

CADD STANDARDS AND DESIGN GUIDELINES



TEXAS TECH UNIVERSITY
Operations Division™

08.17.2021

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Introduction

The purpose of these *CADD Standards and Design Guidelines* is to ensure consistent project creation and submission to Texas Tech University - Operations Division (TTU-OD). These guidelines are intended to ensure consistent and successful use of CAD systems and data throughout TTU-OD.

The requirements in this document are intended for use by both in-house and external A/E Firms. Any variation in these guidelines by either shall only be acceptable when accompanied by written approval of the TTU-OD Project Manager. All submitted CAD drawings/files that do not conform to the guidelines outlined in this document will be returned for correction. The drawings/files may be re-submitted once all requirements have been met.

Upon a project being awarded to an A/E Firm, a **CAD Start Package** is available. It is recommended that the A/E Firm obtain the **CAD Start Package** prior to beginning any drafting work for the project. Contact the appropriate TTU-OD Project Manager to receive the package.

Prior to a project being closed out and final payment from Texas Tech University being rendered, all specified material must be submitted to the appropriate TTU-OD Project Manager, CADD/GIS Supervisor and/or appropriate representative.

Project Process

The processes that a project goes through on the road to completion are constantly being revised and renewed. This being the case, one part of those processes will always be the same. That is the process of initial data gathering and organization as well as the construction of working drawings.

Once the determination is made to do a project "in-house", a written request using the *CADD/GIS Project Request Form* (see Form 1) for additional support should be made to the Supervisor for the CADD/GIS section. This generally will include field verification of the project area, initial design, and any additional facility information necessary for design. Once the request is made, a reasonable date will be established by the Project Manager and the CADD/GIS Supervisor for the submission of the information. The project will then be assigned to the proper draftsman. Once the initial drawings are completed and/or data collected, it will be submitted to the Project Manager for review.

This process accomplishes two goals: to free up the project manager to allow him/her to work on an additional number of projects and to allow for the consistent and proper construction of CADD data sets.



DRAWING FILE FORMAT AND SETUP

1. Drawing Organization

- 1.1. All drawings shall be oriented in the same direction with a true north arrow indicated on all plans and site drawings.
- 1.2. Drawings and files shall be organized in the folder structure as shown in Figure 1. The folders shall contain all relevant files and shall be free from stray elements.
- 1.3. All drawings shall be purged completely to remove all unused blocks, dimension styles, layers, line types, plot styles, etc.
- 1.4. External Reference Files (xrefs); see Section 6 for additional information
 - 1.4.1 External reference files (xrefs) shall contain all of a discipline's drawing entities that pertain to the project. These entities shall be on the proper layer.
 - 1.4.2 Xrefs shall be inserted in the **Master** file with Reference Type set to *Overlay* and Path Type set to *Relative*.
 - 1.4.3 The **Master** file shall contain all annotation, text, schedules, notes, markers, title blocks, etc. in paper space. Dimensions shall be in model space.

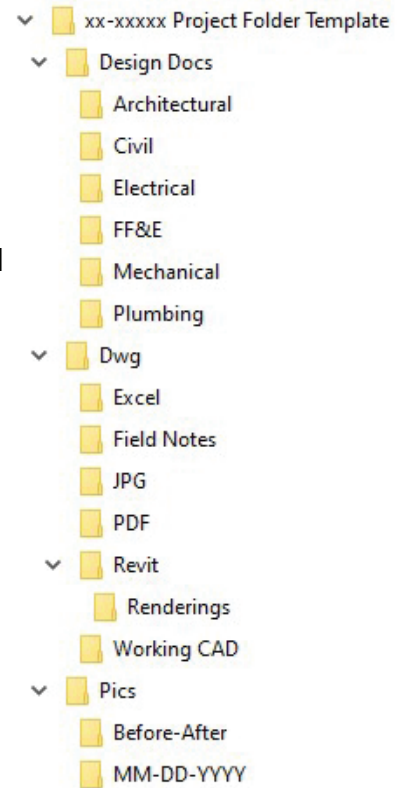


Figure 1
Folder Structure

2. File Numbering

- 2.1. Project number and description will be provided by the Texas Tech University - Operations Division (TTU-OD) Project Manager upon request.
- 2.2. Drawing file numbering:
 - 2.2.1 Master AutoCAD File: Project Number - Building Name - Project Name
i.e. 19-19942 - Murray Hall - Sam's Place Renovation
 - 2.2.2 Discipline related xref file: Discipline
i.e. Mechanical Plumbing

3. Border and Title Blocks

- 3.1. TTU-OD will issue a standard border/title block that shall be used for all "Texas Tech University - Operation Division Drawings" and which will be inserted in the Master AutoCAD File as a block. ***The boarder/title block and it's text shall not be altered, except to add required information where fields are supplied (i.e. date, project number, etc.). If altered in any way the submission shall be rejected.*** See Figure 2 for description of required/appropriate information fields for TTU-OD title block.
- 3.2. Sheet Designation
 - 3.2.1 Sheet designation will use a modified form of the *United States Cad Standards - V6* : (Discipline Designation)(Project Stage) - (Sheet Type)(Sheet Number)
i.e. AD-102 ((Architecture)(Demolition) - (Plan)(Sheet 02))



DRAWING FILE FORMAT AND SETUP

3.2.2 Discipline Designation (abbreviation & order)

G	General (Site Plan)
TAS	Texas Accessibility Standards
H	Hazardous Materials
V	Survey/Mapping
B	Geo-technical
C	Civil
L	Landscape
S	Structural
A	Architectural
I	Interiors
Q	Equipment
P	Process
M	Mechanical
F	Fire Protection
P	Plumbing
E	Electrical
W	Distributed Energy

3.2.3 Project Stage (abbreviation & order)

D	Demolition
N	New
R	Revision

Note: when more than one type is on a single page do not use a Project Stage designation.

3.2.4 Sheet Type (number and description)

0	General (symbols legend, notes, etc.)
1	Plans
2	Elevations, Sections
3	Details, Schedules, Diagrams, etc.
4	User Defined
5	3D Representations (isometrics, perspectives, photographs)

Note: when more than one type is on a single page use the Sheet Type that is most represented on the page.

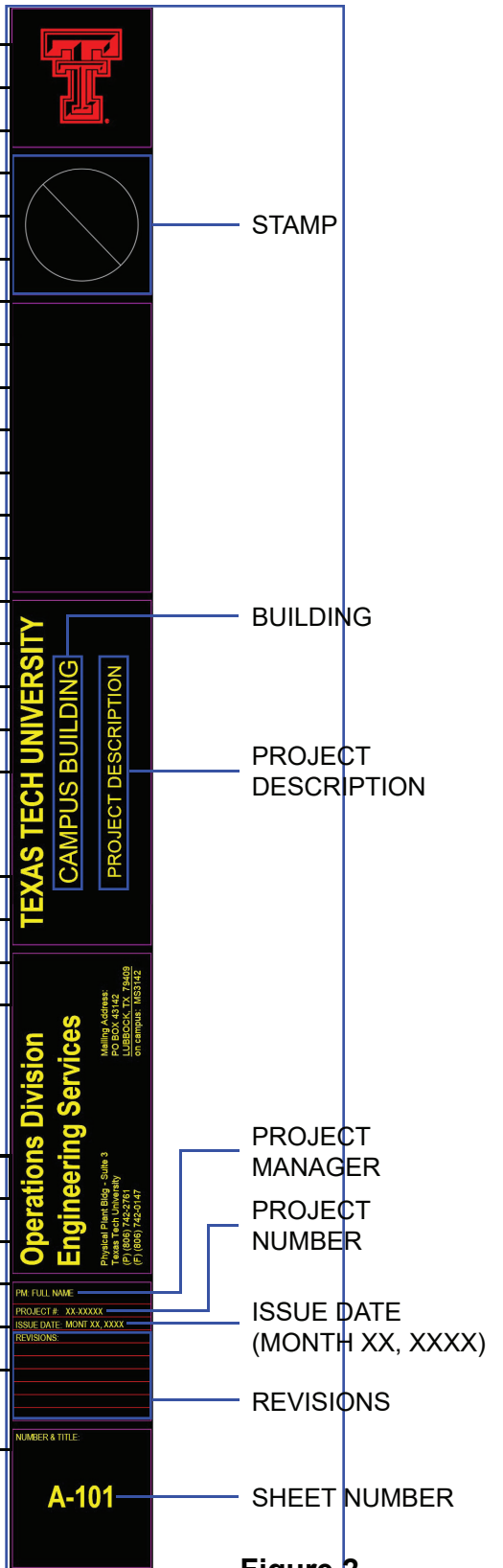


Figure 2

Title Block Information



OPERATIONS DIVISION

3122 MAIN STREET
LUBBOCK, TX,

806.742.4677
OPERATIONS@TTU.EDU

DRAWING FILE FORMAT AND SETUP

4. Title Sheet/Cover Sheet

- 4.1. The title sheet that is included in the *CAD Start Package* shall be included on all projects for TTU-OD. See 4.2 for information concerning how the drawing index, scope of work, time line, and TTU signatures are to be formatted. The title sheet layout may be altered to best suit the needs of the project but must include the following information:
 - 4.1.1 Building name
 - 4.1.2 Project description
 - 4.1.3 Project number
 - 4.1.4 Date issued
 - 4.1.5 Stamp of the A/E and any consultants used on the project
 - 4.1.6 Index of Drawings
 - 4.1.7 Project location on campus map
 - 4.1.8 Scope of Work description
 - 4.1.9 Time line
 - 4.1.10 TTU Signatures
- 4.2. Drawing index, scope of work, time line, and TTU signatures shall be Microsoft Excel tables linked into the title sheet/cover sheet (AutoCAD command : *PASTESPEC*). See Figure 3
- 4.3. Standard Excel tables used by TTU-OD will be included in the *CAD Start Package*. While the tables may be modified to fit the needs of the project, the text style and/or size shall not be modified.
- 4.4. TTU Signatures are required on all projects that contain AutoCAD and/or Revit drawings. It is the responsibility of the Project Manager to ensure that all appropriate TTU representatives have signed off on the project prior to issuing it to either OD-BMC or an outside contractor.
 - 4.4.1 TTU-ODES CADD/GIS Unit Manager shall be the second to last signature required.
 - 4.4.2 TTU-ODES Managing Director shall be the last signature required.

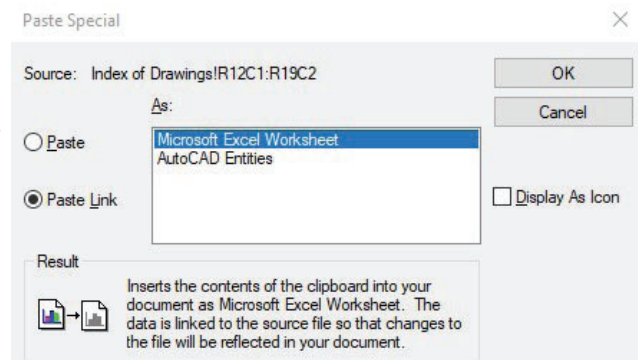


Figure 3
Microsoft Excel Worksheet Link



5. Model Space and Paper Space

5.1. Model Space

5.1.1 Model space shall contain objects that relate to the plan, elevation, section, detail, etc.

5.1.2 All objects shall be drawn at full scale (1'-0"=1'-0")

5.2. Paper Space

5.2.1 Paper space shall contain annotations, call outs, notes, legends, schedules, etc.

5.2.2 Viewports shall be locked when work within the viewport is completed.

5.2.3 Viewports shall be set to one of the following scale factors :

ARCHITECTURAL			
Plan	1/8"	=	1'-0"
Plan, Elevation	1/4"	=	1'-0"
Elevation	3/8"	=	1'-0"
Detail, Section, etc.	1/2"	=	1'-0"
Detail, Section, etc.	3/4"	=	1'-0"
Detail, Section, etc.	1"	=	1'-0"
Detail, Section, etc.	1-1/2"	=	1'-0"
Detail, Section, etc.	3"	=	1'-0"
Detail, Section, etc.	6"	=	1'-0"
Detail, Section, etc.	1'-0"	=	1'-0"

ENGINEERING		
1"	=	10'
1"	=	20'
1"	=	30'
1"	=	40'
1"	=	50'
1"	=	60'
1"	=	100'

5.3. Dimensions

5.3.1 Dimensions will use the TTU-OD dimension style. See Section 10 for additional information.

5.3.2 Dimensions will be housed in model space but shall be placed there through a viewport in paper space. TTU-OD dimension style is setup to utilize paper space units for scaling purposes. This allows all of the drawing's dimension text to print at the same height regardless of the viewport scale.

