



**Computer Aided Drafting
(CAD) Standards (V1.0)
Facilities Planning and Construction
2014**

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1 Introduction

1.1 The Need for (CAD) Standards

The University of Nebraska–Lincoln Facilities Planning and Construction Department (UNL FPC) is responsible for archiving electronic “as-built” construction documents produced as part of capital construction projects.

UNL FPC is also responsible for generating and maintaining accurate electronic floor plans for all campus facilities. These floor plans support many campus entities and initiatives including telecommunications, building automation systems, CCTV, access control, maintenance management, security, Institutional Research & Planning (IRP) and Geographic Information Systems (GIS).

In addition, UNL FPC staff performs Architectural/Engineering design services on an in-house basis for some capital construction projects.

In order to support UNL FPC's missions, a well-defined and detailed set of Computer Aided Design (CAD) standards are required in order to maximize efficiencies and usability.

This document details UNL FPC's CAD standards for the production and delivery of CAD documents for all capital construction projects.

1.2 Building Information Modeling (BIM)

The University recognizes the benefits of the BIM process but has not fully developed a well-defined set of standards for deliverables that make use of this technology. As this technology continues to evolve, UNL FPC will review and expand these CAD Standards to include BIM. When BIM models are used as part of the design process then the model shall be converted/exported to AutoCAD®.dwg formatted CAD files that are fully compliant with all of the standards outlined herein.

1.3 Standard of Production

The intent for the standard production of drawings and plans is to allow a multitude of personnel to review, revise, share, maintain and print various archived projects which all have similar parameters. These parameters include:

- Layering and colors
- Scale factors, line types and line weights
- Font type and size
- Room and door numbering
- Title block and sheet titles
- Drawing sequence and sheet numbers
- Model/Paper space and external reference files (Xrefs)

UNL FPC has adopted the latest version of the AIA CAD Guidelines found in the United States National CAD Standard. All layer names and descriptions shall follow these standards. Some layer attributes in the AIA CAD Guidelines have been predefined by UNL FPC with set Colors, Linetypes and specific layer names in order to maximize the printed clarity of archived drawings and to conform to core layer line weight/color assignments. It is required that all vendors providing CAD documents to the University adopt the AIA CAD Guidelines as well as implement the predefined layer attributes described herein.

2 CAD Drawing Setup Process

2.1 CAD Drawing File Format

UNL FPC require that vendors submit the most current version of AutoCAD®.dwg formatted CAD files for all capital construction intermediate design submittals and final "as-built" documents that are fully compliant with all of the standards outlined herein, and which have no significant loss of drawing entities or project data that can result from standard CAD file translation procedures. PDF and DXF files will not be accepted at project closeout as a *substitution* for ".dwg" CAD file deliverables only as supplemental information.

All CAD files submitted shall be in the latest addition of Autodesk AutoCAD®.dwg format.

2.2 Sheet Numbering and File Identification

2.2.1 Sheet Numbering

The drawing/project sheet number for all projects must follow the single or double discipline, uppercase alphabetic designator followed by a three digit numerical sheet number with a dot, no spaces. The three digit numerical number and dot can be used in any fashion at the discretion of the coordinating professional and shall be similarly repeated by all disciplines. The numbers shall be arranged and used on a project by project basis as it pertains to the size and complexity of a project, the number of floors, construction phases, etc. A single or double digit number or sheet number not using a dot is unacceptable (i.e. A100; A01 or A4). A building name, acronym, project title or progress phase shall not be included in any way as part of the sheet numbering. Below is an example of the UNL FPC sheet numbering nomenclature required:

“G0.01” or “A1.00” or “MD2.10” or “FP3.30”, etc.

The first digit represents the discipline designator (G – General Sheet) (A – Architectural Sheets) (MD – Mechanical Demolition Sheets) (FP – Fire Protection Sheets) etc. Followed by a three digit numerical sheet number with a dot, no spaces (0.01) (1.00) (2.10) (3.30) etc. which is determined by the coordinating professional based on the project complexity/parameters and similarly followed by all other disciplines.

2.2.2 File Identification

The drawing/project file name for all projects must be represented with the UNL project number and drawing/project sheet number. Each CAD, PDF or Revit® drawing file shall be preceded with the UNL project number followed by a hyphen and then the drawing sheet number (as described previously) with no spaces. Finally, a last dot and then the file extension shall conclude the complete file naming. A building name, acronym, project title or progress phase shall not be included in any way as part of the file naming. Below is an example of the UNL FPC file naming nomenclature:

“467123-A1.01.dwg” or “467123-SD2.01.pdf”

The first digits represent the UNL project number (467123), then the hyphen as a placeholder to help make the name more readable and easier to manage, followed by the sheet number (A1.01) (SD2.01). The sheet number includes the discipline designator (A – Architectural) in this case a single digit used for Architectural but expandable up to two alphabetical characters as indicated for (SD – Structural Demolition). Next a three digit numerical sheet number with a dot, no spaces and finally the dot file name extension (.dwg – AutoCAD® file) (.pdf – Adobe System File).

2.2.3 Alternate File Identification

In some cases grouped PDF files, external CAD references/images, zipped files or Revit® models may require an alternate nomenclature. Each PDF, CAD, ZIP or Revit® drawing file shall be preceded with the UNL project number followed by a hyphen, then must follow the single or double discipline, uppercase alphabetic designator as deemed appropriate followed by a dot and the grouped file name, external CAD reference description or short Revit® Model description, no spaces. A building name, acronym, project title or progress phase shall not be included in any way as part of the file naming. Variations of acceptable file naming nomenclature for these type of files are indicated below:

“467123-AE.binder.pdf” or “467123-ME.binder.pdf” or “467123-X.firstfloor.dwg” or “467123-A.binder.zip” or “467123-AE.model.rvt”

The first digits represent the UNL project number (467123), then the hyphen as a placeholder to help make the name more readable and easier to manage, followed by the file name (AE.binder) (ME.binder) (X.firstfloor) (A.binder) (AE.model). The file name includes a single or double digit discipline designator as deemed appropriate (AE = all Arch/Eng. sheets in one file) (ME = Mechanical Electrical sheets) (X =

AutoCAD® external reference file) (A = Architectural sheets). Finally the dot and a file name extension (.pdf – Adobe System file) (.dwg – AutoCAD® file) (.zip – Zipped file) (.rvt – Revit® file).

2.3 Drawing Environment

2.3.1 External Reference & Imported Image Files

All drawing floor plans shall be set up for shared use with external reference files (xrefs). Xrefs must be inserted into sheet files as an attachment or overlay using relative path method in lieu of the full path method. Relative path allows drawings to be moved between subdirectories and still maintain their xref links. Full path (absolute) xref's are not allowed. UNL FPC encourages that any imported image files such as JPG's, Tiff's, BMP's, PDF's, etc. used within a CAD drawing also be imported in the same manner and with the same requirements as drawing xrefs.

The base point for all drawing floor plans shall be set in model space at 0,0,0 reference point. Likewise, all drawing floor plan xrefs inserted into a drawing shall be set in model space at 0,0,0 reference point. This helps to provide for a consistent insertion placement point from file to file.

Sheet title blocks shall be inserted as an xref into paper space at 0,0,0 reference point. Title block sheet identification names and sheet page numbers *shall not* be part of the xref and *shall be* editable from sheet to sheet. Title block sheet project information text *shall be* part of the xref and *shall not* be editable from sheet to sheet. UNL FPC requires that all vendors utilize the standard University of Nebraska–Lincoln title blocks, available for download in the CAD library download section. Refer to Blocks, Details and Title Blocks section herein for additional information.

Upon project completion and prior to delivery to UNL FPC all external reference files that were used during CAD production shall be bound, inserted and retained as a block within a single drawing file, this includes the title block and any image files. UNL FPC will **not** accept the submission of any CAD drawings that contain external reference files.

2.3.2 Model Space and Paper Space

All submitted CAD file drawings shall contain only *one* variation of the *floor plan and site plan* in model space. *Multiple* enlarged partial plans, sections, elevations, details, schedules, dimensions, notes and other material directly related to the drawing set shall also be completed in model space. Model space shall not contain any alternate design considerations, collaboration ideas, multiple variations of design and other work that is not needed or not meant to be submitted as part of the construction documentation.

Paper space is reserved to be used for viewports, title block and sheet titling information only. Multiple paper space tab views, each with its own set of viewports, title block and sheet titling information is acceptable. Each tab view shall be named with the exact respective individual sheet number of depicted sheet. Tab view number and respective sheet number shall strictly follow UNL FPC sheet numbering nomenclature.

Each paper space tab view in a single drawing file is reserved for viewports depicting the elements of that particular floor, space or area. Multiple floor plan levels, (i.e. basement, first floor, second floor, etc.) shall be laid out and provided in separate drawing files. UNL FPC will not accept multiple floor levels within one single drawing file. Limit paper space layouts to only those sheets being submitted as part of the construction documentation.

3 CAD Parameters

3.1 Units and Tolerances

3.1.1 Units of Measure

All CAD drawings shall be drawn in architectural units of feet and inches with a precision not less than 1/64". The format, precision and other conventions to be used in displaying coordinates, distances and angles are set and saved in the drawing units. This system of measure also pertains to the drawing geometry and appropriate distance values required when dimensioning.

3.1.2 Tolerances

Building floor plans, elevations, details and sections shall be shown at not less than 1/16" = 1'-0" scale and no more than 1/2" = 1'-0" drawings scale. Enlarged partial floor plans, sections and details shall be viewed at not less than 1/4" = 1'-0" and no more than 3/4" = 1'-0" drawing scale. Details, schedules and risers are acceptable to be viewed with no particular drawing scale. In these instances the text height of non-scaled entities shall follow the guidelines set forth in the text styles, heights and fonts sections. When circumstances warrant the use of alternate desired drawing scales the vendor shall request a variance through the UNL FPC Project Manager or representative prior to design.

