

CADD Manual

January 2011





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Preface

This document represents the CADD management and other standards for the A&E Department. The standards and procedures discussed are based on AutoCAD Release 2010 and other software used by the Authority. It will need to be revisited as our agency adopts new versions of the software. Please keep this document handy. It is intended to answer your day-to-day questions regarding the use of computers in our office. Note that this document is not intended to be a training manual; rather, it is intended solely as a guide to how we use and manage CADD and other software here.

This chapter includes the following sections:

- The Need for CADD Management Standards
- Adherence to the Standards
- Modifications to the Standards
- Use of Existing Files





The Need for Management Standards

The most costly and time-consuming activity of designing schools is project documentation. Projects are not going to be built without it and over the years the amount of that documentation and the speed with which it has to be produced has constantly increased. It is incumbent upon us as architects, engineers and designers to make this process as efficient as possible while still producing quality documents.

Having standards:

- Improves the organization of the documentation and lends an agency-wide consistency (including consultant's projects) to the deliverables we produce;
- Flattens the learning curve for new staff members as they come on board and for current staff members moving from project to project;
- Helps make project organization more predictable; and
- Mitigates the tendency to "reinvent the wheel" for each new project and to free up time to devote to the design and technical issues encountered while working on our projects.

Adherence to the Standards

By adhering to the CADD and other standards and procedures contained in this manual you contribute to developing a uniform character throughout the documents issued by our agency, and in making the most efficient use of project time. This uniformity allows information to be correctly keyed, added, displayed and plotted at any point in the project cycle.

Everyone shares responsibility in helping to make these standards work for all of us.





Modifications to the Standards

Modifications to the standards and procedures in this manual may be necessary for specific situations. Requests for project specific modifications to the CADD standards should be made through the CADD Unit and implemented upon approval by the V. P. of A&E. All modifications are to be documented by bulletins and communicated to the entire A&E team including consultants. Do not make arbitrary changes to the CADD standards without prior approval.

This standards manual is intended to be an evolving document. Toward that end, please submit suggestions for permanent changes or additions to the CADD Unit, for review and possible inclusion.

Your request should document:

- Why a change or addition is needed;
- What the proposed change or addition should be; and
- How it would improve the CADD standards or procedures and overall productivity.

Use of Existing Files

The most efficient use of AutoCAD is not necessarily in the initial creation of a file, but in the ability to reuse the file or any part of the file at a future date. The true meaning of CADD productivity is embodied in not having to do the old job again, rather than simply doing the old job faster. As an example, the use of "Template Files" can be a very efficient use of project time and resources. On a broad scale this can be very productive; however, the reuse process must not end here. Each user must continually examine the reusability of any information in a current file. Over time, our symbols will be gathered together in appropriate libraries.





Chapter 1

File and Sheet Naming

This chapter describes the office standard project directory structure on the file server. This chapter also describes the office standard for naming project documents. The following topics appear in this chapter:

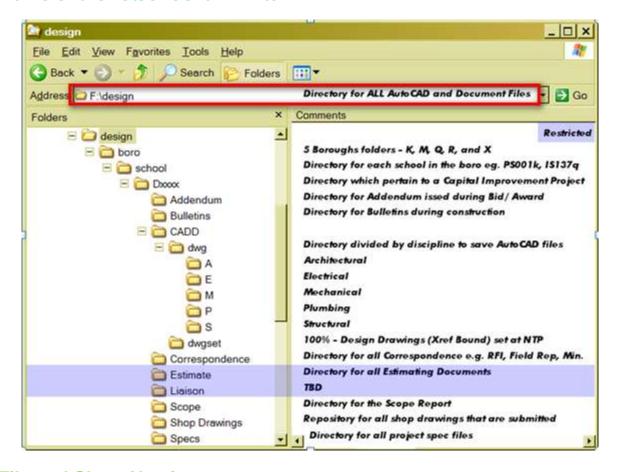
- A&E CADD Directory Structure Diagram
- File and Sheet Naming for Sketches





A&E CADD Directory Structure Diagram

F:\DESIGN\BORO\SCHOOL\DXXXX\CADD



File and Sheet Naming

All Capacity and CIP project drawing files prepared for the NYC School Construction Authority shall follow the Authority's Sheet Numbering Convention as described in Design Requirement 1.1.1.02 - Drawing Number Convention: Sheet files shall be named using the sheet number. For example, the drawing file for sheet A201 shall be named A201.dwg. What is shown below is only a small sample - refer to Design Requirement 1.1.1.02 for latest information.