6. External Reference File(s) (xref)

6.1. Xrefs shall be inserted in to the drawing with "Reference Type" set to *Overlay* and "Path Type" set to *Relative*.

6.2. Scale shall be 1,1,1

6.3. Layer for all xrefs shall be set to "0".

6.4. Color, linetype, lineweight, and transparency shall be set to "ByLayer".

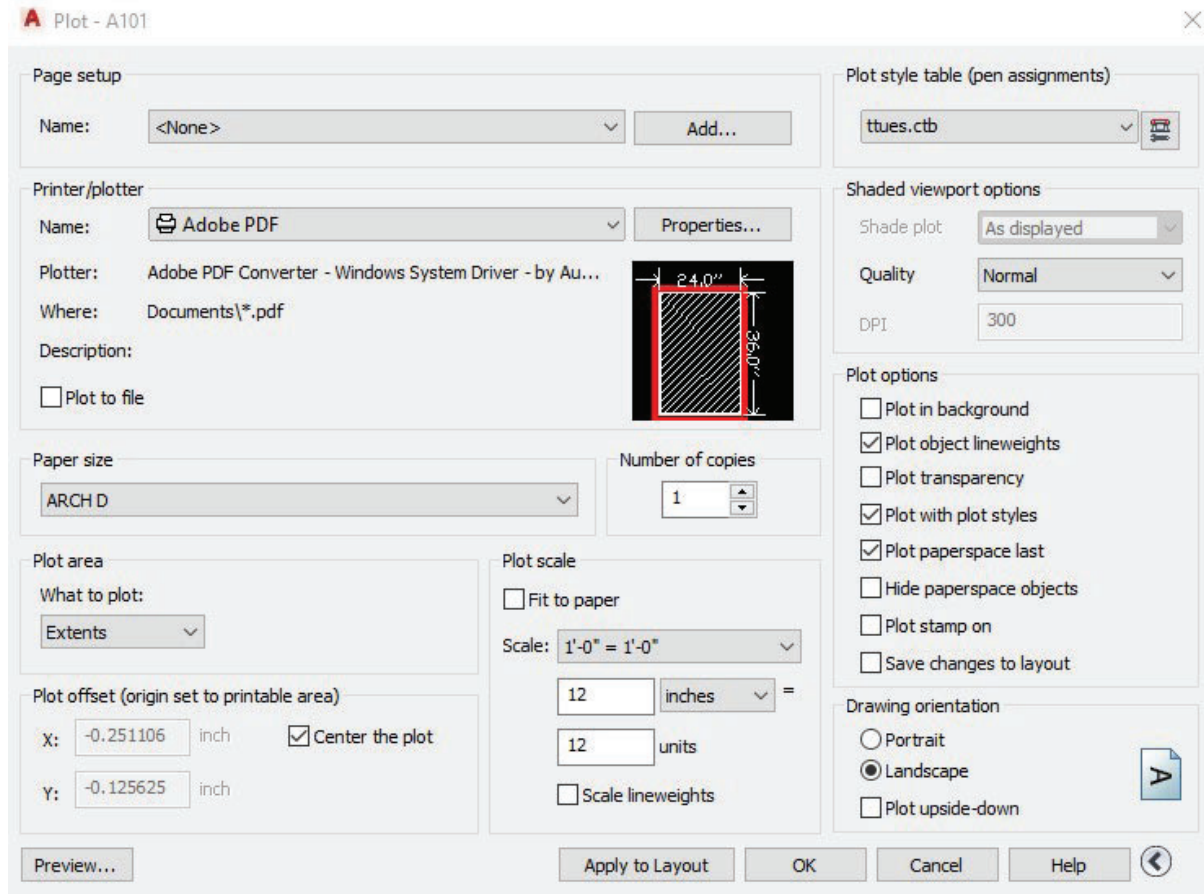
6.5. Linetype scale shall be set to 1.0.

7. Scale and Units

7.1. All CAD drawings shall be drafted at full scale in architectural units.



8. Layout and Plotting Standards



9. Blocks

- 9.1. All entities within a block shall be set to layer "0".
- 9.2. Color, linetype, lineweight, and transparency shall be set to "ByLayer".
- 9.3. Linetype scale shall be set to 1.0.

10. Annotation

10.1. Dimensions

- 10.1.1 Dimension style shall be set to TTU-OD.
- 10.1.2 See Appendix 1 for TTU-OD attributes.

10.2. Text

- 10.2.1 Scale - see Appendix 2
- 10.2.2 Notes

- 10.2.2.1 All notes shall be placed in an AutoCAD table.
- 10.2.2.2 Notes shall be located on the right side of the sheet in Column 6. See Figure 4



5	<p>GENERAL NOTES</p> <ol style="list-style-type: none"> 1 PLANS CREATED FROM AS-BUILT DRAWINGS AND NOT VERIFIED ONSITE. VERIFY & EXAMINE ALL EXISTING CONDITIONS PRIOR TO COMMENCEMENT OF WORK & IMMEDIATELY REPORT ANY QUESTIONABLE OR CONFLICTING CONDITIONS TO THE ARCHITECT AND/OR ENGINEER AT 742-2761 2 REVIEW ASBESTOS REPORTS & COORDINATE DEMOLITION OF ASBESTOS CONTAINING MATERIALS & NON-ASBESTOS CONTAINING MATERIALS, AS REQUIRED. 3 PROVIDE TEMPORARY CONTROLS, AS REQUIRED, FOR PROTECTION OF THE PREMISES DURING DEMOLITION & CONSTRUCTION. 4 REMOVE ALL ITEMS SHOWN DASHED, INCLUDING BUT NOT LIMITED TO: PLUMBING FIXTURES, PIPING, ETC. & RELATED MECHANICAL & ELECTRICAL ITEMS. <p>PLUMBING DEMOLITION NOTES</p> <p>KEYED NOTES DESIGNATED BY  AND  →</p> <ol style="list-style-type: none">  REMOVE & DISCONNECT ALL PLUMBING NOT REQUIRED FOR THIS PROJECT. ELIMINATE ANY PROJECTIONS ABOVE THE CONCRETE SLAB. VISUALLY INSPECT & REPLACE ANY DAMAGED PLUMBING LINES PER CODE.  APPROXIMATE AREA TO BE EXCAVATED FOR NEW SEWER LINE.  REMOVE EXISTING LAVATORY & LAVATORY FAUCET; DISCONNECT & REMOVE ALL PLUMBING LINES NOT TO BE REUSED AT MAINS.  REMOVE EXISTING URINAL; DISCONNECT & REMOVE ALL PLUMBING LINES NOT TO BE REUSED AT MAINS.  REMOVE EXISTING MOP SINK; DISCONNECT & REMOVE ALL PLUMBING LINES NOT TO BE REUSED AT MAINS.  REMOVE EXISTING WATER CLOSET; DISCONNECT & REMOVE ALL PLUMBING LINES NOT TO BE REUSED AT MAINS. 	 
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Figure 4
Notes Location

10.2.2.3 Note Attributes

Alignment	=	Middle Left
Horizontal cell margin	=	1/8"
Vertical cell margin	=	3/32"
Text style	=	ROMANS
Text height	=	3/32"
Text color	=	Yellow

10.2.2.4 Notes table shall be collapsed once all notes have been entered so there is no extra spacing between notes.

10.2.3 Abbreviations

10.2.3.1 See Appendix 3 for standard abbreviations.

10.2.4 Callouts

10.2.4.1 Demolition callouts will use a hexagon with a 5/8" leader. See Figure 5 for example and attributes.



10.2.4.2 New callouts will use a circle with a 5/8" leader. See Figure 6 for example and attributes.

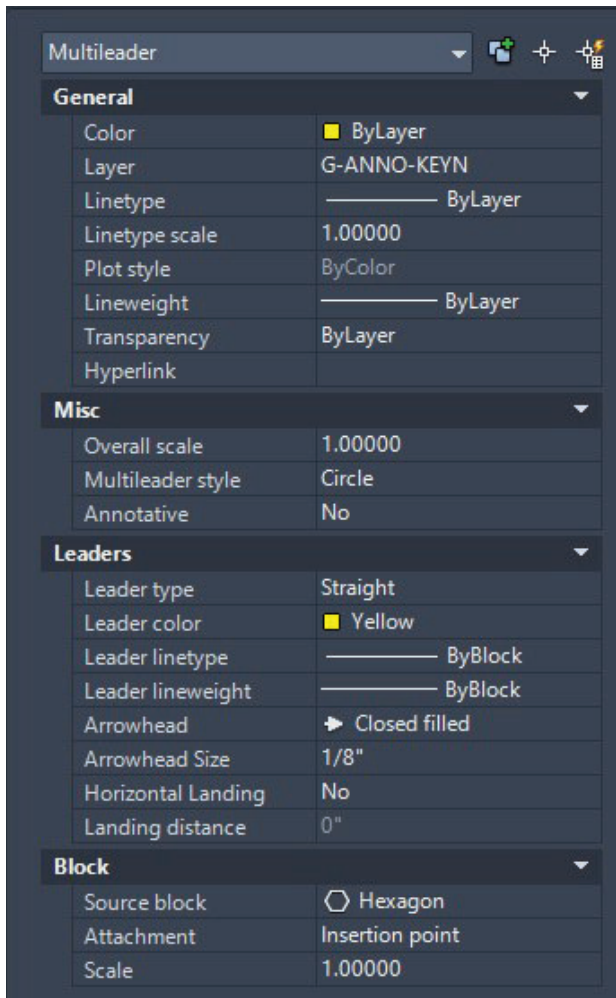
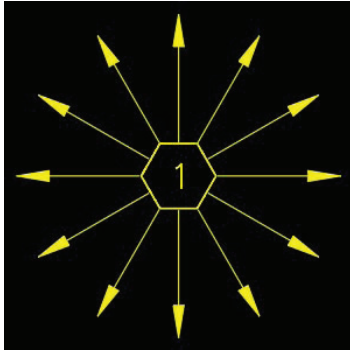


Figure 5

Demolition Callout Example and Attributes

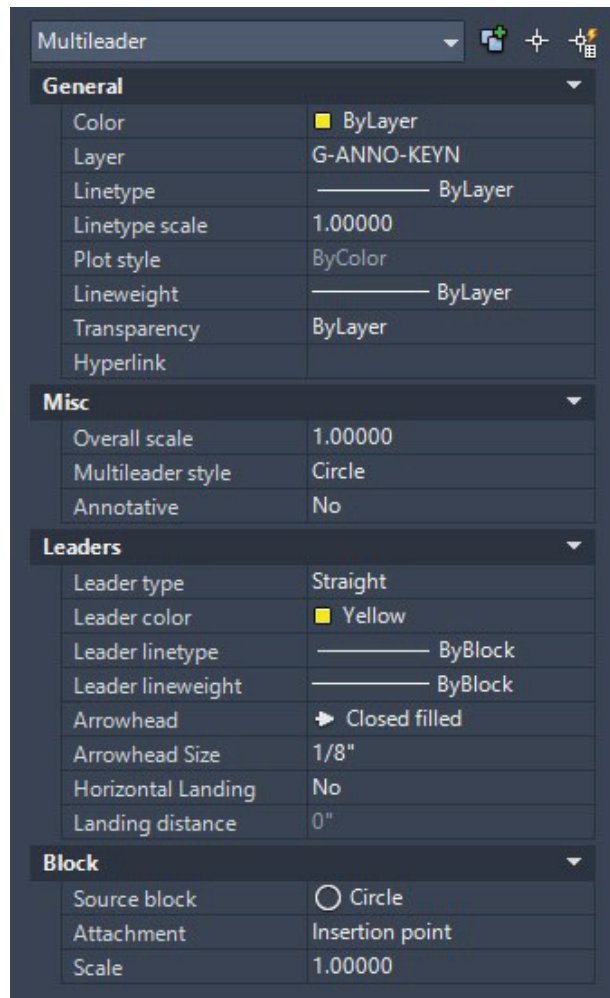
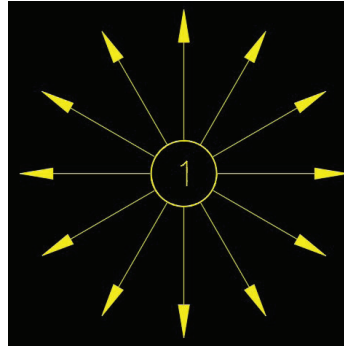