3.1.3 Scale Factors

All CAD model space drawings shall be drawn at full scale. For example when drawing a door in CAD, the door should be drawn 3 feet wide and 7 feet tall.

Model space layouts shall be inserted into paper space via viewports as described previously. Viewports within paper space are required to be scaled to fit the actual sheet size. To do this, a scale factor is required so that the final printed or viewed drawing sheet has a usable scale reference. Below is a quick reference guide for standard architectural scale factors to be used in scaling up or down and as a reference for text size associated with the respective scale of the drawing or viewport.

3.1.4 Scale Factor and Text Table

Drawing Scale	Scale Factor Up	Scale Factor Down	Viewport Scale	Decimal Scale	Model Space Text Height	Paper Space Text Height
1/16" = 1'-0"	192	0.0052083	1/192xp	.0625" = 1'-0"	18"	3/32"
3/32" = 1'-0"	128	0.0078125	1/128xp	.09375" = 1'-0"	12"	3/32"
1/8" = 1'-0"	96	0.0104166	1/96xp	.125" = 1'-0"	9"	3/32"
3/16" = 1'-0"	64	0.015625	1/64xp	.1875" = 1'-0"	6"	3/32"
1/4" = 1'-0"	48	0.0208333	1/48xp	.25" = 1'-0"	4.5"	3/32"
3/8" = 1'-0"	32	0.03125	1/32xp	.375" = 1'-0"	3"	3/32"
1/2" = 1'-0"	24	0.0416666	1/24xp	.50" = 1'-0"	2.25"	3/32"
3/4" = 1'-0"	16	0.0625	1/16xp	.75" = 1'-0"	1.5"	3/32"
1" = 1'-0"	12	0.08333	1/12xp	1" = 1'-0"	1.125"	3/32"
1 1/2" = 1'-0"	8	0.125	1/8xp	1.5" = 1'-0"	0.75"	3/32"
3" = 1'-0"	4	0.25	1/4xp	3" = 1'-0"	0.375"	3/32"
1" = 10'	120	.00833	1/120xp	1" = 10'	11.3	3/32"

1" = 20'	240	.00417	1/240xp	1" = 20'	22.5	3/32"
1" = 30'	360	.00278	1/360xp	1" = 30'	33.8	3/32"
1" = 40'	480	.00208	1/480xp	1" = 40'	45	3/32"
1" = 50'	600	.00167	1/600xp	1" = 50'	56	3/32"
1" = 60'	720	.00139	1/720xp	1" = 60'	68	3/32"
1" = 100'	1200	.00083	1/1200xp	1" = 100'	113	3/32"
<i>All general drawing plan text size shall print out with a minimum height of 3/32"</i>						

3.2 Drawing

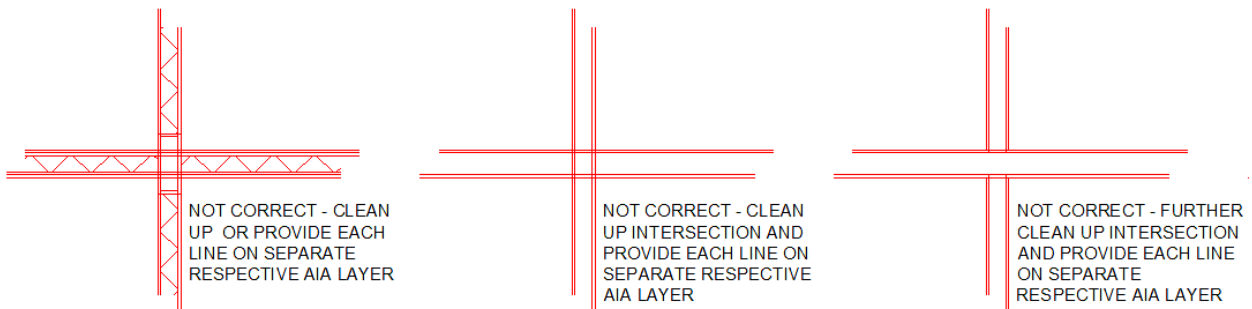
3.2.1 Drawing Description

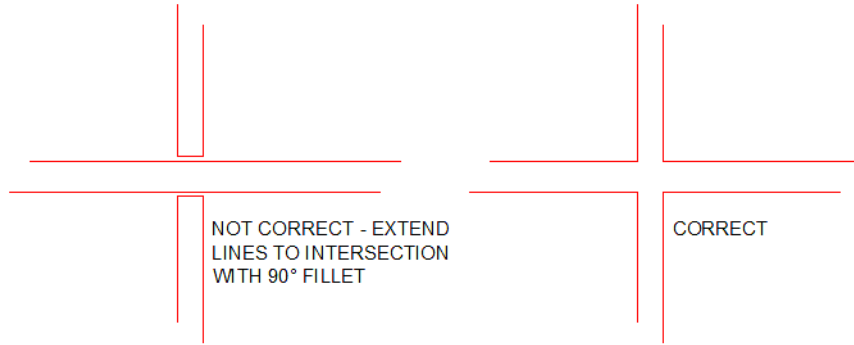
All drawing plan layout entities including but not limited to details, diagrams, hatch patterns, wall types, symbols, line types, text and other predefined entities are strictly required to be created in the correct UNL FPC standard layers and with bylayer properties. All predefined entities shall revert to layer 0 or bylayer properties when exploded. All predefined entities created in programs other than AutoCAD® shall also revert to bylayer properties. UNL FPC requires the use of bylayer properties in order to swiftly and easily convert misused vendor layers and colors to the required UNL standard layer and layer properties. The standard UNL layer properties are essential to internal reproduction of plans from department to department without the need for storing and managing vendor plot styles.

Similarly blocks, symbols and details shall also be created with bylayer properties and revert to layer 0 or bylayer properties when exploded. Refer to the Blocks and Details section herein for additional information on the use and insertion of blocks within floor plans, drawings and/or xrefs.

3.2.2 Drawing Walls

All walls and elements of wall construction shall be clean and clear of erroneous additional lines, double lines, fillers, hatch patterns, etc. which depict drywall, vapor barriers, insulation, air gaps, etc. Wall intersections shall be shown as actual intersections with lines terminating and/or ACAD fillet with intersecting wall line so that it is also clean and clear of erroneous lines, double lines, fillers, hatch patterns, etc. UNL FPC archived drawings require walls be shown with only two lines, depicting the outer most extents of walls. In the event that multiple lines are required to be shown on construction drawings to depict the various construction materials of the wall then the outer most lines of the drawn wall shall be on layer A-WALL and all other lines labeled with an alternate layer name so that erroneous lines not relevant to UNL can be easily frozen or isolated and erased upon delivery of drawing file to UNL FPC. Refer to the examples below for the properly drawn wall detail as it relates to UNL archived drawing requirements.





3.3 Room, Space and Area

3.3.1 Polylines and Room Square Footage

Each room, space, area, and general circulation space such as lobbies, corridors, vestibules, stairs and mezzanines shall be individually enclosed by a continuously joined polyline. The Polyline and square footage number associated with these individual space polylines shall be included in the space on the plans and provided on the appropriate layer and in the text style, font and size as listed in the text table herein this document.

The space polyline and area square footage numbers associated with individual rooms, spaces and area as previously described shall be included on the AutoCAD®.dwg plans. This procedure is similar to the process created with using BIM models. When a BIM model is used the polyline process shall be exported from Revit® as part of the AutoCAD® export feature. When exporting Revit® to AutoCAD® *in session export setup* click the *Modify Export Setup* button then select the *General* tab. Under the *General* tab check the *Room and Area Boundaries* box to *Export Rooms and Areas as Polylines*.

3.4 Text

3.4.1 Text Descriptions

UNL FPC requires that all text associated with the drawing of building floor plans, elevations, enlarged floor plans, section, details, schedules, risers, notes, call-outs, dimensions and titles be represented a standard UNL text style and font as indicated in the table below. All model text heights shown (unless noted otherwise) represent a model space layout drawn at 1/8"=1'-0" scale. Refer to the afore mentioned scale factor section for conversion of model space text height per respective scale factor.

3.4.2 Text Style, Font and Size Table

Use	Text Style	Font	Width	Model Space Height	Paper Space Height	Angle	Color	Orientation
Room, Space Name/No.	UNL-Dwg Text	Arial	1.0	1'-0"	1/8"	18	White 7	90°
Door No.	UNL-Dwg Text	Arial	1.0	1'-2"	9/64"	0	White 7	0° or 90°
Area SF	UNL-Dwg Text	Arial	1.0	1'-6"	3/16"	18	White 7	90°
Dimensions	UNL-Dim Text	Arial	1.0	9"	3/32"	0	White 7	0° or 90°

Leader Note	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	White 7	0°
General Note	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	White 7	0°
Keyed Note	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	White 7	0°
Equip. Tag	UNL-Dwg Text	Arial	.9	9"	3/32"	0	White 7	0° or 90°
Demolition Text	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	White 7	0°
Existing to Remain Text	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	145, 155 or 163	0°
Gen. Single Line Text	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	White 7	0° or 90°
Elevation/Detail/Section Text	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	White 7	0°
Riser Text	UNL-Dwg Text	Arial	1.0	9"	3/32"	0	White 7	0° or 90°
Note Titles	UNL-Dwg Text	Arial	1.0	1'-0"	1/8"	0	White 7	0°
Schedule Titles	UNL-Dwg Text	Arial	1.0	1'-0"	1/8"	0	Red 1	0°
Elevation/Detail/Section Titles	UNL-Dwg Text	Arial	1.0	2'-0"	1/4"	0	Red 1	0°
Plan & Sheet Titles	UNL-Dwg Text	Arial	1.0	2'-0"	1/4"	0	Red 1	0°
Title Block General Info	UNL-Dwg Text	Arial	1.0	---	1/8"	0	White 7	0°
Title Block Sheet Title & Projct.Name	UNL-Dwg Text	Arial	1.0	---	3/16"	0	White 7	0°
Title Block Sheet Numb	UNL-Dwg Text	Arial	1.0	---	3/8"	0	White 7	0°
All model space text sizes above are listed at 1/8"=1'-0" for reference, actual text sizes to be adjusted according to respective scale factors. Only the above text style, sizes and fonts are approved by UNL FPC, no frame, fill or non-standard AutoCAD® text shall be used. Alternate styles, sizes and fonts must have prior approval by UNL FPC.								

