions	0.35	4	•	
I	-	ANNO	-	SYMB				Reference bubbles, matchlines and breaklines	1.00	6	•	
I	-	ANNO	-	TEXT				Detail title text, text and associated leaders, notes	V	V		
DETL - Detail Information				
I	-	DETL	-	GRPH				Graphics, gridlines, non-text items	V	V		
I	-	DETL	-	INPD				Inch-pound-specific dimensions and notes	0.25	2	•	
I	-	DETL	-	METR				Metric-specific dimensions and notes	0.25	2	•	
ELEV - Elevations				
I	-	ELEV	-	CASE				Wall mounted casework	0.25	2	•	
I	-	ELEV	-	FIXT				Miscellaneous fixtures	0.35	3	•	
I	-	ELEV	-	FNSH				Finishes, woodwork and trim	0.25	2	•	
I	-	ELEV	-	IDEN				Component identification numbers	0.50	5	•	
I	-	ELEV	-	PATT				Textures and hatch patterns	0.18	1	•	
I	-	ELEV	-	PFIX				Plumbing fixtures in elevation	0.18	1	•	
I	-	ELEV	-	SIGN				Signage	0.18	1	•	
EQPM - Equipment				
I	-	EQPM	-	ACCS				Equipment access	0.35	8	•	
I	-	EQPM	-	CHLD				Child development (play toys, teaching rugs, play forms)	0.25	2	•	
I	-	EQPM	-	COPY				Copiers, fax machines, office equipment	0.25	2	•	
I	-	EQPM	-	FIXD				Fixed equipment	0.50	5	•	
I	-	EQPM	-	IDEN				Equipment identification numbers	0.18	1	•	
I	-	EQPM	-	MEDI				Medical (exam beds, dental chairs, etc.)	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
I	-	EQPM	-	MOVE		Moveable equipment	0.50	5	•	
I	-	EQPM	-	NICN		Not in contract equipment	0.35	8	•	
I	-	EQPM	-	OVHD		Overhead, ceiling mounted, and suspended equipment	0.35	3	•	
I	-	EQPM	-	STOR		Storage equipment	0.25	2	•	
		FLOR	-	**Floor Information**						
I	-	FLOR	-	SIGN		Signage	1.00	6	•	
		FURN	-	**Furniture**						
I	-	FURN	-	ACCS		Accessories (vestibule matts, partitions, draperies, clocks, trash cans, lecturns, lamps, etc.)	0.18	1	•	
I	-	FURN	-	ADPC		Automated Data Processing Components	0.25	2	•	
I	-	FURN	-	ARTW		Artwork	0.25	2	•	
I	-	FURN	-	CASE		Casegoods (desks, credenzas, beds, dressers, nightstands, wardrobes, etc.)	1.00	6	•	
I	-	FURN	-	FLOR		Flooring (carpet, rugs, etc.)	0.25	2	•	
I	-	FURN	-	FREE		Free-standing furnishings (desks, beds, tables, dressers, credenzas, casegoods)	1.00	6	•	
I	-	FURN	-	GRID		Planning grid/modular outline	0.35	4	•	
I	-	FURN	-	IDEN		Furniture code identification	0.35	3	•	
I	-	FURN	-	MISC		Miscellaneous furniture	0.25	2	•	
I	-	FURN	-	PLNT		Plants	0.18	1	•	
I	-	FURN	-	SEAT		Chairs, sofas, etc.	0.25	2	•	
I	-	FURN	-	STOR		File cabinets, high density storage, shelving, storage cabinets	0.25	2	•	
		STAT	-	**Demolition (used only in creating Existing Demolition model files)**						
I	-	STAT	-	DEMO	- PHS1	Demolition - phase 1	0.50	203		
I	-	STAT	-	DEMO	- PHS2	Demolition - phase 2	0.50	83		
I	-	STAT	-	DEMO	- PHS3	Demolition - phase 3	0.50	163		
		SYST	-	**Systems Furniture**						
I	-	SYST	-	FURN		Furniture	0.25	2	•	
I	-	SYST	-	IDEN		Code identification	0.18	1	•	
I	-	SYST	-	LITE		Lighting components	0.35	4	•	
I	-	SYST	-	PATT		Patterns	0.35	8	•	
I	-	SYST	-	PNLS		Panels	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
I	-	SYST	-	POWR		Power, communication components	0.35	4	•	
I	-	SYST	-	STOR		Storage components	0.25	2	•	
I	-	SYST	-	WALL		Systems furniture partition walls	0.25	2	•	
I	-	SYST	-	WKSF		Work surface components	0.25	2	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
		ANNO	-	General Information							
L	-	ANNO	-	DIMS			Witness/extension lines, dimension terminators, dimension text	V	V		
L	-	ANNO	-	KEYN			Reference keynotes with associated leaders	V	V		
L	-	ANNO	-	LEGN			Legend & Schedule	V	V		
L	-	ANNO	-	NOTE			General notes and general remarks	0.25	2	•	
L	-	ANNO	-	NPLT			Non-plotting graphic information	0.50	5	•	
L	-	ANNO	-	PATT			Miscellaneous patterning	0.35	8	•	
L	-	ANNO	-	REDL			Redlines	0.18	1	•	
L	-	ANNO	-	REVS			Revisions	0.35	4	•	
L	-	ANNO	-	SYMB			Reference bubbles, matchlines and breaklines	1.00	6	•	
L	-	ANNO	-	TEXT			Detail title text, text and associated leaders, notes	V	V		
		DETL	-	Detail Information							
L	-	DETL	-	CABS			Cabinets, enclosures	0.25	2	•	
L	-	DETL	-	CONC			Concrete	0.18	1	•	
L	-	DETL	-	ERTH			Earth	0.35	3	•	
L	-	DETL	-	FENC			Fencing	1.00	6	•	
L	-	DETL	-	FILL			Fill/cover material	0.50	5	•	
L	-	DETL	-	FURN			Furniture, furnishings	0.25	2	•	
L	-	DETL	-	GATE			Gate	0.25	2	•	
L	-	DETL	-	GENF			General features (miscellaneous items)	1.00	6	•	
L	-	DETL	-	GRAS			Grass, sod	0.35	3	•	
L	-	DETL	-	GRPH			Graphics, gridlines, non-text items	V	V		
L	-	DETL	-	INPD			Inch-pound-specific dimensions and notes	0.18	1	•	
L	-	DETL	-	METR			Metric-specific dimensions and notes	0.35	3	•	
L	-	DETL	-	STRC			Structural metal, supports	1.00	6	•	
L	-	DETL	-	TKST			Tank Site	0.25	2	•	
L	-	DETL	-	VEGI			Planting details	0.35	3	•	
L	-	DETL	-	VLVE			Valves, fittings	0.25	2	•	
L	-	DETL	-	WIRE			Wiring	1.00	6	•	
		IRRG	-	Irrigation System							

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
L	-	IRRG	-	COVR			Irrigation coverage, spray distribution patterns	0.50	5	•	
L	-	IRRG	-	EQPM			Equipment (e.g., controllers, valves, RPBPs, etc.)	1.00	6	•	
L	-	IRRG	-	HEAD			Irrigation heads, bubblers, and drip irrigation emitters	0.18	1	•	
L	-	IRRG	-	IDEN			Annotation	0.25	2	•	
L	-	IRRG	-	PIPE			Piping	1.00	6	•	
L	-	IRRG	-	SPKL			Sprinklers	1.00	6	•	
		PLNT	-	**Plants**							
L	-	PLNT	-	BEDS			Planting beds	1.00	6	•	
L	-	PLNT	-	BUSH			Bushes and shrubs (e.g., evergreen, deciduous)	0.50	83		
L	-	PLNT	-	BUSH	-	LINE	Bush and shrub line	0.50	83		
L	-	PLNT	-	CTNR			Containers or planters	0.18	1	•	
L	-	PLNT	-	GRND			Groundcover and vines	0.35	82		
L	-	PLNT	-	IDEN			Annotation	1.00	6	•	
L	-	PLNT	-	MLCH			Mulches - organic and inorganic	0.35	3	•	
L	-	PLNT	-	PLTS			Planting plants (e.g., ornamental annuals and perennials)	0.50	83		
L	-	PLNT	-	SHAD			Shadow areas	0.50	5	•	
L	-	PLNT	-	SPRG			Sprigs	0.35	3	•	
L	-	PLNT	-	TREE			Trees (e.g., evergreen, deciduous, etc.)	0.50	83		
L	-	PLNT	-	TREE	-	LINE	Tree line	0.50	83		
L	-	PLNT	-	TURF			Lawn areas (turfing limits)	0.50	23		
		SITE	-	**Site**							
L	-	SITE	-	BRDG			Bridges	0.35	22		
L	-	SITE	-	DECK			Decks	0.35	232		
L	-	SITE	-	FENC			Fencing	0.25	2	•	
L	-	SITE	-	FURN			Furnishings	0.35	4	•	
L	-	SITE	-	GATE			Gate	0.25	2	•	
L	-	SITE	-	IDEN			Annotation	1.00	6	•	
L	-	SITE	-	PLAY			Play structures	0.25	2	•	
L	-	SITE	-	POOL			Pools and spas	0.35	162		
L	-	SITE	-	ROCK			Boulders and cobble	0.18	1	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
L	-	SITE	-	RTWL			Retaining walls	0.35	4	•	
L	-	SITE	-	SPRT			Sports fields	0.25	2	•	
L	-	SITE	-	TUNL			Tunnels	0.35	22		
L	-	SITE	-	WALK			Walks and steps	V	V		
		STAT	-	**Demolition (used only in creating Existing Demolition model files)**							
L	-	STAT	-	DEMO			Demolition (Note: comprehensive demolition is handled in Model File Type: Demolition Plan)	1.00	6	•	
L	-	STAT	-	DEMO	-	PHS1	Demolition - phase 1	0.50	203		
L	-	STAT	-	DEMO	-	PHS2	Demolition - phase 2	0.50	83		
L	-	STAT	-	DEMO	-	PHS3	Demolition - phase 3	0.50	163		
L	-	STAT	-	EXST			Existing to remain	0.35	3	•	
L	-	STAT	-	FUTR			Future work	0.25	2	•	
L	-	STAT	-	MOVE			Items to be moved	1.00	6	•	
L	-	STAT	-	NEWW			New work	0.35	4	•	
L	-	STAT	-	NICN			Not in contract	0.35	8	•	
L	-	STAT	-	PHS#			Phase numbers (#=1-9)	0.25	2	•	
L	-	STAT	-	RELO			Relocated items	0.50	5	•	
L	-	STAT	-	TEMP			Temporary work	0.35	4	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
		ACID	-	**Industrial Waste Piping AFRZ**							
M	-	ACID	-	EQPM			Acid, alkaline, and oil waste equipment	1.00	6	•	
M	-	ACID	-	PIPE			Acid, alkaline, and oil waste piping	0.25	2	•	
M	-	ACID	-	VENT			Acid, alkaline, and oil waste vent piping	0.25	2	•	
		AFRZ	-	**Antifreeze**							
M	-	AFRZ	-	PIPE			Anti-freeze piping	0.35	82		
M	-	AFRZ	-	WAST			Waste anti-freeze piping	0.35	82		
		ALGN	-	**Alignments**							
M	-	ALGN	-	DATA			Alignment coordinates and curve data	0.35	3	•	
M	-	ALGN	-	LINE			Alignments	0.25	2	•	
M	-	ALGN	-	STAT			Alignment stationing and tick marks	0.35	3	•	
		ANNO	-	**General Information**							
M	-	ANNO	-	DIMS			Witness/extension lines, dimension terminators, dimension text	V	V		
M	-	ANNO	-	KEYN			Reference keynotes with associated leaders	V	V		
M	-	ANNO	-	LEGN			Legend & Schedule	V	V		
M	-	ANNO	-	NOTE			General notes and general remarks	0.25	2	•	
M	-	ANNO	-	NPLT			Non-plotting graphic information	0.50	5	•	
M	-	ANNO	-	PATT			Miscellaneous patterning and hatching	0.35	8	•	
M	-	ANNO	-	REDL			Redlines	0.18	1	•	
M	-	ANNO	-	REFR			Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
M	-	ANNO	-	REVS			Revisions	0.35	4	•	
M	-	ANNO	-	SYMB			Miscellaneous symbols	1.00	6	•	
M	-	ANNO	-	TEXT			Miscellaneous text and callouts with associated leaders	V	V		
		BRIN	-	**Brine Systems**							
M	-	BRIN	-	EQPM			Brine system equipment	1.00	6	•	
M	-	BRIN	-	PIPE			Brine system piping	0.25	2	•	
		CHEM	-	**Chemical Treatment System**							
M	-	CHEM	-	EQPM			Equipment	0.25	121		
M	-	CHEM	-	PIPE			Piping (includes fittings, valves)	0.25	121		
		CNDW	-	**Condenser Water System CNTL**							

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
M	-	CNDW	-	EQPM			Condenser water equipment	0.35	82		
M	-	CNDW	-	PIPE			Condenser water piping	0.35	82		
		COND	-	**Condensate**							
M	-	COND	-	PIPE			Condensate piping (includes fittings, valves)	0.35	3	•	
		CONT	-	**Controls**							
M	-	CONT	-	THER			Thermostats, controls, instrumentation, and sensors	0.18	1	•	
M	-	CONT	-	WIRE			Low voltage wiring	0.18	1	•	
		CWTR	-	**Chilled Water System**							
M	-	CWTR	-	EQPM			Equipment	0.35	122		
M	-	CWTR	-	PIPE			Piping (includes fittings, valves)	0.35	122		
		DETL	-	**Detail Information**							
M	-	DETL	-	ACCS			Accessories	1.00	6	•	
M	-	DETL	-	BOIL			Boilers	0.35	4	•	
M	-	DETL	-	CABS			Cabinets	1.00	6	•	
M	-	DETL	-	COIL			Coils and fin tubes	0.18	1	•	
M	-	DETL	-	DUCT			Ducts	0.50	5	•	
M	-	DETL	-	EQPT			Equipment and fixtures	0.25	2	•	
M	-	DETL	-	FANS			Fans	0.35	3	•	
M	-	DETL	-	GENF			General features (miscellaneous items)	V	V		
M	-	DETL	-	GRLS			Grilles and louvers	0.35	3	•	
M	-	DETL	-	GRPH			Graphics, gridlines, non-text items	V	V		
M	-	DETL	-	INPD			Inch-pound-specific dimensions and notes	0.18	1	•	
M	-	DETL	-	INSL			Insulation and coverings	0.18	1	•	
M	-	DETL	-	METR			Metric-specific dimensions and notes	0.35	3	•	
M	-	DETL	-	MOTR			Motors	0.35	3	•	
M	-	DETL	-	PIPE			Piping	0.25	2	•	
M	-	DETL	-	PUMP			Pumps and compressors	0.35	3	•	
M	-	DETL	-	STRC			Structural support features	1.00	6	•	
M	-	DETL	-	TANK			Tanks	0.25	2	•	
M	-	DETL	-	TRAP			Traps and drains	0.35	3	•	
M	-	DETL	-	VENT			Vents	0.35	3	•	
M	-	DETL	-	VLVE			Valves and fittings	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
M	-	DETL	-	WIRE		Electrical wiring	0.18	1	•	
		DIAG	-	**Diagram Information**						
M	-	DIAG	-	GRPH		Graphics, gridlines, non-text items	V	V		
M	-	DIAG	-	INPD		Inch-pound-specific dimensions and notes	0.18	1	•	
M	-	DIAG	-	METR		Metric-specific dimensions and notes	0.35	3	•	
		DISC	-	**Other Discipline Information**						
M	-	DISC	-	INFO		Clearances and working space information	0.35	3	•	
		DUAL	-	**Dual Temperature Systems**						
M	-	DUAL	-	EQPM		Equipment	0.35	22		
M	-	DUAL	-	PIPE		Piping (includes fittings, valves)	0.35	22		
		DUST	-	**Dust and Fume Collection Systems**						
M	-	DUST	-	DUCT		Dust and fume ductwork	0.35	22		
M	-	DUST	-	EQPM		Dust and fume collection equipment	0.35	22		
		ELEV	-	**Elevations**						
M	-	ELEV	-	FIXT		Miscellaneous fixtures	1.00	6	•	
M	-	ELEV	-	IDEN		Component identification numbers	0.25	2	•	
M	-	ELEV	-	OTLN		Building outlines	1.00	6	•	
M	-	ELEV	-	PATT		Textures and hatch patterns	0.35	8	•	
M	-	ELEV	-	PFIX		Plumbing fixtures	1.00	6	•	
		EXHS	-	**Exhaust**						
M	-	EXHS	-	CDFF		Exhaust air ceiling registers and grilles	0.35	82		
M	-	EXHS	-	DUCT		Exhaust ductwork	0.35	82		
M	-	EXHS	-	EQPM		Equipment	0.35	82		
		FLOR	-	**Floor Information**						
M	-	FLOR	-	IDEN		Room name, space identification text (copied from Architectural - Floor Plan model file)	0.35	3	•	
M	-	FLOR	-	NUMB		Room/space identification number and symbol (copied from Architectural - Floor Plan model file)	0.35	3	•	
		GTHP	-	**Geothermal Heat Pump System**						
M	-	GTHP	-	EQPM		Equipment	1.00	6	•	
M	-	GTHP	-	PIPE		Piping (includes fittings, valves)	1.00	6	•	
		HTCW	-	**HTCW Utilities**						
M	-	HTCW	-	ABND		Abandoned piping	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
M	- HTCW	- CHLL				Main chilled water piping	1.00	6	•	
M	- HTCW	- CHLP				Chilled water plant	1.00	6	•	
M	- HTCW	- CHLS				Chilled water service piping	0.35	3	•	
M	- HTCW	- DEVC				Rigid anchors, anchor guides, rectifiers, reducers, markers, meters, pumps, regulators, tanks, and valves	1.00	6	•	
M	- HTCW	- FLOW				Flow direction arrows	0.35	3	•	
M	- HTCW	- FTTG				Caps and flanges	1.00	6	•	
M	- HTCW	- HTPL				Main high temperature piping	0.18	1	•	
M	- HTCW	- HTPP				High temperature water plant	1.00	6	•	
M	- HTCW	- HTPS				High temperature service piping	0.35	3	•	
M	- HTCW	- IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
M	- HTCW	- JBOX				Junction boxes, manholes, handholes, test boxes	0.18	1	•	
M	- HTCW	- LTPL				Main low temperature piping	0.25	2	•	
M	- HTCW	- LTPS				Low temperature service piping	0.35	3	•	
M	- HTCW	- PITS				Valve pits/vaults, steam pits	0.35	3	•	
M	- HTCW	- PLNT	- IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
M	- HTCW	- PUMP				Pump stations	1.00	6	•	
M	- HTCW	- RTRN				Return for all HTCW lines	0.50	5	•	
M	- HTCW	- STML				Main steam piping	0.18	1	•	
M	- HTCW	- STMS				Steam service piping	0.35	3	•	
M	- HTCW	- STNS	- IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
	HVAC	- **Heating, Ventilation and Air Conditioning**								
M	- HVAC	- ACCS				Equipment access doors	0.35	3	•	
M	- HVAC	- CDFF				Ceiling diffusers, registers, and grilles	0.35	12		
M	- HVAC	- DAMP				Fire and smoke dampers	0.18	1	•	
M	- HVAC	- EQPM				Air system equipment	0.25	2	•	
M	- HVAC	- FDFF				Floor diffusers, registers, and grilles	0.35	162		
M	- HVAC	- IDEN				Duct sizes	1.00	6	•	
M	- HVAC	- RETN				Return ductwork	0.50	23		
M	- HVAC	- ROOF				Roof mounted HVAC equipment	0.25	2	•	
M	- HVAC	- SUPP				Supply ductwork	0.35	4	•	
M	- HVAC	- TAGS				Diffuser/register/grille tags and air flow arrows	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
M	-	HVAC	-	WDFF			Wall diffusers, registers, and grilles	0.25	2	•	
		HWTR	-	**Hot Water Heating System**							
M	-	HWTR	-	EQPM			Equipment	0.35	12		
M	-	HWTR	-	PIPE			Piping (includes fittings, valves)	0.35	12		
		HYDR	-	**Hydraulic**							
M	-	HYDR	-	EQPM			Hydraulic system equipment	1.00	6	•	
M	-	HYDR	-	PIPE			Hydraulic system piping	0.25	2	•	
		INSL	-	**Insulating (transformer) Oil**							
M	-	INSL	-	EQPM			Insulating oil equipment	1.00	6	•	
M	-	INSL	-	PIPE			Insulating oil piping	0.25	2	•	
		LUBE	-	**Lubrication Oil**							
M	-	LUBE	-	EQPM			Lubrication oil equipment	1.00	6	•	
M	-	LUBE	-	PIPE			Lubrication oil piping	0.25	2	•	
		MACH	-	**Machine Design**							
M	-	MACH	-	BASE			Machinery bases	0.25	2	•	
M	-	MACH	-	COMP			Miscellaneous machinery parts and components	0.25	2	•	
M	-	MACH	-	EXST			Existing machinery	0.35	3	•	
M	-	MACH	-	FAST			Fasteners, nuts, and bolts	0.25	2	•	
M	-	MACH	-	LROT			Large rotating machinery (turbine and pump outlines)	1.00	6	•	
M	-	MACH	-	MOTR			Machinery motors	1.00	6	•	
		MATL	-	**Material Handling**							
M	-	MATL	-	CRAN			Bridge cranes, jib cranes, and monorails	0.25	2	•	
M	-	MATL	-	HOIS			Hoists and hooks	0.25	2	•	
M	-	MATL	-	LIFT			Miscellaneous lifting equipment	1.00	6	•	
		PENE	-	**Penetrations**							
M	-	PENE	-	FLOR			Floor penetrations	0.35	3	•	
M	-	PENE	-	ROOF			Roof penetrations	0.18	1	•	
		PROC	-	**Process Piping**							
M	-	PROC	-	EQPM			Equipment	1.00	6	•	
M	-	PROC	-	PIPE			Process piping	0.25	2	•	
		RCOV	-	**Energy Recovery System**							
M	-	RCOV	-	EQPM			Equipment	1.00	6	•	
M	-	RCOV	-	PIPE			Piping (includes fittings, valves)	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
REFG	**-**	**Refrigeration System**								
M	-	REFG	-	EQPM		Equipment	1.00	6	•	
M	-	REFG	-	PIPE		Piping (includes fittings, valves)	1.00	6	•	
RWTR	**-**	**Raw Water Piping**								
M	-	RWTR	-	EQPM		Raw water equipment	1.00	6	•	
M	-	RWTR	-	PIPE		Raw water piping	0.25	2	•	
SECT	**-**	**Sections**								
M	-	SECT	-	IDEN		Component identification numbers	0.25	2	•	
M	-	SECT	-	MBND		Material beyond section cut	0.50	5	•	
M	-	SECT	-	MCUT		Material cut by section	0.35	4	•	
M	-	SECT	-	PATT		Textures and hatch patterns	0.35	8	•	
STAT	**-**	**Demolition (used only in creating Existing Demolition model files)**								
M	-	STAT	-	DEMO		Demolition	1.00	6	•	
M	-	STAT	-	DEMO	- PHS1	Demolition - phase 1	0.50	203		
M	-	STAT	-	DEMO	- PHS2	Demolition - phase 2	0.50	83		
M	-	STAT	-	DEMO	- PHS3	Demolition - phase 3	0.50	163		
M	-	STAT	-	EXST		Existing to remain	0.35	3	•	
M	-	STAT	-	FUTR		Future work	0.25	2	•	
M	-	STAT	-	MOVE		Items to be moved	1.00	6	•	
M	-	STAT	-	NEWW		New work	0.35	4	•	
M	-	STAT	-	NICN		Not in contract	0.35	8	•	
M	-	STAT	-	PHS#		Phase numbers (#=1-9)	0.25	2	•	
M	-	STAT	-	RELO		Relocated items	0.50	5	•	
M	-	STAT	-	TEMP		Temporary work	0.35	4	•	
STEM	**-**	**Steam**								
M	-	STEM	-	EQPM		Equipment	0.25	2	•	
M	-	STEM	-	PIPE		Steam piping	0.25	2	•	