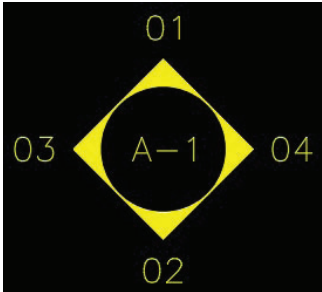
Figure 6

New Callout Example and Attributes



10.2.5 Elevation Marker - see Figure 7 for example and attributes.

10.2.6 Section Marker - see Figure 8 for example and attributes.



Block Reference	
General	
Color	ByLayer
Layer	G-ANNO-NOTE
Linetype	ByLayer
Linetype scale	1.00000
Plot style	ByColor
Lineweight	ByLayer
Transparency	ByLayer
Hyperlink	
3D Visualization	
Material	ByLayer
Geometry	
Position X	2 27/32"
Position Y	1'-2 31/32"
Position Z	0"
Scale X	1.00000
Scale Y	1.00000
Scale Z	1.00000
Misc	
Name	ELEVATION MARKER
Rotation	0.00
Annotative	No
Block Unit	Inches
Unit factor	1"
Attributes	
01	01
02	02
03	03
04	04
A-1	A-1
Advanced	
Bound spaces	Yes

Figure 7

Elevation Marker Example and Attributes



Block Reference	
General	
Color	ByLayer
Layer	G-ANNO-NOTE
Linetype	ByLayer
Linetype scale	1.00000
Plot style	ByColor
Lineweight	ByLayer
Transparency	ByLayer
Hyperlink	
3D Visualization	
Material	ByLayer
Geometry	
Position X	3 1/4"
Position Y	1'-0 15/16"
Position Z	0"
Scale X	-1.00000
Scale Y	1.00000
Scale Z	1.00000
Misc	
Name	DETAIL MARKER2
Rotation	180.00
Annotative	No
Block Unit	Inches
Unit factor	1"
Attributes	
A-1	16/A3
Advanced	
Bound spaces	Yes

Figure 8

Section Marker Example and Attributes



10.2.7 Door Marker - see Figure 9 for example.



Figure 9
Door Marker

11. Layering

- 11.1. All layers shall conform to a modified form of the *AIA CAD Layer Guidelines*. AutoCAD templates located in the *CAD Start Package* have the essential approved layers, colors, line types, line weights, etc. See Appendix 4 for the full list of approved layers.
- 11.2. Approved extensions must be added to the end of the layer (i.e. A-WALL-**DEMO**)
 - 11.2.1 Approved extensions:
 - 11.2.1.1 DEMO (demolition - item to be removed)
 - 11.2.1.2 EXST (existing - item to remain)
 - 11.2.1.3 NEWW (new - item to be added)
- 11.3. Any variation in a layer's color, line type, line weight, etc. shall be done through a viewport and by modifying the layer itself.
- 11.4. Additional layers that are not currently located in the TTU-OD AutoCAD templates must be approved by both the Lead Architect and Lead Engineer prior to use. Once approved, the new layer and its attributes must be submitted to the CADD/GIS Manager for inclusion in the *TTU Standards.dws* file.

12. Colors and Pens

<u>COLOR</u>	<u>PEN NO.</u>	<u>PEN WIDTH</u>	<u>DESCRIPTION</u>	<u>SAMPLE</u>
RED (1)	7	0.005	EXTRA THIN:	_____
YELLOW (2)	7	0.010	THIN:	_____
GREEN (3)	7	0.015	MEDIUM THIN:	_____
CYAN (4)	7	0.020	MEDIUM:	_____
BLUE (5)	7	0.028	MEDIUM HEAVY:	_____
MAGENTA (6)	7	0.040	HEAVY:	_____
WHITE (7)	7	0.050	EXTRA HEAVY:	_____
8	8	0.010	LIGHT, EXTRA THIN:	_____
9	9	0.010	EXTRA LIGHT, EXTRA THIN:	_____
255	255	0.000	DOES NOT PRINT:	_____

13. Grid System

- 13.1. All drawings shall include a grid system as set by the United States National CAD Standards. In the *CAD Start Package* there is an expanded version with grid systems established for various disciplines and scales. See Appendix 5 for example of grid system.
- 13.2. All elements will be placed in the appropriate grid system in model space. The use of the grid system will allow for the proper alignment of drawing elements in paper space.



14. Electronic File Format and Submission

14.1. Signed Bid Set

- 14.1.1 Upon completion of the **Signed Bid Set** the A/E Firm shall submit a complete set of drawings in PDF format (signed by A/E), DWG format (AutoCAD Release 2018 compatible), and, if used, RVT format (Revit 2018 compatible).
- 14.1.2 Electronic files shall be delivered on the appropriate media (see 14.5 for requirements). The “.dwg” file format is required and must be compatible to AutoCAD Release 2018. Any exceptions or special requests must have prior written approval of both the TTU-OD Project Manager and the TTU-OD CADD/GIS Unit Manager.

14.2. Signed Record Set and Record Set

- 14.2.1 Upon completion of the **Signed Record Set** and **Record Set** the A/E Firm shall submit a complete set of drawings in PDF format (signed by A/E), DWG format (AutoCAD Release 2018 compatible), and if used, RVT format (Revit 2018 compatible).
 - 14.2.2 Electronic files shall be delivered on the appropriate media (see 14.5 for requirements). The “.dwg” file format is required and must be compatible to AutoCAD Release 2018. Any exceptions or special requests must have prior written approval of both the TTU-OD Project Manager and the TTU-OD CADD/GIS Unit Manager.
 - 14.2.3 Electronic files must be identical to final media drawings.
 - 14.2.4 All external referenced files (xref) must be bound to the associated file.
 - 14.2.5 All files must be purged prior to submission.
 - 14.2.6 All files must be noted as “Record Documents” and include the date of submission.
 - 14.2.7 All files must be accompanied by a *Submission Checklist* and/or *Quality Assurance Checklist* (see 14.7 for additional information).
- 14.3. Revit files shall contain all linked files, external files, elements, etc. Note: this is typically achieved through eTransmit. It is imperative that the output file be tested to ensure all files, elements, etc. are associated and no errors occur.
- 14.4. For all submissions other than AutoCAD or Revit, single layer and unprotected PDF versions of the drawings shall be provided.
- 14.5. Files may be submitted either electronically via email attachment or link, placed on a CD/DVD or USB/Flash Drive.
- 14.5.1 File submissions must be reviewed and approved by TTU-OD CADD/GIS Unit Manager or designated representative.
 - 14.5.2 All file submissions shall contain all linked files, external referenced files, etc. Any submission missing any element will be rejected.
 - 14.5.3 All files submitted on a CD/DVD(s) must be in a jewel case. Files submitted on



a USB/Flash Drive(s) shall be in a plastic sleeve. Note: only one Texas Tech University project per CD/DVD or USB/Flash Drive. All submitted materials shall be labeled with no less than the building, project number and project name.

14.6. Plotted copies of any stage of a project may be requested by the TTU-OD Project Manager. The A/E Firm will be responsible for supplying these upon request.

14.7. Submission Checklist and Quality Assurance Checklist

14.7.1 Submission Checklist

14.7.1.1 A signed copy of the *Submission Checklist* (see Submission Checklist Form) must accompany all projects being submitted. By signing the *Submission Checklist*, the A/E Firm and/or TTU A/E is ensuring that all drawings and relevant materials are included and adhere to the guidelines in this document.

14.7.2 Quality Assurance Checklist

14.7.2.1 If the project includes a CAD file, a signed copy of the *Quality Assurance Checklist* (see Quality Assurance Checklist Form) must accompany all projects being submitted. By signing the *Quality Assurance Checklist*, the A/E Firm and/or TTU A/E is ensuring that all CAD files adhere to the guidelines in this document.

14.7.3 Failure to provide a signed Submission Checklist and/or Quality Assurance Checklist will result in the project being returned and final payment will be delayed. If there are discrepancies in the signed documents, submitted drawing(s) and/or files, the A/E Firm will correct all necessary documents, drawing(s) and/or files at their expense.

15. Project Release Requirements

15.1. All projects that include a CAD file must be reviewed by the TTU CADD/GIS Supervisor or designated representative prior to release. The CAD file must be accompanied by a signed *Quality Assurance Checklist* (see Appendix 5).

15.2. All projects will adhere to both the Texas Board of Architectural Examiners (see Appendix 6) and Texas Board of Professional Engineers (See Appendix 7) requirements for stamps and seals.

16. CAD File Translation

16.1. Texas Tech University – Operations Division recognizes that not all A/E Firms use the same CAD systems the University uses. However, it is expected that A/E Firms that do not use the same CAD systems as the University will submit DWG formatted CAD files. These files shall be compliant with all of the standards outlined in this document. In addition, the files shall not have a significant loss of drawing entities or project data that can result in the translation process.

16.2. All DWG files and CAD drawing entities submitted at the end of the project must be capable of being editing using standard AutoCAD drafting procedures. Non-compliance



with this policy may result in the rejection of CAD files submitted at project closeout and delay final project payment.

- 16.3. As a result of this policy, it is highly recommended that A/E Firms that plan to translate their native CAD files into AutoCAD format conduct a thorough file translation prior to the design phase of the project. This will identify any issues, errors, etc. in the conversion process.



CADD/GIS PROJECT REQUEST FORM

CADD/GIS PROJECT REQUEST FORM



BUILDING: _____ PROJECT NUMBER: _____

PROJECT INFORMATION

PROJECT NAME: _____

PROJECT DESCRIPTION: _____

FLOOR(S): _____

LOCATION (i.e. ROOM NUMBER): _____

PROJECT CONTACT(S)

PROJECT MANAGER: _____

DEPARTMENT CONTACT: _____

DEPARTMENT: _____

CADD/GIS INFORMATION

INFORMATION REQUIRED (check all that apply):

FIELD VERIFICATION

INITIAL DESIGN

REVIT MODEL

OTHER: _____

PROGRAM (check all that apply):

AutoCAD

PHOTOSHOP

OTHER

REVIT

MAPPING/GIS

ADDITIONAL CADD/GIS INFORMATION

SUBMISSION DEADLINE: _____
Ensure there is enough time for red lines

TECHNICIAN: _____
To be completed by CADD/GIS Supervisor

PROJECT MANAGER SIGNATURE

DATE

CADD/GIS SUPERVISOR SIGNATURE

DATE



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PROJECT SUBMISSION CHECKLIST

PROJECT SUBMISSION CHECKLIST



BUILDING: _____ PROJECT NUMBER: _____

Fill out either the "Signed Bid Set" section or the "Signed Record Set" section, not both. A separate *PROJECT SUBMISSION CHECKLIST* is required for each.

SIGNED BID SET

SIGNED DRAWINGS:

- PDF SET
- DWG SET (AutoCAD Release 2018 compatible)
- REVIT (Revit 2018 compatible)
optional
- BLUEPRINT SET
optional

SIGNED RECORD SET

SIGNED DRAWINGS (2 copies of each):

- PDF SETS
- DWG SETS (AutoCAD Release 2018 compatible)
- REVIT (Revit 2018 compatible)
optional
- BLUEPRINT SETS
optional

By signing this *Submission Checklist*, the A/E Firm and/or TTU A/E is ensuring that all drawings and relevant materials are included and adhere to the *TTU CADD Standards and Design Guidelines*.

COMPANY REPRESENTATIVE SIGNATURE

DATE

PRINTED NAME

COMPANY

TTU PROJECT MANAGER SIGNATURE

DATE

TTU CADD/GIS SUPERVISOR SIGNATURE

DATE



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QUALITY ASSURANCE CHECKLIST FORM

QUALITY ASSURANCE CHECKLIST



BUILDING: _____ PROJECT NUMBER:

Requirement	Yes	No	N/A
Title Sheet/Cover Sheet is formatted to follow the approved TTU Title Sheet/Cover Sheet:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Signature section on Title Sheet/Cover Sheet has been signed by all relevant parties:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Sheet designations adhere to those defined in the <i>CADD Standards and Design Guidelines</i> :	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Layers conform to TTU modified form of the AIA CAD Layer Guidelines:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Text set to appropriate scale as defined in Figure 4 of <i>CADD Standards and Design Guidelines</i> :	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Design professional(s) has reviewed and stamped appropriate sheets:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Linetype scale set to 1.0:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Abbreviations used in drawing adhere to Appendix 3 of <i>CADD Standards and Design Guidelines</i> :	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Drawings are drafted at full scale in architectural units:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Objects that relate to the plan, elevation, section, detail, etc. are located in model space:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Annotations, call outs, notes, legends, schedules, etc are located in paper space:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Dimensions set to TTU-OD:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Dwg file has been checked against <i>TTU Standards.dws</i> file and all discrepancies have been resolved:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
All external referenced files (xref) have been bound to the associated file(s):	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
All files have been purged:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Revit files have all linked files, external files, elements, etc associated:	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Electronic files are identical to final media drawings:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Files submitted on a CD/DVD in a jewel case or USB/Flash Drive in plastic sleeve:	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

By signing this *Quality Assurance Checklist*, the A/E Firm and/or TTU A/E is ensuring that all drawings and relevant materials adhere to the *TTU CADD Standards and Design Guidelines*.