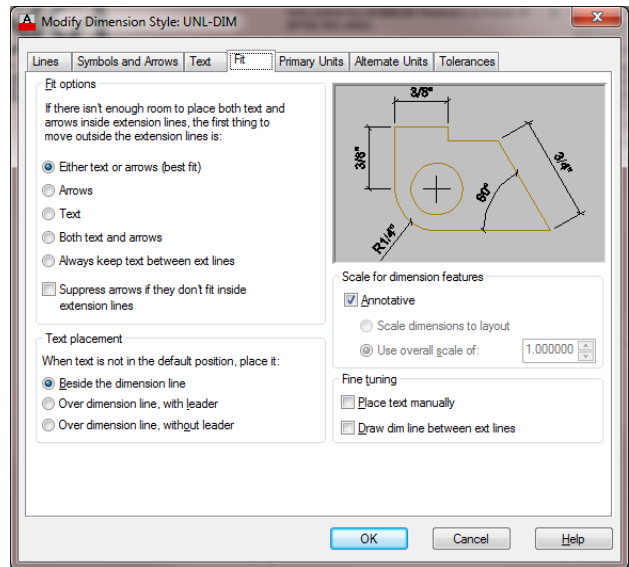
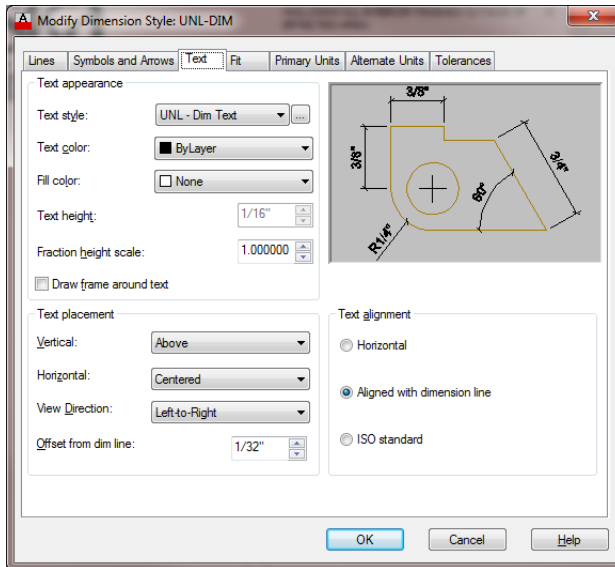
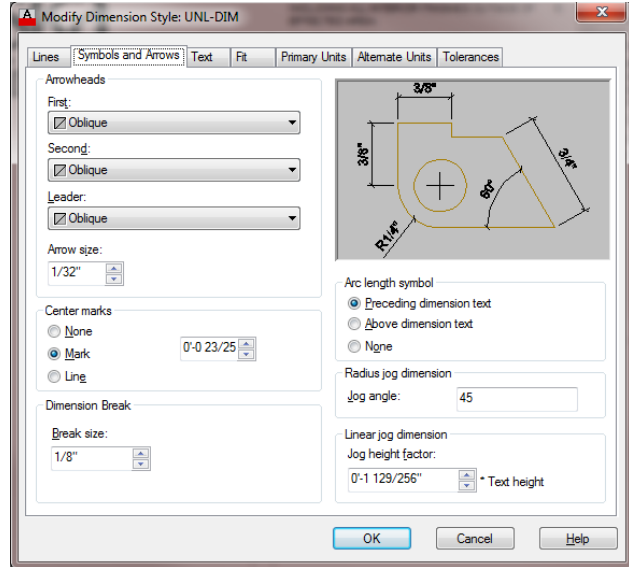
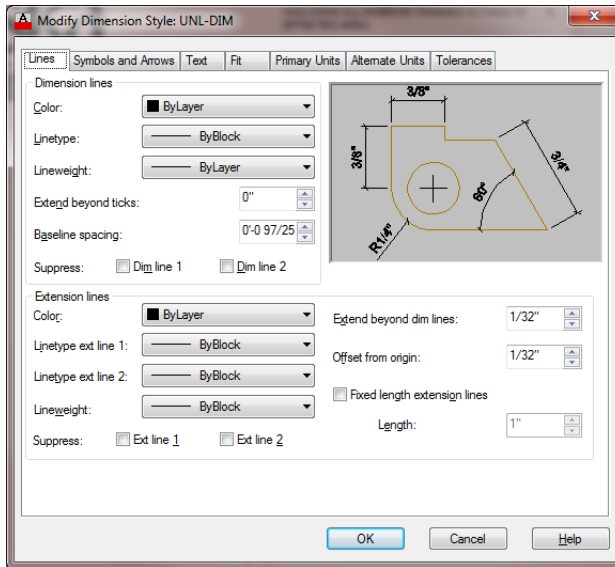
3.5 Dimensioning

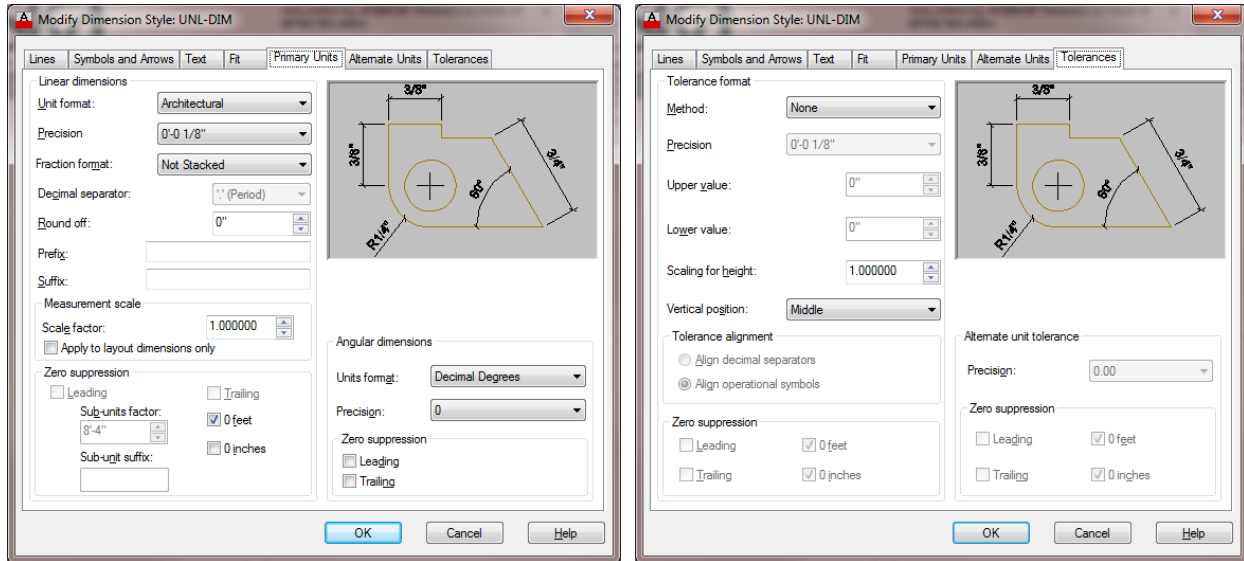
3.5.1 Dimension Description

All dimensioning shall be completed in model space. Dimensioning shall also be completed in layer A-ANNO-DIMS, bylayer, white (7), continuous linetype and default lineweight. UNL does not recognize the use of Interior (I) discipline designator layers for dimensions and request that this either not be used when at all possible or be converted to A-ANNO-DIMS layer upon output to AutoCAD®.dwg delivery to UNL FPC.

3.5.2 Dimension Style Parameters

UNL FPC suggests the use of the standard UNL FPC dimension style. “UNL-DIM” dimension style is available for download with the drawing title block templates found in the CAD library downloads section. UNL-DIM style parameters shall be set according to the UNL FPC standard dimension styles shown below: *Alternate Dimension Style Units are not defined therefore the Dialog Box is not displayed.*





3.6 Blocks, Details and Title Blocks

3.6.1 Block Definitions

All parameters of a CAD drawing including blocks, details, symbols and any other predefined entities shall be easily modified. Floor plans, backgrounds, blocks, details, symbols and other predefined entities shall be easily manipulated to match the UNL FPC uniform standard layer and layer color assignments for best viewing and plotting.

All blocks, block definitions, details, hatch patterns, walls types, symbols, line types and other predefined entities including block attributes shall be created in layer 0 with bylayer properties. All predefined block entities shall revert to layer 0 and Bylayer properties when exploded. Blocks created in layer 0 and bylayer properties shall be inserted into the CAD drawing and then placed in the respective layer for said entity. All predefined entities created in programs other than AutoCAD® shall also revert to layer 0 and bylayer properties. Avoid the use of nested blocks.