Full Layer Name			Description	Line Width (mm)	Color	Modified	Notes
ANNO - **General Information**							
P - ANNO - DIMS			Witness/extension lines, dimension terminators, dimension text	V	V		
P - ANNO - KEYN			Reference keynotes with associated leaders	V	V		
P - ANNO - LEGN			Legend & Schedule	V	V		
P - ANNO - NOTE			General notes and general remarks	0.25	2	•	
P - ANNO - NPLT			Non-plotting graphic information	0.50	5	•	
P - ANNO - PATT			Miscellaneous patterning and hatching	0.35	8	•	
P - ANNO - REDL			Redlines	0.18	1	•	
P - ANNO - REFR			Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
P - ANNO - REVS			Revisions	0.35	4	•	
P - ANNO - SYMB			Reference bubbles, matchlines and breaklines	1.00	6	•	
P - ANNO - TEXT			Detail title text, text and associated leaders, notes	V	V		
CMPA -							
P - CMPA - EQPM			Equipment	0.70	84		
P - CMPA - PIPE			Piping	0.50	83		
DETL - **Detail Information**							
P - DETL - GRPH			Graphics, gridlines, non-text items	V	V		
P - DETL - INPD			Inch-pound-specific dimensions and notes	0.25	2	•	
P - DETL - METR			Metric-specific dimensions and notes	0.25	2	•	
DIAG - **Diagram Information**							
P - DIAG - GRPH			Graphics, gridlines, non-text items	V	V		
P - DIAG - INPD			Inch-pound-specific dimensions and notes	0.18	1	•	
P - DIAG - METR			Metric-specific dimensions and notes	0.18	1	•	
DISC - **Other Discipline Information**							
P - DISC - INFO			Information and notes for other disciplines	V	V		
DOMW - **Domestic Water**							
P - DOMW - ACCS			Equipment access doors	0.35	82		
P - DOMW - CPIP			Domestic cold water piping	0.50	123		
P - DOMW - EQPM			Hot and cold water equipment	1.40	7	•	
P - DOMW - FPIP			Domestic filtered water piping	0.50	83		

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
P	-	DOMW	-	HPIP				Domestic hot water piping	0.50	113		
P	-	DOMW	-	RISR				Domestic hot and cold water risers	0.35	3	•	
P	-	DOMW	-	RPIP				Domestic hot water recirculation piping	0.50	113		
		FLOR	-	**Floor Information**								
P	-	FLOR	-	IDEN				Room name, space identification text (copied from Architectural - Floor Plan model file)	0.35	3	•	
P	-	FLOR	-	NUMB				Room/space identification number and symbol (copied from Architectural - Floor Plan model file)	0.35	3	•	
P	-	FLOR	-	FIXT				Plumbing fixtures [toilets, urinals, lavatories, toilet partitions & specialties]	0.25	131	•	
		FUEL	-	**Liquid Fuel**								
P	-	FUEL	-	EQPM				Equipment	0.70	24		
P	-	FUEL	-	FGAS				Fuel gas piping	0.50	23		
P	-	FUEL	-	FOIL				Fuel oil piping	0.50	23		
P	-	FUEL	-	NGAS				Natural gas piping	0.50	23		
		LGAS	-	**Laboratory Piping**								
P	-	LGAS	-	EQPM				Equipment	0.70	24		
P	-	LGAS	-	PIPE				Piping	0.50	23		
		MDGS	-	**Medical/Dental Piping**								
P	-	MDGS	-	EQPM				Equipment	0.70	24		
P	-	MDGS	-	PIPE				Piping	0.50	23		
		PENE	-	**Penetrations**								

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Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
P	-	PENE	-	FLOR		Floor penetrations	0.35	3	•	
P	-	PENE	-	ROOF		Roof penetrations	0.18	1	•	
		SANR	-	**Sanitary Drainage Piping**						
P	-	SANR	-	COND		Condensate piping	0.50	83		
P	-	SANR	-	EQPM		Equipment (e.g., sand/oil/water separators)	0.70	204		
P	-	SANR	-	FIXT		Plumbing fixtures	1.00	6	•	
P	-	SANR	-	FLDR		Floor drains, sinks, and cleanouts	1.00	6	•	
P	-	SANR	-	PIPE		Piping	0.50	203		
P	-	SANR	-	RISR		Sanitary risers	0.50	203		
P	-	SANR	-	VENT		Vent piping	0.50	203		
		STAT	-	**Demolition (used only in creating Existing Demolition model files)**						
P	-	STAT	-	DEMO		Demolition	1.00	6	•	
P	-	STAT	-	DEMO	- PHS1	Demolition - phase 1	0.50	203		
P	-	STAT	-	DEMO	- PHS2	Demolition - phase 2	0.50	83		
P	-	STAT	-	DEMO	- PHS3	Demolition - phase 3	0.50	163		
P	-	STAT	-	EXST		Existing to remain	0.35	3	•	
P	-	STAT	-	FUTR		Future work	0.25	2	•	
P	-	STAT	-	MOVE		Items to be moved	1.00	6	•	
P	-	STAT	-	NEWW		New work	0.35	4	•	
P	-	STAT	-	NICN		Not in contract	0.35	8	•	
P	-	STAT	-	PHS#		Phase numbers (#=1-9)	0.25	2	•	
P	-	STAT	-	RELO		Relocated items	0.50	5	•	
P	-	STAT	-	TEMP		Temporary work	0.35	4	•	
		STRM	-	**Storm Sewer**						
P	-	STRM	-	PIPE		Storm drain piping	0.50	163		
P	-	STRM	-	RFDR		Roof drains	0.50	163		
P	-	STRM	-	RISR		Storm drain risers	0.50	163		

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
ANNO	-	**General Information**								
S	-	ANNO	-	DIMS		Witness/extension lines, dimension terminators, dimension text, welding symbols	V	V		
S	-	ANNO	-	KEYN		Reference keynotes with associated leaders	V	V		
S	-	ANNO	-	LEGN		Legend & Schedule	V	V		
S	-	ANNO	-	NOTE		General notes and general remarks	0.25	2	•	
S	-	ANNO	-	NPLT		Non-plotting graphic information	0.50	5	•	
S	-	ANNO	-	PATT		Miscellaneous patterning and hatching	0.35	8	•	
S	-	ANNO	-	REDL		Redlines	0.18	1	•	
S	-	ANNO	-	REFR		Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
S	-	ANNO	-	REVS		Revisions	0.35	4	•	
S	-	ANNO	-	SYMB		Reference bubbles, matchlines and breaklines	1.00	6	•	
S	-	ANNO	-	TEXT		Miscellaneous text and callouts with associated leaders	V	V		
BEAM	-	**Beam**								
S	-	BEAM	-	CNTR		Beam centerlines	0.50	5	•	
S	-	BEAM	-	PRIM		Primary beams, girders	0.35	4	•	
S	-	BEAM	-	SECD		Secondary beams, girders	1.00	6	•	
BRAC	-	**Bracing**								
S	-	BRAC	-	LATL		Lateral bracing	0.25	2	•	
S	-	BRAC	-	SHEA		Shear walls	0.25	2	•	
S	-	BRAC	-	VERT		Vertical bracing	0.25	2	•	
COLS	-	**Columns**								
S	-	COLS				Columns (unattached to walls)	0.25	2	•	
S	-	COLS	-	CNTR		Column centerlines/working lines	0.18	10		
S	-	COLS	-	MSC1		Miscellaneous columns (Type 1)	0.35	22		
S	-	COLS	-	MSC2		Miscellaneous columns (Type 2)	0.35	22		
S	-	COLS	-	MSC3		Miscellaneous columns (Type 3)	0.35	22		
S	-	COLS	-	MSC4		Miscellaneous columns (Type 4)	0.35	22		
S	-	COLS	-	PRIM		Primary columns	1.00	6	•	
S	-	COLS	-	SCND		Secondary columns	0.25	2	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
DECK	**-**	**Deck**								
S	-	DECK	-	FLOR		Floor deck	0.35	3	•	
S	-	DECK	-	OPEN		Openings and penetrations	0.18	1	•	
S	-	DECK	-	RBAR		Deck/slab reinforcing	1.40	7	•	
S	-	DECK	-	ROOF		Roof deck	0.35	3	•	
DETL	**-**	**Detail Information**								
S	-	DETL	-	GRPH		Graphics, gridlines, non-text items	V	V		
S	-	DETL	-	INPD		Inch-pound-specific dimensions and notes	0.25	2	•	
S	-	DETL	-	METR		Metric-specific dimensions and notes	0.25	2	•	
FEAT	**-**	**Features**								
S	-	FEAT	-	CMUW		CMU outline (no patterning)	0.25	2	•	
S	-	FEAT	-	CNTR		Feature centerlines	0.50	5	•	
S	-	FEAT	-	CONC		Concrete outline (no patterning)	1.00	6	•	
S	-	FEAT	-	GENL		General features (miscellaneous items)	1.00	6	•	
S	-	FEAT	-	WOOD		Wood outline (no patterning)	0.25	2	•	
FNDN	**-**	**Foundation**								
S	-	FNDN	-	CNTR		Beam centerlines	0.50	5	•	
S	-	FNDN	-	FTNG		Footings	0.35	4	•	
S	-	FNDN	-	GRBM		Grade beams	0.35	4	•	
S	-	FNDN	-	PEDS		Column pedestals	0.35	4	•	
S	-	FNDN	-	PILE		Piles (steel sheet, concrete, wood), piers, caisson piers, drilled piers	0.25	2	•	
S	-	FNDN	-	RBAR		Foundation reinforcing	1.40	7	•	
GRAT	**-**	**Grating GRDL**								
S	-	GRAT	-	ELEV		Elevated grating (catwalks)	0.35	3	•	
S	-	GRAT	-	FLOR		Floor grating	0.35	3	•	
S	-	GRAT	-	SUBS		Subsurface grating	0.35	3	•	
GRDL	**-**	**Grade Lines**								
S	-	GRDL	-	EXGL		Existing ground	0.35	3	•	
S	-	GRDL	-	FNGR		Finished grade	0.25	2	•	
S	-	GRDL	-	WATR		Water surface	0.35	3	•	
GRID	**-**	**Grid Lines**								
S	-	GRID				Grid lines	0.50	5	•	
S	-	GRID	-	DIMS		Grid line dimensions	0.18	1	•	
S	-	GRID	-	HORZ		Primary grid lines (horizontal)	0.50	5	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
S	- GRID	- IDEN				Column I.D. tags	0.18	1	•	
S	- GRID	- MSC1				Miscellaneous grid lines (Type 1)	0.35	8	•	
S	- GRID	- MSC2				Miscellaneous grid lines (Type 2)	0.35	8	•	
S	- GRID	- MSC3				Miscellaneous grid lines (Type 3)	0.35	8	•	
S	- GRID	- MSC4				Miscellaneous grid lines (Type 4)	0.35	8	•	
S	- GRID	- VERT				Primary grid lines (vertical)	0.50	5	•	
	JOIN	**- Joints**								
S	- JOIN	- CNST				Construction joints	0.35	3	•	
S	- JOIN	- CTRL				Control/expansion joints	0.18	1	•	
	JOIS	**- Open Web Joists**								
S	- JOIS	- BRDG				Bridging	0.18	1	•	
S	- JOIS	- PRIM				Primary joists	0.35	4	•	
S	- JOIS	- SECD				Secondary joists	1.00	6	•	
	METL	**- Miscellaneous Metal**								
S	- METL	- MISC				Miscellaneous metal	1.00	6	•	
	OPEN	**- Openings**								
S	- OPEN	- MISC				Openings and penetrations	0.18	1	•	
	PADS	**- Pads (Arm/Disarm, Calibrations, etc.)**								
S	- PADS	- EQPM				Equipment pads	1.00	6	•	
	PIPE	**- Piping**								
S	- PIPE	- GATE				Gates (flap gates, sluice gates, other)	0.35	3	•	
S	- PIPE	- MISC				Miscellaneous piping/culverts	0.25	2	•	
S	- PIPE	- TRSH				Trash racks	0.35	3	•	
	REIN	**- Reinforcing**								
S	- REIN	- RBAR				Rebar, welded wire mesh	1.40	7	•	
	SAFE	**- Safety Barriers**								
S	- SAFE	- FENC				Fencing	0.35	3	•	
S	- SAFE	- HRAL				Handrails	0.35	3	•	
	SECT	**- Sections**								
S	- SECT	- CMUW				CMU outline (no patterning)	0.25	2	•	
S	- SECT	- CNTR				Centerlines	0.50	5	•	
S	- SECT	- CONC				Concrete outline (no patterning)	1.00	6	•	
S	- SECT	- FNGR				Finished grade	0.25	2	•	
S	- SECT	- GENF				General features (miscellaneous items)	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
S	-	SECT	-	JOIN		Joint materials (e.g., felt), vapor barrier, other	0.18	1	•	
S	-	SECT	-	MISC		Miscellaneous fasteners, anchor bolts, supports	0.35	3	•	
S	-	SECT	-	PRIM		Primary beams/girders outlines	0.35	4	•	
S	-	SECT	-	RBAR		Rebar, welded wire mesh	1.40	7	•	
S	-	SECT	-	SHPS		Miscellaneous shapes, plates	0.35	3	•	
S	-	SECT	-	STLS		Wide flange shapes, plates, open web joists, decking	0.35	3	•	
S	-	SECT	-	WOOD		Wood outline (no patterning)	0.25	2	•	
		SLAB	-	**Slabs**						
S	-	SLAB	-	EDGE		Edge of slab	0.25	2	•	
S	-	SLAB	-	OPEN		Openings and penetrations	0.18	1	•	
S	-	SLAB	-	RBAR		Slab reinforcing	1.40	7	•	
		SPPT	-	**Miscellaneous Supports**						
S	-	SPPT	-	MISC		Miscellaneous fasteners, anchor bolts, supports	0.35	3	•	
S	-	SPPT	-	SHPS		Miscellaneous shapes, plates	0.35	3	•	
		STAT	-	**Demolition (used only in creating Existing Demolition model files)**						
S	-	STAT	-	DEMO		Demolition	1.00	6	•	
S	-	STAT	-	DEMO	- PHS1	Demolition - phase 1	0.50	203		
S	-	STAT	-	DEMO	- PHS2	Demolition - phase 2	0.50	83		
S	-	STAT	-	DEMO	- PHS3	Demolition - phase 3	0.50	163		
S	-	STAT	-	EXST		Existing to remain	0.25	91		
S	-	STAT	-	FUTR		Future work	0.25	2	•	
S	-	STAT	-	MOVE		Items to be moved	1.00	6	•	
S	-	STAT	-	NEWW		New work	0.35	4	•	
S	-	STAT	-	NICN		Not in contract	0.35	8	•	
S	-	STAT	-	PHS#		Phase numbers (#=1-9)	0.25	2	•	
S	-	STAT	-	RELO		Relocated items	0.50	5	•	
S	-	STAT	-	TEMP		Temporary work	0.35	4	•	
		STRS	-	**Stairs and Elevators**						
S	-	STRS	-	FRAM		Stair/elevator framing	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
S	-	STRS	-	LADD			Ladders, ladder handrails, safety guard, grab bars	0.35	3	•	
S	-	STRS	-	RBAR			Stair reinforcing	1.40	7	•	
		TRUS	-	**Trusses**							
S	-	TRUS	-	PRIM			Primary trusses	0.35	4	•	
S	-	TRUS	-	SECD			Secondary trusses	1.00	6	•	
		WALL	-	**Walls**							
S	-	WALL	-	CONC			Concrete walls	0.25	2	•	
S	-	WALL	-	HBAR			Horizontal/secondary reinforcement	0.35	4	•	
S	-	WALL	-	LOAD			Load bearing CMU walls	0.25	2	•	
S	-	WALL	-	NONL			Non-load bearing CMU walls	1.00	6	•	
S	-	WALL	-	OPEN			Openings and penetrations	0.18	1	•	
S	-	WALL	-	OTLN			Wall outline	0.25	2	•	
S	-	WALL	-	PCST			Precast walls	0.25	2	•	
S	-	WALL	-	RBAR			Wall reinforcing	1.40	7	•	
S	-	WALL	-	STUD			Stud walls	0.25	2	•	
S	-	WALL	-	VBAR			Vertical/primary reinforcement	0.35	4	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
		ALRM	-	**Fire Alarm / Detection Equipment**							
T	-	ALRM	-	IDEN			Identifier tags, symbol modifier, and text	0.18	1	•	
T	-	ALRM	-	SYST			Miscellaneous alarm system symbols	1.00	6	•	
		ANNO	-	**General Information**							
T	-	ANNO	-	DIMS			Witness/extension lines, dimension terminators, dimension text	V	V		
T	-	ANNO	-	KEYN			Reference keynotes with associated leaders	V	V		
T	-	ANNO	-	LEGN			Legend & Schedule	V	V		
T	-	ANNO	-	NOTE			General notes and general remarks	0.25	2	•	
T	-	ANNO	-	NPLT			Non-plotting graphic information	0.50	5	•	
T	-	ANNO	-	PATT			Miscellaneous patterning and hatching	0.35	8	•	
T	-	ANNO	-	REDL			Redlines	0.18	1	•	
T	-	ANNO	-	REFR			Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
T	-	ANNO	-	REVS			Revisions	0.35	4	•	
T	-	ANNO	-	SYMB			Miscellaneous symbols	1.00	6	•	
T	-	ANNO	-	TEXT			Miscellaneous text and callouts with associated leaders	V	V		
		CABL	-	**Cable System**							
T	-	CABL	-	COAX			Coax cable	0.50	83		
T	-	CABL	-	FIBR			Fiber optics cable	0.50	83		
T	-	CABL	-	IDEN			Cable identifiers	0.25	2	•	
T	-	CABL	-	MULT			Multi-conductor cable	0.50	83		
T	-	CABL	-	TRAY			Cable trays and wireways	0.50	203		
		CLOK	-	**Clock System**							
T	-	CLOK	-	IDEN			Identifier tags, symbol modifier, and text	0.18	1	•	
T	-	CLOK	-	SYST			Clock system symbols	1.00	6	•	
		COMM	-	**Communications**							
T	-	COMM	-	APSY			Audio paging system	0.35	V		
T	-	COMM	-	ATMS			Advanced traffic management system	0.35	V		
T	-	COMM	-	AVID			Automatic vehicle identification system	0.35	V		
T	-	COMM	-	BIDS			Baggage information display system	0.35	V		
T	-	COMM	-	FIDS			Flight information display system	0.35	V		
T	-	COMM	-	GISY			Gate information system	0.35	V		

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
T	-	COMM	-	JBOX				Junction boxes	0.50	83		
T	-	COMM	-	PMRC				Parking management and revenue control	0.35	V		
T	-	COMM	-	VPSY				Visual paging system	0.35	V		
		DIAG	-	**Diagram Information**								
T	-	DIAG	-	GRPH				Graphics, gridlines, non-text items	V	V		
T	-	DIAG	-	IDEN				Identifier tags, symbol modifier and text	0.25	2	•	
T	-	DIAG	-	INPD				Inch-pound-specific dimensions and notes	0.25	2	•	
T	-	DIAG	-	METR				Metric-specific dimensions and notes	0.25	2	•	
		DISC	-	**Other Discipline Information**								
T	-	DISC	-	INFO				Information and notes for other disciplines	V	V		
		EQPM	-	**Equipment**								
T	-	EQPM	-	COMB				Distribution equipment for both copper and fiber optics	0.35	4	•	
T	-	EQPM	-	COPP				Distribution equipment for copper	0.35	4	•	
T	-	EQPM	-	FIBR				Distribution equipment for fiber optic	0.35	4	•	
T	-	EQPM	-	OTHR				Other telecommunications equipment	0.35	4	•	
T	-	EQPM	-	RELA				Relays, resistors, capacitors, and inducers	0.35	4	•	
		FLOR	-	**Floor Information**								
T	-	FLOR	-	IDEN				Room name, space identification text (copied from Architectural - Floor Plan model file)	0.35	3	•	
T	-	FLOR	-	NUMB				Room/space identification number and symbol (copied from Architectural - Floor Plan model file)	0.35	3	•	
		JACK	-	**Jacks**								
T	-	JACK	-	COMB				Combination telephone and data/LAN jacks	0.50	203		
T	-	JACK	-	DATA				Data/LAN jacks	0.50	203		
T	-	JACK	-	IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
T	-	JACK	-	PHON				Telephone jacks	0.50	203		
		NURS	-	**Nurse Call / Paging System**								
T	-	NURS	-	IDEN				Identifier tags, symbol modifier, and text	0.18	1	•	
T	-	NURS	-	SYST				Nurse call system symbols	1.00	6	•	
		SOUN	-	**Sound Systems**								
T	-	SOUN	-	IDEN				Identifier tags, symbol modifier, and text	0.18	1	•	
T	-	SOUN	-	SYST				Sound system symbols	1.00	6	•	

Full Layer Name					Description	Line Width (mm)	Color	Modified	Notes
STAT - **Demolition (used only in creating Existing Demolition model files)**									
T	- STAT	- DEMO	- PHS1		Demolition - phase 1	0.50	203		
T	- STAT	- DEMO	- PHS2		Demolition - phase 2	0.50	83		
T	- STAT	- DEMO	- PHS3		Demolition -phase 3	0.50	163		

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
	AERI	**-**	**Aerial Survey**							
V	-	AERI	-	BNDY		Aerial photography boundaries	1.00	6	•	
V	-	AERI	-	INDX		Aerial photo index	1.40	7	•	
V	-	AERI	-	PATH		Aerial flight lines/paths	0.35	22		
	AIRF	**-**	**Airfield**							
V	-	AIRF	-	DEVC		Capacitors, voltage regulators, motors, buses, generators, meters, grounds, and markers	1.00	6	•	
V	-	AIRF	-	DUCT		Ductbanks	0.35	3	•	
V	-	AIRF	-	JBOX		Junction boxes, pull boxes, manholes, handholes, pedestals, splices	0.18	1	•	
	ALGN	**-**	**Alignments**							
V	-	ALGN	-	DATA		Alignment coordinates and curve data	0.35	3	•	
V	-	ALGN	-	LINE		Alignments	0.25	2	•	
V	-	ALGN	-	MARK		Alignment tick marks	0.35	3	•	
V	-	ALGN	-	STAT		Alignment stationing and tick marks	0.35	3	•	
	ANNO	**-**	**General Information**							
V	-	ANNO	-	DIMS		Witness/extension lines, dimension terminators, dimension text	V	V		
V	-	ANNO	-	KEYN		Reference keynotes with associated leaders	V	V		
V	-	ANNO	-	LEGN		Legend & Schedule	V	V		
V	-	ANNO	-	NOTE		General notes and general remarks	0.25	2	•	
V	-	ANNO	-	NPLT		Non-plotting graphic information	0.50	5	•	
V	-	ANNO	-	PATT		Miscellaneous patterning and hatching	0.35	8	•	
V	-	ANNO	-	REDL		Redlines	0.18	1	•	
V	-	ANNO	-	REFR		Reference files (AutoCAD users only, see Chapter 4)	NA	NA		
V	-	ANNO	-	REVS		Revisions	0.35	4	•	
V	-	ANNO	-	SYMB		Miscellaneous symbols	1.00	6	•	
V	-	ANNO	-	TEXT		Miscellaneous text and callouts with associated leaders	V	V		
	BCNS	**-**	**Beacons**							
V	-	BCNS	-	IDEN		Identifier tags, symbol modifier, and text	1.00	6	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
V	-	BCNS	-	MISC				Miscellaneous navaids - windcones and beacons	1.00	6	•	
V	-	BCNS	-	STRB				Strobe beacons	1.00	6	•	
		BLDG	**-**	**Buildings**								
V	-	BLDG	-	IDEN				Building and other stucture annotation	0.25	2	•	
V	-	BLDG	-	OTLN				Buildings and other structures	1.40	7	•	
		CATH	**-**	**Cathodic Protection System**								
V	-	CATH	-	ANOD				Sacrificial anode system	0.25	161		
V	-	CATH	-	CURR				Impress current system	0.25	161		
V	-	CATH	-	IDEN				Identifier tags, symbol modifier, and text	0.25	161		
V	-	CATH	-	TEST				Test stations	0.25	161		
		CHAN	**-**	**Channels (waterway)**								
V	-	CHAN	-	AIDS				Navigation aids and text	0.25	2	•	
V	-	CHAN	-	CNTR				Channel centerline and survey report lines	0.50	5	•	
V	-	CHAN	-	CNTR	-	IDEN		Channel centerline and survey report lines - annotation	0.50	5	•	
V	-	CHAN	-	DACL				De-authorized channel limits, anchorages, etc.	0.35	3	•	
V	-	CHAN	-	DACL	-	IDEN		De-authorized channel limits, anchorages, etc. - annotation	0.35	3	•	
V	-	CHAN	-	IDEN				Channel limits, anchorages, turning basins, disposal areas, etc. - annotation	1.00	6	•	
V	-	CHAN	-	LIMT				Channel limits, anchorages, turning basins, disposal areas, etc.	1.00	6	•	
		CIRC	**-**	**Circuits**								
V	-	CIRC	-	CTRL				Control and monitoring circuits	0.35	12		
V	-	CIRC	-	IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	CIRC	-	MULT				Multiple circuits	0.35	22		
V	-	CIRC	-	SERS				Series circuits	0.35	82		
		COMM	**-**	**Communications**								
V	-	COMM	-	EQPM				Other communications distribution equipment	0.25	21		
V	-	COMM	-	JBOX				Communication junction boxes, pull boxes, manholes, handholes, pedestals, splices	0.25	21		
V	-	COMM	-	OVHD				Overhead communications/telephone lines	0.25	81		