COMPANY REPRESENTATIVE SIGNATURE _____
DATE

PRINTED NAME _____
COMPANY

TTU PROJECT MANAGER SIGNATURE _____
DATE

TTU CADD/GIS SUPERVISOR SIGNATURE _____
DATE



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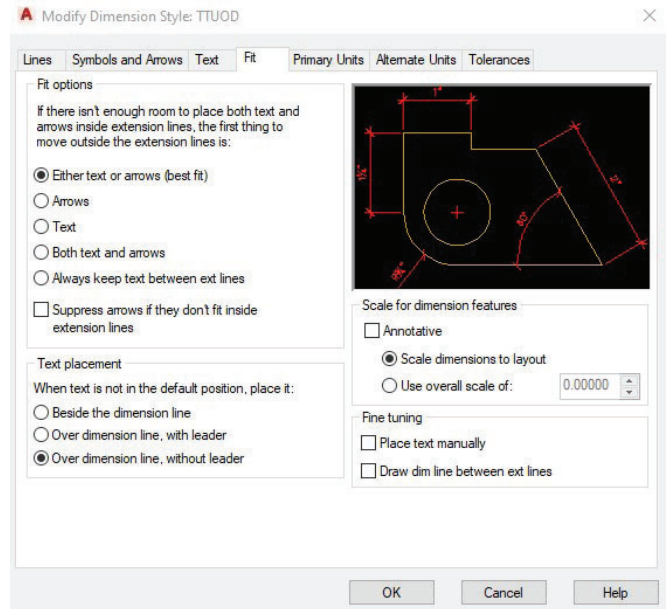
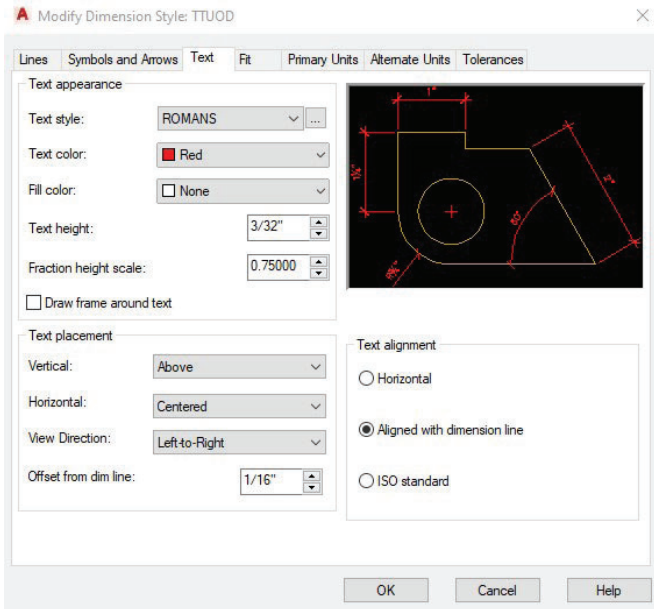
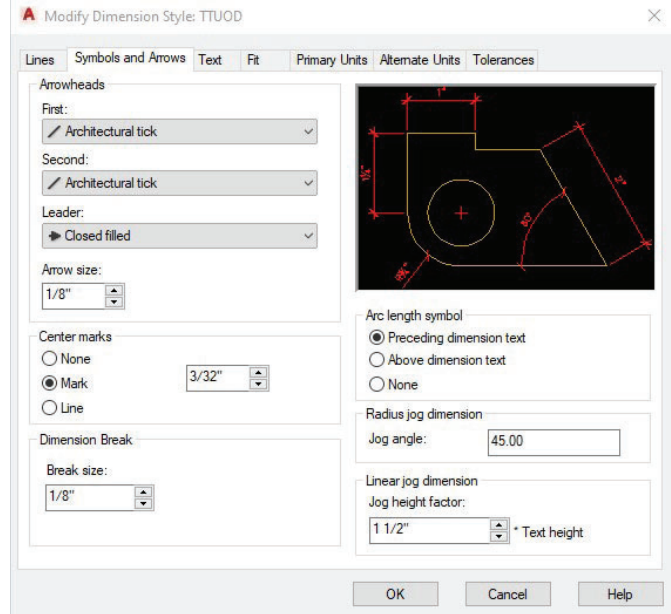
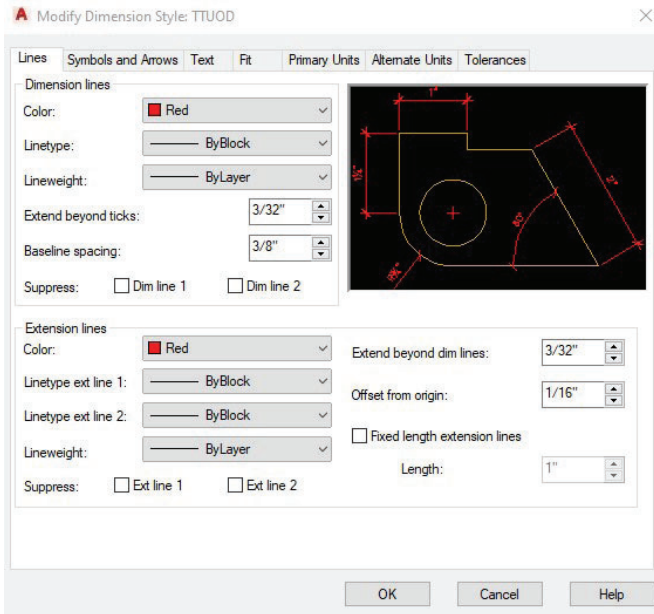
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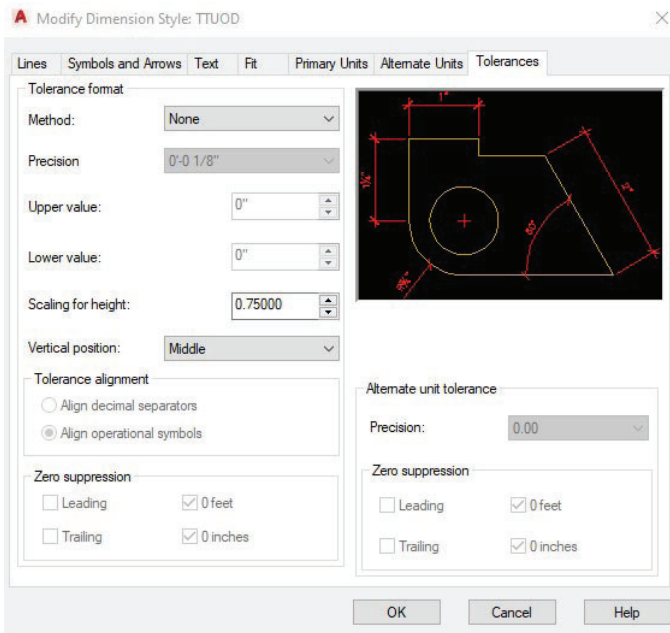
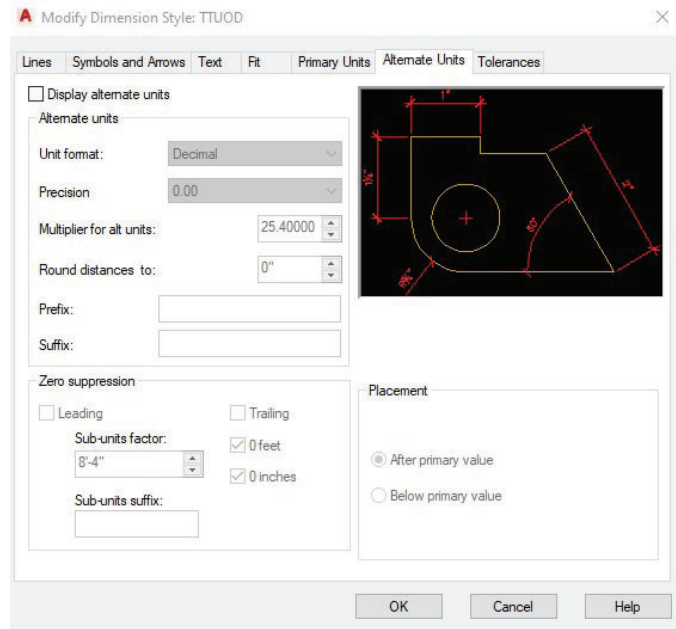
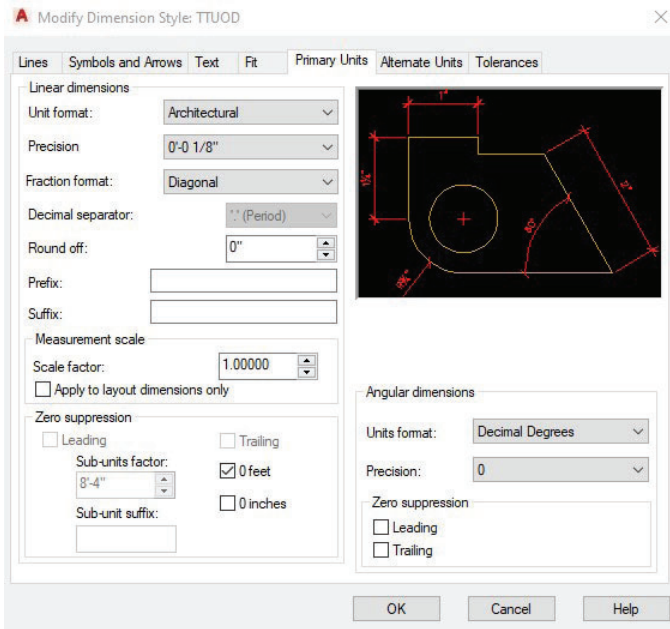


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SCALING FACTORS - ARCHITECTURAL UNITS							
PLOT SCALE	SCALE FACTOR	1/8" TEXT	3/16" TEXT	1/4" TEXT	LTYPE SCALE	ZOOM XP FACTORS	
						FRAC.	DEC.
1/64" = 1'	768	96"	144"	192"	384	1/768	0.0013
1/32" = 1'	384	48"	72"	96"	192	1/384	0.0026
1/16" = 1'	192	24"	36"	48"	96	1/192	0.0052
3/32" = 1'	128	16"	24"	32"	64	1/128	0.0078
1/8" = 1'	96	12"	18"	24"	48	1/96	0.0104
3/16" = 1'	64	8"	12"	16"	32	1/64	0.0156
1/4" = 1'	48	6"	9"	12"	24	1/48	0.0208
3/8" = 1'	32	4"	6"	8"	16	1/32	0.0313
1/2" = 1'	24	3"	4.5"	6"	12	1/24	0.0417
3/4" = 1'	16	2"	3"	4"	8	1/16	0.0625
1" = 1'	12	1.5"	2.25"	3"	6	1/12	0.0833
SCALING FACTORS - ENGINEERING UNITS							
PLOT SCALE	SCALE FACTOR	1/8" TEXT	3/16" TEXT	1/4" TEXT	LTYPE SCALE	ZOOM XP FACTORS	
						FRAC.	DEC.
1" = 1'	12	1.5"	2.25"	3"	6	1/12	0.08333
1" = 10'	120	15"	22.5"	30"	60	1/120	0.00833
1" = 20'	240	30"	45"	60"	120	1/240	0.00147
1" = 30'	360	45"	67.5"	90"	180	1/360	0.00278
1" = 50'	600	75"	112.5"	150"	300	1/600	0.00167
1" = 100'	1200	150"	225"	300"	600	1/1200	0.00083
1" = 200'	2400	300"	450"	600"	1200	1/2400	0.00042
1" = 500'	6000	750"	1125"	1500"	3000	1/6000	0.00017

NOTE:

1. Scale factor is used for scaling of blocks, hatch and dimensions (DIMSCALE).
2. Ltype scale is used with LTSCALE command to assure proper scaling of linetypes.
3. Zoom XP is used in modelspace for the scaling of MVIEWES of paperspace.