3.6.2 UNL FPC Defined Blocks and Details

UNL FPC has created a library of general blocks and details specific to UNL projects. Refer to the CAD library downloads section and utilize the blocks and details as required for respective project needs.

3.6.3 Vendor Defined Blocks and Symbols

Utilize the US National CAD Standards V5, AIA, ASHRAE and SMACNA for user defined blocks and symbols. Represent all Blocks and Symbols with a well-defined symbols legend sheet that accurately depicts these items. Vendor defined blocks and symbols shall be created with bylayer properties and attributes and inserted into the drawing with the appropriate AIA CAD layering guideline. When initially creating a user defined block or symbol, such entity shall be constructed such that it will revert back to layer 0 when exploded. All predefined entities created in programs other than AutoCAD® shall also revert to layer 0 and Bylayer properties.

3.6.4 UNL Title Blocks

UNL FPC requires the use of a standard UNL cover sheet and UNL title block. The cover sheet and title blocks are available for download and can be found in the CAD library downloads section. 24"x36" and 30"x42" title block sheets are the standard size required by UNL FPC. There may be times when it may become necessary to utilize a larger or alternate sized title block for special circumstances. In the event an alternate sized title block is needed it shall be constructed similarly and with the same attributes as standard UNL title blocks. The alternate title block shall be submitted and approved by UNL FPC prior to its use describing the reason to waiver away from the standard title blocks.

Supplemental design sheets, sketch sheets and revision sheets shall also be provided on a standard UNL FPC title block. 8.5"x11" and 11"x17" UNL supplemental title block sheets are available for download and can be found in the CAD library download section.

3.6.5 UNL North Arrow

UNL FPC requires the use of a standard UNL north arrow, sheet title and detail/section/elevation title. The north arrow and titles are available for download and can be found in the CAD library downloads section.

3.6.6 Addenda, Revisions

Construction revisions that impact a project's drawing set including addendums, sketches, change directives and supplemental instructions/information shall be clearly documented and provided as part of the AutoCAD®.dwg construction drawing. Any changes made to the original construction set of drawings shall be highlighted using a revision cloud and revision delta triangle. These revisions indicators shall correspond with the revision section of the UNL FPC title block with matching numerical characters.

The addenda and/or revisions may be issued under separate cover and separate UNL FPC title block sheet. 8.5"x11" or 11"x17" sheets using the standard UNL FPC title block are recommended. However, any size media to best suit the needs pertaining to those addenda will be acceptable. The addenda are required to follow all standards as set forth herein as well as follow AIA documentation. During construction or pre-construction these revisions shall become part of the final set of construction As-Built drawings. Refer to Project Closeout section herein for additional information.

3.7 Layers

3.7.1 Layer Description

UNL FPC has adopted and requires the use of the most recent version of the AIA CAD Layer Guidelines found in the latest addition of the United States National CAD Standards. Any and all additional vendor layers used shall strictly follow the AIA CAD Layer Guidelines procedure. All drawing elements outside of the required UNL FPC layer and layer attributes shall be placed on respective AIA CAD standard layers. User defined bylayer properties are required for all elements and entities when assigning a layer to an element. UNL does not recognize the use of Interior (I) discipline designator layers for any objects or elements and request that these either not be used when at all possible or be converted to a respective Architectural (A) discipline designator layer upon output to AutoCAD®.dwg delivery to UNL FPC.

3.7.2 AIA CAD Layer Naming Summary



1.0 Layer Name Format

1.1 HIERARCHY OF DATA FIELDS

The layer name format is organized as a hierarchy. This arrangement allows users to select from a number of options for naming layers according to the level of detailed information desired. Layer names consist of distinct data fields separated from one another by dashes. A detailed list of abbreviations, or field codes, is prescribed to define the content of layers. Most field codes are mnemonic English abbreviations of construction terminology that are easy to remember.

There are four defined layer name data fields: Discipline Designator, Major Group, two Minor Groups, and Status. The Discipline Designator and Major Group fields are mandatory. The Minor Group and Status fields are optional. Each data field is separated from adjacent fields by a dash ("-") for clarity.

The complete NCS layer name format, showing the Discipline Designator, the Major Group, two Minor Groups, and the Status fields.

A I - W A L L - F U L L - D I M S - N

1.2 BEFORE YOU BEGIN

The NCS allows you to select from a number of format options for creating layer names. It is recommended that you select the options that you wish to use for layer names on a given project, and then apply the resulting format consistently for all layer names on that project.

NOTE: For *conceptual conformance* to ISO 15667, *Organization and Naming of Layers for CAD*, the layer name format and length must be the same for all layers on a given project. See [CLG Appendix C - Complying with NCS and ISO 15667, CLG section 6.0](#) for information about ISO conformance. Δ

1.3 DISCIPLINE DESIGNATOR, LEVEL 1

The Discipline Designator denotes the category of subject matter contained on the specified layer. The Discipline Designator is a two-character field. The first character is the discipline character, and the second character is an optional modifier. The Discipline

Designator is described in greater detail in UDS Section 1.3. For a complete list of Discipline Designators see [CLG Appendix A - Discipline Designators, CLG section 4.1](#) and [UDS Appendix A - Discipline Designators, UDS section 1.6](#).

A typical layer name showing the required data fields only.

Note that only the mandatory discipline character is shown, creating a Level 1 Discipline Designator.

A - W A L L

A	Architectural
B	Geotechnical
C	Civil
D	Process
E	Electrical
F	Fire Protection

G	General
H	Hazardous Material
I	Interiors
L	Landscape
M	Mechanical
O	Operations
P	Plumbing
Q	Equipment
R	Resource
S	Structural
T	Telecommunication
V	Survey / Mapping
W	Distributed Energy
X	Other Disciplines
Z	Contractor/Shop Dwgs.

1.4 DISCIPLINE DESIGNATOR, LEVEL 2

The optional second character is used to further define the discipline character. As an example, the Level 2 Discipline Designators for Architectural are shown:

A	Architectural
AD	Architectural Demolition
AE	Architectural Elements
AF	Architectural Finishes
AG	Architectural Graphics
AI	Architectural Interiors
AS	Architectural Site
AJ	User Defined
AK	User Defined

A typical layer name showing the required data fields only.

Note that the mandatory Level 1 discipline character is supplemented by the optional discipline modifier to create a Level 2 Discipline Designator.

A	D	-	W	A	L	L
---	---	---	---	---	---	---

For a complete list of Discipline Designators see [CLG Appendix A - List of Discipline Designators, Major and Minor Groups, and Status Fields, CLG section 4.1](#) and [UDS Appendix A - Discipline Designators, UDS section 1.6](#).

1.5 MAJOR GROUP

The major group is a four-character field that identifies a major building system. The prescribed Major Group field codes (four-character abbreviations) shown on the Layer List are logically grouped with specific discipline designators. However, any Major Group may be combined with any prescribed Discipline Designator, provided that the definition of the Major Group remains unchanged.

Therefore, any reasonable combination of the prescribed Discipline Designators and Major groups is permitted.

A typical layer name showing the required data fields only. The mandatory Major Group field is highlighted:

A	-	W	A	L	L
---	---	---	---	---	---

NOTE: The NCS recognizes that there will be instances where user-defined Major Group field codes will be required. The NCS set of Major Group field codes is not intended to be all inclusive. There will be instances when project specific Major Groups will need to be created. In these cases Major Group field codes are allowed, however, they must contain four alphabetic and/or numeric characters and/or "~", and must be fully documented on the NCS Compliance Disclosure Statement for the project or identified as project specific in the standard supplement in which they are used.

NOTE: For *conceptual conformance* to ISO 13567, *Organization and Naming of Layers for CAD*, the use of the Major Group "ANNO" is not permitted. See [CLG Appendix C - Complying with NCS and ISO 13567, CLG section 6.0](#) for information about ISO conformance. ▲

1.6 MINOR GROUP

This is an optional, four-character field to further define the Major Groups. For example, *A-WALL-FULL* denotes *Architectural, Wall, Full-height*. A second minor group may be used for still further delineation of the data contained on a layer. For example, *A-WALL-FULL TEXT* indicates *Architectural, Wall, Full-height, Text*.

The prescribed Minor Group field codes (four-character abbreviations) shown on the Layer List are logically grouped with specific Major Groups. However, any Minor Group may be used to modify any Major Group, provided that the definition of the Minor Group remains

unchanged. Therefore, any reasonable combination of the prescribed Major and Minor Groups is permitted.

A	-	W	A	L	L	-	F	U	L	L	-	T	E	X	T
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

A typical layer name showing one optional Minor Group field:

A	-	W	A	L	L	-	F	U	L	L
---	---	---	---	---	---	---	---	---	---	---

A typical layer name showing two optional Minor Group fields:

NOTE: User-defined Minor Group field codes are permitted. They must contain four alphabetic and/or numeric characters and/or "~", and must be fully documented on the NCS Compliance Disclosure Statement for the project on which they are used.