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Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	-	COMM	-	OVHD	IDEN		Identifier tags, symbol modifier and text	0.25	81		
V	-	COMM	-	UNDR			Underground communications/telephone lines	0.25	81		
V	-	COMM	-	UNDR	- IDEN		Identifier tags, symbol modifier and text	0.25	81		
V	-	COMM	-	VALT			Communications vault	0.25	21		
		DOMW	-	**Domestic Water**							
V	-	DOMW	-	ABND			Abandoned piping	1.00	6	•	
V	-	DOMW		DEVC			Connectors, faucets, reducers, regulators, vents, intake points, tanks, taps, backflow preventers, and valves	1.00	6	•	
V	-	DOMW	-	FIRE			Fire lines	0.18	1	•	
V	-	DOMW	-	FTTG			Caps, cleanouts, crosses, and tees	1.00	6	•	
V	-	DOMW	-	HYDR			Hydrants	0.18	1	•	
V	-	DOMW	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	DOMW	-	MAIN			Main domestic water piping	1.00	6	•	
V	-	DOMW	-	METR			Meters	0.35	3	•	
V	-	DOMW	-	NHYD			Non-potable hydrants/flushing hydrants	0.18	1	•	
V	-	DOMW	-	NPOT			Non-potable water piping	1.00	6	•	
V	-	DOMW	-	PITS	- IDEN		Identifier tags, symbol modifier, and text	0.18	1	•	
V	-	DOMW	-	PUMP			Booster pump stations	1.00	6	•	
V	-	DOMW	-	REDC			Pressure reducing stations	1.00	6	•	
V	-	DOMW	-	RSVR			Reservoirs	0.18	1	•	
V	-	DOMW	-	RSVR	- IDEN		Identifier tags, symbol modifier, and text	0.18	1	•	
V	-	DOMW	-	SERV			Domestic water service piping	1.00	6	•	
V	-	DOMW	-	SIGN			Surface markers/signs	0.18	1	•	
V	-	DOMW	-	STNS	- IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	DOMW	-	TANK			Water storage tanks	0.18	1	•	
V	-	DOMW	-	VENT			Vent pits	0.35	3	•	
V	-	DOMW	-	VLVE			Valve pits/vaults	0.35	3	•	
V	-	DOMW	-	WELL			Water well houses	0.18	1	•	
		DUCT	-	**Underground Duct Bank (to be used when multiple systems are in one ductbank system)**							
V	-	DUCT	-	MULT			Ductbank	0.25	201		
V	-	DUCT	-	MULT	- IDEN		Identifier tags, symbol modifier and text	0.25	201		
		ELEC	-	**Electrical Support Equipment**							

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	-	ELEC	-	DEVC		Capacitors, voltage regulators, motors, buses, generators, meters, grounds, and markers	0.25	21		
V	-	ELEC	-	JBOX		Junction boxes, pull boxes, manholes, handholes, pedestals, splices	0.25	21		
V	-	ELEC	-	SUBS		Other substation equipment	0.25	21		
V	-	ELEC	-	SWCH		Fuse cutouts, pole mounted switches, circuit breakers, gang operated disconnects, reclosers, cubicle switches	0.25	21		
V	-	ELEC	-	VALT		Vaults	0.25	21		
		FUEL	-	**Liquid Fuel**						
V	-	FUEL	-	ABND		Abandoned piping	1.00	6	•	
V	-	FUEL	-	DEFL		Defueling piping	1.00	6	•	
V	-	FUEL	-	DEVC		Air eliminators, filter strainers, hydrant fill points, line vents, markers, oil/water separators, reducers, regulators, and valves	1.00	6	•	
V	-	FUEL	-	FLOW		Flow direction arrows	1.00	6	•	
V	-	FUEL	-	FTTG		Caps, crosses, and tees	1.00	6	•	
V	-	FUEL	-	HYDR		Hydrant control pits	0.35	3	•	
V	-	FUEL	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	FUEL	-	JBOX		Junction boxes, manholes, handholes, test boxes	0.18	1	•	
V	-	FUEL	-	MAIN		Main fuel piping	1.00	6	•	
V	-	FUEL	-	METR		Meters	0.35	3	•	
V	-	FUEL	-	PITS	- IDEN	Identifier tags, symbol modifier, and text	0.18	1	•	
V	-	FUEL	-	PUMP		Booster pump stations	1.00	6	•	
V	-	FUEL	-	SERV		Service piping	1.00	6	•	
V	-	FUEL	-	STNS		Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	FUEL	-	TANK		Fuel tanks	0.35	3	•	
V	-	FUEL	-	TRCH		Fuel line trench	0.35	3	•	
V	-	FUEL	-	VENT		Vent pits	0.35	3	•	
V	-	FUEL	-	VLVE		Valve pits	0.35	3	•	
		GRAD	-	**Grade Linework**						
V	-	GRAD	-	EXST		Existing grade, ground line	1.00	6	•	
V	-	GRAD	-	FNSH		Finished grade	0.35	4	•	

		Full Layer Name					Description	Line Width (mm)	Color	Modified	Notes
		GRID	-	**Grid Lines**							
V	-	GRID	-	FRAM			Frame	0.35	4	•	
V	-	GRID	-	MAJR			Major grid lines	0.18	1	•	
V	-	GRID	-	MINR			Minor grid lines	0.35	8	•	
V	-	GRID	-	TEXT			Border text, annotation	0.25	2	•	
		GTHP	-	**Geothermal Heat Pump System**							
V	-	GTHP	-	EQPM			Equipment	1.00	6	•	
V	-	GTHP	-	PIPE			Piping (includes fittings, valves)	1.00	6	•	
		HTCW	-	**HTCW Utilities**							
V	-	HTCW	-	ABND			Abandoned piping	1.00	6	•	
V	-	HTCW	-	CHLL			Main chilled water piping	1.00	6	•	
V	-	HTCW	-	CHLP			Chilled water plant	1.00	6	•	
V	-	HTCW	-	CHLS			Chilled water service piping	0.35	3	•	
V	-	HTCW	-	DEVC			Rigid anchors, anchor guides, rectifiers, reducers, markers, meters, pumps, regulators, tanks, and valves	1.00	6	•	
V	-	HTCW	-	FLOW			Flow direction arrows	0.35	3	•	
V	-	HTCW	-	FTTG			Caps and flanges	1.00	6	•	
V	-	HTCW	-	HTPL			Main high temperature piping	0.18	1	•	
V	-	HTCW	-	HTPP			High temperature water plant	1.00	6	•	
V	-	HTCW	-	HTPS			High temperature service piping	0.35	3	•	
V	-	HTCW	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	HTCW	-	JBOX			Junction boxes, manholes, handholes, test boxes	0.18	1	•	
V	-	HTCW	-	LTPL			Main low temperature piping	0.25	2	•	
V	-	HTCW	-	LTPS			Low temperature service piping	0.35	3	•	
V	-	HTCW	-	PITS			Valve pits/vaults, steam pits	0.35	3	•	
V	-	HTCW	-	PLNT	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	HTCW	-	PUMP			Pump stations	1.00	6	•	
V	-	HTCW	-	RTRN			Return for all HTCW lines	0.50	5	•	
V	-	HTCW	-	STML			Main steam piping	0.18	1	•	
V	-	HTCW	-	STMS			Steam service piping	0.35	3	•	
V	-	HTCW	-	STNS	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
		INDW	-	**Industrial Waste Water**							
V	-	INDW	-	ABND			Abandoned piping	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	-	INDW	-	DEVC		Grit chambers, meters, flumes, neutralizers, oil/water separators, ejectors, tanks, and valves	1.00	6	•	
V	-	INDW	-	FLOW		Flow direction arrows	1.00	6	•	
V	-	INDW	-	FTTG		Caps and cleanouts	1.00	6	•	
V	-	INDW	-	IDEN		Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	INDW	-	JBOX		Junction boxes and manholes	0.18	1	•	
V	-	INDW	-	LAGN		Lagoons	1.00	6	•	
V	-	INDW	-	LIFT		Lift stations	1.00	6	•	
V	-	INDW	-	MAIN		Main industrial waste water piping	1.00	6	•	
V	-	INDW	-	PLNT		Treatment plants	1.00	6	•	
V	-	INDW	-	RSVR	- IDEN	Identifier tags, symbol modifier, and text	1.00	6	•	
V	-	INDW	-	SERV		Industrial waste water service piping	0.18	1	•	
V	-	INDW	-	SIGN		Surface markers/signs	0.18	1	•	
V	-	INDW	-	STNS	- IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
		LITE	-	**Lights**						
V	-	LITE	-	APPR		Approach lights	1.00	6	•	
V	-	LITE	-	DIST		Distance and arresting gear markers	1.00	6	•	
V	-	LITE	-	FIXT		Exterior Lights	0.25	121		
V	-	LITE	-	FIXT	- IDEN	Identifier tags, symbol modifier, and text	0.25	121		
V	-	LITE	-	LANE		Hoverlane, taxilane, and helipad lights	1.00	6	•	
V	-	LITE	-	OBST		Obstruction lights	0.25	2	•	
V	-	LITE	-	RUNW		Runway lights	1.00	6	•	
V	-	LITE	-	RUNW	- CNTL	Runway Centerline lights	1.00	6	•	
V	-	LITE	-	RUNW	- TDZN	Runway Touchdown Zone lights	1.00	6	•	
V	-	LITE	-	SIGN		Taxiway guidance signs	1.00	6	•	
V	-	LITE	-	TAXI		Taxiway lights	1.00	6	•	
V	-	LITE	-	THRS		Threshold lights	1.00	6	•	
		NGAS	-	**Natural Gas**						
V	-	NGAS	-	ABND		Abandoned piping	1.00	6	•	
V	-	NGAS	-	DEVC		Hydrant fill points, lights, vents, markers, rectifiers, reducers, regulators, sources, tanks, drip pots, taps, and valves	1.00	6	•	
V	-	NGAS	-	DEVC	- IDEN	Identifier tags, symbol modifier, and text	1.00	6	•	
V	-	NGAS	-	FLOW		Flow direction arrows	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	- NGAS	- FTTG				Caps, crosses, and tees	1.00	6	•	
V	- NGAS	- IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
V	- NGAS	- MAIN				Main natural gas piping	1.00	6	•	
V	- NGAS	- METR				Meters	0.35	3	•	
V	- NGAS	- PITS	- IDEN			Identifier tags, symbol modifier, and text	0.18	1	•	
V	- NGAS	- PUMP				Compressor stations	1.00	6	•	
V	- NGAS	- REDC				Reducing stations	1.00	6	•	
V	- NGAS	- SERV				Service piping	0.18	1	•	
V	- NGAS	- SIGN				Surface markers/signs	0.18	1	•	
V	- NGAS	- STNS	- IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
V	- NGAS	- VENT				Vent pits	0.35	3	•	
V	- NGAS	- VLVE				Valve pits/boxes	0.35	3	•	
	POLE	**- Utility Poles**								
V	- POLE	- GUYS				Guying equipment	0.35	3	•	
V	- POLE	- GUYS	- IDEN			Guying equipment identifier tags, symbol modifiers, and text	0.35	3	•	
V	- POLE	- IDEN				Utility pole identifier tags, symbol modifier, and text	0.35	3	•	
V	- POLE	- UTIL				Utility poles	0.35	3	•	
	PRIM	**- Primary Electrical Cables**								
V	- PRIM	- OVHD				Overhead electrical utility lines	0.18	1	•	
V	- PRIM	- OVHD	- IDEN			Identifier tags, symbol modifier, and text	0.18	1	•	
V	- PRIM	- UNDR				Underground electrical utility lines	0.18	1	•	
V	- PRIM	- UNDR	- IDEN			Identifier tags, symbol modifier, and text	0.18	1	•	
	PROF	**- Profile**								
V	- PROF	- CUID				Existing grade and grading cuts - annotation	0.18	1	•	
V	- PROF	- FILL				New work, grading fills	0.35	3	•	
V	- PROF	- INLT				Curb and surface inlets, catch basins	0.35	3	•	
V	- PROF	- MHOL				Manholes	0.18	1	•	
V	- PROF	- PIPE				Piping	1.00	6	•	
V	- PROF	- ROAD				Roads	0.25	2	•	
	PROP	**- Property**								
V	- PROP	- BRNG				Bearings and distance labels	1.00	6	•	
V	- PROP	- CNTY				County Boundary	1.00	6	•	
V	- PROP	- ESMT				Government easements/property lines	0.35	4	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	-	PROP	-	IDEN			Property annotation	1.00	6	•	
V	-	PROP	-	LEAS			Lease line (surveyed)	1.00	6	•	
V	-	PROP	-	LINE			Property lines (Existing recorded plats)	0.25	2	•	
V	-	PROP	-	LUSE			Land Use Area	1.00	6	•	
V	-	PROP	-	MUNI			Municipal Boundary	1.00	6	•	
V	-	PROP	-	QTRS			Quarter lines	1.00	6	•	
V	-	PROP	-	RWAY			Right of ways	1.40	7	•	
V	-	PROP	-	SECT			Section lines	1.00	6	•	
V	-	PROP	-	STAT			State Boundary	1.00	6	•	
V	-	PROP	-	SXTS			Sixteenth lines (40 lines)	1.00	6	•	
V	-	PROP	-	ZONG			Zoning Areas	1.00	6	•	
		PVMT	-	**Pavements/Transportation**							
V	-	PVMT	-	IDEN			Road, parking lot, railroad, airfield pavement annotation	0.25	2	•	
V	-	PVMT	-	MRKG			Pavement markings	0.25	2	•	
V	-	PVMT	-	PATT			Joint patterns, text and dimensions	0.25	2	•	
V	-	PVMT	-	ROAD			Roads, parking lots, railroads, airfield pavements	0.25	2	•	
		SECD	-	**Secondary Electrical Cables**							
V	-	SECD	-	OVHD			Overhead electrical utility lines	0.25	61		
V	-	SECD	-	OVHD		IDEN	Identifier tags, symbol modifier, and text	0.25	61		
V	-	SECD	-	UNDR			Underground electrical utility lines	0.25	61		
V	-	SECD	-	UNDR	-	IDEN	Identifier tags, symbol modifier, and text	0.25	61		
		SECT	-	**Sections**							
V	-	SECT	-	IDEN			Component identification numbers	0.25	2	•	
V	-	SECT	-	MBND			Material beyond section cut	0.50	5	•	
V	-	SECT	-	MCUT			Material cut by section	0.35	4	•	
V	-	SECT	-	PATT			Textures and hatch patterns	0.35	8	•	
		SITE	-	**Site**							
V	-	SITE	-	EROS			Riprap, revetments/stone protection, breakwaters, dikes, jetties, and drains	0.18	1	•	
V	-	SITE	-	EWAT			Water features	0.35	162		
V	-	SITE	-	FENC			Fences and handrails	1.00	6	•	
V	-	SITE	-	FENC	-	IDEN	Fence, handrail, ramp, and trail annotation	1.00	6	•	
V	-	SITE	-	IDEN			Existing site feature/structure annotation	1.00	6	•	

Full Layer Name							Description	Line Width (mm)	Color	Modified	Notes
V	-	SITE	-	OTLN				Existing site features (play structures, bike racks, benches, recreational equipment)	0.35	4	•	
V	-	SITE	-	STRC				Structures (bridges, sheds, foundation pads, footings, etc.)	0.35	22		
V	-	SITE	-	STRS				Stairs and ramps	1.00	6	•	
V	-	SITE	-	VEGE				Existing treelines and vegetation	0.35	82		
V	-	SITE	-	WALK				Walks, trails, and bicycle paths	0.25	2	•	
V	-	SITE	-	WATR				Water features	0.35	162		
		SPCL	-	**Special Systems**								
V	-	SPCL	-	IDEN				Special systems (UMCS, EMCS, CATV, etc.) identifier tags, symbol modifier, and text	0.25	151		
V	-	SPCL	-	SYST				Special systems (UMCS, EMCS, CATV, etc.)	0.25	151		
V	-	SPCL	-	TRAF				Traffic signal system	0.25	151		
V	-	SPCL	-	TRAF	-	IDEN		Traffic signal identifier tags, symbol modifier, and text	0.25	151		
		SSWR	-	**Sanitary Sewer**								
V	-	SSWR	-	ABND				Abandoned piping	1.00	6	•	
V	-	SSWR	-	DEVC				Grease traps, grit chambers, flumes, neutralizers, oil/water separators, ejectors, and valves	1.00	6	•	
V	-	SSWR	-	DEVC	-	IDEN		Identifier tags, symbol modifier, and text	1.00	6	•	
V	-	SSWR	-	FILT				Filtration beds	0.35	3	•	
V	-	SSWR	-	FILT	-	IDEN		Identifier tags, symbol modifier, and text	0.35	3	•	
V	-	SSWR	-	FLOW				Flow direction arrows	1.00	6	•	
V	-	SSWR	-	FTTG				Caps and cleanouts	1.00	6	•	
V	-	SSWR	-	IDEN				Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	SSWR	-	JBOX				Junction boxes and manholes	0.18	1	•	
V	-	SSWR	-	JBOX	-	IDEN		Identifier tags, symbol modifier, and text	0.18	1	•	
V	-	SSWR	-	LAGN				Lagoons	0.35	3	•	
V	-	SSWR	-	LEAC				Leach field	0.35	3	•	
V	-	SSWR	-	MAIN				Sanitary sewer piping	1.00	6	•	
V	-	SSWR	-	NITF				Nitrification drain fields	0.35	3	•	
V	-	SSWR	-	PLNT				Treatment plants	1.00	6	•	
V	-	SSWR	-	PUMP				Booster pump stations	1.00	6	•	
V	-	SSWR	-	RSVR	-	IDEN		Identifier tags, symbol modifier, and text	0.35	3	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	-	SSWR	-	SERV			Sanitary sewer service piping	0.18	1	•	
V	-	SSWR	-	SIGN			Surface markers/signs	0.18	1	•	
V	-	SSWR	-	STNS	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	SSWR	-	TANK			Septic tanks	0.35	3	•	
		STAT	-	**Demolition (used only in creating Existing Demolition model files)**							
V	-	STAT	-	DEMO			Demolition (Note: comprehensive demolition is handled in Model File Type: Demolition Plan)	1.00	6	•	
V	-	STAT	-	EXST			Existing to remain	0.35	3	•	
V	-	STAT	-	FUTR			Future work	0.25	2	•	
V	-	STAT	-	MOVE			Items to be moved	1.00	6	•	
V	-	STAT	-	NEWW			New work	0.35	4	•	
V	-	STAT	-	NICN			Not in contract	0.35	8	•	
V	-	STAT	-	PHS#			Phase numbers (#=1-9)	0.25	2	•	
V	-	STAT	-	RELO			Relocated items	0.50	5	•	
V	-	STAT	-	TEMP			Temporary work	0.35	4	•	
		STRC	-	**Structures**							
V	-	STRC	-	IDEN			Bridges, piers, breakwaters, docks, floats, etc. - annotation	0.25	2	•	
V	-	STRC	-	OTLN			Bridges, piers, breakwaters, docks, floats, etc. - outlines	0.35	4	•	
V	-	STRC	-	TOWR			Tower	0.35	4	•	
		STRM	-	**Storm Sewer**							
V	-	STRM	-	ABND			Abandoned piping	1.00	6	•	
V	-	STRM	-	AFFF			AFFF lagoon/detention pond	0.35	3	•	
V	-	STRM	-	CHUT			Chutes and concrete erosion control structures	0.18	1	•	
V	-	STRM	-	CULV			Culverts	0.35	3	•	
V	-	STRM	-	DEVC			Downspouts, flumes, oil/water separators, and flap gates	1.00	6	•	
V	-	STRM	-	DRAN	-	IDEN	Identifier tags, symbol modifier, and text	0.35	3	•	
V	-	STRM	-	EROS			Erosion control (riprap)	0.50	5	•	
V	-	STRM	-	FLOW			Flow direction arrows	1.00	6	•	
V	-	STRM	-	FMON			Flow monitoring station	1.00	6	•	
V	-	STRM	-	FTTG			Caps and cleanouts	1.00	6	•	

Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	-	STRM	-	HDWL			Headwalls and endwalls	1.40	7	•	
V	-	STRM	-	IDEN			Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	STRM	-	INLT			Inlets (curb, surface, and catch basins)	0.35	3	•	
V	-	STRM	-	LAGN			Lagoons, ponds, watersheds, and basins	0.35	3	•	
V	-	STRM	-	MAIN			Storm sewer piping	1.00	6	•	
V	-	STRM	-	MHOL			Manholes	0.18	1	•	
V	-	STRM	-	PUMP			Pump stations	1.00	6	•	
V	-	STRM	-	ROOF			Roof drain line	0.35	3	•	
V	-	STRM	-	RSVR	-	IDEN	Identifier tags, symbol modifier, and text	0.35	3	•	
V	-	STRM	-	SERV			Storm sewer service piping	0.18	1	•	
V	-	STRM	-	SIGN			Surface markers/signs	0.18	1	•	
V	-	STRM	-	STNS	-	IDEN	Identifier tags, symbol modifier, and text	0.25	2	•	
V	-	STRM	-	SUBS			Subsurface drain piping	0.35	3	•	
		SURV	**-**	**Survey Lines**							
V	-	SURV	-	DATA			Survey data (benchmarks and horizontal control points or monuments)	1.00	6	•	
V	-	SURV	-	IDEN			Survey, baseline, and control line annotation	1.00	6	•	
V	-	SURV	-	LINE			Survey, baseline, and control line	0.35	4	•	
		TOPO	**-**	**Topography**							
V	-	TOPO	-	BKLN			Breaklines	1.40	7	•	
V	-	TOPO	-	BORE			Boring locations	1.00	6	•	
V	-	TOPO	-	COOR			Coordinate grid ticks and text	0.35	122		
V	-	TOPO	-	DTCH			Ditches and swales	0.35	3	•	
V	-	TOPO	-	DTMP			DTM points	1.00	6	•	
V	-	TOPO	-	DTMT			DTM triangles	0.35	22		
V	-	TOPO	-	MAJR			Major contours	0.25	2	•	
V	-	TOPO	-	MAJR	-	IDEN	Major contours - annotation	0.25	2	•	
V	-	TOPO	-	MINR			Minor contours	0.35	3	•	
V	-	TOPO	-	MINR	-	IDEN	Minor contours - annotation	0.35	3	•	
V	-	TOPO	-	SHOR			Shorelines, land features, and references	0.35	4	•	
V	-	TOPO	-	SLOP	-	TOPT	Top/toe slopes	1.00	6	•	
V	-	TOPO	-	SOUN			Soundings	0.18	V		
V	-	TOPO	-	SPEC			Species Site	0.25	2	•	
V	-	TOPO	-	SPOT			Spot elevations	0.25	2	•	

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Full Layer Name						Description	Line Width (mm)	Color	Modified	Notes
V	-	TOPO	-	WETL			Wetland	0.25	2	•	
		TRAN	-	**Transformers**							
V	-	TRAN	-	PADM			Pad mounted transformers	0.25	21		
V	-	TRAN	-	PADM	-	IDEN	Identifier tags, symbol modifier, and text	0.25	21		
V	-	TRAN	-	POLE			Pole mounted transformers	0.25	21		
V	-	TRAN	-	POLE	-	IDEN	Identifier tags, symbol modifier, and text	0.25	21		
		UTIL	-	**Utilities**							
V	-	UTIL	-	ELEC			Power lines, lights, telephone poles, communication lines	0.35	4	•	
V	-	UTIL	-	ELEC	-	IDEN	Power/communication annotation	0.25	2	•	
V	-	UTIL	-	IDEN			Utility annotation	0.25	2	•	
V	-	UTIL	-	LINE			Utilities	0.35	4	•	
V	-	UTIL	-	NGAS			Gas lines, features, and valves	0.35	4	•	
V	-	UTIL	-	NGAS	-	IDEN	Gas annotation	0.25	2	•	
V	-	UTIL	-	SSWR			Sanitary lines and manholes	0.35	4	•	
V	-	UTIL	-	SSWR	-	IDEN	Sanitary annotation	0.25	2	•	
V	-	UTIL	-	STEM			Steam lines and annotation	0.25	2	•	
V	-	UTIL	-	STRM			Storm sewer lines, culverts, manholes, and headwalls	0.35	4	•	
V	-	UTIL	-	STRM	-	IDEN	Storm sewer annotation	0.25	2	•	
V	-	UTIL	-	WATR			Water lines, hydrants, tanks	0.35	4	•	
V	-	UTIL	-	WATR	-	IDEN	Water annotation	0.25	2	•	

revision letter A

LAWA
Measurement Standard
As-Built Terminals

Prepared by Kelar Corporation
Los Angeles, California
December, 2005

INTRODUCTION

    This Standard provides consistent tools toward accurate field measurements for the creation of new As-Built Drawings that will, in-turn, be used to create up-to-date verifiably accurate Master Lease Exhibits (MLE), of various terminals. Using these Standards, one would expect to be able to duplicate a measurement at random, and get a result reasonably similar to the original measurement.