ABBREVIATIONS

Appendix 3

ABBREVIATION	DEFINATION
AB	ANCHOR BOLT
A/C	AIR CONDITIONER
ADDN'L	ADDITIONAL
ADJ	ADJUSTABLE
ADH	ADHESIVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
AP	ACOUSTICAL PANEL or ACCESS PANEL
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
B	BEYOND
B/B	BACK TO BACK
BHP	BREAK HORSEPOWER
BL	BUILDING LINE
BLDG	BUILDING
BLKG	BLOCKING
BM	BEAM
BOD	BOTTOM OF METAL DECK
BOG	BOTTOM OF GUTTER
BOM	BOTTOM OF MASONRY
BOS	BOTTOM OF STEEL
BOT	BOTTOM
BP	BASE, PORCELAIN TILE
BQ	BASE, QUARRY TILE
BR	BASE, RUBBER
BRES	BASE, RESINOUS
BRG	BEARING
BRK	BRICK
BRV	BASE, RUBBER VENTED
BTC	BASE, CERAMIC
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BTWN	BETWEEN
BTZP	BASE, PRECAST TERRAZZO
BTZ	BASE, TERRAZZO
BW	BOTH WAYS
C	CHANNEL
C/C	CENTER TO CENTER
CAB	CABINET
CAD	CADMIUM
CFM	CUBIC FEET PER MINUTE
CI	CAST IRON
CJ	CONTROL JOINT
CL	CENTERLINE
CLG	CEILING
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
CNTRD	CENTERED

ABBREVIATION	DEFINATION
CO	CLEAN OUT
COL	COLUMN
CONC	CONCRETE
COND	CONDENSATE
CONN(S)	CONNECTION(S)
CONT	CONTINUOUS
COORD	COORDINATE
COP	POLISHED CONCRETE
CORR	CORRIDOR
COS	CONCRETE (SEALED)
CPT	ROLLED CARPET
CPTW	WALL CARPET
CPY	CANOPY
CS	CAST STONE
CSM	CONCRETE STONE MASONRY
CU	CONDENSING UNIT
CUST	CUSTODIAN
CT	CARPET TILE
CW	COLD WATER
DB	DRY BULB
DBL	DOUBLE
DET	DETAIL
DH	DOOR HARDWARE
DIA	DIAMETER
DIAG	DIAGONAL
DIFF	DIFFUSER
DIM	DIMENSION
DN	DOWN
DS	DOWNSPOUT
DRWG	DRAWING
DWR	DRAWER
EA	EXHAUST AIR
EAT	EXHAUST AIR TEMPERATURE
EB	EXPANSION BOLT
EF	EXHAUST FAN
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC'L	ELECTRICAL
ELEV	ELEVATOR
ENGR	ENGINEER
EPT	EPOXY PAINT
EQ	EQUAL (EQUALLY)
ESP	EXTERNAL STATIC PRESSURE
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR
F/F	FACE TO FACE
FA	FRESH AIR
FCU	FAN COIL UNIT



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ABBREVIATIONS

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ABBREVIATION	DEFINATION
FD	FLOOR DRAIN or FIRE DAMPER
FDN	FOUNDATION
FEC	FIRE EXTINGUISHER CABINET
FFE	FINISHED FLOOR ELEVATION
FG	FIBERGLASS
FHC	FIRE HOUSE CABINET
FIN	FINISH(ED)
FIN FLR	FINISHED FLOOR
FLG	FLANGE
FLR	FLOOR
FS	FAR SIDE
FSD	COMBINATION FIRE/SMOKE DAMPER
FSAP	FIXED SOUND ABSORPTIVE PANELS
FTG	FOOTING
FV	FIELD VERIFY
GA	GAGE OR GAUGE
GALV	GALVANIZED
GB	BRAB BAR
GEN	GENERAL
GMU	GLAZED MASONRY UNIT
GPL	PLASTER/GYPSUM PLASTER
GR BM	GRADE BEAM
GRF	GROUND FACE/BURNISHED CMU
GUT	GUTTER
GYP	GYPSUM BOARD
HB	HOSE BIB
HC	HANDICAP
HD BD	HARD BOARD
HDWD	HARD WOOD
HFB	HOLLOW FACE BRICK
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HP	HORSE POWER
HPT	HIGH POINT
HT	HEIGHT
HVAC	HEATING, VENTILATION, AND A/C
ICF	INSULATED CONCRETE FORMS
ID	INSIDE DIAMETER
IF	INSIDE FACE
IND BD	INDUSTRIAL BOARD
INFO	INFORMATION
INSUL	INSULATION
INT	INTERIOR
JT	JOINT
JST(S)	JOIST(S)
L	ANGLE
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LONG	LONGITUDINAL

ABBREVIATION	DEFINATION
LRP	LOW POINT
MAS	MASONRY
MAT'L	MATERIAL
MAX	MAXIMUM
MB	MARKERBOARD
MBH	BTUH x 1,000
MDF	MEDIUM DENSITY FIBERCORE
MECH	MECHANICAL
MEZZ	MEZZANINE
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MP	METAL WALL PANELS
MS	MOP SINK
MTL	METAL
NB	NO BASE
NF	NO FINISH
NIC	NOT IN CONTRACT
NO	NUMBER NATURAL STONE
NS	NOT TO SCALE
NTS	ON CENTER
OA	OUTSIDE AIR
OC	ON CENTERS EACH WAY
OCEW	OUTSIDE DIAMETER
OD	OUTSIDE FACE
OF	OPPOSITE HAND
OH	OPPOSITE HAND
OHD	OVERHEAD
OPP	OPPOSITE
OS	OVERFLOW SCUPPER
P	PUMP
P/C	PRECAST CONCRETE
PB	PIPE BRACE
PD	PRESSURE DROP
PEN	PENETRATION
PERIM	PERIMETER
PERP	PERPENDICULAR
PL	PLATE
PLC	PLASTIC LAMINATE CASEWORK
PLP	PLASTIC LAMINATE-FACED WOOD PANEL
PNT	PAINT
PPL	PLASTER (PORTLAND CEMENT)
PROJ	PROJECTION
PT	POINT
PW	PLYWOOD
QTZ	QUARTZ
R	RISER
RA	RETURN AIR
RAD	RADIUS
RAFF	RESILIENT FLUID APPLIED FLOORING



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ABBREVIATIONS

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ABBREVIATION	DEFINATION
RAFS	RESILIENT ROLLED RUBBER FLOORING
RAFT	RESILIENT ATHLETIC FLOORING TILE
RAFV	RESILIENT ATHLETIC FLOORING VINYL
RD	ROOF DRAIN
REF	REFERENCE
REINF	REINFORCING
REM	REMAINDER
RES	RESINOUS FLOORING
REQ'D	REQUIRED
RF	RIGID FRAME
RO	ROUGH OPENING
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SB	SPLASH BLOCK
SCHED	SCHEDULE
SEC	SECURITY
SECT	SECTION
SHT	SHEET
SIM	SIMILAR
SJ	SAWN JOINT
SMO	SCHEDULED MASONRY OPENING
SP	STATIC PRESSURE
SPEC	SPECIFICATIONS
SPF	SPLIT-FACE CONCRETE MASONRY UNIT
SPS	SOLID POLYMER SURFACE MATERIAL
SS	STAINLESS STEEL
STD	STANDARD
STIFF	STIFFENER
STIR	STIRRUPS
STL	STEEL
STN	STAIN
STOR	STORAGE
STRUCT	STRUCTURE
STU	STUCCO
SUPT	SUPPORT
SVT	SOLID VINYL TILE
SYMM	SYMMETRICAL
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TC	CERAMIC TILE
TH	THRESHOLD
TLT	TOILET
TMD	TOP OF METAL DECK
TOB	TOP OF BEAM
TOBB	TOP OF CMU BOND BEAM
TOBR	TOP OF BRICK
TOC	TOP OF CURB
TOCP	TOP OF CONCRETE PANEL
TOF	TOP OF FOOTING
TOJ	TOP OF JOIST

ABBREVIATION	DEFINATION
TOM	TOP OF MASONRY
TOP	TOP OF PIER
TOPC	TOP OF PIER CAP
TOS	TOP OF STEEL
TOSC	TOP OF STRUCTURAL CONCRETE
TOSF	TOP OF METAL STUD FRAMING
TOSS	TOP OF STRUCTURAL STEEL
TOT	TOP OF STEEL TRUSS
TOW	TOP OF WALL
TOWD	TOP OF WOOD BLOCKING/NAILER
TPC	PORCELAIN TILE
TQ	QUARRY TILE
TRAN	TRANSVERSE
TRIM	METAL FLASHINGS AND COPINGS
TS	TUBE STEEL
TYP	TYPICAL
TZ	TERRAZZO
TZE	TERRAZZO EPOXY
TZT	TERRAZZO TILE
U	URINAL
UNO	UNLESS NOTED OTHERWISE
VCT	BINYL COMPOSITION TILE
VIF	VERIFY IN FIELD
VERT	VERTICAL
W/	WITH
W/O	WITHOUT
WASH	WASHSTATION
WB	WET BULB
WC	WATERCLOSET
WD	WOOD
WH	WATER HEATER
WMP	MAPLE WOOD ATHLETIC FLOORING
WMS	MASONITE WOOD BLOCKING
WP	WORKPOINT
WS	WATERSTOP
WCT	WALK-OFF CARPET TILE
WT	WEIGHT
WVC	WOOD VENEER CASEWORK
WWF	WELDED WIRE MESH (FABRIC)
XB	X-BRACING
>=	GREATER THAN OR EQUAL TO
<=	LESS THAN OR EQUAL TO



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STANDARD COLORS AND LINETYPES FOR APPROVED LAYERS		
EXTENSION	COLOR	LINETYPE
DEMO	YELLOW	DEMO
EXST	RED	CONTINUOUS
NEWW	YELLOW	CONTINUOUS
ALL ANNO LAYERS	YELLOW	CONTINUOUS

* NOTE: STANDARD LINETYPES DO NOT APPLY TO SPECIAL LAYERS (i.e. COLD WATER PIPE, CHILLED WATER PIPE, FENCE, ETC.)

LAYER	DEFINATION
0	0
24x36GRID1	24x36 GRID 1" = 1'-0", nonplotting
24x36GRID1_1_2	24x36 GRID 1'-6" = 1'-0", nonplotting
24x36GRID1_2	24x36 GRID 1/2" = 1'-0", nonplotting
24x36GRID1_4	24x36 GRID 1/4" = 1'-0", nonplotting
24x36GRID1_8	24x36 GRID 1/8" = 1'-0", nonplotting
24x36GRID3	24x36 GRID 3" = 1'-0", nonplotting
24x36GRID3_4	24x36 GRID 3/4" = 1'-0", nonplotting
24x36GRID3_8	24x36 GRID 3/8" = 1'-0", nonplotting
24x36GRID6	24x36 GRID 6" = 1'-0", nonplotting
24x36GRID12	24x36 GRID 1'-0" = 1'-0", nonplotting
A-ANNO-DIMS	Dimensions
A-ANNO-KEYN	Key notes
A-ANNO-LEGN	Legends and schedules
A-ANNO-NOTE	Notes
A-ANNO-NPLT	Construction lines, nonplotting information
A-ANNO-REDL	Redline
A-ANNO-REVS	Revisions
A-ANNO-SYMB	Symbols
A-ANNO-TEXT	Text
A-ANNO-TTLB	Border and title block
A-AREA	Area calculation boundary lines
A-AREA-IDEN	Room numbers, tenant identifications, area calculation
A-AREA-OCCP	Occupant or employee names
A-AREA-PATT	Area cross hatching
A-CASE	Wallmounted casework
A-CLNG	Ceiling information
A-CLNG-ACCS	Ceiling access
A-CLNG-GRID	Ceiling grid
A-CLNG-OPEN	Ceiling/roof penetrations
A-CLNG-PATT	Ceiling patterns
A-CLNG-SUSP	Suspended elements
A-CLNG-TEES	Main tees
A-COLS	Columns
A-DETL	Details
A-DETL-IDEN	Component identification numbers
A-DETL-MBND	Material beyond section cut
A-DETL-MCUT	Material cut by section
A-DETL-PATT	Textures and hatch patterns