NOTE: For *conceptual conformance* to ISO 13567, *Organization and Naming of Layers for CAD*, the use of certain Minor Group field codes is restricted. See [CLG Appendix C - Complying with NCS and ISO 13567, CLG section 6.0](#) for information about ISO conformance. ▲

1.7 STATUS (PHASE)

The status field is an optional single-character field that distinguishes the data contained on the layer according to the status of the work or the construction phase. The prescribed field codes for this field are as follows:

A	Abandoned
D	Existing to demolish
E	Existing to remain
F	Future work
M	Items to be moved

A typical layer name showing the location of the optional

Status field:

A	-	W	A	L	L	-	F	U	L	L	-	T	E	X	T	-	N
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

N	New Work
T	Temporary work
X	Not in contract
1-9	Phase numbers

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3.7.3 UNL FPC Layer Properties

In addition to the use of AIA CAD Layer Guidelines, UNL FPC has supplemented specific CAD layer properties and attributes which are extensively used internally for program assessment, space management and future project development. In addition to vendors following the AIA national CAD standard layer guidelines it is imperative that the **bold and dark highlighted (A) Architectural layers** and layer attributes shown below be implemented and strictly followed on all projects upon output of AutoCAD®.dwg files delivered to UNL FPC either for progress submittal, final construction submittal or “as-built” documentation. Take note that UNL FPC does not implement the use of the (I) Interiors layer discipline designation. All other layers and layer attributes shown below are for reference as to the layers used by UNL FPC for internal projects.

3.7.4 UNL FPC Layer Property Table

Name	Description	Color	Linetype	Plotted Lineweight
0		7	Continuous	0.15mm
A-ANNO-AREA-IDEN	Architectural area square foot identification	6	Continuous	0.15mm
A-ANNO-DETL-TEXT	General architectural detail text	7	Continuous	0.15mm
A-ANNO-DIMS	Architectural Dimensions	7	Continuous	0.15mm
A-ANNO-DOOR-IDEN	Door identification	7	Continuous	0.15mm
A-ANNO-GLAZ-IDEN	Glazing, window identification	7	Continuous	0.15mm
A-ANNO-KEYN	Architectural keynote	7	Continuous	0.15mm
A-ANNO-LEGN	Architectural legend	7	Continuous	0.15mm
A-ANNO-LOGO	Architectural consultant logo	7	Continuous	0.15mm
A-ANNO-NOTE	Architectural sheet notes	7	Continuous	0.15mm
A-ANNO-NPLT	Non-plotting graphic information	5	Continuous	0.20mm
A-ANNO-REVC	Architectural revision clouds	11	Continuous	0.70mm
A-ANNO-REVS	Architectural revision indicators and text	241	Continuous	0.50mm
A-ANNO-ROOM-IDEN	Architectural room identification	7	Continuous	0.15mm
A-ANNO-SCHD	Architectural schedules	7	Continuous	0.15mm
A-ANNO-STMP	Architectural professional stamps	7	Continuous	0.15mm
A-ANNO-SYMB	Architectural reference symbols	7	Continuous	0.15mm
A-ANNO-TEXT	General architectural text	7	Continuous	0.15mm
A-AREA	Area polyline	6	Continuous	0.15mm
A-CLNG	Ceiling	9	Continuous	0.10mm
A-CLNG-ACCS	Ceiling: access	212	Continuous	0.10mm
A-CLNG-GRID	Ceiling: grid	9	Continuous	0.10mm
A-CLNG-SUSP	Ceiling: suspended elements	212	Continuous	0.10mm
A-COLS	Columns	7	Continuous	0.15mm
A-DETL	Details	6	Continuous	0.15mm
A-DETL-BYND	Detail hatch patterns, objects beyond	8	Continuous	0.05mm 50% Screen
A-DOOR	Doors	1	Continuous	0.35mm
A-EQPM	Equipment	30	Continuous	0.15mm

A-EQPM-OVHD	Equipment: overhead	30	Dashed	0.15mm
A-FLOR	Floor	9	Continuous	0.10mm
A-FLOR-CSWK	Floor: casework	8	Continuous	0.05mm 50% Screen
A-FLOR-EVTR	Floor: elevator cars and equipment	151	Continuous	0.05mm
A-FLOR-FIXT	Floor: fixtures (plumbing)	151	Continuous	0.05mm
A-FLOR-OTLN	Floor: outline	9	Continuous	0.10mm
A-FLOR-OVHD	Floor: overhead	9	Dashed	0.10mm
A-FLOR-SIGN	Floor: signage	2	Continuous	0.25mm
A-FLOR-STRS	Floor: stair treads (escalators, ladders)	151	Continuous	0.05mm
A-FLOR-TPTN	Floor: toilet partitions	151	Continuous	0.05mm
A-FURN	Furnishings	8	Continuous	0.05 50% Screen
A-FURN-STOR	Furnishings: storage (component system)	8	Continuous	0.05 50% Screen
A-GLAZ	Glazing, windows	2	Continuous	0.25mm
A-HTCH-PATT	Textures & hatch patterns excluding walls	9	Continuous	0.10mm
A-HVAC	HVAC systems	3	Continuous	0.25mm
A-HVAC-CDFF	HVAC system: Diffuser, Grille, & Register	3	Continuous	0.25mm
A-LITE	Lighting	3	Continuous	0.25mm
A-ROOF	Roof	9	Continuous	0.10mm
A-ROOF-HRAL	Roof: handrails/guard rails	1	Continuous	0.35mm
A-ROOF-OTLN	Roof: outline	9	Continuous	0.10mm
A-ROOF-STRS	Roof: stair treads (ladders)	151	Continuous	0.05mm
A-WALL	Walls	1	Continuous	0.35mm
A-WALL-CURT	Walls: curtain	151	Continuous	0.05mm
A-WALL-FIRE	Walls: fire protection	101	Continuous	0.25mm
A-WALL-HEAD	Walls: Header, doors, windows	8	Continuous	0.05mm 50% Screen
A-WALL-PATT	Walls: texture and hatch patterns	9	Continuous	0.10mm
Defpoints	Non-plotting information	8	Continuous	----
E-ALRM	Alarm system	121	Continuous	0.25mm
E-ANNO-DETL-TEXT	General electrical detail/riser text	7	Continuous	0.15mm
E-ANNO-DIMS	Electrical Dimensions	7	Continuous	0.15mm
E-ANNO-IDEN	General electrical identification	7	Continuous	0.15mm
E-ANNO-KEYN	Electrical keynote	7	Continuous	0.15mm
E-ANNO-LEGN	Electrical legend	7	Continuous	0.15mm
E-ANNO-LITE-IDEN	Lighting device/equip. identification	7	Continuous	0.15mm
E-ANNO-LOGO	Electrical consultant logo	7	Continuous	0.15mm
E-ANNO-NOTE	Electrical sheet notes	7	Continuous	0.15mm
E-ANNO-NPLT	Non-plotting graphic information	5	Continuous	0.20mm
E-ANNO-POWR-IDEN	Power device/equip. identification	7	Continuous	0.15mm
E-ANNO-REVC	Electrical revision clouds	11	Continuous	0.70mm
E-ANNO-REVS	Electrical revision indicators and text	241	Continuous	0.50mm
E-ANNO-SCHD	Electrical schedules	7	Continuous	0.15mm
E-ANNO-STMP	Electrical professional stamps	7	Continuous	0.15mm
E-ANNO-TEXT	General electrical text	7	Continuous	0.15mm
E-AUXL	Auxiliary systems	150	Continuous	0.25mm
E-BELL	Bell system	150	Continuous	0.25mm
E-CABL-TRAY	Cable systems: cable tray and wire ways	30	Dashed	0.15mm
E-CATV	Cable TV system	114	Continuous	0.25mm
E-CCTV	Closed-circuit television system	121	Continuous	0.25mm
E-CLOK	Clock system	150	Continuous	0.25mm
E-COMM	Communications	114	Continuous	0.25mm
E-COMM-EQPM	Communications: equipment	114	Continuous	0.25mm
E-CONT	Controls and instrumentation	150	Continuous	0.25mm