    The new As-Built Drawings are to adhere to the latest LAWA CAD Standards published on the LAWA web site:

    http://www.lawa.org/lawa_sd.cfm

    All measuring and the resulting drawings are to follow the Standard parameters as set forth in this document. Field measurements and factual observations duly documented shall take precedence over existing As-Built Drawings or any other existing construction documents.

    Methods described in this Standard are the result of several years' field experience measuring and drawing several airport terminal structures over 100,000 square feet per floor, and several stories in height. The intention is to provide proven methods to avoid common errors, remove the necessity to repeat the entire learning curve, providing the new or novice measuring team with some basic rules helpful to this end. The experienced measuring team will recognize many shared methods, and may appreciate this measuring standard as a useful tool.

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LAWA-AIMS-LUSAD-2410	A									**5/19/2006**

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MEASURING STANDARDS

FIELD MEASUREMENT SHEETS:

☐ **Small Scale Sector Map: showing all Sectors per Level in one Terminal**
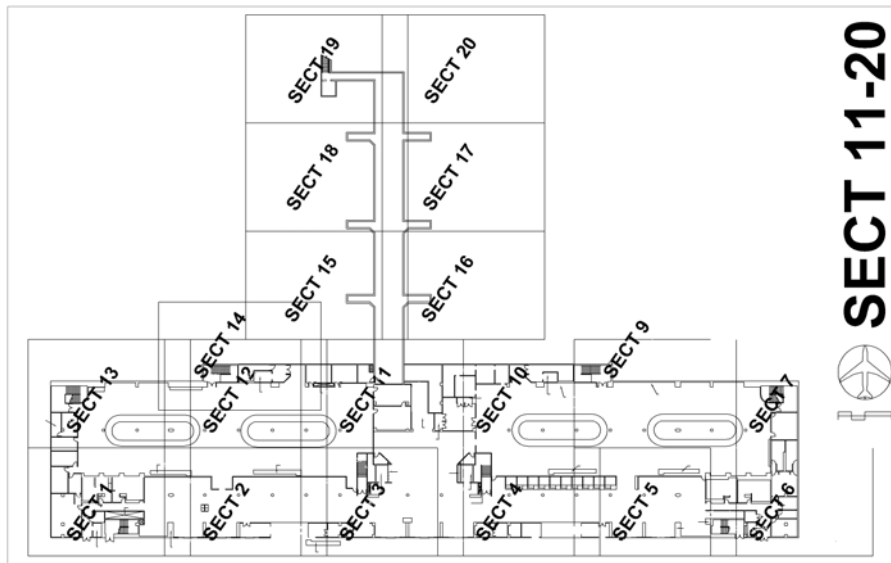
Figure 1:   Sector Map Showing Total Floor Plan

☐ LARGE SCALE SECTOR DRAWING: **Individual Sectors for measuring**
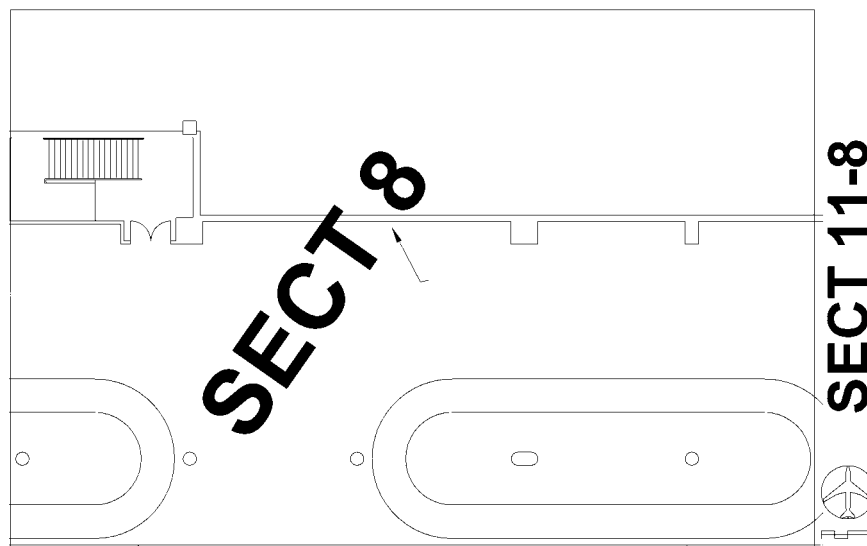
Figure 2:   Single Sector Showing Partial Floor Plan

Drawing Setup in AutoCAD:

☐ Units: Engineering

☐ Precision: 1/256"

☐ Line Type Scale: 0.5 or 0.3 when necessary for short lines

☐ PSLTSCALE: 1.0

☐ Plotted Scale:

- 11" x 17" Sector Sheets for Field Measuring: 1/8" = 1' – 0"

- 11" x 17" As-Built Drawing Sheets: 1" = 40'

☐ Rounding Off:

- CAD Dimension Round-Off: 1/16"

- Field Measurements to be to nearest 1/16"

- CAD Drawings to be to nearest recorded Field Measurement. Do not round-off recorded Field Measurements when drawing the data. Dimensions will round off to the nearest 1/16", but the drawing object data will be drawn as measured.

☐ Snap Setting: Setting is ON, and 1/16" to ensure drawing accuracy.

☐ Sheet Size: 11" x 17"

☐ Drawing CAD Object Properties

- Grid Lines: Refer to Grid Lines Section of this Standard

- Layers

- Line Types

- Text Styles

- Dimension Styles

- Blocks or Symbols

- Refer to the LAWA CAD Standards for additional properties

MASTER LEASE EXHIBIT (MLE) DRAWING:

The typical MLE drawing shown below in Figure 3, is a reference only to show the intended future use of this measuring work. This example shows a complete drawing using the new As-Built drawing as a base for the MLE in the next phase applying lease information and other details.

The drawings created from the field measurements will provide the basic information/raw cad data for the MLE drawings. For this reason the new As-Built drawings must conform to the LAWA CAD Standards.
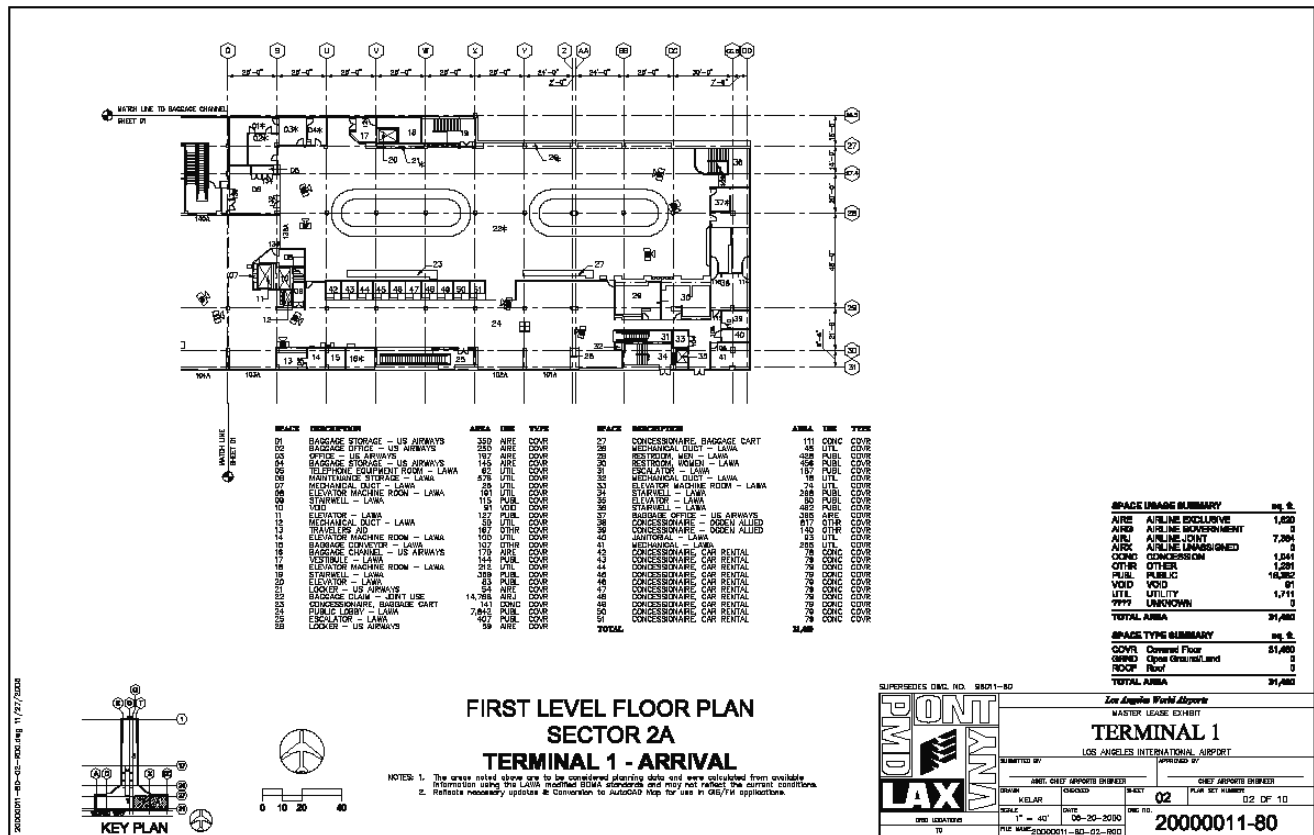
Figure 3:   Typical MLE (Master Lease Exhibit) drawing

Photographs

☐ **For reference:**

Field observations of unusual conditions may require photographs for greater understanding during the conversion of field data to drawing data.

☐ **Before Measuring:**

The Measuring Team should walk the site and photograph as much in general as possible to provide a thorough over-all description of the terminal.

☐ **Additional photographs:**

Photographs are to be taken in areas where the method of measuring needs to be explained clearly to a draftsperson.
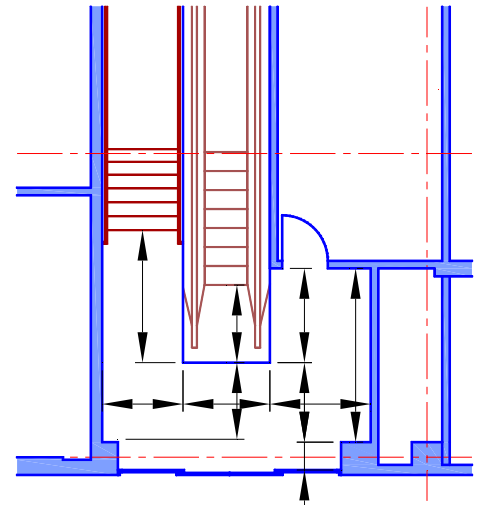
Figure 4: Complex stair and escalator relationship

This example illustrates the need for precise measurements of the curbs and grates in the floor, and surrounding the stair and escalator. In order to locate them relative to each other, to total structure, and to the floors above and below, the metal grates in the floor and the curbs must be measured.

Also, sometimes these measurements will be necessary to adequately measure the location of boundary walls, not otherwise measurable.

Photographic Record:

   Maintain a stored record of all photographs taken. This may include maps of where the photographs were taken. An example is shown below.

Figure 5:   Arrival Public Lobby – Overhead FIDS
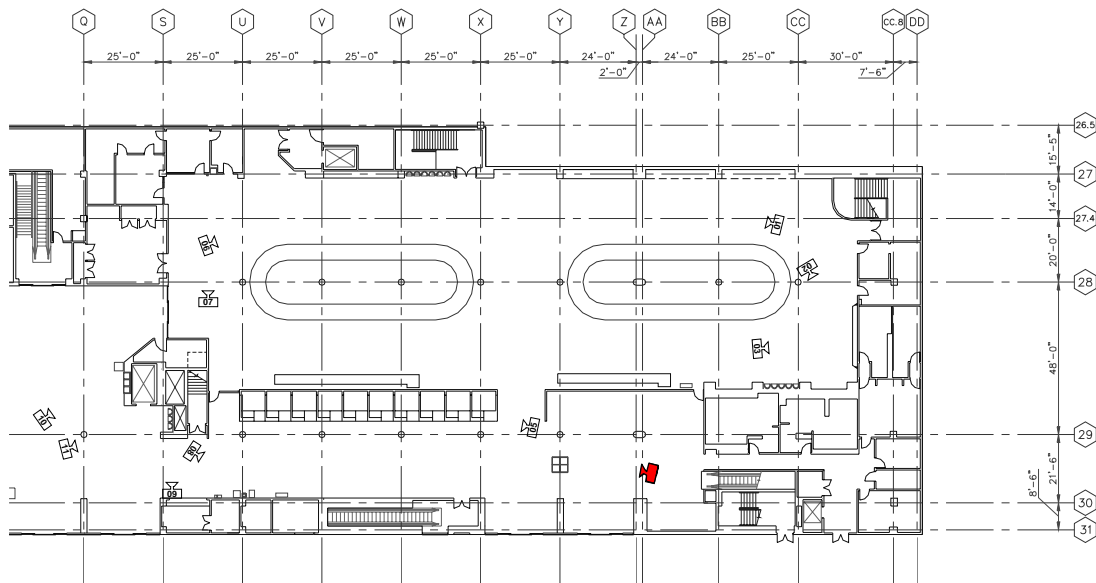
Equipment – Measuring Devices

□ **Acceptable**

- Manual: Recommend 100' and 30' metal tapes.
- Digital: Leika Disto Classic or equal.
- Accuracy: Minimum Device accuracy to be 1/16".

□ **Not Acceptable**

- Sonar based measuring equipment
- Non-metallic tapes and tapes that may stretch with use.

□ **Additional Notes**

- **Measurements Less than 18"**

Because of the nature of the two primary measuring instruments, metal tape and digital, the metal tape is to be used for all measurements less than 18".

- **MEASUREMENTS GREATER THAN 100**

Great care must be taken to accurately mark the incremental beginnings and endings. Use structural landmarks whenever possible, and accurately measure the landmarks, and their relative positions to other notable landmarks in the vicinity.

- **Measuring in Sunlight**

Certain measurements such as outdoors in sunlight should be done with the metal tape.

Aligning Multiple Floors

Align floors, above to below, using elevators (Fig. 6), and/or stairs (Fig. 7), as a guide. Measuring correctly to vertically line up multiple floors is critical.

□ **Elevators**

Elevators are excellent tools to use as datum reference (the whole cab). The cab interior is always the same physical space on every level. Key to this is to measure the interior of the cab and relate it to the exterior landing area, and then expand outward from this elevator lobby to adjoining spaces.

Refer to Figure 6 below for illustrations of critical measurements inside and outside an elevator that are to be used for vertical floor alignments.
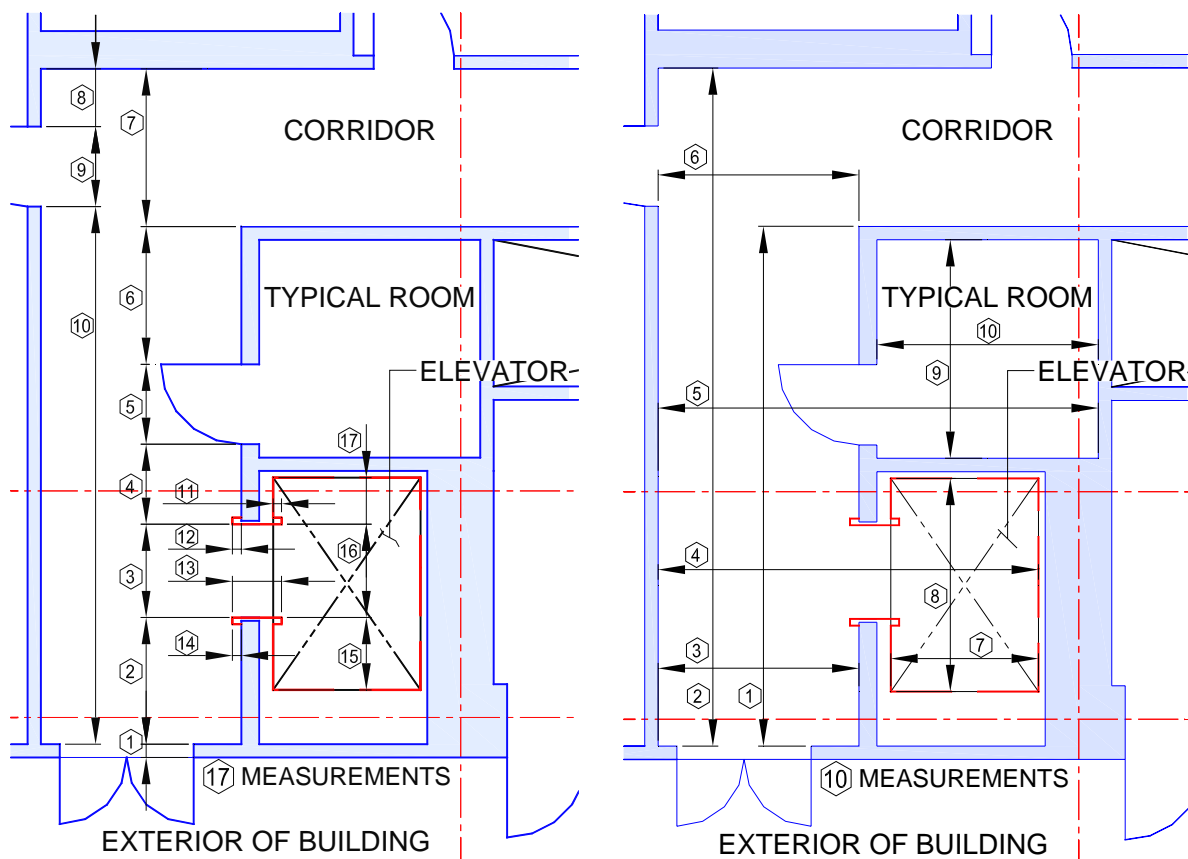
Figure 6:   Elevator as Datum

Notice that the inside of the elevator cab is a vertical link to the floor levels above and below. In order to utilize this with accuracy, one must follow the concept as illustrated in these figures. In Figure 6, the elevator cab is linked to the outside surface of an exterior wall. In addition, these drawings show how wall thickness can be determined, and also apparent redundancy can help verify measurements later in the office.

☐ **Stairs**

Stairs are also good tools for floor to floor alignment, but unlike the elevator cab, the stairwell walls are not always located in the same location on every landing of the stairs. This makes measuring the stairwell more complicated than the elevator, and the measurer must be observant so not to miss a critical difference. Key to this, similar to the elevator, is diligent measuring of the interior of the stairwell, and relating it to the exterior adjacent area, and then expand outward from the stair area to adjoining spaces.
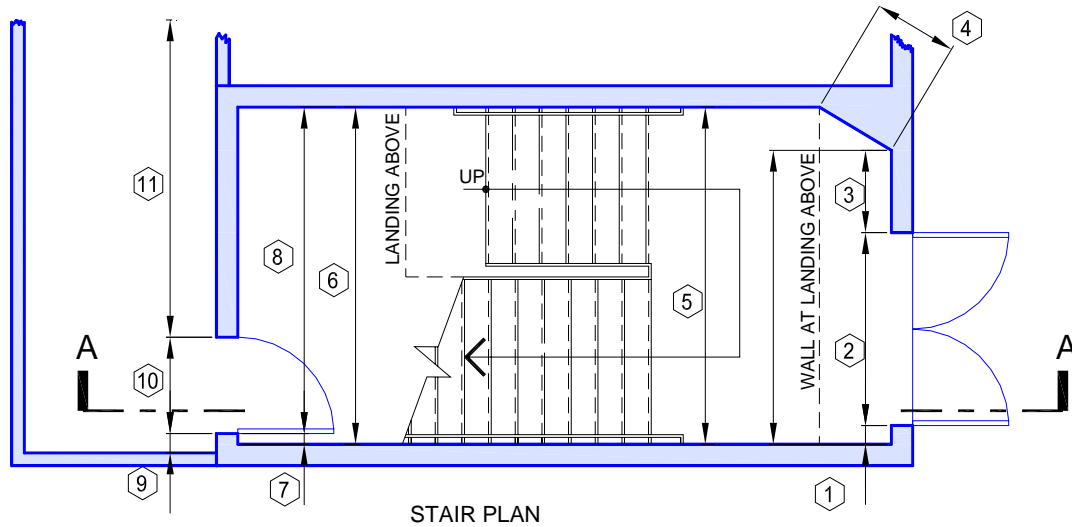
Figure 7:   Stair Plan
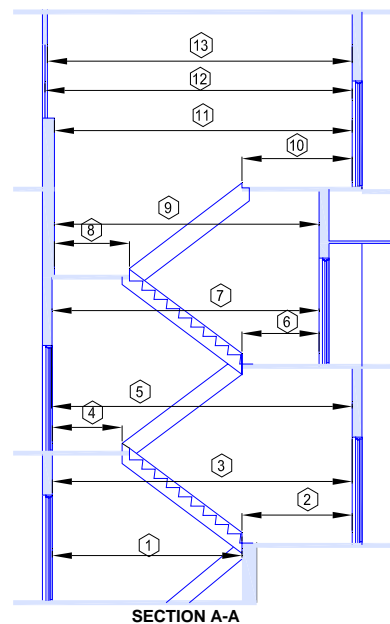
Figure 8:   Stair Section

Included and Excluded Items

This list is for the purpose of answering just what is and is not to be measured or noted, in addition to the obvious physical structure of the airport terminals.

☐ **Excluded Items:**

▪ Restrooms: Do not show plumbing fixtures, stall partitions, mirrors, or counter tops

▪ Movable, freestanding objects in various public areas.

▪ Do not note or measure any private non-LAWA equipment of any kind, unless LAWA specifically requests a usually excluded item to be included.

▪ Verify with LAWA exactly what other items are excluded from measurement and data documentation as to their existence and/or location and size.

☐ **Included Items:**

▪ Note any unusual physical features and verify with LAWA if they are to be documented.

▪ Show all vending machines found in any public area.

▪ All lockers found in public areas.

▪ Free standing kiosks such as might be used by a flower retailer, or also by candy vendors or others.

▪ Baggage handling equipment such as carousels in the baggage arrival areas,

▪ Trash Compaction machinery, whether private or LAWA owned

▪ There are free standing portable offices located throughout the airport facility. All of these are to be measured and noted on the drawings.

▪ Note and measure all FIDS (Flight Information Dispensing System). Show the correct number of monitors installed in a single cabinet. Measure and locate the cabinets, or note the monitors when flush mounted within a wall. There should be an accommodation in the wall thickness for these, or there may be a monitor that protrudes from the wall on the interior space.

▪ Security check points, Immigration and Agricultural examination tables and booths.

▪ Other items not listed here, but included as they occur.

▪ When questioning or deciding on items not listed in this section, always verify the status with LAWA before proceeding with your own decisions. All questions are to be in writing with a clear date of asking, the name of the requestor, and who it was sent to, along with the question itself. All written material should be in a reasonably readable condition.

Inaccessible Areas

All areas, rooms, and spaces are to be measured. Any of these found to be inaccessible are to be documented and reported to LAWA in a timely manner.

Structural Changes during Measuring

Often during a measuring assignment, a Lessee or LAWA may make changes to a structure that was already measured, or is about to be measured while this change is taking place. Request access if necessary, and measure the newly constructed structure. If the measuring of this area is completed prior to the beginning of the change, verify with LAWA or measuring supervisors whether this change will be included in the new As-Built drawings or will the measuring team ignore the change.

Each of these are subject to including or excluding in the measurement process, each as a separate decision process.

If at all possible for the measuring team, always try to get the latest data on the structure.

Gridlines in Drawings:

Grid Lines in Field Sector Sheets and new As-Built Drawings shall be drawn orthogonally located and labeled as represented on the existing As-Built reference construction documents. Grid lines are to follow the LAWA CAD Standard.

Accuracy of Measurements:

☐ Single Measurement: 1/2" maximum for any single measurement regardless of the distance measured.

☐ Cumulative Measurements: Strings of Measurements, such as a series of rooms along a corridor, shall be within 1/2" in either direction, larger or smaller than a single measurement along an adjacent space such as an adjacent corridor. This permits a tolerance of 1", but limits it to1/2" greater or smaller than the total dimension. This limit is required to assure that as these cumulative spaces are drawn, that they do not produce over-lapping areas, or an interior that extends beyond the exterior of the building.

☐ Multiple or Redundant Measurements: These are useful to verify accuracy and are often needed in the case of a. and b. above.

Wall thickness

□ Measure and note all wall thicknesses as accurately as possible.

□ See Figures 6, 9, and 10, for one or more methods to determine the wall thickness.

□ Use existing As-Built construction documents to verify walls when they are hidden behind temporary objects such as boxes or shelving that prohibits visual verification of the wall. Door and Window Jamb Details can provide this information as to original intent during construction.