LAYER	DEFINATION
A-DOOR	Door
A-DOOR-ELEV	Doors: 3D views
A-DOOR-FULL	Full-height (to ceiling) door: swing and leaf
A-DOOR-IDEN	Door number, hardware group, etc.
A-DOOR-PRHT	Partial-height door: swing and leaf
A-ELEV	Interior and exterior elevations
A-ELEV-CASE	Elevation: Wall-mounted casework
A-ELEV-CLNG	Elevation: Ceiling
A-ELEV-DOOR	Elevation: Door
A-ELEV-ELEC	Elevation: Electrical components
A-ELEV-FIXT	Elevation: Miscellaneous fixtures
A-ELEV-FLOR	Elevation: Floor
A-ELEV-FNSH	Elevation: Finishes, woodwork, trim
A-ELEV-FURN	Elevation: Furniture
A-ELEV-GLAZ	Elevation: Windows, window walls, curtain walls, glazed partitions
A-ELEV-HRAL	Elevation: Stair and balcony handrails, guardrails
A-ELEV-IDEN	Component identification numbers
A-ELEV-MECH	Elevation: Mechanical
A-ELEV-OTLN	Building outlines
A-ELEV-PATT	Textures and hatch patterns
A-ELEV-PFIX	Elevation: Plumbing fixtures
A-ELEV-SIGN	Elevation: Signage
A-ELEV-WALL	Elevation: Wall
A-EQPM	Equipment
A-EQPM-ACCS	Equipment access
A-EQPM-CLNG	Ceiling-mounted or suspended equipment
A-EQPM-ELEV	Equipment surfaces: 3D views
A-EQPM-FIXD	Fixed equipment
A-EQPM-IDEN	Equipment identification numbers
A-EQPM-MOVE	Movable equipment
A-EQPM-NICN	Equipment not in contract
A-FLOR	Floor information
A-FLOR-CASE	Floor: Casework (manufactured cabinets)
A-FLOR-DOOR	Floor: Door
A-FLOR-EVTR	Floor: Elevator cars and equipment
A-FLOR-FIXT	Floor: Miscellaneous fixtures
A-FLOR-GLAZ	Floor: Windows, window walls, curtain walls, glazed partitions
A-FLOR-HRAL	Floor: Stair and balcony handrails, guardrails
A-FLOR-IDEN	Floor: Room numbers, names, targets, etc.
A-FLOR-LEVL	Floor: Level changes, ramps, pits, depressions
A-FLOR-OTLN	Floor: Floor or building outline
A-FLOR-OVHD	Floor: Overhead items (skylights, over-hangs-usually dashed line)
A-FLOR-PATT	Floor: Paving, tile, carpet patterns
A-FLOR-PFIX	Floor: Plumbing fixtures



LAYER	DEFINATION
A-FLOR-RAIS	Floor: Raised floors
A-FLOR-RISR	Floor: Stair risers
A-FLOR-SIGN	Floor: Signage
A-FLOR-SPCL	Floor: Architectural specialties (toilet room accessories, display cases)
A-FLOR-STRS	Floor: Stair treads, escalators, ladders
A-FLOR-TPTN	Floor: Toilet partitions
A-FLOR-WALL	Floor: Walls
A-FLOR-WDWK	Floor: Architectural woodwork (field-built cabinets and counters)
A-FURN	Furniture
A-FURN-BORD	Whiteboards, glassboards, etc.
A-FURN-CHAR	Chairs and other seating
A-FURN-ELEV	Furniture: 3D views
A-FURN-FILE	File cabinets
A-FURN-FREE	Furniture: freestanding (desks, credenzas, etc)
A-FURN-IDEN	Furniture numbers
A-FURN-PATT	Finish patterns
A-FURN-PLNT	Plants
A-FURN-PNLS	Furniture system panels
A-FURN-POWR	Furniture system-power designations
A-FURN-STOR	Furniture system storage components
A-FURN-WKSF	Furniture system work surface components
A-GLAZ	Windows, window walls, curtain walls, glazed partitions
A-GLAZ-CVRG	Window coverings
A-GLAZ-ELEV	Glazing and mullions - elevation views
A-GLAZ-FULL	Full-height glazed walls and partitions
A-GLAZ-IDEN	Window number
A-GLAZ-PRHT	Windows and partial-height glazed partitions
A-GLAZ-SILL	Windowsills
A-GRID	Planning grid or column grid
A-HRAL	Stair and balcony handrails, guardrails
A-PANL	Panels
A-PANL-PATT	Panel hatching
A-ROOF	Roof surfaces
A-ROOF-ELEV	Roof surfaces: 3D views
A-ROOF-HRAL	Stair handrails, nosings, guardrails
A-ROOF-LEVEL	Level changes
A-ROOF-OTLN	Roof outline
A-ROOF-PATT	Roof surface patterns, hatching
A-ROOF-RISR	Stair risers
A-ROOF-STRS	Stair treads, ladders
A-SECT	Sections
A-SECT-IDEN	Section: Component identification numbers
A-SECT-MBND	Section: Material beyond section cut
A-SECT-MCUT	Section: Material cut by section
A-SECT-PATT	Section: Textures and hatch patterns

LAYER	DEFINATION
A-TBLK-SEAL	Seal
A-WALL	Wall
A-WALL-FIRE	Fire wall
A-WALL-FULL	Full-height walls, stair and shaft walls, walls to structure
A-WALL-HEAD	Door and window headers (appear on reflected ceiling plans)
A-WALL-JAMB	Door and window jambs (do not appear on reflected ceiling plans)
A-WALL-MOVE	Movable partitions
A-WALL-PATT	Wall insulation, hatching and fill
A-WALL-PRHT	Partial-height walls (do not appear on reflected ceiling plans)
BASEMAP	Basemap
C-ANNO-DIMS	Dimensions
C-ANNO-KEYN	Key notes
C-ANNO-LEGN	Legends and schedules
C-ANNO-NOTE	Notes
C-ANNO-NPLT	Construction lines, nonplotting information
C-ANNO-REDL	Redline
C-ANNO-REVS	Revisions
C-ANNO-SYMB	Symbols
C-ANNO-TEXT	Text
C-ANNO-TTLB	Border and title block
C-BLDG	Proposed building footprints
C-COMM	Site communication/telephone poles, boxes, towers
C-COMM-OVHD	Overhead communication lines
C-COMM-UNDR	Underground communication lines
C-FIRE	Fire protection-hydrants, connections
C-FIRE-UNDR	Fire protection--underground lines
C-NGAS	Natural gas-manholes, meters, storage tanks
C-NGAS-UNDR	Natural gas-underground lines
C-PKNG	Parking lots
C-PKNG-CARS	Graphic illustration of cars
C-PKNG-DRAN	Parking lot drainage slope indications
C-PKNG-ISLD	Parking islands
C-PKNG-STRP	Parking lot striping, handicapped symbol
C-PROP	Property lines, survey benchmarks
C-PROP-BRNG	Bearings and distance labels
C-PROP-CONS	Construction controls
C-PROP-ESMT	Easements, rights-of-way, setback lines
C-ROAD	Roadways
C-ROAD-CNTR	Center lines
C-ROAD-CURB	Curbs
C-SSWR	Sanitary sewer-manholes, pumping stations
C-SSWR-UNDR	Sanitary sewer-underground lines
C-STRM	Storm drainage catch basins, manholes
C-STRM-UNDR	Storm drainage pipe-underground
C-TOPO	Proposed contour lines and elevations



LAYER	DEFINATION
C-TOPO-BORE	Test borings
C-TOPO-RTWL	Retaining wall
C-TOPO-SPOT	Spot elevations
C-WATR	Domestic water-manholes, pumping stations, storage tanks
C-WATR-UNDR	Domestic water-underground lines
Defpoints	Defpoints
E-1LIN	One-line diagrams
E-ALRM	Miscellaneous alarm system
E-ANNO-DIMS	Dimensions
E-ANNO-KEYN	Key notes
E-ANNO-LEGN	Legends and schedules
E-ANNO-NOTE	Notes
E-ANNO-NPLT	Construction lines, nonplotting information
E-ANNO-REDL	Redline
E-ANNO-REVS	Revisions
E-ANNO-SYMB	Symbols
E-ANNO-TEXT	Text
E-ANNO-TTLB	Border and title block
E-AUXL	Auxiliary systems
E-BELL	Bell system
E-CCTV	Closed-circuit TV
E-CLOK	Clock system
E-COMM	Telephone, communication outlets
E-CTRL	Electric control systems
E-CTRL-DEVC	Control system devices
E-CTRL-WIRE	Control system wiring
E-DATA	Data outlets
E-DETL	Details
E-DETL-IDEN	Component identification numbers
E-DETL-PATT	Textures and hatch patterns
E-DICT	Central dictation system
E-FIRE	Fire alarm, fire extinguishers
E-GRND	Ground system
E-GRND-CIRC	Ground system circuits
E-GRND-DIAG	Ground system diagram
E-GRND-EQUI	Equipotential ground system
E-GRND-REFR	Reference ground system
E-INTC	Intercom system
E-LEGN	Legend of symbols
E-LITE	Lighting
E-LITE-CAT5	Lighting CAT5 cable
E-LITE-CIRC	Lighting circuits
E-LITE-CLNG	Ceiling-mounted lighting
E-LITE-EMER	Emergency lighting
E-LITE-EQPM	Lighting equipment
E-LITE-EXIT	Exit Lighting

LAYER	DEFINATION
E-LITE-FLOR	Floor-mounted lighting
E-LITE-IDEN	Luminaire identification and text
E-LITE-JBOX	Junction box
E-LITE-NUMB	Lighting circuit numbers
E-LITE-OTLN	Lighting outline for background (optional)
E-LITE-ROOF	Roof lighting
E-LITE-SITE	Site lighting (see also civil group)
E-LITE-SPCL	Special lighting
E-LITE-SWCH	Lighting-switches
E-LITE-WALL	Wall-mounted lighting
E-LTNG	Lightning protection system
E-NURS	Nurse call system
E-PGNG	Paging system
E-POWR	Power
E-POWR-BUSW	Busways
E-POWR-CABL	Cable trays
E-POWR-CIRC	Power circuits
E-POWR-CLNG	Power-ceiling receptacles and devices
E-POWR-EQPM	Power equipment
E-POWR-FEED	Feeders
E-POWR-IDEN	Power identification, text
E-POWR-JBOX	Junction box
E-POWR-NUMB	Power circuit numbers
E-POWR-OTLN	Power outline for backgrounds
E-POWR-PANL	Power panels
E-POWR-ROOF	Roof power
E-POWR-SITE	Site power (see also civil group)
E-POWR-SWBD	Power switchboards
E-POWR-UCPT	Under-carpet wiring
E-POWR-URAC	Underfloor raceways
E-POWR-WALL	Power wall outlets and receptacles
E-PRJT	Projectors and projector screens
E-PRJT-SWCH	Projectors and projector screens switches
E-RISR	Riser diagram
E-SECT	Sections
E-SECT-IDEN	Component identification numbers
E-SECT-PATT	Textures and hatch patterns
E-SERT	Security
E-SITE	Site electrical substations, poles
E-SITE-LITE	Site lighting (see also civil group)
E-SITE-OVHD	Overhead lines
E-SITE-POLE	Electric poles
E-SITE-UNDR	Underground electrical lines
E-SOUN	Sound/PA system
E-TVAN	TV antenna system
F-ANNO-DIMS	Dimensions
F-ANNO-KEYN	Key notes



LAYER	DEFINATION
F-ANNO-LEGN	Legends and schedules
F-ANNO-NOTE	Notes
F-ANNO-NPLT	Construction lines, nonplotting information
F-ANNO-REDL	Redline
F-ANNO-REVS	Revision identification numbers
F-ANNO-SYMB	Symbols
F-ANNO-TEXT	Text
F-ANNO-TTLB	Border and title block
F-CO2S	CO2 system
F-CO2S-EQPM	CO2 equipment
F-CO2S-PIPE	CO2 sprinkler piping
F-HALN	Halon
F-HALN-EQPM	Halon equipment
F-HALN-PIPE	Halon piping
F-IGAS	Inert gas
F-IGAS-EQPM	Inert gas equipment
F-IGAS-PIPE	Inert gas piping
F-PROT	Fire protection systems
F-PROT-ALRM	Fire alarm, fire extinguishers
F-PROT-EQPM	Fire system equipment (fire hose cabinet extinguishers)
F-PROT-SMOK	Smoke detectors/heat sensors
F-SPRN	Fire protection sprinkler system
F-SPRN-CLHD	Sprinkler head-ceiling
F-SPRN-OTHD	Sprinkler head-other
F-SPRN-PIPE	Sprinkler piping
F-SPRN-STAN	Sprinkler system standpipe
F-STAN	Fire protection standpipe system
G-ACCS	Access plan
G-ANNO-DIMS	Dimensions
G-ANNO-KEYN	Key notes
G-ANNO-LEGN	Legends and schedules
G-ANNO-NOTE	Notes
G-ANNO-NPLT	Construction lines, nonplotting information
G-ANNO-REDL	Redline
G-ANNO-REVS	Revisions
G-ANNO-SYMB	Symbols
G-ANNO-TEXT	Text
G-ANNO-TTLB	Border and title block
G-CODE	Code compliance plan
G-EVAC	Evacuation plan
G-FIRE	Fire protection plan
G-PLAN	Floor plan-key plan
G-SITE	Site plan-key map
H-ANNO-DIMS	Dimensions
H-ANNO-KEYN	Key notes
H-ANNO-LEGN	Legends and schedules