Description/ Approach

The intention of this "group numbering" system is to allocate numbers to specific groups of drawings within a discipline i.e. architectural plan, elevations, etc.

A drawing number starts with a one or two letter Discipline Code (e.g. "A" for Architectural, "FP" for Fire Protection) followed by a three-digit numeric Group Code. Note that there is no hyphen between Discipline and Group codes. The Group Code numbers are either sequentially numbered starting at "001" and are used for general notes, symbols and legends, and general clarification drawings or they are batched in series by hundred (i.e. 101,





201, 301) corresponding to a Group Code description, such the 101 series for floor plans, the 201 series for elevations, the 301 series for wall sections, the 401 series for details and the 901 series for schedules, etc. Group

Codes vary for each discipline code. The sheet numbering convention for Discipline and Group Codes are shown in the following table.

Example format sheet names:

M002 is a sheet of HVAC Schedules

A101 is the first floor plan in a series

Note: Filenames shall have at most one "." character in the filename, separating the drawing name from the windows files extension, for example "dwg" for an AutoCAD drawing file.

Sheet Numbering Convention

Code	Description	Drawing Number	Description	Sample Drawing Number
Т	Cover & General Notes Drawings	001	Project Title, School Name	T001.00
Z	Zoning Drawings	001	Zoning Data & Diagrams	Z001.00
FPP	Fire Protection Plan Drawings	001	Floor Plans, Areas, and Schedules, and Occupant Egress Calculations	FPP001.00
EN	Energy Code Compliance Drawings	001	Computer printouts from energy calculation or if proscriptive, comparison of NYCECC values to provided values,	EN001.00
PA	Place of Assembly Drawings	101	Place of Assembly for Auditorium, Cafeteria, Multi-purpose room, Gymatorium, & Gymnasium. Floor Plans and Travel Distances, Door Capacity, Occupancy Loads, Etc.	PA101.00
BPP	Builders Pavement Plan Drawings	101	Builder Pavement Plans, General Notes, Waivers, etc.	BPP101.00
G	Site Surveys	101	Site Survey	G101.00





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Code	Description	Drawing Number	Description	Sample Drawing Number
Н	Environmental Remediation/Asbestos Drawings	001	Symbols & Legends, General Notes, Abbreviations	H001.00
DM	Demolition Drawings	001	General Notes	DM001.00
R	Reference Drawings	001	Drawings of existing buildings, etc., photographs, etc	R001.00
FF	Furniture & Furnishings and Room Layouts	101	Cellar, First, Second, Third, Fourth Floor – Furniture Plans	FF101.00
SOE	Excavation/Underpinning/ Soil Support Drawings	101	Schematic Underpinning/Shoring Plans and Details	SOE101
FO	Foundation Drawings	001	Foundation Symbols, Abbreviations & Notes	FO001.00
F	Fire Suppression Systems Drawings	001	Fire Suppression Symbols, Abbreviations, and Notes	F001.00
Р	Plumbing Drawings	001	P&D Symbols, Abbreviations, Notes,	P001.00
		101	Floor Plans (Full & Part Plans)	P101.00
FA	Fire Alarm Drawings	001	Fire Alarm System Symbols, Abbreviations, Notes	FA001.00
		101	Fire Alarm System Floor Plans	FA101.00

Note: The above is a sample - refer to Design Requirement 1.1.1.02 for latest information.





File and Sheet Naming Sketches

In this context, sketches refer to formal drawings prepared in support of addenda and bulletins.

Addenda

Supporting drawing files addenda are named such that the first two characters indicate the drawing is an addendum "AD" followed by the addendum number, an underscore "_" character and the drawing sequence number.

Example format for addendum file and sheet names:

AD1.1 is Addendum 1 Sheet 1	(AD1_1.dwg)
AD12.2 is Addendum 12 Sheet 2	(AD12_2.dwg)

Bulletins

Supporting drawing files and sheets for bulletins are named such that the first two characters indicate the drawing is a bulletin "BU" followed by the addendum number, an underscore "_" character and the drawing sequence number.