E-CONT-WIRE	Controls and instrumentation: wiring	150	Continuous	0.25mm
E-DATA	Data/LAN system	114	Continuous	0.25mm
E-DATA-EQPM	Data/LAN system: equipment	114	Continuous	0.25mm
E-DETL	Details	6	Continuous	0.15mm
E-DETL-BYND	Detail hatch patterns, objects beyond	8	Continuous	0.05mm 50% Screen
E-FIRE	Fire protection	101	Continuous	0.25mm
E-GRND	Ground system	30	Continuous	0.15mm
E-INTC	Intercom system	150	Continuous	0.25mm
E-LITE	Lighting	4	Continuous	0.25mm
E-LITE-CIRC	Lighting: circuits	2	Continuous	0.25mm
E-LITE-CIRC-EMER	Lighting: circuits: emergency	125	Continuous	0.25mm
E-LITE-CNMB	Lighting: circuit number	7	Continuous	0.15mm
E-LITE-CNMB-EMER	Lighting: circuit number: emergency	7	Continuous	0.15mm
E-LITE-EMER	Lighting: emergency	125	Continuous	0.25mm
E-LITE-EXIT	Lighting: exit	125	Continuous	0.25mm
E-LITE-SWCH	Lighting: switches	4	Continuous	0.25mm
E-LTNG	Lightning protection system	3	Continuous	0.25mm
E-MNTG	Electrical mounting system	30	Continuous	0.25mm
E-POWR	Power	3	Continuous	0.25mm
E-POWR-CIRC	Power: circuits	41	Continuous	0.25mm
E-POWR-CIRC-EMER	Power: circuits: emergency	41	Continuous	0.25mm
E-POWR-CNMB	Power: circuit number	7	Continuous	0.15mm
E-POWR-CNMB-EMER	Power: circuit number: emergency	7	Continuous	0.15mm
E-POWR-EQPM	Power: equipment	30	Continuous	0.15mm
E-POWR-EQPM-EMER	Power: equipment: emergency	30	Continuous	0.15mm
E-POWR-PANL	Power: panels	30	Continuous	0.15mm
E-POWR-SWBD	Power: switchboards	30	Continuous	0.15mm
E-POWR-XFMR	Power: transformers: pad-mounted	30	Continuous	0.15mm
E-SECU	Security system	121	Continuous	0.25mm
E-SITE	Site features	4	Continuous	0.25mm
E-SITE-OVHD	Site: overhead	2	Continuous	0.25mm
E-SITE-POLE	Site: pole	30	Continuous	0.15mm
E-SITE-UGND	Site: underground	41	Hidden	0.25mm
E-SOUN	Sound system	150	Continuous	0.25mm
E-UTIL	Utilities	30	Hidden	0.15mm
F-SPKL-EQPM	Fire Suppression Equipment	30	Continuous	0.15mm
F-SPKL-EQPM-POWR	Fire Suppression Equipment With Power	30	Continuous	0.15mm
F-SPKL-HEAD	Fire Suppression Heads	32	Continuous	0.25mm
F-SPKL-PIPE	Fire Suppression Piping	32	Continuous	0.25mm
G-ANNO-KEYN	Keynotes	7	Continuous	0.15mm
G-ANNO-LOGO	Consultant logo	7	Continuous	0.15mm
G-ANNO-MATC	Match lines	11	Phantom	0.70mm
G-ANNO-NOTE	Notes	7	Continuous	0.15mm
G-ANNO-PLAN	Key plan	7	Continuous	0.15mm
G-ANNO-REFR	Reference, external files	7	Continuous	0.15mm
G-ANNO-SYMB	Reference symbols	7	Continuous	0.15mm
G-ANNO-TITL	Drawing or detail titles - scarlet red	240	Continuous	0.25mm
G-ANNO-TTLB	Border and title block	7	Continuous	0.15mm
G-ANNO-TTLB-IDEN	Title block identification	7	Continuous	0.15mm
G-ANNO-TTLB-INFO	Title block information - scarlet red	7	Continuous	0.25mm
G-ANNO-TTLB-TEXT	Title block text - scarlet red	240	Continuous	0.25mm
M-ANNO-DETL-TEXT	Details, Risers, and Schematics Text	7	Continuous	0.15mm
M-ANNO-DIMS	Mechanical dimensions	7	Continuous	0.15mm
M-ANNO-EQPM-IDEN	Equipment Marks/Identification Text	7	Continuous	0.15mm
M-ANNO-IDEN	General Mechanical Identification Text	7	Continuous	0.15mm

M-ANNO-KEYN	Mechanical Keynote	7	Continuous	0.15mm
M-ANNO-LEGN	Legends and Symbol Keys	7	Continuous	0.15mm
M-ANNO-LOGO	Mechanical consultant logo	7	Continuous	0.15mm
M-ANNO-NOTE	Mechanical sheet notes	7	Continuous	0.15mm
M-ANNO-NPLT	Non-Plotting Graphic Information	5	Continuous	0.20mm
M-ANNO-REVC	Mechanical revision Clouds	11	Continuous	0.70mm
M-ANNO-REVS	Mechanical revision Indicators and Text	241	Continuous	0.50mm
M-ANNO-SCHD	Mechanical schedules	7	Continuous	0.15mm
M-ANNO-STMP	Mechanical professional Stamp	7	Continuous	0.15mm
M-ANNO-TEXT	General Mechanical Text	7	Continuous	0.15mm
M-CONT	Controls and Instrumentation	191	Continuous	0.25mm
M-CWTR	Chilled Water Piping	32	Continuous	0.25mm
M-DETL	Mechanical Details, Risers, & Schematics	6	Continuous	0.15mm
M-DETL-BYND	Detail hatch patterns, objects beyond	8	Continuous	0.05mm 50% Screen
M-HTPM	Heat Pump Piping	205	Continuous	0.25mm
M-HVAC-CDFF	Ceiling Diffusers, Grilles, and Registers	190	Continuous	0.25mm
M-HVAC-DMPR	Fire/Smoke Dampers	211	Continuous	0.25mm
M-HVAC-EQPM	HVAC Equipment	30	Continuous	0.15mm
M-HVAC-EQPM- POWR	HVAC Equipment With Power	30	Continuous	0.15mm
M-HVAC-EXHS	Exhaust Ductwork	54	Continuous	0.25mm
M-HVAC-OAIR	Outside Air Ductwork	245	Continuous	0.25mm
M-HVAC-RAIR	Relief Air Ductwork	54	Continuous	0.25mm
M-HVAC-RETN	Return Ductwork	42	Continuous	0.25mm
M-HVAC-SPLY	Supply Ductwork	34	Continuous	0.25mm
M-HWTR	Hot Water Piping	214	Continuous	0.25mm
M-REFG	Refrigerant Piping	224	Continuous	0.25mm
M-STEM	Steam Piping	210	Continuous	0.25mm
M-STEM-CONS	Steam Condensate Piping	244	Continuous	0.25mm
P-ANNO-DETL-TEXT	Details, Risers, and Schematics Text	7	Continuous	0.15mm
P-ANNO-DIMS	Plumbing Dimensions	7	Continuous	0.15mm
P-ANNO-EQPM-IDEN	Equipment Marks/Identification Text	7	Continuous	0.15mm
P-ANNO-IDEN	General Plumbing Identification Text	7	Continuous	0.15mm
P-ANNO-KEYN	Plumbing Keynote	7	Continuous	0.15mm
P-ANNO-LEGN	Legends and Symbol Keys	7	Continuous	0.15mm
P-ANNO-LOGO	Mechanical consultant logo	7	Continuous	0.15mm
P-ANNO-NOTE	Plumbing sheet notes	7	Continuous	0.15mm
P-ANNO-NPLT	Non-Plotting Graphic Information	5	Continuous	0.20mm
P-ANNO-REVC	Plumbing revision Clouds	11	Continuous	0.70mm
P-ANNO-REVS	Plumbing revision Indicators and Text	241	Continuous	0.50mm
P-ANNO-SCHD	Plumbing schedules	7	Continuous	0.15mm
P-ANNO-STMP	Mechanical professional Stamp	7	Continuous	0.15mm
P-ANNO-TEXT	General Plumbing Text	7	Continuous	0.15mm
P-DETL	Plumbing Details, Risers, and Schematics	6	Continuous	0.15mm
P-DETL-BYND	Detail hatch patterns, objects beyond	8	Continuous	0.05mm 50% Screen
P-DOMW-CPIP	Domestic Cold Water Piping	150	Cold_Water	0.25mm
P-DOMW-HPIP	Domestic Hot Water Piping	150	Hot_Water	0.25mm
P-DOMW-RPIP	Domestic Hot Water Recirc. Piping	150	Recirc	0.25mm
P-EQPM	Plumbing Equipment	30	Continuous	0.15mm
P-EQPM-POWR	Plumbing Equipment With Power	30	Continuous	0.15mm
P-GAS~	Gas Piping	242	Continuous	0.25mm
P-INDL	Industrial Water Piping (Non Potable)	233	Continuous	0.25mm
P-SSWR	Sanitary Sewer Piping	82	Continuous	0.25mm
P-STRM	Storm Sewer Piping	10	Continuous	0.25mm

P-VENT	Vent Piping	204	Continuous	0.25mm
S-ANNO-DETL-TEXT	Details, Risers, and Schematics Text	7	Continuous	0.15mm
S-ANNO-DIMS	Structural dimensions	7	Continuous	0.15mm
S-ANNO-IDEN	Structural identification text	7	Continuous	0.15mm
S-ANNO-KEYN	Structural keynote	7	Continuous	0.15mm
S-ANNO-LEGN	Structural legends and symbol keys	7	Continuous	0.15mm
S-ANNO-LOGO	Structural consultant logo	7	Continuous	0.15mm
S-ANNO-NOTE	Structural sheet notes	7	Continuous	0.15mm
S-ANNO-NPLT	Non-Plotting Graphic Information	5	Continuous	0.20mm
S-ANNO-REVC	Structural revision clouds	11	Continuous	0.70mm
S-ANNO-REVS	Structural revision indicators and text	241	Continuous	0.50mm
S-ANNO-SCHD	Structural schedules	7	Continuous	0.15mm
S-ANNO-STMP	Structural professional stamp	7	Continuous	0.15mm
S-ANNO-SYMB	Structural reference symbols	7	Continuous	0.15mm
S-ANNO-TEXT	General structural text	7	Continuous	0.15mm
S-BEAM	Structural: Beams	135	Dashed	0.25mm
S-BRCG	Structural: Bracing	167	Continuous	0.25mm
S-COLS	Structural: Columns	135	Continuous	0.25mm
S-DECK	Structural: Deck	167	Continuous	0.25mm
S-DETL	Structural: Detail	6	Continuous	0.15mm
S-DETL-BYND	Detail hatch patterns, objects beyond	8	Continuous	0.05mm 50% Screen
S-FNDN	Structural: Foundation	15	Continuous	0.25mm
S-FNDN-FTNG	Structural: Foundation footings	15	Hidden	0.25mm
S-GRID	Structural: Grids	8	Center2	0.05mm 50% Screen
S-GRLN	Structural: Grade line	3	Continuous	0.25mm
S-JNTS	Structural: Joints	15	Continuous	0.25mm
S-JOIS	Structural: Joists	135	Center2	0.25mm
S-LNTL	Structural: Lintels	9	Dashed	0.10mm
S-PADS-EQPM	Structural Pads: equipment	9	Continuous	0.10mm
S-PLAT	Structural: Platform	9	Dashed	0.10mm
S-PLAT-GRTG	Structural: Platform grating	9	Continuous	0.10mm
S-SLAB-CONC	Structural: Slab, concrete	15	Continuous	0.25mm
S-STRS	Structural: Stairs	151	Continuous	0.05mm
S-TRUS	Structural: Trusses	135	Hidden	0.25mm
S-WALL	Structural: Walls	1	Continuous	0.35mm
(A) W/Status Indicator	Demo, New and Existing Layers			
A-DOOR-D	Existing to demolish doors	1	Continuous	0.35mm
A-DOOR-N	New doors, used when existing layers do not utilize the 'E' (existing) status indicator	1	Continuous	0.35mm
A-GLAZ-D	Existing to demolish glazing, windows	2	Continuous	0.25mm
A-GLAZ-N	New glazing, used when existing layers do not utilize the 'E' (existing) status indicator	2	Continuous	0.25mm
A-WALL-D	Existing to demolish walls	1	Continuous	0.35mm
A-WALL-N	New walls, used when existing layers do not utilize the 'E' (existing) status indicator	1	Continuous	0.35mm
A-~~~~~D	Existing to demolish specific Architectural ceilings, walls, structure, outlines	Copy Main Layr	Copy Main Layr	0.25mm
A-~~~~~D	Existing to demolish specific Architectural devices, furnishings, doors, glazing	Copy Main Layr	Copy Main Layr	0.25mm
A-~~~~~E	Existing to remain specific Architectural ceilings, walls, structure, outlines, text	145	Existing	0.05mm
A-~~~~~E	Existing to remain specific Architectural	31	Existing	0.05mm