LAYER	DEFINATION
H-ANNO-NOTE	Notes
H-ANNO-NPLT	Construction lines, nonplotting information
H-ANNO-REDL	Redline
H-ANNO-REVS	Revisions
H-ANNO-SYMB	Symbols
H-ANNO-TEXT	Text
H-ANNO-TTLB	Border and title block
H-PLAN	Floor plan-key plan
H-SITE	Site plan-key map
I-ANNO-DIMS	Dimensions
I-ANNO-KEYN	Key notes
I-ANNO-LEGN	Legends and schedules
I-ANNO-NOTE	Notes
I-ANNO-NPLT	Construction lines, nonplotting information
I-ANNO-REDL	Redline
I-ANNO-REVS	Revisions
I-ANNO-SYMB	Symbols
I-ANNO-TEXT	Text
I-ANNO-TTLB	Border and title block
I-AREA	Area calculation lines
I-AREA-IDEN	Room numbers, tenant identifications, area calculation
I-AREA-OCCP	Occupant or employee names
I-AREA-PATT	Area cross hatching
I-CLNG	Ceiling Information
I-CLNG-ACCS	Ceiling access
I-CLNG-GRID	Ceiling grid
I-CLNG-OPEN	Ceiling/roof penetrations
I-CLNG-PATT	Ceiling patterns
I-CLNG-SUSP	Suspended elements
I-CLNG-TEES	Main tees
I-COLS	Columns
I-DETL	Details
I-DETL-IDEN	Component identification numbers
I-DETL-MBND	Material beyond section cut
I-DETL-MCUT	Material cut by section
I-DETL-PATT	Textures and hatch patterns
I-DFRM	Doorframes
I-DOOR	Doors
I-DOOR-ELEV	Doors: 3D views
I-DOOR-FULL	Full-height (to ceiling) door: swing and leaf
I-DOOR-IDEN	Door number, hardware group, etc.
I-DOOR-PRHT	Partial height door: swing and leaf
I-ELEV	Interior and exterior elevations
I-ELEV-CASE	Wall-mounted casework
I-ELEV-FIXT	Elevation: Miscellaneous fixtures
I-ELEV-FNSH	Elevation: Finishes, woodwork, trim
I-ELEV-IDEN	Elevation: Component identification numbers



LAYER	DEFINATION
I-ELEV-PATT	Elevation: Textures and hatch patterns
I-ELEV-PFIX	Elevation: Plumbing fixtures in elevation
I-ELEV-SIGN	Elevation: Signage
I-EQPM	Equipment
I-EQPM-ACCS	Equipment access
I-EQPM-CLNG	Ceiling-mounted or suspended equipment
I-EQPM-ELEV	Equipment surfaces: 3D views
I-EQPM-FIXD	Fixed equipment
I-EQPM-IDEN	Equipment identification numbers
I-EQPM-MOVE	Movable equipment
I-EQPM-NICN	Equipment not in contract
I-FLOR	Floor information
I-FLOR-CASE	Floor: Casework (manufactured cabinets)
I-FLOR-EVTR	Floor: Elevator cars and equipment
I-FLOR-FIXT	Floor: Miscellaneous fixtures
I-FLOR-HRAL	Floor: Stair and balcony handrails, guardrails
I-FLOR-IDEN	Floor: Room numbers, names, targets, etc.
I-FLOR-LEVL	Floor: Level changes, ramps, pits, depressions
I-FLOR-OTLN	Floor or building outline
I-FLOR-OVHD	Floor: Overhead items (skylights, overhangs-usually dashed lines)
I-FLOR-PATT	Floor: Paving, tile, carpet patterns
I-FLOR-PFIX	Floor: Plumbing fixtures
I-FLOR-RAIS	Raised floors
I-FLOR-RISR	Floor: Stair risers
I-FLOR-SIGN	Floor: Signage
I-FLOR-SPCL	Floor: Architectural specialties (toilet room accessories, display cases)
I-FLOR-STRS	Floor: Stair treads, escalators, ladders
I-FLOR-TPTN	Floor: Toilet partitions
I-FLOR-WDVK	Floor: Architectural woodwork (field-built cabinets and counters)
I-FURN	Furniture
I-FURN-CHAR	Chairs and other seating
I-FURN-ELEV	Furniture: 3D Views
I-FURN-FILE	File cabinets
I-FURN-FREE	Furniture: freestanding (desks, credenzas, etc)
I-FURN-IDEN	Furniture numbers
I-FURN-PATT	Finish patterns
I-FURN-PLNT	Plants
I-FURN-PNLS	Furniture system panels
I-FURN-POWR	Furniture system-power designations
I-FURN-STOR	Furniture system storage components
I-FURN-WKSF	Furniture system work surface components
I-GLAZ	Glazing
I-GLAZ-ELEV	Glazing and mullions-elevation views
I-GLAZ-FULL	Full-height glazed walls and partitions
I-GLAZ-IDEN	Window number

LAYER	DEFINATION
I-GLAZ-PRHT	Windows and partial-height glazed partitions
I-GLAZ-SILL	Windowsills
I-GRID	Planning grid or column grid
I-SECT	Sections
I-SECT-IDEN	Section: Component identification numbers
I-SECT-MBND	Section: Material beyond section cut
I-SECT-MCUT	Section: Material cut by section
I-SECT-PATT	Section: Textures and hatch patterns
I-WALL	Interior walls
I-WALL-ELEV	Wall surfaces: 3D views
I-WALL-FIRE	Fire wall patterning
I-WALL-FULL	Full-height walls, stair and shaft walls, walls to structure
I-WALL-HEAD	Door and window headers (appear on reflected ceiling plan)
I-WALL-JAMB	Door and window jambs (do not appear on reflected ceiling plans)
I-WALL-MOVE	Movable partitions
I-WALL-PATT	Wall insulation, hatching and fill
I-WALL-PRHT	Partial-height walls (do not appear on reflected ceiling plans)
L-ANNO-DIMS	Dimensions
L-ANNO-KEYN	Key notes
L-ANNO-LEGN	Legends and schedules
L-ANNO-NOTE	Notes
L-ANNO-NPLT	Construction lines, nonplotting information
L-ANNO-REDL	Redline
L-ANNO-REVS	Revisions
L-ANNO-SYMB	Symbols
L-ANNO-TEXT	Text
L-ANNO-TTLB	Border and title block
L-IRRG	Irrigation system
L-IRRG-COVR	Irrigation coverage
L-IRRG-EQPT	Irrigation equipment
L-IRRG-PIPE	Irrigation piping
L-IRRG-SPKL	Irrigation sprinklers
L-PLNT	Plant and landscape materials
L-PLNT-BEDS	Rock, bark and other landscaping beds
L-PLNT-GRND	Ground covers and vines
L-PLNT-PLAN	Planting plants
L-PLNT-TREE	Trees
L-PLNT-TURF	Lawn areas
L-SITE	Site improvements
L-SITE-BRDG	Bridges
L-SITE-DECK	Decks
L-SITE-FENC	Fencing
L-SITE-FURN	Site furnishings
L-SITE-PLAY	Play structures
L-SITE-POOL	Pools and spas



LAYER	DEFINATION
L-SITE-SPRT	Sports fields
L-SITE-STEP	Steps
L-SITE-WALL	Walls
L-WALK	Walks and steps
L-WALK-PATT	Walks and steps-cross-hatch patterns
M-ADEQ	Air distribution equipment
M-ADEQ-ARRW	Air distribution equipment air flow
M-ANNO-DIMS	Dimensions
M-ANNO-KEYN	Key notes
M-ANNO-LEGN	Legends and schedules
M-ANNO-NOTE	Notes
M-ANNO-NPLT	Construction lines, nonplotting information
M-ANNO-REDL	Redline
M-ANNO-REVS	Revisions
M-ANNO-SYMB	Symbols
M-ANNO-TEXT	Text
M-ANNO-TTLB	Border and title block
M-BRIN	Brine systems
M-BRIN-EQPM	Brine system equipment
M-BRIN-PIPE	Brine system piping
M-CHIM	Prefabricated chimneys
M-CMPA	Compressed air systems
M-CMPA-CEQP	Compressed air equipment
M-CMPA-CPIP	Compressed air piping
M-CMPA-PEQP	Process air equipment
M-CMPA-PPIP	Process air piping
M-CONT	Controls and instrumentation
M-CONT-THER	Thermostats
M-CONT-WIRE	Low voltage wiring
M-CWTR	Chilled water systems
M-CWTR-EQPM	Chilled water equipment
M-CWTR-PIPE	Chilled water piping
M-DETL	Details
M-DUCT	Dust and fume collection system
M-DUCT-EQPM	Dust and fume collection equipment
M-DUCT-PATT	Dust and fume ductwork pattern
M-ELHT-EQPM	Electric heat equipment
M-ENER	Energy management system
M-ENER-EQPM	Energy management equipment
M-ENER-WIRE	Energy management wiring
M-EXHS	Exhaust system
M-EXHS-DUCT	Exhaust system ductwork
M-EXHS-EQPM	Exhaust system equipment
M-EXHS-RFEQ	Rooftop exhaust equipment
M-FUEL	Fuel system piping
M-FUEL-GGEP	Fuel gas general piping
M-FUEL-GPRP	Fuel gas process piping

LAYER	DEFINATION
M-FUEL-OGEP	Fuel oil general piping
M-FUEL-OPRP	Fuel oil process piping
M-FUME-EQPM	Fume hoods
M-FUME-EXHS	Fume hood exhaust system
M-HOTW	Hot water heating system
M-HOTW-EQPM	Hot water equipment
M-HOTW-PIPE	Hot water piping
M-HVAC	HVAC system
M-HVAC-CFM	HVAC cubic feet per minute
M-HVAC-DUCT	HVAC ductwork
M-HVAC-EQPM	HVAC equipment
M-HVAC-EQPM-PATT	HVAC equipment pattern
M-HVAC-ODFF	HVAC other diffusers
M-HVAC-OPNG	HVAC openings
M-HVAC-RDFF	Return air diffusers
M-HVAC-SDFF	Supply air diffusers
M-LGAS	Laboratory gas systems
M-LGAS-EQPM	Laboratory gas equipment
M-LGAS-PIPE	Laboratory gas piping
M-MACH	Machine shop equipment
M-MDGS	Medical gas systems
M-MDGS-EQPM	Medical gas equipment
M-MDGS-PIPE	Medical gas piping
M-NGAS	Natural gas piping
M-NGAS-EQPM	Natural gas equipment
M-NGAS-PIPE	Natural gas piping
M-PROC	Process systems
M-PROC-EQPM	Process equipment
M-PROC-PIPE	Process piping
M-RCOV	Energy recovery
M-RCOV-EQPM	Energy recovery equipment
M-RCOV-PIPE	Energy recovery piping
M-REFG	Refrigeration systems
M-REFG-EQPM	Refrigeration equipment
M-REFG-PIPE	Refrigeration piping
M-SPCL	Special systems
M-SPCL-EQPM	Special systems equipment
M-SPCL-PIPE	Special systems piping
M-STEM	Steam systems
M-STEM-CONP	Steam systems condensate piping
M-STEM-EQPM	Special systems equipment
M-STEM-HPIP	High pressure steam piping
M-STEM-LPIP	Low pressure steam piping
M-STEM-MPIP	Medium pressure steam piping
M-TEST-EQPM	Test equipment
P-ACCS	Plumbing accessories
P-ACID	Acid, alkaline, oil waste systems