□ Measure to finish of wall.

□ If there are two finish surfaces, (tile and paint over dry-wall), and both finishes are visible, measure to the painted dry-wall surface, and note that this is the case.
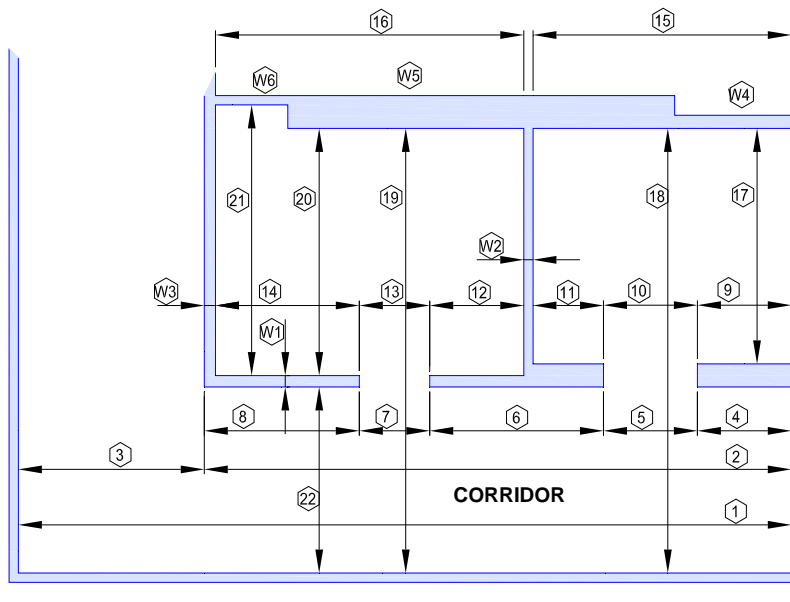
NOTES:
- INTERIOR ROOMS LOCATED ALONG AN ADJACENT CORRIDOR NEED TO HAVE THEIR LOCATION RELATIVE TO EACH OTHER AND THE CORRIDOR DEFINED ACCURATELY AND THOROUGHLY.
- POTENTIAL ERRORS CAN OCCUR WHEN A WALL CHANGES THICKNESS INSIDE A ROOM, AND DIMENSION 20 OR 21 IS NOT NOTED OR MEASURED.
- WALL THICKNESS ERRORS MAY PRODUCE ERRORS IN ADJACENT SPACE LOCATIONS, AND SUBSEQUENTLY CAUSE AN ENCROACHMENT INTO OTHER SPACES.

WALL THICKNESS CALCULATION EXAMPLES:
- W1 = 19 - (22 + 20)
- W2 = (4 + 5+ 6 + 7 + 12) - (15 + 16)
- W3 = 1 - (3 - 4 + 5+ 6 + 7 + 12)
- W4, W5, & W6 SHOW A POTENTIAL ERROR.

LESSON: BE OBSERVANT & DILIGENT.

Figure 9: Wall Thickness Measurement guidelines

Door Dimension Points
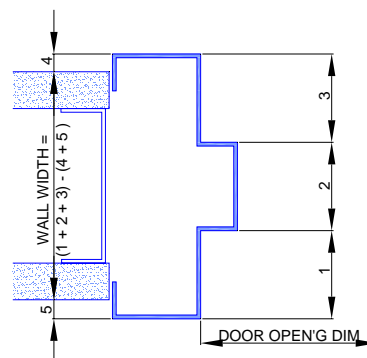
Figure 10: Door Jamb - Typical Measure points

Walls: Curved, Non-Rectilinear, and Sloped

When walls are not perpendicular or parallel to each other and this becomes apparent, either through visual observation, or while drawing per the Field Measurements, but the CD's show the walls as perpendicular or parallel, measure from two diagonally opposed corners of the space, as accurately as possible to obtain the correct geometry of the space. This may require two diagonal dimensions to give the complete and accurate geometry.
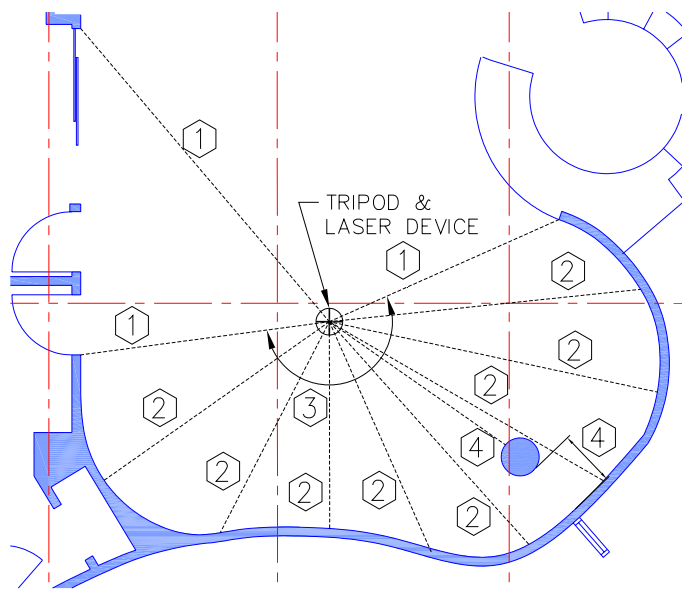
1. ESTABLISH LOCATION OF THE TRIPOD RELATIVE TO SEVERAL KNOWN POINTS.

2. DISTANCE OF LINES OF MEASUREMENT FROM TRIPOD TO WALL.

3. NOTE ANGLE OF EACH LINE OF MEASUREMENT RELATIVE TO LAST ONE.

4. LOCATE COLUMN USING SURROUNDING KNOWN FIXED ELEMENTS.

Figure 11:   Curved Walls
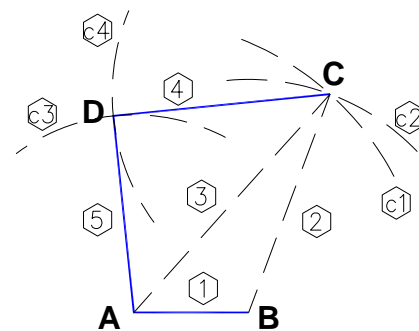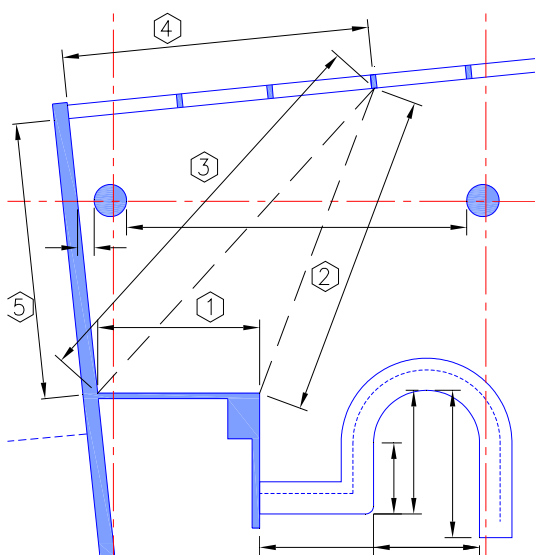
1. **USE POINTS A & B TO DRAW CIRCLES C1 & C2.**

2. **USE POINT A & INTERSECTION OF C1 & C2 TO DRAW CIRCLES C3 & C4.**

3. **DRAW WALL FROM POINTS C TO D TO A TO B.**

Figure 12:   Non-Rectilinear

Measure all sloping walls at their floor line.

Figure 13:   Sloped Walls

Redundant Measurements:

Utilize multiple measurements when necessary to assure that accuracy is maintained. An example of this is the incremental measuring of columns, including their individual sizes, and their locations relative to each other in a large space, and an over-all measurement of the same space. Another example would be a series of contiguous offices along a corridor. In this case, interior walls between offices become important measurements.

Door Information to be shown on drawings:

- ☐   Door Swing: Note Door swing accurately.
- ☐   Door Number: Note number accurately.
- ☐   Door Width: (See Figure 10, for correct Dimension Points)

Security Key Pads (ACAMS):

- ☐   Show the location as to where relative to the door opening.
- ☐   Show the number of the Key Pad whenever possible.

Columns

- ☐   As-Built Locations

  - ▪   Locate columns relative to adjacent columns, and to adjacent walls or windows.
  - ▪   Do NOT rely on existing As-Built construction drawings to locate the columns.
  - ▪   Measure the finish surface of the column. This may be the actual structural column or it may be an applied finish, or box around the column.

- ☐   **As-Built Diameter** of Round Columns

  - ▪   Round Columns: Measure the circumference and calculate the diameter.
  - ▪   Diameter (D) = Circumference (C) divided by Pi. **D = C ÷ 3.14**

Miscellaneous Equipment in Public Areas:

☐ FIDS **(Flight Information Display System)**
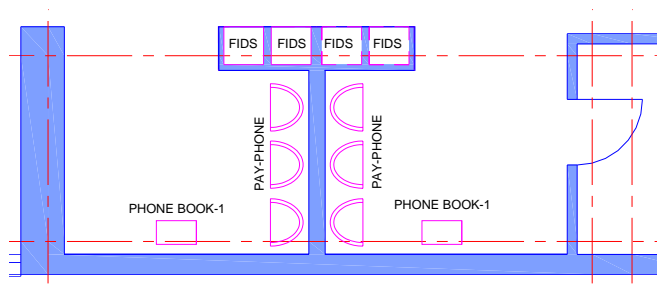
Use ceiling and floor tile grids when measuring the object is not feasible or accuracy is not possible with a tape or laser device.

Figure 14:   FIDS examples.

☐ **Vending Machines**
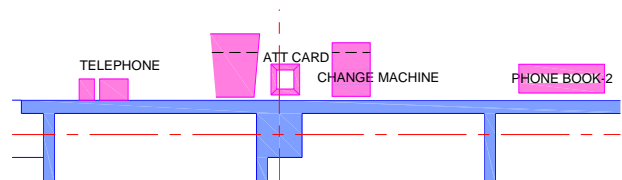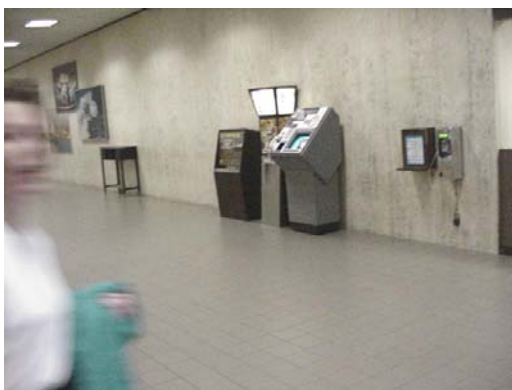
Figure 15:   Vending Machines

☐ **Baggage Carts**
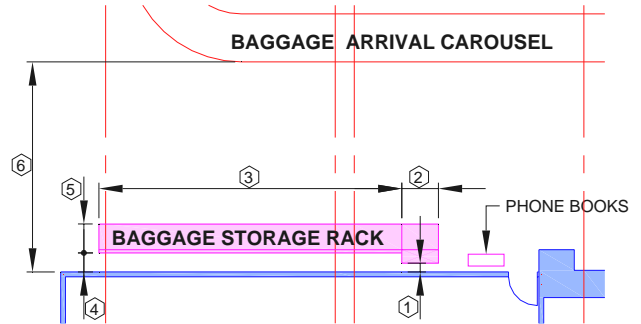
Figure 16:   Baggage Cart Storage Racks

☐ **Lockers in Public Areas**
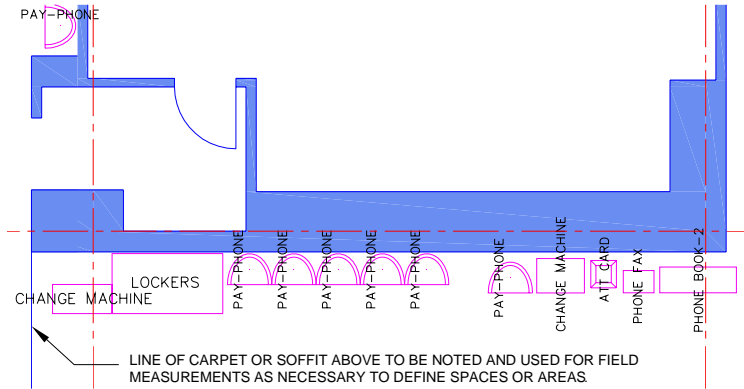
Figure 17:   Public Lockers

□   **Security areas**

▪   Photograph to aid in drawing the space accurately

▪   Measure a simple geometric shape such as a rectangle that encompasses the Security Area. See drawing below photo in Figure 18, as an example.
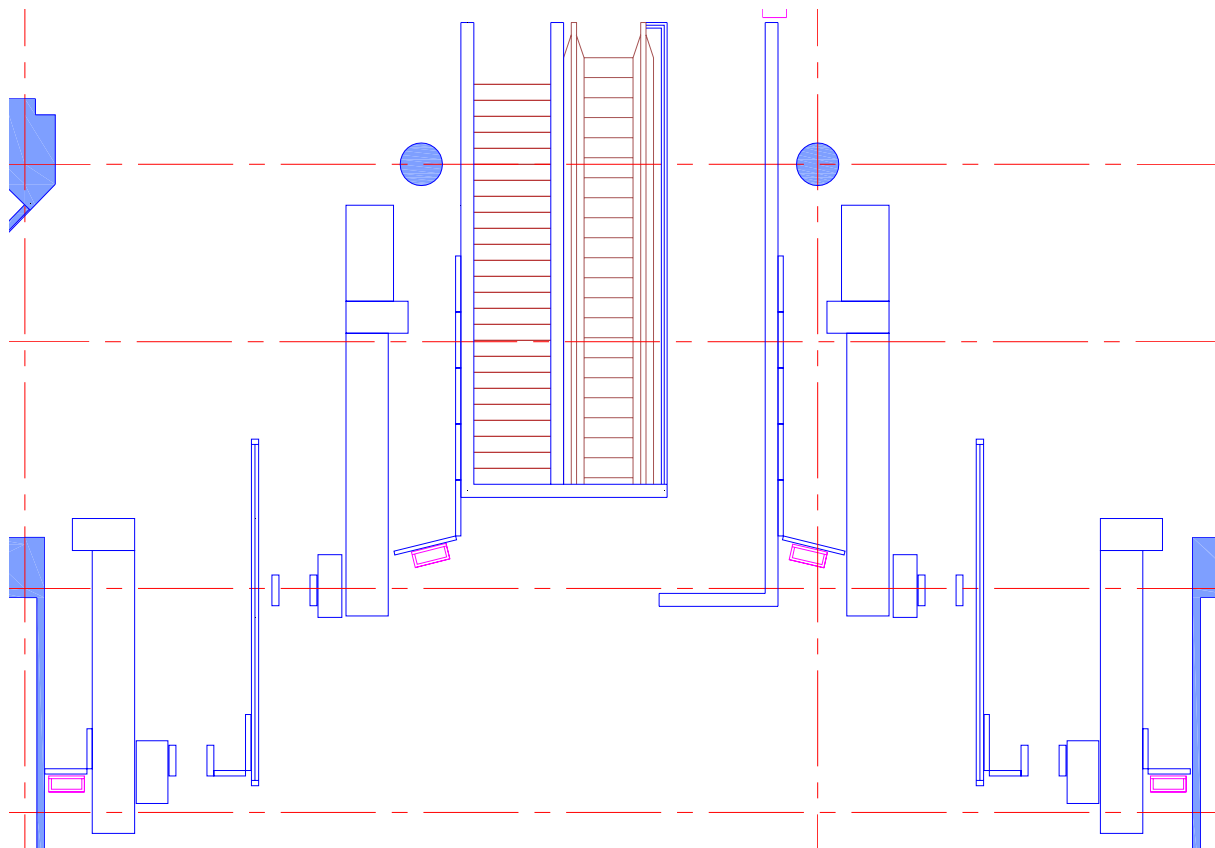
Figure 18:   Security Equipment

☐   **Kiosks**
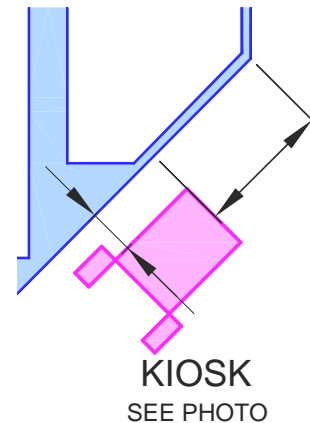
Figure 19:   Kiosk – Typical Example

Areas Not Enclosed or Defined By Walls

Measure to carpet lines or soffit lines above, or other objects that delineate the space, and note that this was done. Show on the drawings the line of carpet or the soffit or other objects used.

Open areas such as exterior Baggage Handling areas, or interior Holding areas, or eating areas to use Soffit or Drip Lines above. For the purpose of this Standard, The edge joining the horizontal to the vertical outer-most edge is to be the measuring point. These lines can define the outer-most edges of the building in some cases.

Figure 20:   Areas not defined by walls.

Carpet lines, ceilings, adjacent face of walls or columns, or exterior face of walls, also referred to as "Drip Lines".

Los Angeles World Airports

Date: March 3, 2009

Memo To: Robin Rollins, Property Manager III
Real Estate Portfolio Management Division – LA/Ontario Airport

From: Jeffrey C. Smith, Chief Airports Engineer
Engineering and Project Management Division

Subject: Buildings – Passenger Terminal Building Areas Space Assignments
Los Angeles International, LA/Ontario, Van Nuys, and Palmdale Airports
Transmittal of Measurement Standards

Pursuant to your request, we have developed a *Passenger Terminal Building Area Measurement Standards* informational sheet and exhibits. This information sheet outlines the measurement standards for Passenger Terminal Buildings in accordance with the LAWA Modified and Simplified Building Owners and Managers Association (BOMA) Standards. These are the standards that have been used to measure leaseholds at LAX (Terminals 1-8 and T.B.I.T.), Palmdale Terminal, and the Van Nuys FlyAway Terminal. These standards will now be used for all future Master Lease Exhibits (MLE) for LA/Ontario Airport as well. This information may be distributed to the tenants at LA/Ontario Airport to help explain the revisions that are being made to the MLE's.

The existing MLE's for LA/Ontario Airport were signed on December 30, 2003 and were based on the original Terminal Master Lease Exhibits prepared by Consultants as part of the Terminal Area Facilities construction project. Currently, my office is in the process of updating these documents as the result of the recent In-Line Baggage construction project. We have discovered that there will be major revisions to the leasehold areas on the first floor of the passenger terminal. These revisions are due to the recent In-Line Baggage construction project and inconsistencies with respect to usable area measurements. The updated documents will reflect the *LAWA Modified and Simplified BOMA Standards*.

In 1996, several LAWA divisions, including Engineering and Properties, adopted measurement standards. These standards were based on the BOMA standards at the time. The American National Standards Institute (ANSI) approved the BOMA standards and published "ANSI/BOMA Z65.1-1996 Standard Method for Measuring Floor Area in Office Buildings." The LAWA committee reviewed this publication and modified it to suit the unique airport environment. In developing the *LAWA Modified and Simplified BOMA Standards* some important modifications were made; in particular, with respect to measurements at exterior walls and windows and the definition of excluded areas.

LAWA Modified and Simplified BOMA Standards include the 1996 BOMA provision that original area calculations are deemed accurate if re-measurements give results with a variance of two percent or less. The new LA/Ontario MLE will conform to this standard.

If you have any questions concerning this matter or require additional information, please do not hesitate to contact Mr. Colón Fabre of my staff at (310) 646-5700, ext. 3031.

JCS:CES:kak

Attachments: Passenger Terminal Building Area Measurement Standards Information Sheet and exhibits.
PC Docs 259439v1

Ms. Robin Rollins
March 3, 2009
Page 2

cc: D. Bowers
       J. Romo
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       J. Rae
       M. Langlois
       D. Jones
       B. Nadler
       V. Howell
       G. Ito
       J. Moore
       P. Burns
       D. Kalanick
       C. Fabre
       E. Bivian

Los Angeles World Airports

Passenger Terminal Building Area Measurement Standards

- When two tenant leaseholds share a common wall, the lease line will be placed along the centerline of the demising wall. (Refer to Exhibit 1 as an example of measurements at a common wall.)

- For tenant leaseholds with interior walls, the lease line will be placed on the centerline of the wall. When a tenant leasehold is adjacent to an exterior wall, the lease line will be placed on the inside face of the wall assembly, not at the centerline of the wall nor at the window glazing, if such occurs. (Refer to Exhibit 2 as an example of measurements at an interior and exterior wall.)

- The only areas that are excluded from the calculation of rentable space are those areas that are clearly marked "void" on the Master Lease Exhibits. These areas, may include, for example, but are not limited to: elevator shafts, pipe shafts, or vertical ducts that are not for the private use of the tenant. (Refer to Exhibit 3 as an example of areas clearly marked as "void.")