Example format for bulletin file and sheet names:

BU3.2 is Bulletin 3 Sheet 2	(BU3_2.dwg)
BU9.4 is Bulletin 9 Sheet 4	(BU9_4.dwg)





Chapter 2

Drawing Management

This section discusses how drawings are organized in the following sections:

- Creating a new drawing
- Template files
- Format Drawings Titleblock
- Drawing Organization
- Drawing Setup
- Layer Standards





Creating a New Drawing

Template Files

Template files are used to begin new drawings. They establish drawing units, text styles, dimension styles, system variables and the layer standard and many other things. They are used when beginning a new drawing to simplify the startup procedure. The pre-established settings in the template files are intended to represent the office standard and should not be changed.

The default installations at the SCA provides the template files "SCA Model (AEC Ctb).dwt" and "SCA Model (AECB Ctb).dwt" for AutoCAD Architecture 2010 and AutoCAD MEP 2010 respectively, set as the QNEW file used to start new drawings. If you launch the software using the desktop shortcut, one of the standard SCA template files is automatically used when you start a new drawing. If the software has already been launched, you will start a new drawing by using the "QNEW" button located on the AutoCAD Quick-Access Toolbar, on the upper left hand side of the display. Additional SCA standard template files, located in T:\winapps\acad2010\Templates and T:\winapps\acad2010\Templates and

The template files are set up to plot to the CADPLOT-FULL.PC3 plot device using the SCA-FULL.ctb plot style table. When using the A-size and B-size template files it will be necessary to change the plot device to your local plotter and adjust page size accordingly.

Also provided are the SCA Sheet (AEC Ctb).dwt & SCA Sheet (AECB Ctb).dwt file which hold the standard layouts for configuring sheet files.

Standard Layouts from Sheet Template Files

Name	Paper Designation	Paper Size
sht-a	A-size (portrait)	8.5"x11"
sht-a-wide	A-size (landscape)	11"x8.5"
sht-b	B-size (portrait)	11"x17"
sht-b-wide	B-size (landscape)	17"x11"
sht-d-bt	D-size (bottom text)	36"x24"
sht-d-st	D-size (side text)	36"x24"
sht-e-bt	E-size (bottom text)	48"x36"
sht-e-st	E-size (side text)	48"x36"





Format Drawings

Accessing an SCA Titleblock via Layouts

Office standard format drawings have been created for each sheet size that can be used. The standard formats are at a scale of 1:1. For example the format sheet for our office standard 36-inch by 24-inch page is actually drawn at 36 inches by 24 inches in a paper space layout. Each SCA job should have its own format sheet created from a copy of the office standard (where) that has been placed in the project folder located in F:\design\... The project specific format sheet is attached as an external reference to the issue drawing in paper space at the coordinate 0,0 at one to one scale. The standard formats are located on the network at T:\sca_stds\std_sht. They are named according to sheet size and titleblock alignment. Each titleblock sheet is paired with an attribute drawing used to insert the sheet specific data. This drawing is inserted as a block at the coordinate 0,0. In the attribute dialogue box that appears, type in the requested sheet specific information. Each format sheet includes an AutoCAD rtext object that displays the drawing name, date and time on plots. If the rtext object does not display properly, activate it by typing rtext at the command line and canceling the command.

Example format sheet names:

sht-e-st is an E-size sheet with a Side Titleblock sht-d-bt is a D-size sheet with a Bottom Titleblock

Example attribute drawing names:

sht-e-st-txt is attributes for an E-size sheet with a Side Titleblock sht-d-bt-txt is attributes for a D-size sheet with a Bottom Titleblock





Standard Title Sheets

Figure 1- Capital Improvement Projects (C.I.P.) – Side Alignment- D-size – 24" x 36"



Figure 2 - Capital Improvement Projects (C.I.P.) - Bottom Alignment- D- size - 24"x 36"