	devices, furnishings, doors, glazing			
A-~~~~~N	New Architectural, used when existing layers do not utilize the 'E' (existing) status indicator	Copy Main Layr	Copy Main Layr	0.25mm
(E) W/Status Indicator	Demo, New and Existing Layers			
E-LITE-D	Existing to demolish lighting items	4	Continuous	0.25mm
E-LITE-E	Existing to remain lighting items	155	Existing	0.05mm
E-POWR-D	Existing to demolish power items	3	Continuous	0.25mm
E-POWR-E	Existing to remain power items	33	Existing	0.05mm
E-AUXL-D	Existing to demolish low voltage items	150	Continuous	0.25mm
E-AUXL-E	Existing to remain low voltage items	33	Existing	0.05mm
E-~~~~~D	Existing to demolish specific Electrical Routings, text	Copy Main Layr	Copy Main Layr	0.25mm
E-~~~~~D	Existing to demolish specific Electrical Equipment	Copy Main Layr	Copy Main Layr	0.25mm
E-~~~~~E	Existing to remain specific Electrical Routings, text	155	Existing	0.05mm
E-~~~~~E	Existing to remain specific Electrical Equipment	33	Existing	0.05mm
E-~~~~~N	New Electrical, used when existing layers do not utilize the 'E' (existing) status indicator	Copy Main Layr	Copy Main Layr	0.25mm
(M) W/Status Indicator	Demo, New and Existing Layers			
M-HVAC-D	Existing to demolish HVAC items	190	Continuous	0.25mm
M-HVAC-E	Existing to remain HVAC items	43	Existing	0.05mm
M-~~~~~D	Existing to demolish specific Mechanical Routing, text	Copy Main Layr	Copy Main Layr	0.25mm
M-~~~~~D	Existing to demolish specific Mechanical Equipment	Copy Main Layr	Copy Main Layr	0.25mm
M-~~~~~E	Existing to remain specific Mechanical Routings, text	163	Existing	0.05mm
M-~~~~~E	Existing to remain specific Mechanical Equipment	43	Existing	0.05mm
M-~~~~~N	New Mechanical, used when existing layers do not utilize the 'E' (existing) status indicator	Copy Main Layr	Copy Main Layr	0.25mm
(P) W/Status Indicator	Demo, New and Existing Layers			
P-PLUM-D	Existing to demolish plumbing items	150	Continuous	0.25mm
P-PLUM-E	Existing to remain plumbing items	163	Existing	0.05mm
P-~~~~~D	Existing to demolish specific Plumbing Routings, text	Copy Main Layr	Copy Main Layr	0.25mm
P-~~~~~D	Existing to demolish specific Plumbing Equipment	Copy Main Layr	Copy Main Layr	0.25mm
P-~~~~~E	Existing to remain specific Plumbing Routings, text	163	Existing	0.05mm
P-~~~~~E	Existing to remain specific Plumbing Equipment	43	Existing	0.05mm
P-~~~~~N	New Plumbing, used when existing layers do not utilize the 'E' (existing) status indicator	Copy Main Layr	Copy Main Layr	0.25mm

3.7.5 Layer Attributes

The predefined layers and attributes listed in the UNL Layer Property Table have been assigned specific colors and line types. The bold highlighted attributes are critical, as they are used internally with “as-built” construction drawings. The “as-built” construction drawings become part of the building plan “library of record” at UNL FPC. Implementing and following these layers and layer attributes are strictly required when delivering electronic copies of AutoCAD®.dwg files to UNL FPC. In order for UNL FPC to seamlessly pass along accurate building data to all departments within the University on a daily basis and print or otherwise manipulate the drawings; the layer property table must be implemented upon delivery of AutoCAD®.dwg files to UNL FPC. Layers and layer attributes that have not been predefined may be assigned at the discretion of the user following the exact AIA CAD Layering Guidelines found in the most current addition of the National CAD Standards Guidelines.

3.7.6 Layer Colors

The bold highlighted layers and layer colors found in the predefined UNL Layer Property Table are specific to the layers and colors most often used to assist in University space documentation. All other layers and layer colors may be assigned at the discretion of the vendor to meet their individual needs. Coordinate and consider the selection of non-UNL required layer colors with the University plotted pen color lineweights found in this document.

As a general rule for all CAD projects, drawings should assume the color property of the layer on which they reside. The color of individual entities should be assigned “bylayer” as opposed to “by entity.” Likewise, all blocks, block definitions, details, hatch patterns, walls types, symbols, line types and other predefined entities including block attributes shall be created with Bylayer properties. All user defined entities shall revert to layer 0 and Bylayer properties when exploded. Blocks created in layer 0 and Bylayer properties shall be inserted into the CAD drawing and then placed in the respective layer for said entity. All predefined entities created in programs other than AutoCAD® shall also revert to layer 0 and Bylayer properties.

3.7.7 Layer Linetypes

The UNL FPC default linetype for each predefined layer is typically CONTINUOUS unless otherwise specified. All other layers may have their linetypes assigned at the discretion of the user. Linetype “UNL.lin” includes linetypes defined as Existing; Cold_Water; Hot_Water and Recirc. is available for download in the CAD library download section.

3.7.8 Layer Lineweight

The UNL FPC default lineweight for each predefined layer is typically DEFAULT 0.00. Furthermore, UNL FPC utilizes plotted pen lineweights associated with respective colors to produce the desired lineweight thickness. All vendor defined layers may have their lineweights assigned at the discretion of the user either via lineweight properties or utilizing the UNL color assignments. Coordinate and consider the selection of non-UNL required layer lineweights with the University plotted pen color line weights found herein.

4 CAD Templates

Refer to the University design guidelines for all CAD library downloads and use as necessary per project requirements. The UNL-FPC CAD library downloads are located here:

<http://unlcms.unl.edu/businessandfinance/fmp/designguidelines/cad-library-downloads>

5 UNL Space & Door Numbering Requirements

5.1 Room, Space & Area Numbering

Refer to the Space and Door numbering convention in the University design guidelines and provide as necessary per requirements. Room, Space and Area numbers shall be provided on appropriate layers and in the text style, font and size as listed in the text table herein this document.

5.2 Door Numbering

Refer to the Space and Door numbering convention in the University design guidelines and provide as necessary per requirements. Door numbers shall be provided on appropriate layers and in the text style, font and size as listed in the text table herein this document.

5.3 Signage

Refer to the Signage Policy & Procedure in the University design guidelines and provide as necessary per requirements.

The UNL signage policy and procedure is located here: <http://fmp.unl.edu/policies/interior-signage-policy-procedure>

The UNL signage and wayfinding standards manual is located here:
http://fmp.unl.edu/fpc/Wayfinding_and_Signage_Standards_Manual_2009.pdf

6 CAD Reproduction

6.1 UNL Drawing File Disclaimer

All construction documents **must** include the following UNL disclaimer: *“These drawings and the designs here illustrated are the sole property of the University of Nebraska and may not be reproduced in whole or in part without express written permission.”*

6.2 Plot Styles

UNL FPC does not maintain, manage or store vendor AutoCAD® plot styles. The plot style used by UNL is a color-dependent (.CTB) file that sets the style based on the color of the objects. As described in the previous Layer section, all vendors shall follow the bold, highlighted layers found in the UNL Layer Property Tables for AutoCAD®.dwg delivery to UNL FPC. By using the UNL predefined layers and layer colors the internal University departments are assured of reproducing archived drawings that best depict the original intent of the drawing plans. The UNL FPC .CTB file is available for download and can be found in the CAD library download section.