- The calculation for an area, resulting from site measurement by LAWA, is deemed accurate if a re-measurement gives results with variance of two percent (2%) or less.
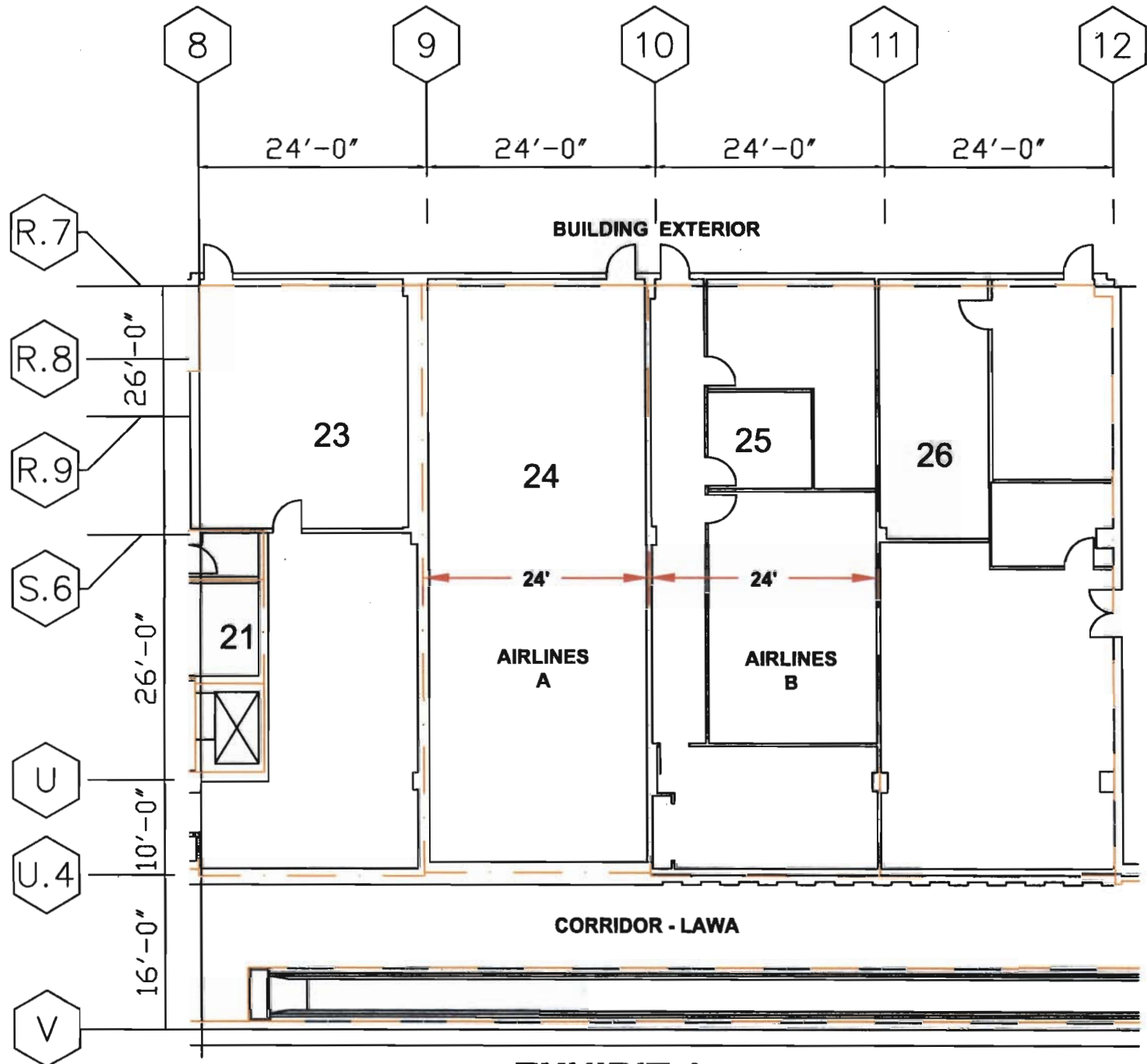
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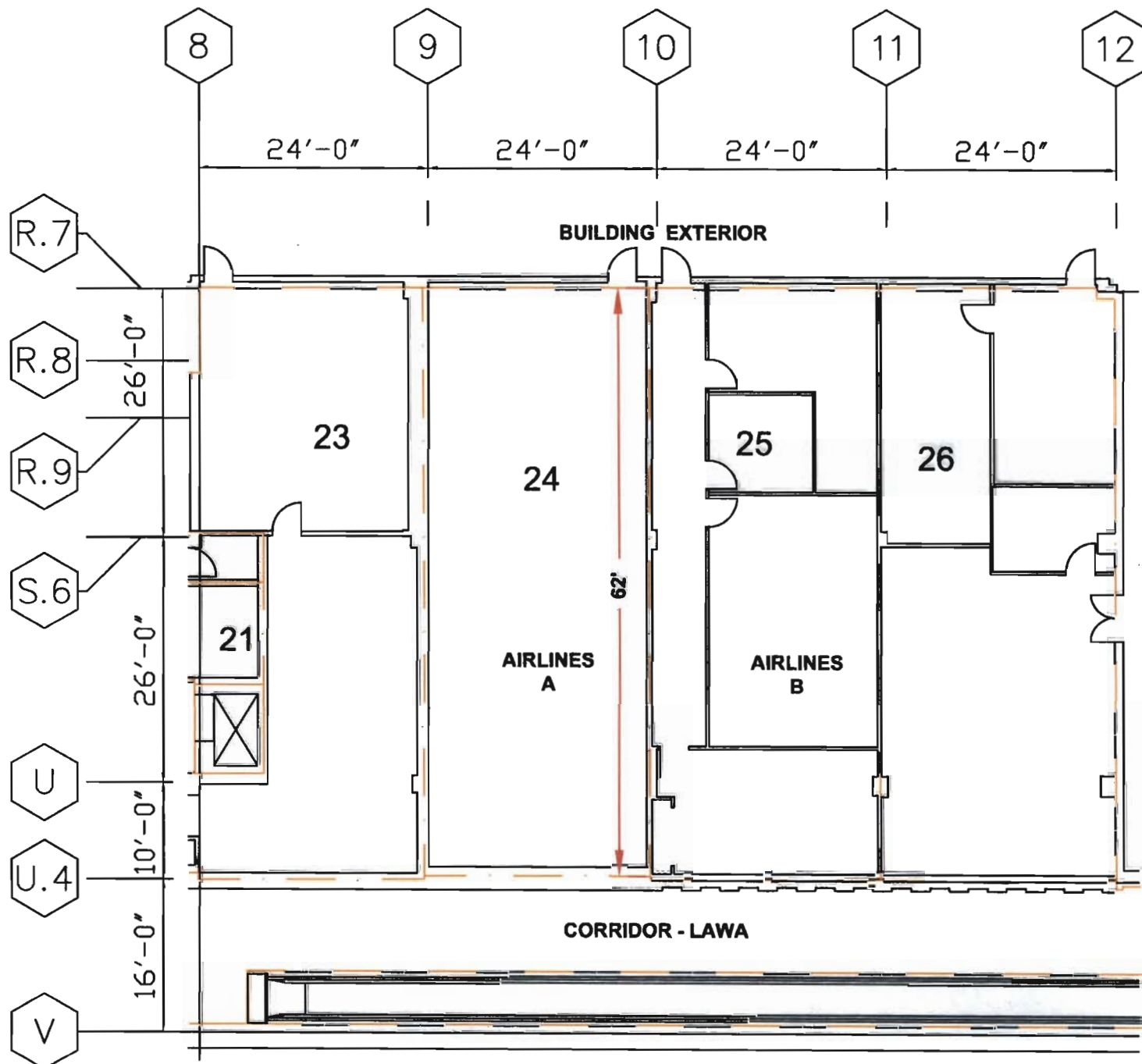
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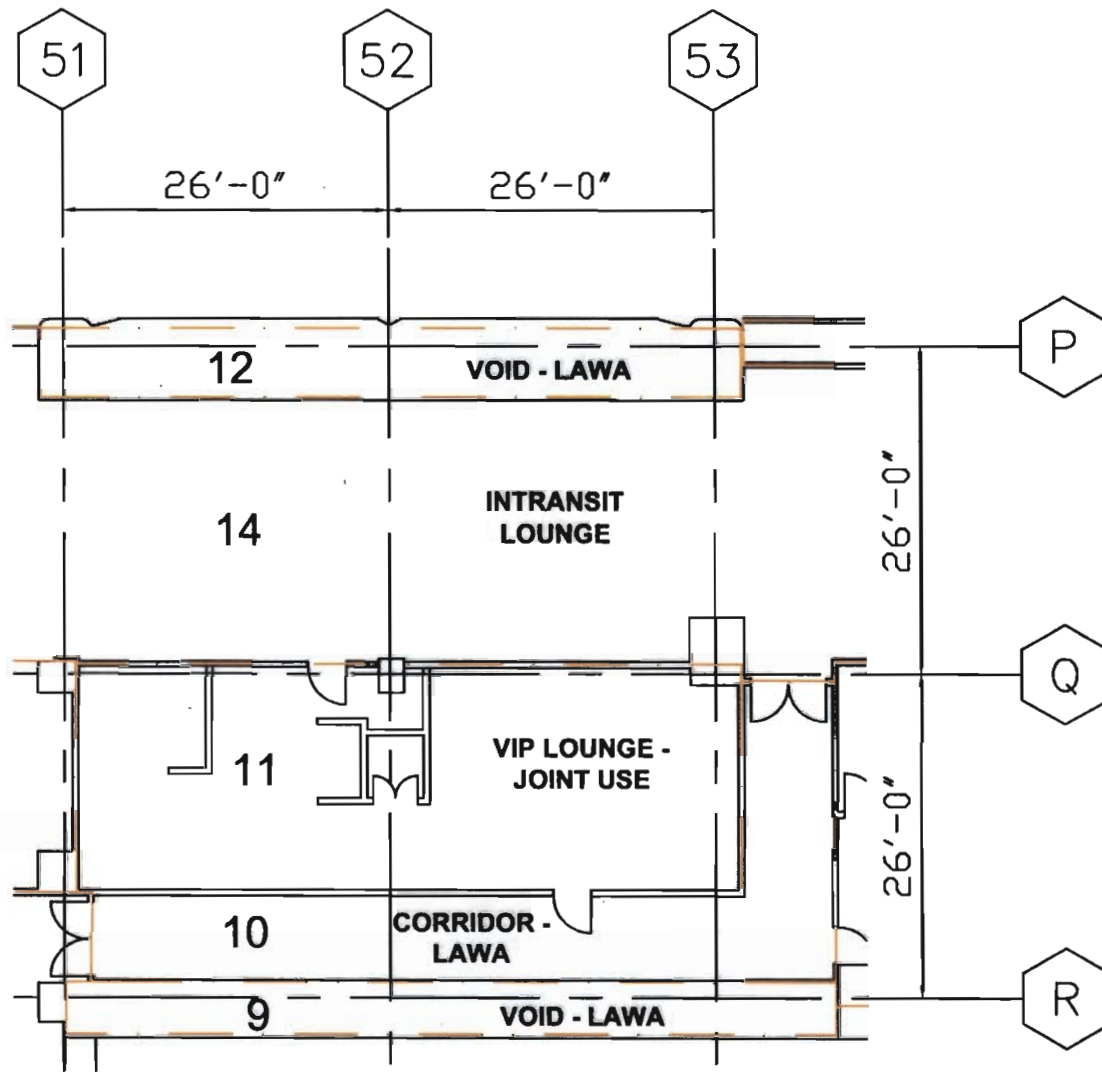
EXHIBIT 3

FOREWORD

A standard's purpose is to permit communication and computation on a clear and understandable basis. Another important purpose is to allow comparison of values on the basis of a generally agreed upon method of measurement.

For more than 75 years, BOMA International has sponsored the *Standard Method for Measuring Floor Area in Office Buildings*. The BOMA *Standard* has been the one accepted and approved by the American National Standards Institute (ANSI). The result is a method of measurement used by building owners, managers, facilities managers, tenants, appraisers, architects, leasing professionals, lending institutions and others to compute the floor area of an office building.

This *Standard* may be used to measure space in both existing and new office buildings. BOMA International urges all its members and others in the office building industry to use the *Standard* to measure office space. Facilities professionals are also encouraged to use the *Standard* in allocating building expenses to various cost centers or for comparing occupancy.

(This Foreword is not officially a part of the *Standard Method for Measuring Floor Area in Office Buildings, ANSI/BOMA Z65.1-1996*.)

PREFACE

It is not uncommon for an area calculated from the building plans to differ from the area measured on site. It is also not uncommon for a site measurement and calculation by one party to differ from the same measurement and calculation by another party. The calculation for an area, resulting from site measurement by the building owner or manager, is deemed accurate if a re-measurement gives result with variance of two percent (2%) or less. If the variance is greater than two percent (2%), BOMA International recommends that an unbiased professional third party be sought to assist in resolving the matter.

DEFINITIONS

FINISHED SURFACE shall mean a wall, ceiling or floor surface, including glass, as prepared for tenant use, excluding the thickness of any special surfacing materials such as panelling, furring strips and/or carpet.

DOMINANT PORTION shall mean the portion of the inside *FINISHED SURFACE* of the permanent outer building wall which is 50% or more of the vertical floor-to-ceiling dimension, at the given point being measured as one moves horizontally along the wall. *DOMINANT PORTION* itself is a vertical measurement between *FINISHED SURFACE*s (or a series of vertical measurements), with the number of measurements needed based upon the conditions found along the wall. If, for instance, a window system is 4'-6" (1.372 meters) high and the floor to ceiling dimension is 9'-0" (2.743 meters), the *DOMINANT PORTION* is the inside surface of the glass for the full width of the window system. If, however, the window system is 4'-5" (1.346 meters), the *DOMINANT PORTION* is the inside surface of the wall. In designs of alternating window systems and wall sections, the *DOMINANT PORTION* will move in and out as often as conditions dictate. If no *FINISHED SURFACE* of the permanent outer building wall is 50% or more of the vertical floor-to-ceiling dimension, or if the permanent outer building wall is not vertical, the *DOMINANT PORTION* shall be the inside finished surface of the wall where it intersects the finished floor. In the case of *STORE AREA* with street level frontage, the *DOMINANT PORTION* shall be the building line.

GROSS BUILDING AREA shall mean the total constructed area of a building. It is generally not used for leasing purposes.

GROSS MEASURED AREA shall mean the total area of a building enclosed by the *DOMINANT PORTION*, excluding parking areas and loading docks (or portions of same) outside the building line. It is generally not used for leasing purposes and is calculated on a floor by floor basis.

*MAJOR VERTICAL PENETRATION*s shall mean stairs, elevator shafts, flues, pipe shafts, vertical ducts, and the like, and their enclosing walls. Atria, lightwells and similar penetrations above the finished floor are included in this definition. Not included, however, are vertical penetrations built for the private use of a tenant occupying *OFFICE AREA*s on more than one floor. Structural columns, openings for vertical electric cable or telephone distribution, and openings for plumbing lines are not considered to be *MAJOR VERTICAL PENETRATION*s.

FLOOR RENTABLE AREA shall mean the result of subtracting from the *GROSS MEASURED AREA* of a floor the *MAJOR VERTICAL PENETRATION*s on that same floor. It is generally fixed for the life of the building and is rarely affected by changes in corridor size or configuration.

USABLE AREA shall mean the measured area of an *OFFICE AREA, STORE AREA*, or *BUILDING COMMON AREA* on a floor. The total of all the *USABLE AREA*s for a floor shall equal *FLOOR USABLE AREA* of that same floor.

OFFICE AREA shall mean the area where a tenant normally houses personnel and/or furniture, for which a measurement is to be computed.

STORE AREA shall mean the area of an office building suitable for retail occupancy. *STORE AREA*s are included in FLOOR *RENTABLE AREA* and *RENTABLE AREA*.

DEFINITIONS

BUILDING COMMON AREA shall mean the areas of the building that provide services to building tenants but which are not included in the *OFFICE AREA* or *STORE AREA* of any specific tenant. These areas may include, but shall not be limited to, main and auxiliary lobbies, atrium spaces at the level of the finished floor, concierge areas or security desks, conference rooms, lounges or vending areas, food service facilities, health or fitness centers, daycare facilities, locker or shower facilities, mail rooms, fire control rooms, fully enclosed courtyards outside the exterior walls, and building core and service areas such as fully enclosed mechanical or equipment rooms. Specifically excluded from *BUILDING COMMON AREA* are *FLOOR COMMON AREA*s, parking space, portions of loading docks outside the building line, and *MAJOR VERTICAL PENETRATION*s.

FLOOR USABLE AREA shall mean the sum of *USABLE AREA*s of *OFFICE AREA*s, *STORE AREA*s and *BUILDING COMMON AREA*s of a floor. The amount of *FLOOR USABLE AREA* can vary over the life of a building as corridors expand and contract and as floors are remodeled.

FLOOR COMMON AREA shall mean the areas on a floor such as washrooms, janitorial closets, electrical rooms, telephone rooms, mechanical rooms, elevator lobbies, and public corridors which are available primarily for the use of tenants on that floor.

FLOOR R/U RATIO shall mean the conversion factor that, when applied to *USABLE AREA*, gives the *BASIC RENTABLE AREA* of the *OFFICE AREA, STORE AREA* or *BUILDING COMMON AREA.*

BASIC RENTABLE AREA of an *OFFICE AREA, STORE AREA* or *BUILDING COMMON AREA* shall mean the *USABLE AREA* of that *OFFICE AREA, STORE AREA* or *BUILDING COMMON AREA* and its share of the *FLOOR COMMON* AREAs on that floor. *BASIC RENTABLE AREA* is determined by multiplying the *USABLE AREA* of that *OFFICE AREA, STORE AREA* or *BUILDING COMMON AREA* by the *FLOOR R/U RATIO.* The total *BASIC RENTABLE AREA* of a tenant occupying more than one floor shall be the sum of its *BASIC RENTABLE AREA*s on each floor. The total of all *BASIC RENTABLE AREA*s on a floor shall equal the *FLOOR RENTABLE AREA* of that same floor.

BUILDING RENTABLE AREA shall equal the sum of all the *FLOOR RENTABLE AREA*s.

BUILDING R/U RATIO shall mean the conversion factor that distributes the BUILDING COMMON AREA of a building.

RENTABLE AREA shall mean the *USABLE AREA* of an *OFFICE AREA* or *STORE AREA* with its associated share of *FLOOR COMMON AREA*s and *BUILDING COMMON AREA*s. *RENTABLE AREA* is determined by multiplying the *USABLE AREA* of an *OFFICE AREA* or *STORE AREA* by the *R/U RATIO.* The total of all *RENTABLE AREA*s equals the *BUILDING RENTABLE AREA* for the building.

R/U RATIO shall mean the conversion factor that, when applied to *USABLE AREA*, gives the *RENTABLE AREA* of the *OFFICE AREA* or *STORE AREA.*

OVERVIEW OF METHOD

The following steps must be followed to obtain the *RENTABLE AREA* of an *OFFICE AREA* or *STORE AREA*. Please note that an *OFFICE AREA* located in a *STORE AREA* is measured as a *STORE AREA*.

1. Determine, for record keeping, the overall *GROSS BUILDING AREA*.

2. Ascertain the *GROSS MEASURED AREA* of each floor of the building, applying the concepts of *FINISHED SURFACE* and *DOMINANT PORTION*.

3. Establish the *FLOOR RENTABLE AREA* for each floor by deducting from each floor *GROSS MEASURED AREA* the area of its *MAJOR VERTICAL PENETRATION*s.

4. Measure the *USABLE AREA* of *OFFICE AREA*s, *STORE AREA*s and *BUILDING COMMON AREA*s on each floor to determine each *FLOOR USABLE AREA*.

5. Determine the *FLOOR COMMON AREA* of every floor by subtracting from each *FLOOR RENTABLE AREA* its *FLOOR USABLE AREA*.

6. The *FLOOR COMMON AREA* is allocated to each *USABLE AREA* on that floor by applying that *FLOOR R/U RATIO*. The result is the *BASIC RENTABLE AREA*.

7. The *BUILDING COMMON AREA* is allocated to each *BASIC RENTABLE AREA* by applying the *BUILDING R/U RATIO*. The result is the *RENTABLE AREA*.

Note that the *RENTABLE AREA* can be calculated by applying to the *USABLE AREA* of *OFFICE AREA* and *STORE AREA* the *R/U RATIO* (*BUILDING R/U RATIO X FLOOR R/U RATIO*). See chart on pages 26-27 for a summary of the interrelationship of areas.

RATIOS AND EQUATIONS

$$FLOOR\ R/U\ RATIO\ =\ FLOOR\ RENTABLE\ AREA\ \div\ FLOOR\ USABLE\ AREA$$

$$BASIC\ RENTABLE\ AREA\ =\ USABLE\ AREA\ \times\ FLOOR\ R/U\ RATIO$$

$$BUILDING\ R/U\ RATIO\ =\ BUILDING\ RENTABLE\ AREA\ \div\ (BUILDING\ RENTABLE\ AREA\ -\ BASIC$$
$$RENTABLE\ AREA\ of\ BUILDING\ COMMON\ AREA)$$

$$RENTABLE\ AREA\ =\ BASIC\ RENTABLE\ AREA\ \times\ BUILDING\ R/U\ RATIO$$

$$R/U\ RATIO\ =\ FLOOR\ R/U\ RATIO\ \times\ BUILDING\ R/U\ RATIO$$

$$RENTABLE\ AREA\ =\ USABLE\ AREA\ \times\ R/U\ RATIO$$

EFMD

Engineering & Facilities Management Division

BIM – Record File Standards

Document History

revision letter	release date	major changes	approved by
1.0	March 2014	First version of standard	

Contents

About this book

The intent of these guidelines is to provide a framework for all Revit as-built deliverables, including:

- Revit Architecture
- Revit MEP
- Revit Structure

This guide is NOT intend to be a Revit tutorial, but rather assumes that the user has a sufficient level of proficiency to comprehend the requirements outlined in this guide.

BIM Model organization

Revit files (.rvt) contain all views (model based or sheet based) in the same file.

Using agreed upon conventions makes it easy to identify the:

- Discipline
- Project number
- Project Zone (where applicable)
- Model description
- Revit Version

These guidelines focus primarily on adaptation of standards for practical and efficient application of BIM, particularly at the handover (Record - As-Built) stage of a project.

The objectives are:

- To maximize efficiency through adopting a coordinated and consistent approach to working in Revit Models.
- To define the standards, settings and best practices that ensures delivery of high quality data and uniform drawing output.
- To ensure that digital Revit files are structured correctly to enable efficient data sharing within LAWA.

> ❖❖ Revit is the BIM software of choice within LAWA
>
> The Revit software version will be determined and enforced per project
>
> Revit, record files must reflect the As-Built conditions

References

This guideline is written with reference to the following documents:

- USACE_CAD-BIM_Technology Center: version 1.1
- National BIM standard (United States): version2
- NCS – United States National CAD Standard: version 5
- LAWA CAD Standards
- LAWA GIS Standards
- LAWA Survey Standards

Standards in use at LAWA

This section provides an overview of LAWA specific standards, plus related federal, local, and national standards. LAWA standards have been created to improve productivity and reliable information exchange through the full life-cycle of Revit files, geospatial data, CAD drawings and related documents

LAWA CAD Standards

The LAWA CAD standards are based largely on the AIA CAD Layer Guidelines and the National CAD Standards (NCS), adapted where necessary to suit LAWA-specific requirements. The document CAD Standards for LAWA Projects is available from the LAWA web site at

LAWA GIS Standards

The LAWA GIS standards are directly based on the ANSI Spatial Data Standard for Facilities Infrastructure and Environment (SDSFIE), Release 2.60, extended in certain areas to handle specific information relevant to LAWA. GIS Standards for LAWA Projects presents the most important aspects of SDSFIE as it applies to LAWA. The document is available from the LAWA web site at www.lawa.org/laxdev/Handbook.aspx

SDSFIE is developed and maintained by the Federal CADD/GIS Technology Center, Vicksburg, MS. For further details on SDSFIE 2.60, use the online browser available at

LAWA Survey Standards

The LAWA Survey and Remote Sensing Standards are based on requirements laid out in Airport Circulars published by the FAA, adapted where necessary to suit LAWA-specific requirements.

LAWA Metadata Standards

Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information. LAWA has distinct metadata standards for:

- drawings and documents
- geospatial data sets

Changes or additions

Any deviation from these standards must be approved by LAWA, in advance and in writing. Requests need to be submitted on the "Request for variance" form, available from the LAWA website.

Suggestions for improvements or expansion of these standards to meet unforeseen requirements and as a way to improve effectiveness and clarify any ambiguities are encouraged.

Definitions

The following terms define the concepts of BIM and data structures used in this guideline.

Definitions	
BIM	Building Information Modelling (BIM): the creation and use of coordinated, internally consistent, computable information about a project in design and construction. **In this document, specifically related to Revit files.**
Views/ Output files	A generated rendition of graphical or non-graphical information (a plan, section, elevation, schedule, or other views of a project)**.**
Central Files	The central file is the source of the Record (as-built) file. The Central file is created the first time you save the project after sharing it. This file stores the current ownership information for all the Worksets in the project. The central file acts as the distribution point for publishing work to the rest of the team. All users should save their own local copies of the file, work locally, and then save changes back to the central file for other users to see their work.
Worksets	Autodesk Revit projects can be subdivided into Worksets. A Workset is a collection of building elements (such as walls, doors, floors, stairs, etc.) in the building. In the Autodesk Revit project, users have the option of checking out entire worksets or individual elements in a workset. All other team members may view these elements or Worksets, but are unable to change them, preventing possible conflicts in the project**.**
View Types	Defines some graphics properties, such as a reference label and tags for elevations, callouts, or sections. It can also specify a view template to apply to a new view, and whether template updates should be applied to existing views.
Coordinates	There are two coordinate systems in a Revit project: **project internal** and shared. Each system has essential features and limitations. **Project Internal Coordinate System** Every Revit project has an internal coordinate system referred to in several places as Project. The project coordinate system cannot be changed. **Shared Coordinates** The shared coordinate system consists of a single origin and true north orientation which can be synchronized between models and even AutoCAD drawings.
View Templates	A view template is a collection of view properties, such as view scale, discipline, detail level, and visibility settings. Use view templates to apply standard settings to views. View templates can help to ensure adherence to office standards and achieve consistency across construction document sets**.**

Definitions	
View Range	Every plan view has a property called View Range, also known as a visible range. The view range is a set of horizontal planes that control object visibility and display in the view. The horizontal planes are Top, Cut Plane, and Bottom. The top and bottom clip planes represent the topmost and bottommost portion of the view range. The cut plane is a plane that determines at what height certain elements in the view are shown cut. These 3 planes define the primary range of the view range.
Families	A **family** is a group of elements with a common set of properties, called parameters, and a related graphical representation. Different elements belonging to a family may have different values for some or all of their parameters, but the set of parameters (their names and meanings) is the same. These variations within the family are called **family types** or **types**. There are 3 types of Revit Families – System Families, Component Families and In-Place Families**.**
Object Styles	The Object Styles tool specifies line weights, line colors, line patterns, and materials for different categories and subcategories of model objects, annotation objects, and imported objects in a project. You can override project object styles on a view-by-view basis with Visibility Graphics.
Visibility Graphics	The visibility and graphics settings of a view define whether elements and categories are visible in the view and their graphical appearance (color, lineweight, and linestyle). The Visibility/Graphics Overrides dialog lists all categories in the project. Some examples of categories are furniture, doors, and window tags. The visibility status and appearance of each category can be modified for each view in the project. Use the context menu to modify the appearance and visibility of individual elements.

Introduction

To achieve technical excellence and a successful outcome to a project, it is essential that explicit attention is given to the management, display and quality of the Record (As-Built) data.

Below are a number of key principles that will facilitate efficient, high quality work products.

> ❖   When submitting record files, the consulting company must clearly document what has been modeled and what level of development (LOD) has been provided

- All outstanding warnings and issues (that can be) must be resolved.
  - Any warnings that cannot be resolved must be detailed in the project submission documentation.
- All issues in Coordination Review within Revit should be resolved.
- All un-hosted / orphaned families should be reconciled onto the appropriate host.
- Record (As-Built) BIM Project Review should take place to ensure model integrity.
- Record model quality control procedures must be performed and documented
- Separate models submitted for each building and each disciplines (mechanical, electrical, plumbing etc…).
  Further divide models within a discipline if the files sizes become too big or slow to operate.

Interoperability

Interoperability between software products is of paramount importance for LAWA. Whether it is output to 2D CAD for subsequent drawing production or output for GIS visualization or analysis, the preparation and methods adopted to compose the as-built BIM will ultimately determine its successful interoperability to other software packages and technologies

Central Files

The main central files from each discipline shall be supplied to the owner as the final record model. All essential linked models including Revit files, CAD files and Point Clouds must be provided as their own separate central files.