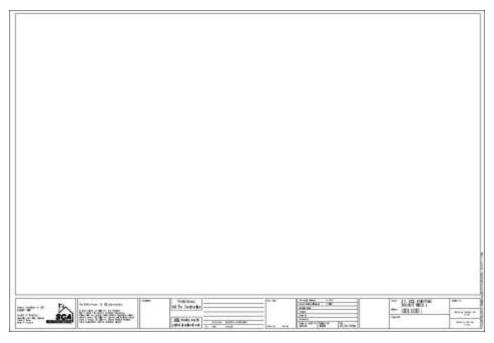
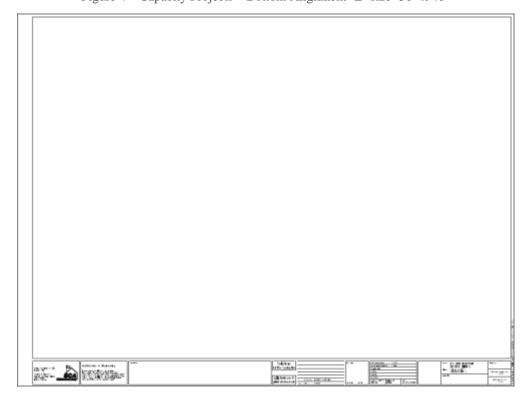




Figure 3 – Capacity Projects – Side Alignment- E- size- 36" x 48"



Figure 4 – Capacity Projects – Bottom Alignment- E- size- 36" x 48"







Drawing Organization

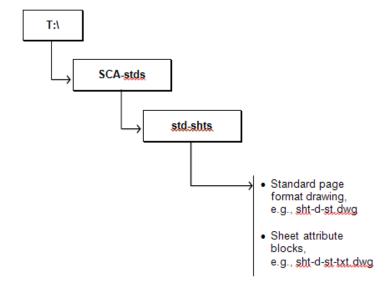
Each drawing file should contain only one drawing. Verify the sheet size with project requirements. CIP projects use D-size sheets (36"x24") and CAP projects use E-size sheets (48"x36").

All building graphics shall be created in model using actual (real world) size. Scaling of the final product is performed in paper space viewports and plotted at full scale (1:1). The standard format sheet used will depend on the output scale. Sizing text and tags may be automatically determined where "Annotative" styles are used, however where standard styles are utilized the operator must still consider the scale of the plotted drawing. For these cases refer to the chapter on graphic conventions for text scale factors. In general, General notes, legends and schedules should be placed in the paper space of their respective drawings. At this writing, schedules generated using ADT cannot follow this convention therefore schedules generated in ADT will be placed in model space.

Drawing Setup

Project Title Blocks

- XREF Titleblock for Project: T:\SCA-stds\std-sht
- Insert Blocks with Attributes: T:\SCA-stds\std-sht



Note to Design Consultants:

SCA Standard Title block can be found on the SCA website, under the Architecture & Engineering Page, on the Download tab.





Chapter 3

Drawing Project Standards

In order for our drawings to have a professional appearance it is important that we use a consistent set of graphic conventions. This chapter concerns itself with the graphic standards that we use here. The following sections are included:

- Layer Standard
- Dimension Styles
- Text Styles
- Multi-Leader Styles
- Lines and Linetypes

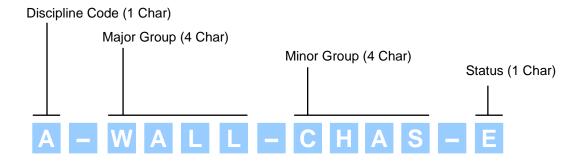




Layer Standard

Our layer naming convention consists of four parts. Part one is the discipline which is a single letter followed by a hyphen. The available discipline codes are found below in the section titled Discipline Codes. Part two is a Major Group code consisting of four characters in length. The third (optional) part is the Minor Group code that further refines the purpose of the layer. The Minor Group codes will be four characters in length when used. The fourth and final part, which is also optional, is the Status code. These single character codes are listed in the section titled status codes below. Layers with no status character are assumed to be proposed/new items, therefore such redundant designations are not necessary, and should be avoided.

The following is a typical layer name:



In this layer name, the Discipline Code is 'A', the Major Group is 'Wall,' the Minor sub-category is 'Chas' and the status is "E". This layer would be suitable for depicting existing chase wall construction on architectural plans.