6.3 UNL FPC Color and Line Weights

Color	Plotted Lineweight	Color	Plotted Lineweight
RED 1	0.35mm	ACAD 135	0.25mm
YELLOW 2	0.25mm	ACAD 140	0.40mm
GREEN 3	0.25mm	ACAD 142	0.80mm
CYAN 4	0.25mm	ACAD 145	0.05mm
BLUE 5	0.20mm	ACAD 150	0.25mm
MAGENTA 6	0.15mm	ACAD 151	0.05mm
WHITE 7	0.15mm	ACAD 155	0.05mm
DARK GRAY 8	0.05mm 50% Screen	ACAD 163	0.05mm
LIGHT GRAY 9	0.10mm	ACAD 167	0.25mm
ACAD 10	0.25mm	ACAD 190	0.25mm
ACAD 11	0.70mm	ACAD 191	0.25mm
ACAD 15	0.25mm	ACAD 200	0.40mm
ACAD 30	0.15mm	ACAD 204	0.25mm
ACAD 31	0.05mm	ACAD 205	0.25mm
ACAD 32	0.25mm	ACAD 210	0.25mm
ACAD 33	0.05mm	ACAD 211	0.25mm
ACAD 34	0.25mm	ACAD 212	0.10mm
ACAD 41	0.25mm	ACAD 214	0.25mm
ACAD 42	0.25mm	ACAD 220	0.60mm
ACAD 43	0.05mm	ACAD 224	0.25mm
ACAD 54	0.25mm	ACAD 233	0.25mm
ACAD 62	0.60mm	ACAD 240	0.25mm
ACAD 81	0.80mm	ACAD 241	0.50mm
ACAD 82	0.25mm	ACAD 242	0.25mm
ACAD 101	0.25mm	ACAD 244	0.25mm
ACAD 114	0.25mm	ACAD 245	0.25mm
ACAD 121	0.25mm	All Other Colors	0.20mm
ACAD 125	0.25mm		

6.4 Printing

Prepared progress submittals, final construction documents or “as-built” documents shall be printed from paper space layout. Each paper space layout page shall have settings saved in the Page Setup Manager. Printer/Plotter device, paper size, paper area, plot scale, drawing orientation, layout viewports and a completed title block are the parameters that shall be set within the page setup manager.

A vendor's final plot shall be accomplished using the vendor defined color-dependent plot style (.CTB) or named plot styles (.SB) to determine the characteristics of their object lineweights. However, final output of AutoCAD®.dwg electronic files delivered to UNL FPC shall be capable of being printed with the UNL.CTB file, thus the layering must follow the UNL FPC Layer properties table.

Internal UNL FPC printing shall be completed in the same manner as the vendor's procedure with the exception being that the UNL-Standard.CTB file should be used as the AutoCAD®.dwg file should contain the respective UNL Layer Properties from the vendor.

6.5 Sheet Size

UNL FPC requires all projects to be delivered on a standard 24"x36" or 30"x42" sheet size. UNL required cover sheets and title block templates on 24"x36" and 30"x42" sheets are available for download and can be found in the CAD library downloads section.

There may be times when it may become necessary to utilize a larger or alternate sized sheet size for special circumstances. In the event an alternate sheet size is needed a new cover sheet and title block shall be constructed similarly and with the same attributes as the standard UNL cover sheet and title block. The alternate sheet size, cover sheet and title block shall be submitted and approved by UNL FPC prior to its use describing the reason to waiver away from the standard sheet size.

When submitting project drawing revisions, sketch sheets or supplemental drawings the standard UNL FPC required sheet size shall be 8.5"x11" or 11"x17". UNL required sketch sheets and supplemental drawing title block templates on 8.5"x11" and/or 11"x17" sheets are available for download and can be found in the CAD library downloads section.

6.6 Delivery

Delivery of drawing files whether produced in CAD or BIM shall be delivered in the same format as previously described. Progress milestones, review submittals, construction documents, revisions and "as-built" documents shall all follow the same delivery process, procedure and requirements as previously outlined in these guidelines.

UNL FPC requires all drawing files to be submitted in the most current version of AutoCAD®. AutoCAD® files shall also be accompanied with a respective .pdf in order to properly view the vendor's intent of the finished plotted AutoCAD®.dwg file.

When possible any multiple .dwg files shall be zipped into one .zip file and the drawing "pdf's" shall be combined into one .pdf binder both file names shall follow the file naming nomenclature as previously described.

The space polyline and area square footage numbers associated with individual rooms, spaces and area as previously described shall be included on the AutoCAD®.dwg plans. This procedure is similar to the process created with using BIM models. When a BIM model is used the polyline process shall be exported from Revit® as part of the AutoCAD® export feature. When exporting Revit® to AutoCAD® *in session export setup* click the *Modify Export Setup* button then select the *General* tab. Under the *General* tab check the *Room and Area Boundaries* box to *Export Rooms and Areas as Polylines*.

Follow and complete the Electronic File Quality Assurance Checklist found herein the Reproduction Quality Assurance section.

6.7 Reproduction Quality Assurance

Electronic File Quality Assurance Checklist

CAD drawings delivered at intermediate progress milestones and closeout of a capital project must be accompanied by this checklist and a signed letter on firm letterhead stating that all materials adhere to the standards and guidelines set forth herein the University of Nebraska **CAD** Standards publication.

FILE FORMAT AND SETUP

- ☐ UNL Electronic File Format
- ☐ UNL Policy on Model Space and Paper Space
- ☐ UNL External Reference (XREFs) Policy
- ☐ UNL Scale, Units, & Tolerances
- ☐ UNL Fonts and Text Styles
- ☐ UNL Dimensioning
- ☐ UNL Details/Block Definitions
- ☐ UNL Title Block/Cover Sheet/Size
- ☐ Current Date Indicated on Drawings

LAYERING

- ☐ UNL Standard Layering
- ☐ AIA and UNL Layer Name Formatting
- ☐ General Rules about Naming and Uses
- ☐ Layer Attributes (Colors, Pens, Linetypes)

Building, CAD, PDF FILE NAME CONVENTIONS

- ☐ Building and Project Identification
- ☐ Discipline Designation Codes
- ☐ Drawing Sheet Numbers
- ☐ Drawing File Name
- ☐ Door Numbering
- ☐ Area Polyline and Square Footage

POLICY ON CAD FILE TRANSLATION

- ☐ Full AutoCAD® Compliance
- ☐ Bound xrefs and images
- ☐ Translation Testing Procedures of Bound xrefs, UNL Layering and Plotting

Deliverables and Closeout

- ☐ Progress Submittal _____ (Phase or %)
- ☐ Construction Documents
- ☐ Supplemental Drawing Revisions
- ☐ "As-Built" Documents
- ☐ AutoCAD®.dwg and .PDF submitted

Name of Accountable Vendor Representative (Printed)

Signature & Date of Accountable Vendor Representative

7 CAD Project Closeout Documentation

7.1 Reference Binding

When submitting drawing plans to UNL FPC all images and external reference files shall be bound into one AutoCAD®.dwg file. To prevent unintentional updating of archived drawings by later changes to referenced drawings or images, bind the xrefs and images to the final drawing. Binding an xref or image to a drawing makes the xref a permanent part of the drawing and no longer an externally referenced file. Bind the entire database of the xref drawing, including all its xref-dependent named objects by using the XREF Bind option. UNL FPC will not accept the submission of any CAD drawing deliverables which contain unbound external or image reference files.

7.2 Conversions and CAD Translations

Revit®.rvt or other CAD software shall be converted into the latest version of AutoCAD®.dwg files which have no significant loss of drawing information, entities or data from file translation procedures. It is recommended that a thorough translation/conversion test procedure be conducted *before* the drawing development phase of the project. The test shall cover all standards required herein this document. This will assure early detection of file conversion issues and allow for corrective measures to be taken. In the event that a non-AutoCAD® source CAD system software does not properly translate certain objects and attributes as required by these guidelines, it will be determined by UNL FPC on a case-by-case basis whether this limitation is deemed acceptable. It is expected that vendors provide CAD work that are fully compliant with all standards outlined herein.

All DWG files and CAD drawing entities submitted at the end of a project must be able to be manipulated using standard AutoCAD® drafting procedures. Non-compliance with this policy may result in the rejection of CAD files submitted at project closeout in addition to delayed final project payment.

7.3 As-Built Documents

Delivery of As-Built Construction drawing files whether produced in CAD or BIM shall be delivered in the same format as described in these guidelines.

UNL FPC requires all As-Built drawing files to be submitted in the most current version of AutoCAD®. AutoCAD® files shall also be accompanied with a respective .pdf in order to properly view the intent of the As-Built plotted AutoCAD®.dwg file.

As-built drawings shall include all addendums, change directives, supplemental instructions and any other revisions made to a project that can be identified and indicated on the drawings shall become part of the As-Built file. Revision clouds and revision identification tags shall not be included as part of the As-built plans and will not be accepted by UNL FPC at project closeout. The As-built file and any changes shall be provided in the proper UNL layer and layer attributes as well as all other standards previously described.

7.4 Construction Revisions

Construction revisions that impact a project's drawing set including change directives and supplemental instructions shall be documented and provided electronically as part of the As-Built AutoCAD® file. Include all AIA documentation, correspondence and discussions regarding said revisions. During

construction or pre-construction these revisions may have been submitted under separate cover and separate title block sheet. However at closeout of the project these shall become part of the final set of construction As-Built drawings.

7.5 Delivery

All CAD drawings submitted to UNL FPC shall be purged of all un-referenced dimension styles, linetypes, blocks, layers, shapes and text styles. UNL FPC requires that the UNL FPC CAD standards are strictly followed. Drawings submitted without bound xrefs, improper layering, door numbering, sheet/file naming, title block/sheet sizes or any other improper parameters set forth herein, are subject to rejection and revision. The delay of a project or missing project delivery milestones as a result of UNL FPC rejection of an AutoCAD®.dwg will not be acceptable.

7.6 Waiver Procedure

Any request for change or variance in the current University of Nebraska CAD standards or procedures outlined herein shall be made in writing to the UNL FPC CAD manager prior to delivery of any erroneous CAD files.