Files linked for the purpose of internal reference requirements and not needed for final record file shall be unlinked and removed using the tools within Revit.

> ❖   The central file is the source of the Record (As-Built) file

Coordinates

All Revit models supplied shall reference true coordinates and use the Revit shared coordinates functionality for all linked files that require coordinates with the final record files.

When referencing, Revit or CAD files, the models must be positioned relative to the **agreed** surveyed and benchmarked project points and also reference a Shared Coordinate system dictated in Revit.

All points must be specified in the mapping service tab of the Location dialog box within Revit.
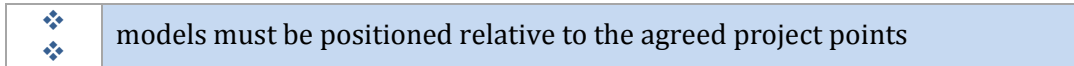
❖ ❖	models must be positioned relative to the agreed project points

Shared Coordinates

The shared coordinate system consists of a single origin and true north orientation which can be synchronized between models and any AutoCAD drawings.

Referencing file linking using Manage Links

Some projects may require that models of single buildings are split into multiple files and linked back together in order to maintain manageable model file size.

Revit models must always be kept separate by discipline, e.g. architecture, structure, mechanical, electrical, piping and plumbing.

Each discipline in a Revit model shall be in its own unique workset.

Ensure that all .RVT and .DWG or any other required files are linked and **not** imported into the Revit file.

All Linked files must be supplied as a part of the record file deliverables

Remove all links to irrelevant or extraneous files that are not required as record file deliverables.

View Filters

View Filters are used in Revit to provide a higher level of control of view details, whether for graphic representation or hiding of objects. All systems used in Revit shall have filters applied to their categories for an added level of control.

Families

All Revit families must follow a logical naming convention; this is true for all system, component and in-place families.

All families will be categorized in a correct Revit category. No families shall be reference as "generic model" only.

All Hosted Families, in linked models shall be linked and reconciled if orphaned.

Visibility Graphics

Objects in views shall be shown or hidden by category, view filter, or by workset.

Hide objects at the category level, by using visibility graphics, filters or worksets.

Only use element hiding when necessary.

Object Styles

Linetype, lineweight and drafting standards shall be set in the object styles dialog box to conform to the LAWA CAD standards.

View Templates

All views in the Revit model created for final sheets shall be controlled by a View Template applied to the view in a manner that is consistent with a logical naming convention.

These templates shall be created by the consultant within their own central file.

Scope Boxes

Scope Boxes shall be used on all views that require the division of a view layout and then applied to all levels that require the same division.

Manual editing of the crop area is not acceptable.

All Scope Boxes separating areas shall have appropriate naming conventions and matchlines attached.

Revit Model Requirements and Warnings

The following represents some examples of the Revit model requirements and possible warnings requiring attention and correction.

- Overlapping of design elements (especially walls and room boundaries).
- All floors are subdivided by space/room.
- Every space/room has a name and a number, including all shafts and stairs.
- LAWA room numbering conventions must be applied. Refer to FM@LAWA Facilities Management Handbook Building Space Naming Convention.
- There is only one space instance per space, per discipline, no duplicates.
  - Note: Some engineering spaces may fit exactly on top of linked architectural models
- All engineering spaces are defined level to level
- Plenums are defined; as a separate engineering spaces.
- Reconcile all orphaned families (resulting from using "copy/paste". (in Revit this is known as reconciling an orphaned family)
- All mechanical systems are defined (every element belongs to a system). This can be verified using the Revit MEP system browser.
- Sidewall diffusers are placed in defined spaces and attached to corresponding walls.
- Ensure that all objects in a Revit project are placed in the correct workset.
- Ensure that all mechanical zones are defined.
- Ensure that there are no unassigned components (View/User Interface/System Browser).

Data Segregation

General Principles

The project BIM models should be constructed in a manner that allows LAWA to view and use the model without recourse to complicated introductions to the project methodology.

The methods adopted for data segregation shall take into account, and be agreed with LAWA.

The following practices shall be followed:

- No more than one building shall be modeled in a single file. Further divide within a building if the model file becomes too big or slow to operate.

- A model file shall contain data from one discipline only (although exceptions may apply for Building Services where multiple disciplines converge).

- Further segregation of the geometry may be required to ensure that model files remain workable on available hardware.

- Where multiple buildings (models) make up a single project, a site model should be considered, where all architectural models in the project are linked together using shared coordinates.

Example of Data Segregation:

Discipline	Segregation
Architecture	level by level
Structure	Major geometry splits, such as east-wing or west-wing, or movement joints between sections. All items shall be separated by their levels dictated by Revit.
Mechanical	Construction joints such as podium and tower. All mechanical systems shall be separated by levels.
Electrical	All distribution systems shall be separated by their levels.
Civil	Document sets Work allocation such as core, shell and interiors

Data segregation in the Revit Model must show/highlight/identify those points of integration across floors when exported to 2D plans (DWG). For those systems that span floors, all controls/valves/switches et cetera that isolate floors from those systems must be identified and highlighted in both the model and the dwg

Folder Structure and File Naming Conventions

Introduction

Even with BIM systems, the importance of model and file naming convention cannot be overstated and a clear and concise naming convention is critical to the successful identification of BIM data.

A naming convention is required to ensure that all files created on a project can be identified quickly, accurately and without ambiguity. Ownership, location, type of file and a unique number are all of paramount importance when identifying the content of a BIM file.

The following paragraphs provide the necessary guidelines for a model naming convention suitable for multi-discipline and multi-functional project.

Project Folder Structure

Record files will be submitted to LAWA within a clearly designated set of folders.

Where a project comprises of a number of separate elements such as multiple buildings, zones or areas, the BIM structure shall be maintained within a set of designated sub-folders representing the various project elements.

All record files shall be held within the standard project folder structure.

No spaces are to be used in the folder naming as this can potentially interfere with certain file management tools and collaboration across the internet.

General Naming Conventions

- Use only letters A-Z, hyphen, underscore and numbers 0-9 for all fields.
- All fields shall be separated by a hyphen character "-" Do NOT use spaces.
- Within a field, either CamelCase or an underscore "_" shall be used instead of a space to separate words.
- A single period character "." shall be used to separate the file name from the extension. This character should not be used anywhere else in the file name.
- The file extension shall not be amended or deleted.
- The scheme for zone and level sub-division shall be agreed with LAWA at the outset of the project.

BIM Record File Naming Convention

The following naming conventions must be used for all Record files

BIM Record file naming convention

Discipline　　　　　**Project zone**　　　　　**Revit version**

　　　　Project　　　　　　**Model Description**
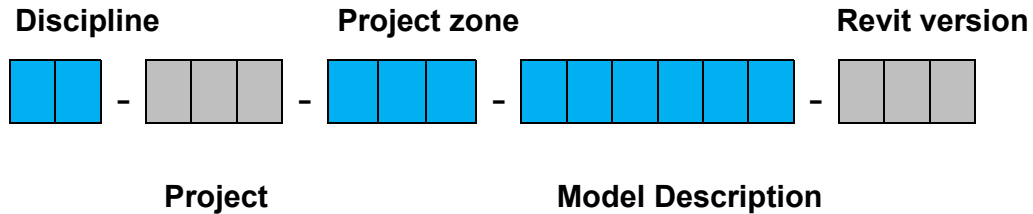
BIM Record file names		
component	**length**	**comment**
Discipline designator		The discipline designator for a file name identifies the discipline. Where a file applies to a high-level discipline with a single-letter code, the second letter is replaced with a hyphen. Allowable characters for the discipline designator in sheet files are listed below.
Project code		Project codes are developed by LAWA or their authorized representative and are provided to the contractors for each project. Agreed project codes must be used in all LAWA files, to guarantee unique, consistent file names.
Project zone		These codes are defined per project, and generally identify a building, zone or area.
Model Description		Descriptive field to define the type of data portrayed in the file. Avoid repeating information codified in other fields. Can be used to describe any part of the previous fields, or to further clarify any other aspect of the contained data.
Revit Version		Version of Revit in which the file was created

Examples of Record file naming:

- A-1282-ZA-BuildingCore-R12 (includes a Project zone)
- A-1282-BuildingCore-R12 (Project zone is not applicable)

Discipline (2 char)

This is a simple list of single or double character codes identifying the Discipline.

Discipline designators for View naming			
discipline	**Designator**	**discipline**	**designator**
A	Architectural	I	Interior
B	Building Surveyors	K	Kitchen Consultant
C	Civil Engineers	L	Landscape
D	Electronics (Data/ Communication/Security)	M	Mechanical
E	Electrical	R	Irrigation Consultant
F	Fire	S	Structural
G	Surveyor	T	Vertical Transportation
H	Hydraulic	Z	General (non-specific)

M - Mechanical	
Sub-discipline	**Designator**
MH	HVAC
MP	Piping
MF	Fire Suppression

Where necessary this field should include an Originator code to help identify the owner of the contents. For example on larger projects where two architects are involved, it may be necessary to add the company's initials before the discipline, where logical character limits will apply:

For example:

ABC_A-   ABC Architects

XYZ_A-   XYZ Architects

Project zone Codes (examples)

Project zone codes (examples)	
Code	**Description**
01	Building or Zone 1
ZA	Zone A
B1	Building 1
CP	Car Park
A2	Area Designation 2

Revit Version (examples)

Revit Version (examples)	
Code	**Description**
R08	Revit 2008
R09	Revit 2009
R10	Revit 2010
R11	Revit 2011
R12	Revit 2012
R13	Revit 2013

Project Browser and View Organization for Record files

When handing over the Record (As-Built) Revit project file to LAWA all views that are created for sheet views shall be named in accordance with these standards.

For record files, only As-built views should be available within the project browser.
All other views should be considered as working views and must be filtered out of the project browser

❖	Only Record (As-Built) information may be included in the sheets
❖	All relevant Record (As-Built) information must be available in the sheets

The Sheet Views (discipline sets) in the Revit Project Browser dictates the final product delivered by the consultant and should have all appropriate view filtering applied in the model to represent this state.

Within the discipline sets the sheets are organized as per sheet reference number

Sheet View Organization

The project browser must be organized according to the "disciplines sets" as shown below.
This follows the recommended best practices from the NCS CAD standards.
The prefix number allows for the correct sorting of sheets based upon their assigned discipline

❖	Use the sheet area to organize the Record (As-Built) final products.
❖	Organize the project browser as the sheets will appear in the set.

Sheet Discipline sets			
Code	**Discipline**	**Code**	**Discipline**
00	00 – Sketches	11	11 – Equipment
01	01 – General	12	12 – Fire Protection
02	02 – Hazardous Materials	13	13 – Plumbing
03	03 – Survey / Mapping	14	14 – Process
04	04 – Geotechnical	15	15 – Mechanical
05	05 – Civil Works	16	16 – Electrical
06	06 – Civil	17	17 – Telecommunications
07	07 – Landscape	19	19 – Other Disciplines
08	08 – Structural	20	20 – Contractor Shop Drawings
09	09 – Architectural	21	21 – Operations
10	10 – Interiors		

Within the discipline sets the sheets are organized as per sheet reference number

Sheet reference number:

Within the designated "sheet discipline" the sheets will be further organized according to their "sheet reference number"

Sheet references shall be based on the document and drawing numbering protocols established for the project. These names automatically match the text as it appears in the title block

The sheet identification format used by LAWA has the following components.

Example of a sheet reference number:

A	2	1	N	2

Architectural floor plan, level 01 area N2

A	N	L	R	R

Discipline Designator

A	N	L	R	R

Sheet Type Designator

A	N	L	R	R

Floor level and Floor region

A = alphabetical character
N = alphanumerical character
L = numerical character
R = alphanumerical character

BIM Sheet naming conventions		
Component	**length**	**comment**
Discipline designator	1	The discipline designator denotes the category of subject matter contained on the sheet. Allowable characters for the discipline designator in sheet files are listed below.
Sheet type designator	1	The sheet type designator is a single numerical character that identifies the sheet type. All sheet types may apply to all discipline designators. It is not necessary to use all the sheet types for a project or within a discipline.
Floor level	1	Floor level
Floor Region	2	Floor area or region

Discipline designator

This is a simple list of single character codes identifying the Discipline.

Discipline designators			
discipline	**Designator**	**discipline**	**designator**
A	Architectural	I	Interior
B	Building Surveyors	K	Kitchen Consultant
C	Civil Engineers	L	Landscape
D	Electronics (Data/ Communication/Security)	M	Mechanical
E	Electrical	R	Irrigation Consultant
F	Fire	S	Structural
G	Surveyor	T	Vertical Transportation
H	Hydraulic	Z	General (non-specific)

Sheet Type Designators

Sheet type designators			
Sheet type	**Designator**	**Sheet type**	**Designator**
1	Discipline General sheets	6	Sections
2	Plans (horizontal views)	7	Exterior Details
3	Reflected Ceiling Plans	8	Interior Elevations
4	Furniture, Fixtures and Equipment plans	9	Interior Details
5	Exterior elevations	0	Base sheets

Sheet description:

This is a more complete description, which provides an appropriate clarification on the location and content of the sheet

LAWA expects that the description will be sufficient to allow for easy recognition of the sheet content

Sheet description

| See Above | - | D | D | D | D | _ | D | D | D | D | _ | D | D | D | D |

Sheet reference number

BIM Sheet naming conventions		
Component	**length**	**comment**
Discipline designator	1	See sheet reference number.
Sheet type designator	1	See sheet reference number.
Floor level and region	1	See sheet reference number.
Floor Region	2	See sheet reference number.
Sheet description (D)		Appropriate clarification on the location and content of the sheet, separated with an underscore were appropriate

Example of sheet organization and naming:

09 – Architecture

     A21N2-AreaN2_FloorPlan_Level_01

Discipline set: 09 – Architecture

Sheet Reference: A21N2

Sheet description: AreaN2_FloorPlan_Level01

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EFMD

Engineering & Facilities Management Division

GIS standards for LAWA projects

Document History

revision letter	release date	major changes	approved by
A	September 2012	new version of standards	

Contents

About this book

This document establishes the data standards for submitting Geographic Information System (GIS) data to LAWA and for organizing GIS data within the LAWA geospatial data repository. These standards help ensure efficient exchange of digital information between LAWA and all authorized users of LAWA GIS data.

Relation to existing standards

This LAWA GIS standard is directly based on the ANSI Spatial Data Standard for Facilities Infrastructure and Environment (SDSFIE), Release 2.60. SDSFIE is developed and maintained by the Federal CADD/GIS Technology Center, Vicksburg, MS.

This document presents the most important aspects of SDSFIE as it applies to LAWA. The LAWA GIS standards are based on SDSFIE, extended in certain areas to handle specific information relevant to LAWA.

For further details on SDSFIE 2.60, use the online browser available at http://tools.sdsfieonline.org/browser/

Who should read this book

This book is intended for all LAWA employees, consultants, and contractors, especially for members of their staff who prepare GIS data; and for local, state, and federal government agencies including city, police, state DOT, FAA, and TSA.

How this book is organized

This book contains the following sections:

Introduction

Why these standards are important, what they are based on, how to suggest extensions or changes, and how compliance is assessed.

Data organization

The five elements of the classification hierarchy: entity sets, entity classes, entity types, attributes, and attribute domains

LAWA SDSFDIE data dictionaries

The two major reference sources to be used when applying the LAWA GIS standards.

File names

How filenames are to be constructed, based on the classification hierarchy.

Coordinate system and property addressing grid

Horizontal and vertical datum references to be used when applying the LAWA GIS standards

Translating CAD layers to GIS layers

Mapping layers in the LAWA *CAD Layering Standard* to the GIS layering standard

Introduction

Standards-compliant GIS data are stored in LAWA's geospatial data repository containing spatial and attribute data. These data standards are critical to supporting the airport infrastructure, because they make it easier to access and maintain the GIS data, throughout the life of the airport infrastructure. Benefits include:

- standardizing requirements for collecting GIS data
- enabling common GIS workflows throughout LAWA
- supporting standard implementation procedures and requirements
- easy sharing of data thanks to a common data model

Except for highly specialised applications, the software packages used for processing GIS data are Autodesk and ESRI. GIS data is stored in an Oracle database.

SDSFIE

SDSFIE provides a standard for the development of a GIS or CAD drawing where all features (that is, "real-world" objects) are geographically referenced. The LAWA GIS standards are based on SDSFIE, extended in certain areas to handle specific information relevant to LAWA. The emphasis is on:

- geospatial referencing of each feature
- collecting and maintaining accurate data concerning each feature, stored in relational database tables

Changes or additions

Any deviation from these standards must be approved by LAWA, in advance and in writing. Requests need to be submitted on the "Request for variance" form, available from the LAWA website http://www.lawa.org/laxdev/Handbook.aspx

Suggestions for improvements or extensions to these standards are encouraged, to meet unforeseen requirements and as a way to improve effectiveness and clarify any ambiguities.

Compliance

Having up to date, accurate, fully compliant data available to the LAWA community is forms an integral part of planning within any project. The aim of these standards is to ensure a smooth data transfer of information into the LAWA geospatial data base and efficient data maintenance through the complete data lifecycle. Accordingly, the terms and conditions of a LAWA contract require compliance with these standards. Failure to comply with these standards may be taken into account when inviting organisations to participate in future LAWA projects.

LAWA or a third party reviewer will perform detailed quality assurance procedures on all data submitted. Files containing significant errors will be rejected and returned to the submitter for correction and re-submittal. To avoid delays to project planning, LAWA maintain the right to rework and make compliant the relevant data and back-charge the supplier.

Files submitted to LAWA electronically must meet *the LAWA Standards for Electronic Digital Data Exchange* (LSEDE), available from the LAWA website. The individual or organisation submitting the files is also responsible for ensuring that all links between non-graphic data and graphic data, and all relationships between database tables, shall be preserved or automatically reconstructed when data is transferred to the LAWA GIS environment.

Data organization

The data organization described in this standard is based upon the ANSI standard Spatial Data Standards for Facilities, Installations and Environment (SDSFIE), Release 2.60.

The SDSFIE standard organizes real world features such as runways, roads and water pipes into a hierarchical structure. The data model for SDSFIE consists of five basic levels of hierarchy:

Entity Sets	group data by function, in line with SDSFIE
Entity Classes	group data within each entity sets
Entity Types	group entities – individual, real world features (such as runways, roads and water pipes) represented on a map or drawing
Attribute tables	contain non-graphic information, or attribute data, used to describe entities; **relationships** define which attributes may be used to describe a given entity type
Domains	limit possible values for a particular attribute; list domains define a list of valid values for text attributes, range domains set upper and lower limits for numeric attributes.
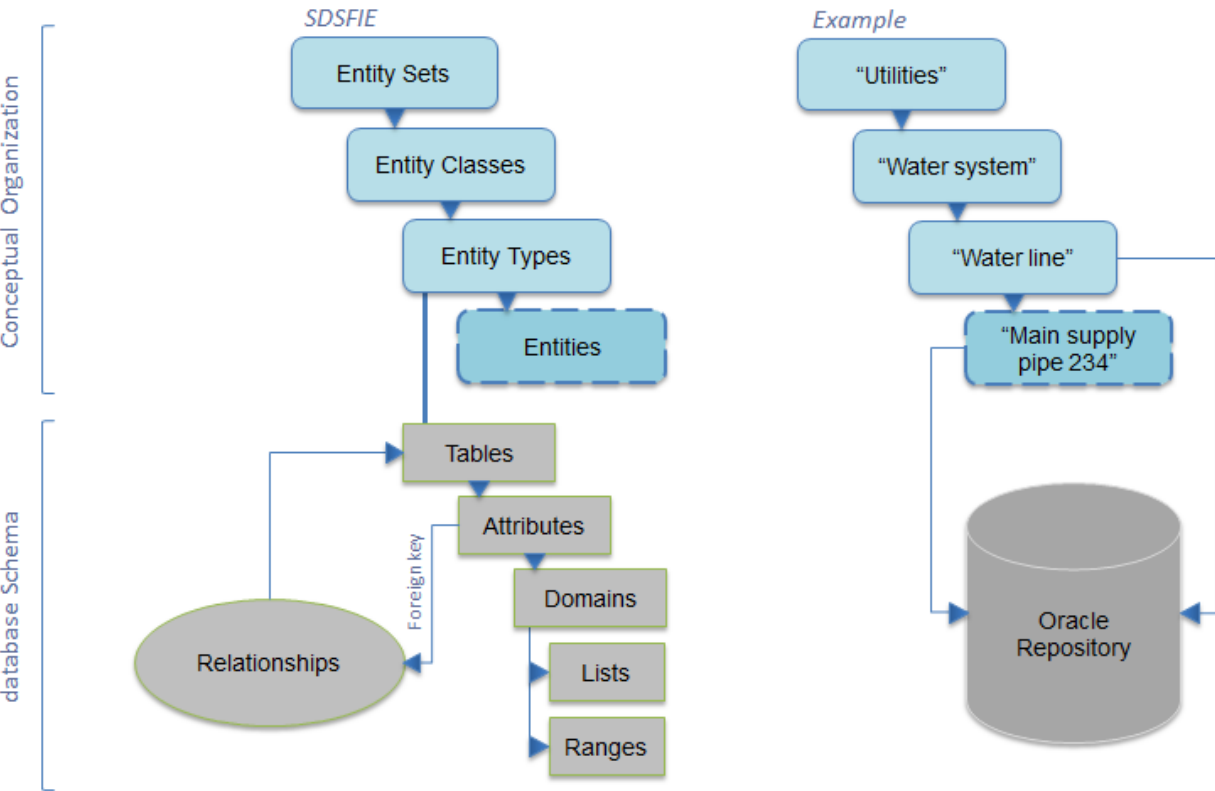
Figure 1.   Spatial data standard hierarchy

Implementing SDSFIE at LAWA

Every entity type at the airport, and the entities that belong to it, will have a minimal set of attributes that identify it uniquely, plus a number of other attributes that explain how it fits into the structure of entity types, entity classes and entity sets.
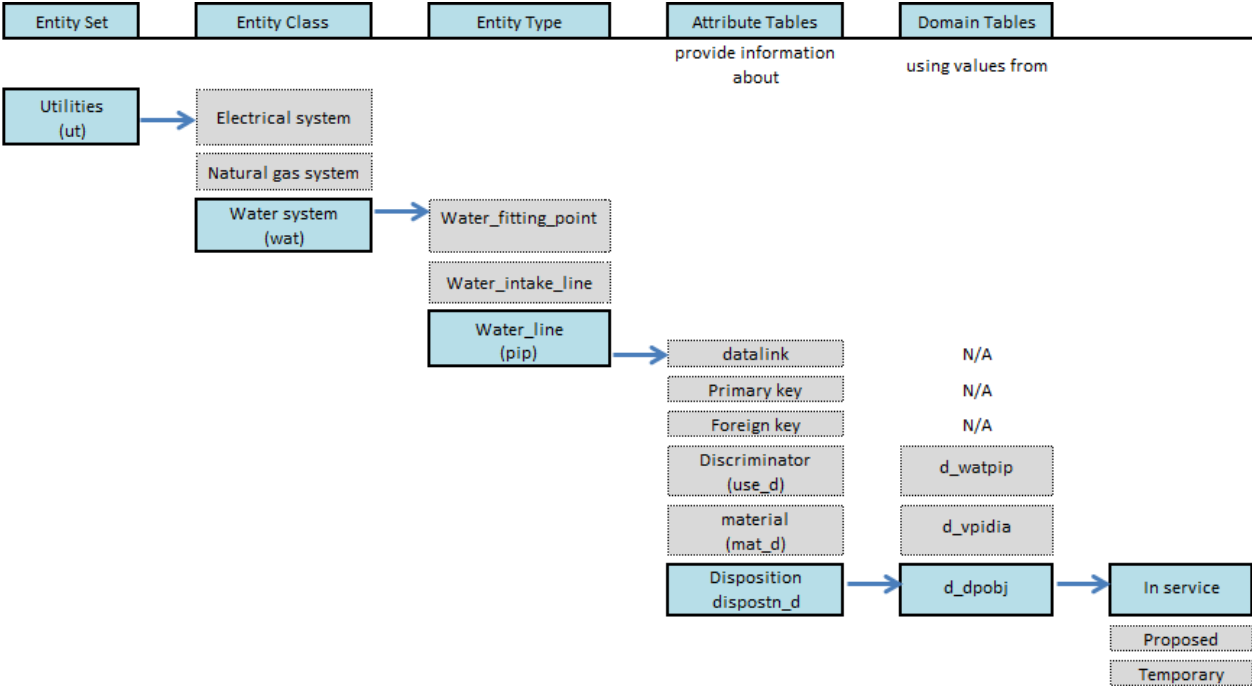
Figure 2.   SDSFIE data structure

Attributes common to most entity types include:

datalink

A unique identifier generated by the software, and used to link a database record to a specific graphic feature.

primary key

A unique, LAWA defined identifier for each record or instance of an entity.

foreign key

Used where an entity record held in one database table refers to information held in another table (building, project, owner and so on).

discriminator

When an entity type references a domain table, one of the attributes in the domain table must be identified as the *discriminator*. The default value for this attribute is specified in the attribute table.