Discipline Codes

Discipline codes serve to distinguish between layers belonging to the building chassis from those relating to the fit out of the space. Should it become necessary, additional codes can be added with the approval of the project manager, to accommodate special situations. All efforts should be made to use designations conforming with the National Cad Standards, should this need arise.

Code	Discipline
А	Architectural
Е	Electrical
F	Fire Protection
M	Mechanical
Р	Piping
S	Structural





Status Codes

Status codes are used to distinguish between objects belonging to different aspects or phases of the work. Should it become necessary, additional codes can be added with the approval of the project manager in order to accommodate special situations.

Code	Discipline
Е	Existing to Remain
D	Demolition
F	Future
Т	Temporary
М	Items to be Moved
X	Not In Contract
1-9	Phase Numbers

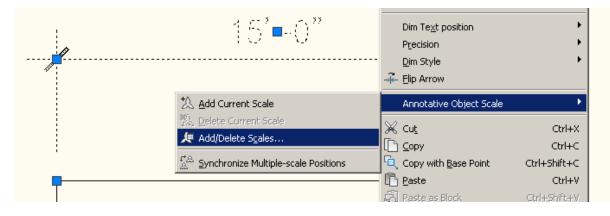
See "Appendix A" for the list of standard layers.

Note: The uses of colors 1-9 are reserved; Layers other than "DETL" major category layers shall not use these colors.

Dimension Styles

Annotative Dimension Styles

Architectural units appropriate for the particular project are to be used when dimensioning. SCA projects should specify the dimension style "SCA", an "Annotative", "Associative" dimension style to allow for the ease of editing and dynamic updating provide by these features. Drawings must be drawn accurately and to scale prior to dimensioning so that all dimensioning functions work properly. An initial "Annotative Scale" should be selected prior to the creation of any dimensions. Never explode dimensions and do not override the default dimension text unless required by the specific instance such as "5 EQ SPACES". The "SCA" dimension style may be loaded via the "Design Center" from the SCA standard drawing templates.





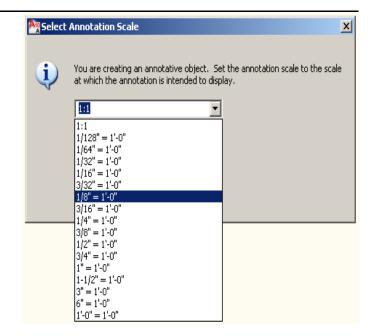




The Authority uses one dimension style, "SCA", which is an annotative style. To change a dimension string from one scale to another (to make the text and ticks larger or smaller), begin by adding the appropriate scale representation to annotative dimensions in the drawing. Using the annotative scale list, located in the AutoCAD status bar, select the desired scale and all annotative features with the selected representation applied will automatically update. To effect this change in paper space, continue by settings the viewport's annotative scale to one of the values applied to the model space entities. The value of "ANNOALLVISABLE" is set to "0" in paper space layouts by default; this will cause entities which do not have the selected representation applied to be hidden from view.

Dimensioning

The first time that an annotative function is used in an AutoCAD session, the application will prompt for an annotation scale to be selected.



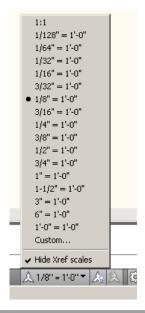


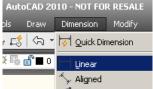




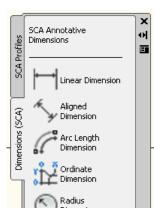
Alternatively the current annotative scale in the drawing "CANNOSCALE" can be set at any time from the annotation scale control in the application status bar at the lower right hand side of the drawing window.

There are numerous ways that you can use to place dimensions in the drawing. However, provided that the "SCA" annotative dimension style is used, they will automatically be placed in the drawing at the correct scale and if inserted from a tool palette on the correct layer as well.





or







Text Styles

Text styles are configured in the SCA template drawings. The text styles intended for general use are based on the font romans.shx. These styles support annotation scaling and are based on a plotted paper text height of 3/32" or 3/16". They will automatically be scaled correctly based on the current annotative scale selected. The 3/16" plotted text height is provided to support sheet titles, table heading/titles and are nested within certain block etc... Text of this height is not intended for general annotation. All annotation produced should be created in the "SCA_3-32" text style (3/32" tall). The styles that do not support annotation scaling are defined with the height set to 0; this allows the height to be established by the TEXTSIZE variable on placement in the drawing.