LAYER	DEFINATION
P-ACID-PIPE	Acid, alkaline, oil waste piping
P-AIR	Compressed air
P-AIR-PIPE	Compressed air piping
P-ANNO-DIMS	Dimensions
P-ANNO-KEYN	Key notes
P-ANNO-LEGN	Legends and schedules
P-ANNO-NOTE	Notes
P-ANNO-NPLT	Construction lines, nonplotting information
P-ANNO-REDL	Redline
P-ANNO-REVS	Revisions
P-ANNO-SYMB	Symbols
P-ANNO-TEXT	Text
P-ANNO-TTLB	Border and title block
P-DOMW	Domestic hot and cold water systems
P-DOMW-CPIP	Domestic cold water piping
P-DOMW-EQPM	Domestic hot and cold water equipment
P-DOMW-HPIP	Domestic hot water piping
P-DOMW-RISR	Domestic hot and cold water risers
P-EQPM	Plumbing-miscellaneous equipment
P-FIXT	Plumbing fixtures
P-SANR	Sanitary drainage
P-SANR-EQPM	Sanitary equipment
P-SANR-FIXT	Plumbing fixtures
P-SANR-FLDR	Floor drains
P-SANR-PIPE	Sanitary piping
P-SANR-RISR	Sanitary risers
P-STRM	Storm drainage system
P-STRM-PIPE	Storm drain piping
P-STRM-RFDR	Roof drains
P-STRM-RISR	Storm drain risers
Q-ANNO-DIMS	Dimensions
Q-ANNO-KEYN	Key notes
Q-ANNO-LEGN	Legends and schedules
Q-ANNO-NOTE	Notes
Q-ANNO-NPLT	Construction lines, nonplotting information
Q-ANNO-REDL	Redline
Q-ANNO-REVS	Revisions
Q-ANNO-SYMB	Symbols
Q-ANNO-TEXT	Text
Q-ANNO-TTLB	Border and title block
Q-OTLN	Equipment outlines
Q-PIPE	Piping information
Q-POWR	Power information
R-ANNO	Annotation
R-DETL	Additional detail graphics
R-OTLN	Outline or profile graphics
R-PATT	Textures and hatch patterns

LAYER	DEFINATION
S-ABLT	Anchor bolts
S-ANNO-DIMS	Dimensions
S-ANNO-KEYN	Key notes
S-ANNO-LEGN	Legends and schedules
S-ANNO-NOTE	Notes
S-ANNO-NPLT	Construction lines, nonplotting information
S-ANNO-REDL	Redline
S-ANNO-REVS	Revisions
S-ANNO-SYMB	Symbols
S-ANNO-TEXT	Text
S-ANNO-TTLB	Border and title block
S-BEAM	Beams
S-COLS	Columns
S-DECK	Structural floor deck
S-FNDN	Foundation
S-FNDN-PILE	Piles, drilled piers
S-FNDN-RBAR	Foundation reinforcing
S-GRID	Column grid
S-GRID-DIMS	Column grid dimensions
S-GRID-EXTR	Column grid outside building
S-GRID-IDEN	Column grid tags
S-GRID-INTR	Column grid inside building
S-JOIS	Joists
S-METL	Miscellaneous metal
S-SLAB	Slab
S-SLAB-EDGE	Edge of slab
S-SLAB-JOIN	Slab control joints
S-SLAB-RBAR	Slab reinforcing
S-WALL	Structural bearing or shear walls
T-ANNO-DIMS	Dimensions
T-ANNO-KEYN	Key notes
T-ANNO-LEGN	Legends and schedules
T-ANNO-NOTE	Notes
T-ANNO-NPLT	Construction lines, nonplotting information
T-ANNO-REDL	Redline
T-ANNO-REVS	Revisions
T-ANNO-SYMB	Symbols
T-ANNO-TEXT	Text
T-ANNO-TTLB	Border and title block
T-CABL	Cable Plan
T-DIAG	Diagram
T-EQPM	Equipment Plan
T-JACK	Data/telephone jacks
T-JACK-CLNG	Ceiling mounted data/telephone jacks
T-ROTR	Wireless access point



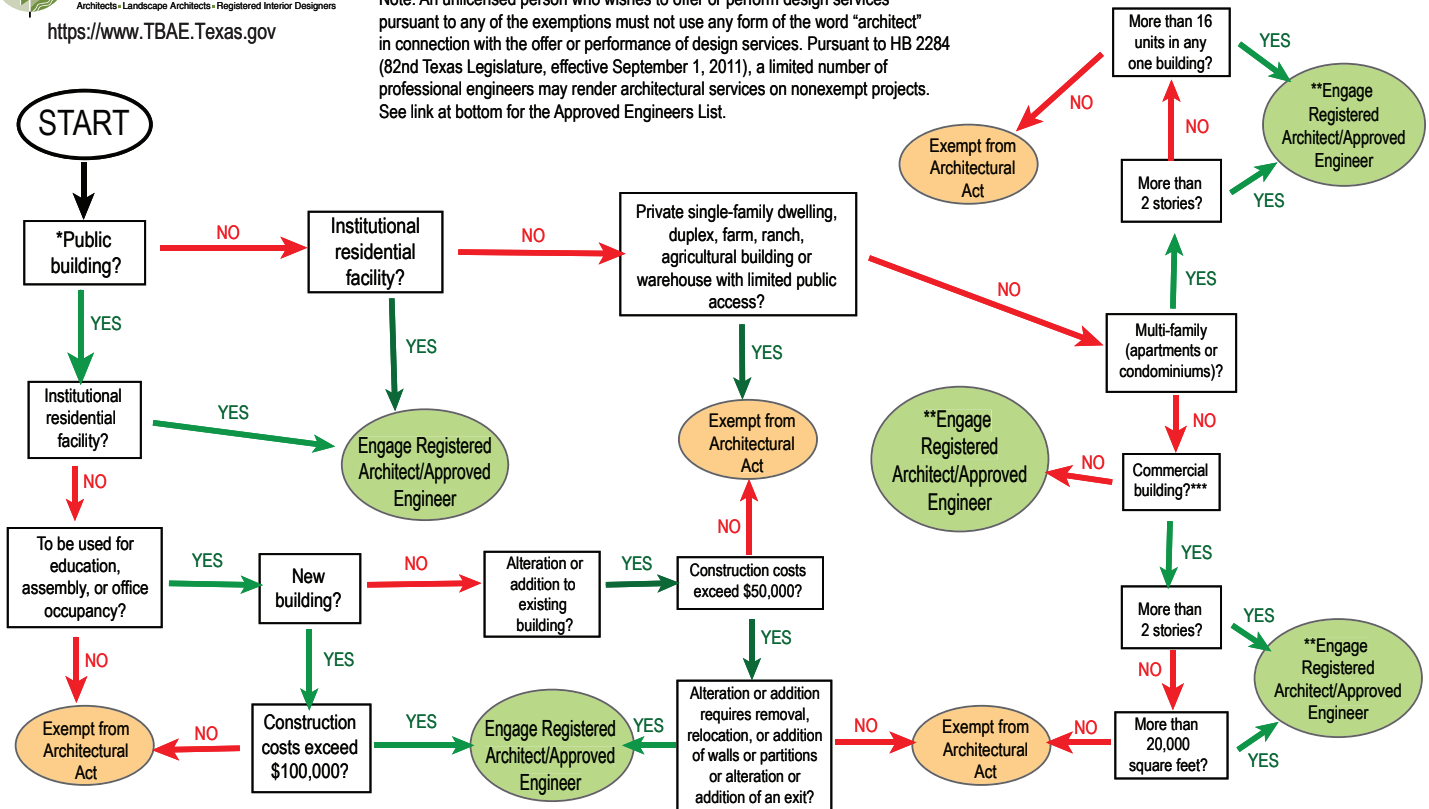
	1	2	3	4	5	6	
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C							C
B							B
A							A
	1	2	3	4	5	6	





When to Engage an Architect or Approved Engineer for Design and Construction Observation

Note: An unlicensed person who wishes to offer or perform design services pursuant to any of the exemptions must not use any form of the word "architect" in connection with the offer or performance of design services. Pursuant to HB 2284 (82nd Texas Legislature, effective September 1, 2011), a limited number of professional engineers may render architectural services on nonexempt projects. See link at bottom for the Approved Engineers List.



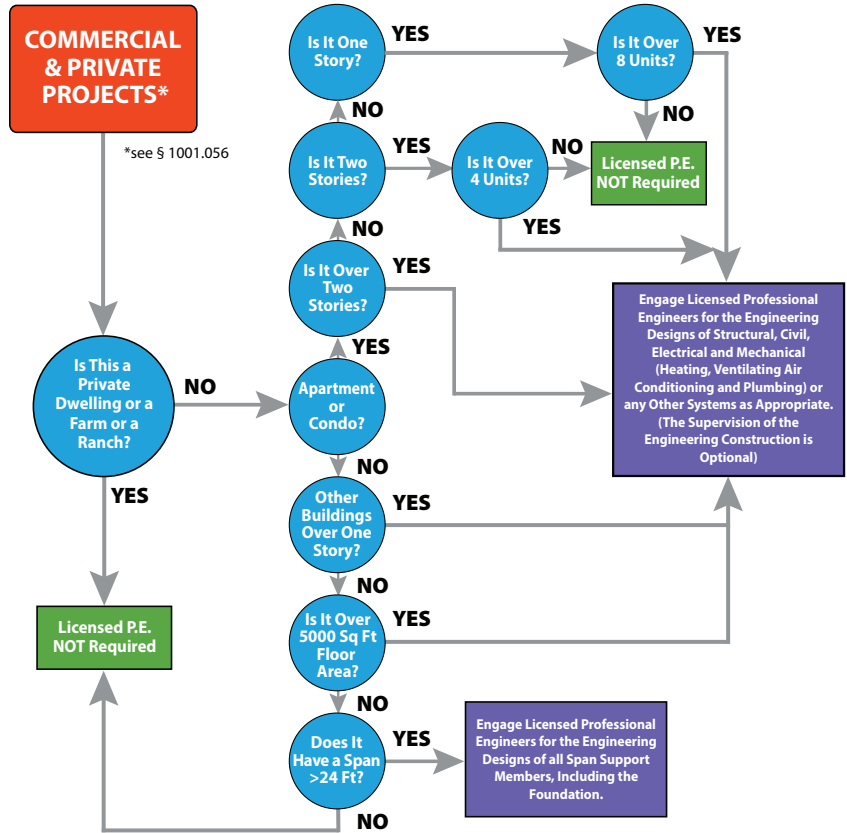
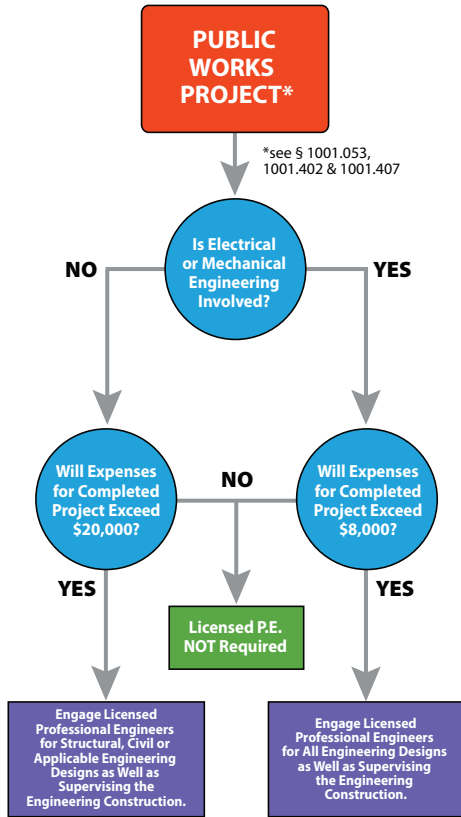
- * "Public Building" means any building that is owned by a State agency, a political subdivision of the State, or any other public entity in Texas.
- ** If a project involves only the alteration of an existing building and the alteration does not involve a substantial structural or exitway change to the building, the project is exempt from the architectural act.
- *** "Commercial building" means an enclosed structure primarily used for the purchase, sale, or exchange of commodities or services.

List of Approved Engineers, pursuant to HB 2284: <https://www.tbae.texas.gov/Content/documents/Home/ApprovedEngineerList.pdf>
 More copies of this flowchart: <https://www.tbae.texas.gov/Content/documents/LawsEnforcement/ArchRequiredFlowChart.pdf>
 Verify the registration status of a TBAE registrant: <https://www.tbae.texas.gov/PublicInformation/FindDesignProfessional>

This page revised September, 2018



When is a Professional Engineer required on a project?



This flowchart is intended for guidance purposes only and the Texas Engineering Practice Act and Rules govern final interpretation. Local codes and ordinances may be more restrictive as long as not in conflict

Visit <http://engineers.texas.gov/downloads.htm> for a copy of the Texas Engineering Practice Act and Board Rules and download this diagram.