Entity set

Entity sets are the highest level of the SDSFIE data model structure and represent data organised at the project level. Each entity set corresponds to a broad, generalized theme, and contains one or more entity classes.

SDSFIE identifies 26 top-level classifications or entity sets. The GIS standards for LAWA use the SDSFIE entity sets relevant to the airport and its surroundings to classify GIS data at LAWA by function

SDSFIE entity sets:

- have a unique name, 2-character code and definition
- determine the entity classes (and related tables) that may be grouped in an entity set
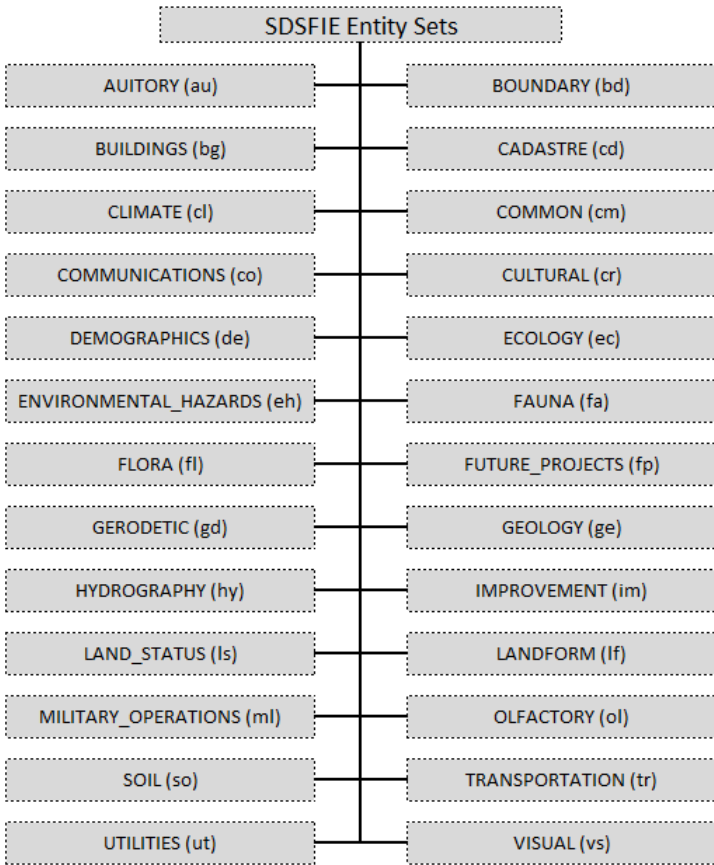
Figure 3.   SDSFIE entity sets

Each entity set has an entity set code and definition: see the example in the next table.

Table 1. Example of entity set information	
Entity set	Utilities
Entity set code	ut
Definition	The man-made components of a system that provides a service to the public. The components of each utility system in this entity set are located outside the foundation of a structure.

Entity classes

Entity classes are the second level of the hierarchy, and contain a number of entity types. The name of an entity class reflects the entity types the class contains.

In CAD applications, an entity class often corresponds to a drawing file.

Entity set	utilities	Entity class		Entity type	
Name		**Code**	**Definition**		
Compressed Air System		air	The components of a compressed air system.		
Control & Monitoring System		ecm	The components of an electronic monitoring and control (emcs) system, including cables, devices, etc.		
Electrical Exterior Lighting		axl	The components of an electrical exterior lighting system, including cables, switches, devices, transformers, etc.		
Electrical System		ele	The components of an electrical distribution system, including cables, switches, devices, motors, transformers, etc.		
Fuel System		ful	The components of a fuel distribution system, consisting of pipes, fittings, fixtures, pumps, tanks, etc.		
General Utility Features		gen	The components of a utility system which are universal in use and purpose and do not belong to a specific utility.		
Heating & Cooling System		hcs	The components of a heating and cooling distribution system, consisting of pipes, fittings, fixtures, etc.		
Industrial System		inw	The components of an industrial waste collection system, including pipes, fittings, fixtures, tanks, lagoons, etc.		
Natural Gas System		gas	The components of a natural gas distribution system, consisting of pipes, fittings, fixtures, etc.		
Saltwater System		swt	The components of a salt water collection system.		
Storm System		sto	The components of a storm drainage collection system, including pipes, fittings, fixtures, etc.		
Wastewater System		wwt	The components of a wastewater collection system, including pipes, fittings, fixtures, treatment plants, collection locations, etc.		
Water System		wat	The components of a water system, including pipes, fittings, valves, fixtures, treatment plants, etc.		

Figure 4.   Examples of entity classes from entity set `utilities`

Table 2. Example of entity class information from entity set `utilities` (ut)	
Entity class name	Water system
Entity class code	wat
Definition	The components of a water system including pipes, valves, fixtures, treatment plants, etc.

Entity types

An entity type is a name identifying a type of object that can be represented on a map or drawing. Each SDSFIE entity type has a text definition, a name that clearly identifies the entities it can contain, and a separate table in the database.

Every entity belonging to a particular entity type is represented on a map or drawing as an object type, using a point, a line or a polygon. Where an entity is represented as a point, an agreed symbol may also be used.

The attribute table for an entity type defines the attributes that may be used to describe that entity. One attribute for each entity type may be identified as the discriminator. The discriminator is used to determine which CAD layer is used for this entity type.

Entity set	utilities	Entity class	water system	Entity type				

Name	Object type	Polygon	Line	Point	Attribute table	Discriminator	Definition
water_anode_point	point			utwatand	utwatand	N/A	A material used for water distribution systems that is electrically connected to a less electrolytically active material so that it will oxidize in the place of the less active material.
water_anode_test_station_ point	point			utwatant	utwatant	N/A	A central location where anodes are tested for performance in water systems.
water_fire_connection_point	point			utwatfir	utwatfir	con_type_d	An apparatus which dispenses fluids for use in fire management.
water_fitting_point	point			utwatfit	utwatfit	type_d	A fitting is an item used to connect, cap, plug or otherwise alter a pipe carrying water.
water_hydrant_point	point			utwathyd	utwathyd	design_d	An apparatus which dispenses fluids.
water_intake_point	point			utwatsrc	utwatsrc	N/A	The location where water is allowed into the water distribution system.
water_junction_point	point			utwatmh	utwatmh	use_d	A box or small vault (usually concrete, brick, or cast iron) in water systems located below grade with above grade access where pipes intersect. The manhole also houses associated fittings, valves, meters, etc.
water_line	string/chain		utwatpip		utwatpip	use_d	A pipe used to carry water from location to location (main line, service line, vent line, etc).
water_marker_point	point			utwatmrk	utgenmrk	N/A	A sign, concrete monument, etc. installed either directly above or immediately adjacent to underground lines, bends, fittings, etc to indicate the presence of water.
water_meter_point	point			utwatmtr	utwatmtr	N/A	A device installed in a line for measuring the quantity and or rate of water flowing to a facility or through a section of line.
water_pressure_reducing_ station_point	point			utwatrst	utwatrst	N/A	A station consists of a box/pit containing one or more pressure regulators and appurtenant shutoff valves and fittings.
water_pump_point	point			utwatpmp	utwatpmp	N/A	A mechanical device for water system that draws material into itself through an entrance port and forces the material out through an exhaust port.
water_pump_station_site	point/polygon	utwatpsa		utwatpst	utwatpst	sta_ty_d	A building in which one or more pumps operate to maintain flow at adequate pressure within a water distribution system.
water_rectifier_point	point			utwatrec	utwatrec	N/A	A device that changes alternating current to direct current for an impressed current cathodic protection system on an element of the water distribution system.

Figure 5. *Examples of attributes for entity types in class* `water system`

Table 3. Example of entity type information	
Entity set	utilities
Entity class	water system
Entity type	Water line (pip)
Object type	string/chain
Line	utwatpip
Attribute Table	utwatpip
Discriminator	use_d
Definition	A pipe used to carry a substance from location to location (main line, service line, vent line etc.)

Entities

Using GIS effectively at LAWA relies on the ability to distinguish adequately between subtle differences between entities. This permits greater value in output products by displaying entities based on predetermined criteria.

Each entity belongs to one specific entity type. The object type used to represent an entity graphically depends on the entity type it belongs to.

Entity names:

- always begin with a prefix identifying the entity type and entity class the entity belongs to

- have a suffix from the list in the next table

Table 4. Entity name suffixes		
non-text entities – each entity uses a layer which is unique within its entity class		
b	Boundary	The line string forming the perimeter of an area
c	Centroid	An electronic point within the boundary to which the attribute table is attached
l	String/Chain	A collection of vertices, when taken as a whole, represent a line string on a map
p	Point	A single point representing the geographical location of a entity
text entities – all text entities for a given entity class use the same layer		
a	Label	The placement and position of a displayable attribute within the attachment attribute code
t	Text	Any annotation relating to the entity that adequately conveys information about the map product

Entity set	utilities	Entity class	water_system	Entity type	water_line
Entity name		**Discriminator value**	**Discriminator description**		**CAD layer**
utwat_line_abandoned_l		Abandoned	Abandoned piping		C-DOMW-ABND
utwat_line_fire_l		Fire	Fire lines		C-DOMW-FIRE
utwat_line_main_l		Main	Main domestic water piping		C-DOMW-MAIN
utwat_line_service_l		Service	Domestic water service piping		C-DOMW-SERV
utwat_line_sprinkler_l		Sprinkler	Piping (lawn sprinklers)		L-IRRG-PIPE

Figure 6.   Examples of entities in entity class `water system`

Table 5. Example of entity information	
Set name	utilities
Class name	water_system
Type name	water_line
Entity name	utwat_line_main_l
Discriminator value	Main
Discriminator description	Main domestic water piping
CADD layer	C-DOMW-MAIN

Attribute tables

Attributes are the fields that can be used to describe each individual entity, and depend on the entity type the entity belongs to. The attributes available for each entity type are defined in attribute tables.

Names for attribute tables

The names for LAWA attribute tables always start with the entity set and entity class prefix, for example `utwat`, and are always 8 characters long

Rows in attribute tables

Attribute tables always include contain:

- a Primary Key field; the name of this field ends in `_id`
- a `datalink` field

Attribute names

- end in `_d` if valid values are defined by an attribute domain
- end in `_id` if they contain a primary or foreign key

Each entity type has a corresponding table in the database. The attributes that can be used to describe a particular entity depend on the entity type, so several entities will refer to the same attribute table. For example, while a main water line and a fire water line are different entities, they use the same attribute table because they belong in the same entity type.

A complete list of attribute tables is available from the LAWA website.

UTILITIES WATER SYSTEM	Water line table	
table name	waterline	
table identifier	utwatpip	
table definition	This table contains data about water system pipes	
Attribute	**Oracle type**	**Definition**
size_d	varchar(16)	The manufacturers designated size, or nominal (i.e., rounded to the nearest unit) diameter for the subject item (e.g., 1in gas hydrant, 2in meter, 6in pipe).
type_d	varchar(16)	The kind, class, or group of the subject item.
source_d	varchar(16)	The source type for the origin of a water system's water supply.
use_d	varchar(16)	Discriminator. The use code for water pipes.
watzone_id	varchar(20)	Foreign Key. Used to link the record to the appropriate utility management zone.
watstat_id	varchar(20)	Foreign Key. Used to link the record to an associated station (pump station, pressure reducing station).
watsource_id	varchar(20)	Foreign Key. Used to link the pipe to an optional source.
watsect_id	varchar(20)	Foreign Key. Used to link the record to an associated pipe or cable section.
wattank_id	varchar(20)	Foreign Key. An operator generated identifier used to locally identify the subject item.
watpipe_id	varchar(20)	Primary Key. A unique, user defined identifier for each record or instance of an entity.
watplnt_id	varchar(20)	Foreign Key. The site specific unique identification name or number of the treatment plant.
w_util_d	varchar(20)	FOREIGN KEY - Links the record to UTWATUTI through primary key W_UTIL_ID.
datalink	integer	Graphic Key. A unique identifier generated by Computer-Aided Design and Drafting (CADD) or Geographic Information System (GIS) software that is used to link the database record to a specific graphic feature.

Figure 7.   Attribute table

Domain values

Domains place a limit on the values that can be assigned to a specific attribute. SDSFIE contains two tables that define list domains and range domains.

Note: domain tables all have the prefix `d_` in the name of the table, for example `d_dpobj` or `d_headng`

- list domains contain a list of valid values

  When an attribute is associated with a list domain, it is not possible to type in a value directly. The user has to select a pre-defined value from a pull-down.

- range domains apply only to numeric value; they define a maximum value, a minimum value, or both.

The next figure shows an example of a list domain.

Domain table name	d_dpobj
Domain type	list
Domain definition	Allowable input for the disposition of an object.

Value	Definition
ABANDONED	abandoned in place (not in use)
BURIED	buried
IN_SERVICE	in service and being used
INCOMPLETE	incomplete or unfinished
NATURAL	natural
OTHER	other
PERMANENT	permanent
PROPOSED	proposed
RETIRED	permanently retired, or taken out of service
TBD	to be determined
TEMPORARY	temporary
UNKNOWN	unknown

Figure 8.   List domain

Table 6. Example of attribute value from list domain	
Domain table name	d_dpobj
Domain name	disposition list
Value code	IN_SERVICE
Definition	In service and being used

The next figure shows an example of a range domain.

Domain table name	d_headng
Domain type	range
Domain definition	The limits on directional heading in degrees; e.g. 0 through 360.
Maximum value	360
Minimum Value	0

Figure 9.   *Range domain*

This table gives the acceptable range of values for a directional heading. When an attribute is associated with a range domain, values outside the specified limits are not accepted.

LAWA SDSFIE data dictionaries

The LAWA SDSFIE data dictionary for GIS attribute tables is available from the LAWA website. Only attributes defined in this dictionary can be used. If additional attributes are found to be necessary, a variance form must be submitted and approved before the new attribute can be added to the data dictionary. The variance form is available from the LAWA website.

All LAWA GIS projects use this dictionary. It is organised by attribute table, and each table corresponds to an entity type. For each entity type, the dictionary gives:

- attribute table information
- valid attributes and their data types
- the definition of each attribute

See Figure 7. for an example of an attribute table.

There is a separate LAWA SDSFIE data dictionary for graphical entities. Only entities defined in this dictionary can be used. If additional entities are needed, a variance form must be submitted and approved before the new entity can be used. The data dictionary and the variance form are available from the LAWA website.

Utilities Water System	graphic properties for water_line
Feature type	list
Domain definition	Allowable input for the disposition of an object.
Tablie identifier	utwatpip
Table definition	A pipe used to carry water from location to location (main line, service line, vent line etc.)

Discriminator value	Entity name	Layer	Entity alpha	Line type	Line width	Color	Symbol library	Symbol name
ABANDONED	utwat_line_abandoned_a	10	utwatlnaba	0	1	3	N/A	N/A
ABANDONED	utwat_line_abandoned_l	9	utwatlnabl	41	2	3	tssdslin	N/A
ABANDONED	utwat_line_abandoned_t	10	utwatlnabt	0	1	3	N/A	N/A
FIRE	utwat_line_fire_a	54	utwatfirea	0	1	3	N/A	N/A
FIRE	utwat_line_fire_l	54	utwatfirel	67	2	3	N/A	N/A
FIRE	utwat_line_fire_t	54	utwatfiret	0	1	3	N/A	N/A
MAIN	utwat_line_main_a	2	utwatlnmna	0	1	3	N/A	N/A
MAIN	utwat_line_main_l	1	utwatlnmnl	67	2	3	tssdslin	N/A
MAIN	utwat_line_main_t	2	utwatlnmnt	0	1	3	N/A	N/A
RAW_WATER	utwat_line_nonpotable_a	6	utwatlnnpa	0	1	3	N/A	N/A
RAW_WATER	utwat_line_nonpotable_l	5	utwatlnnpl	53	2	3	tssdslin	N/A
RAW_WATER	utwat_line_nonpotable_t	6	utwatlnnpt	0	1	3	N/A	N/A
SERVICE	utwat_line_service_a	4	utwatlnsva	0	1	3	N/A	N/A
SERVICE	utwat_line_service_l	3	utwatlnsvl	67	2	3	tssdslin	N/A
SERVICE	utwat_line_service_t	4	utwatlnsvt	0	1	3	N/A	N/A
SIPHON	utwat_line_siphon_a	56	utwatsipaa	0	1	3	N/A	N/A
SIPHON	utwat_line_siphon_l	55	utwatsipal	0	1	3	N/A	N/A
SIPHON	utwat_line_siphon_t	56	utwatsipat	0	1	3	N/A	N/A
SPRINKLER	utwat_line_sprinkler_a	8	utwatlnspa	0	1	3	N/A	N/A
SPRINKLER	utwat_line_sprinkler_l	7	utwatlnspl	20	2	3	tssdslin	N/A
SPRINKLER	utwat_line_sprinkler_t	8	utwatlnspt	0	1	3	N/A	N/A

Figure 10.   Data dictionary for graphical entities

All LAWA GIS projects use this dictionary. For each entity type, it gives:

- discriminator value
- entity name
- CAD layer
- Entity alpha

  Unique alphabetic code (10 characters) for each entity. These codes always start with the map prefix for the entity class (see Map/file-name prefix, on page 23), and end with the letter corresponding to the entity type suffix (see Entity name suffixes, on page 15).

- Line, color and symbol information

File names

SDSFIE uses a five-character prefix for map names and drawing-file names. This prefix is made up from the entity set code and the entity class code.

Entity set name	Entity set code	Entity class name	Entity class code	Map prefix	Definition
utilities	ut	Compressed Air System	air	utair	The components of a compressed air system.
utilities	ut	Control & Monitoring System	ecm	utecm	The components of an electronic monitoring and control (emcs) system including cables, devices, etc.
utilities	ut	Electrical Exterior Lighting	exl	utexl	The components of an electrical exterior lighting system including cables, switches, devices,
utilities	ut	Electrical System	ele	utele	The components of an electrical distribution system including cables, switches, devices, motors, transformers, etc.
utilities	ut	Fuel System	ful	utful	The components of a fuel distribution system consisting of pipes, fittings, fixtures, pumps, tanks, etc.
utilities	ut	General Utility Features	gen	utgen	The components of a utility system which are universal in use and purpose and do not belong to a specific utility.
utilities	ut	Heating & Cooling System	hcs	uthcs	The components of a heating and cooling distribution system consisting of pipes, fittings, fixtures. etc.
utilities	ut	Industrial System	inw	utinw	The components of an industrial waste collection system including pipes, fittings, fixtures, tanks, lagoons, etc.
utilities	ut	Natural Gas System	gas	utgas	The components of a natural gas distribution system consisting of pipes, fittings, fixtures, etc.
utilities	ut	Saltwater System	swt	utswt	The components of a salt water collection system.

Figure 11.   Map/file-name prefix

Entity set name	Utilities (ut)
Entity class name	Water system (wat)
Map prefix	utwat
Definition	The components of a water system including pipes, valves, fixtures, treatment plants, etc.

Each user/installation can use unique suffixes to identify different versions and updates of map and drawing files.

by date	utwat20000516 or utwat51600
by year	utwat2000
sequence number	utwat01

All files submitted must be compatible with LAWA hardware and software as follows:

- GIS data files: ArcView Shape File, ESRI SDE, AutoCAD Map (a recent version)
- vector graphics: AutoCAD (a recent version)
- raster graphics: TIF, ECW, SID
- digital media: CD-ROM, DVD-ROM, Flash drive, USB HD

Coordinate system and property addressing grid

This coordinate system for all AIMS applications, including LUSAD will be the State Plane California Coordinate System (Feet) (CCS83) using the North American Datum of 1983 California Zone 5 (NAD 83) for horizontal data and the North American Vertical Datum of 1988 (NAVD 88) for vertical data. Coordinate references must be compliant with AC 150/5300-18b.

Property addressing grids are available for LAX, ONT, and VNY

Translating CAD layers to GIS layers

The standard for GIS layers is based on the major groups of the SDSFIE data standard. The next figure illustrates how a layer is named from the entity set, entity class, and entity type that it belongs to.

CAD and GIS systems are similar because both of them may contain a mix of graphical and tabular data. In a CAD-based GIS, each entity is assigned a particular set of layers or levels. Each layer represents a particular discriminator and graphic property for that entity, which means there can be a many-to-one relationship between layers and entities. As a result, multiple CAD layers may translate into one GIS layer.

A translation table, in order to ensure proper translation from CAD data to GIS data, is available from the LAWA website. This table maps layers in the LAWA *CAD Layering Standard* to the GIS layering standard.

Example

CAD uses different layers to represent water lines with different functions, for example:

- CAD layer C-DOMW-MAIN for a domestic water main
- CAD layer C-DOMW-FIRE for a fire line

GIS uses the single entity type `utwatpip` (water pipe line) to represent both of these water lines, and uses attributes to identify the difference between them.

LAWA uses the Feature Classification tool in AutoDesk Map to make it easier to convert CAD based drawings into useable GIS features.
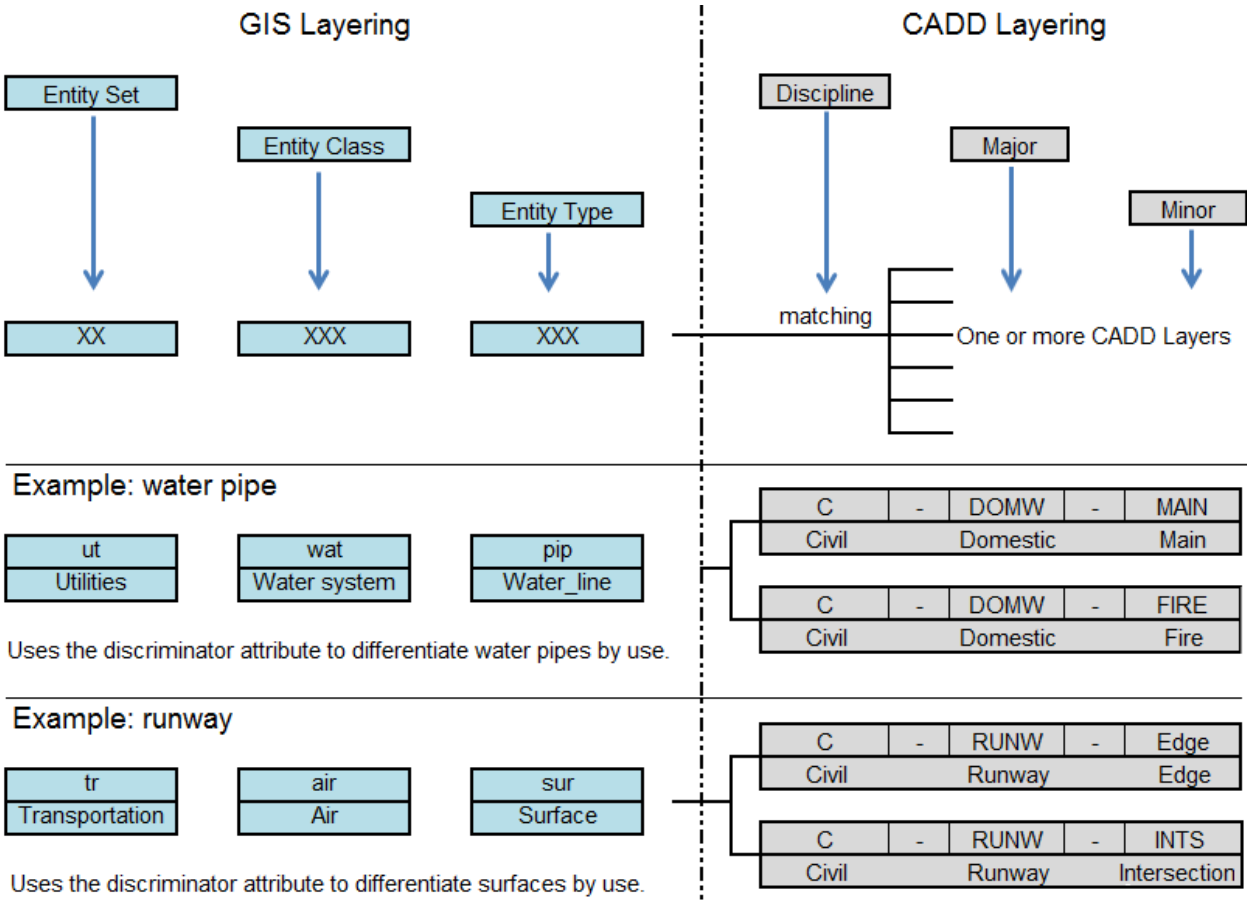
Figure 12.   GIS conventions and CAD conventions for layers and naming compared