Text Style Names

Style	Font	Description
SCA_3-32	Romans.shx	General Notation (Annotative)
SCA_3-16	Romans.shx	Headings, Titles etc (Annotative)
SCA-TBLK	Romans.shx	Title Block Text
SCA-TBLK_Complex	Romanc.shx	Title Block
STAMP	Romand.shx	Title Block Preliminary Stamp
Standard	Romans.shx	





The following table lists the appropriate text height for non-annotative drafted text and is provided solely as a historic reference. The "TEXTSIZE" variable need no longer be altered for annotative text styles.

Drawing Scale vs. Text Height

Dwg Scale	Scale Factor	3/32"	1/8"	3/16"	1/4"
1" = 50"	600	56.25	75	112.5	150
1" = 20'	240	22.5	30	45	60
1/16"	192	18	24	36	48
3/32"	128	12	16	24	32
1/8"	96	9	12	18	24
3/16"	64	6	8	12	16
1/4"	48	4.5	6	9	12
3/8"	32	3	4	6	8
1/2"	24	2.25	3	4.5	6
-1"	12	1.125	1.5	2.25	3
3/4"	16	1.5	2	3	4
1-1/2"	8	0.75	1	1.5	2
3"	4	0.375	0.5	0.75	1
FULL	1	0.09375	0.125	0.1875	0.25

Fig- Drawing Scale with appropriate Text Height Suggestions

Understanding the Calculation

The architectural scale of 1/8"=1'-0" can also be stated as 1"=8'-0" (check your scale). Therefore, one foot on your drawing is 8'x12" per foot which equals 96'. Thus, the scale factor for 1/8"=1'-0" scale is 1/96. To find the required model space text height, multiply the desired plotted height by the inverse of the scale factor. For example: if you want a plotted text height of 1/8" multiple that by 96 to get 12", which is the correct height for the model space text.





Mutli-Leader Styles

Tags

Tags are notational symbols that are used to label and identify specific parts of a drawing. Since they do not have an intrinsic physical size like a door or a merchandising fixture, they are scaled to be legible when plotted, independently of drawing scale. Most tags include attributes, which can be left blank and edited at a later time or filled in at the time of insertion.

Most tags will come from the SCA design content using DesignCenter.

Example tag:

For room labels use the SCA-Room Tag.





Hatching

Hatching can be used to represent architectural materials. Hatching should be kept to a large enough scale to represent the material without overloading the drawing database. Hatching can make a drawing very large, use it sparingly.

Following below are two groups of hatch patterns. The first group applies to Capacity Projects and the second group applies to CIP projects.

Capacity Projects

SCA Custom Hatch Patterns for Capacity Projects

	Application	Pattern	Angle	Scale*
	Brick	ANSI 31	0	12
	Structural Glaze Faced Tile	ANSI 31	45	36
	Concrete Block	NET	45	48
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Stone Concrete	AR-CONC	0	3
	Earth	EARTH	45	36
	Broken Stone or Gravel	AR-CONC	0	2
	Finished Wood	WOOD2	225	48
	Wood Blocking	n.a.	n.a.	n.a.
	Ceramic Tile (on concrete block)	LINE	0	12
	Steel	STEEL	0	36
	Aluminium	NET	45	24
	Bronze	LINE	45	12
	Rigid Insulation	NET	0	24
	Batt Insulation	n.a.	Batting linetype (adjust celtscale)	n.a.
	Caulking	n.a.	n.a.	n.a.

Scale based on 1/8" = 1'-0" plot scale.





CIP Projects

SCA Custom Hatch Patterns for CIP Projects

	PARAPET/MASONRY REMOVAL		CONCRETE COPING REPLACEMENT	BRICK
	PARAPET/MASONRY REPLACEMENT		LIMESTONE COPING REPLACEMENT	STRUCTURAL GLAZE FACED TILE (SGFT)
	FACE BRICK REPLACEMENT		TERRA COTTA COPING REPLACEMENT	CONCRETE BLOCK
	BRICK POINTING		COPING STONE REMOVAL AND RESETTING	STONE CONCRETE
	TERRA COTTA/LIMESTONE POINTING		COPPER CORNICE	EARTH
+ + + + + +	MASONRY PINNING		SLATE SHINGLES	BROKEN STONE (OR) GRAVEL
+ + + + + + + + + + + + + + + + + + + +	BRICK POINTING AND PINNING		CONC. SCREED CONC. FILL	FINISHED WOOD
	MASONRY CLEANING		ROOFING STRIP REPLACEMENT	CERAMIC TILE AND CONCRETE BLOCK
* * * *	PAINT REMOVAL		WOOD BLOCKING	ALUMINUM
	ANTI-GRAFFITI COATING		RIGID INSULATION	RIGID INSULATION
* * * * *	MASONRY CLEANING AND ANTI-GRAFFITI COATING	10000	BATT INSULATION	BRONZE
	WEATHERPROOFING		STUCCO/PLASTER	CAULKING
	REPLACEMENT OF LINTEL AND SOLDER BRICKS		STEEL	





Lines

Different linetypes should be used to clearly express the information needed for construction. The scale of linetypes is established by the system variables LTSCALE, PS LTSCALE and MSLTSCALE. If adjustments are necessary beyond the base scale of the linetype selected, use the current entity scale, to modify the line pattern by the scale factor assigned. Please note the CELTSCALE variable is displayed when an entity is selected on the AutoCAD properties palette as "Linetype Scale". Use standard AutoCAD linetypes unless otherwise approved by the CADD manager.

Varied line weights are used to properly express the information needed in a drawing for construction. The Authority configures AutoCAD uses colors to determine plotted line weights, reference Appendix "B" for pen assignments and line weights.

Recommended Scale Variable Settings

Variable	Value
LTSCALE	1
PSLTSCALE	1
MSLTSCALE	1

Example CELTSCALE:

For the HIDDEN linetype (1/4" Line, 1/8" Gap)					
CELTSCALE value of 0.5 results in a pattern of (1/8" Line, 1/16" Gap)					
	· — -				
CELTSCALE value of 2 results in a pattern of (1/2" Line, 1/4" Gap)					





Linetypes

The linetypes shown in the following table are not built into the software. They are created as required by drawing a line using the linetype shown in the table, then manually breaking it, and inserting the appropriate text. We use this technique in order to be able to place the text in the precise desired location.

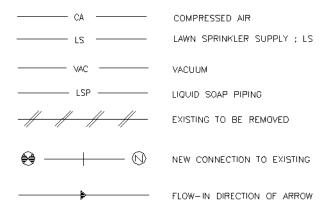
	SOIL OR WASTE ; S/W
	SOIL AND WASTE BELOW GRADE; S/W
SD	STORM DRAIN ; SD
	VENT ; V
	COLD WATER ; CW
	HOT WATER (110 F); HW
	HOT WATER CIRCULATION (110 F); HWC
140°	HOT WATER (140 F); HW
	HOT WATER (180 F); HW
	HOT WATER CIRCULATION (140 F); HWC
	HOT WATER CIRCULATION (180 F); HWC
G	GAS ; G
MU	MAKE UP WATER ; MU
AW	ACID WASTE ; AW
— — - AV — — —	ACID VENT ; AV
D	INDIRECT DRAIN
PD	PUMP DISCHARGE
FSP	FIRE PROTECTION WATER SUPPLY; STANDPIPE
SP	AUTOMATIC FIRE SPRINKLER; SP
	NEW WORK
	EXISTING WORK







Linetypes cont...







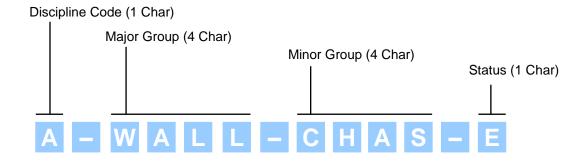
Appendix A

Standard Layers

The SCA has chosen to adopt the layer naming convention promulgated by the American Institute of Architects (AIA). The AIA provides both a format for naming layers and a prescribed list of layers. Where possible the SCA will use the listed layer names. Should the need arise to create additional layer names, the AIA layer naming format will be used. All AutoCAD drawings will contain a "0" layer and most drawings will contain a "Defpoints" layer. These layers are maintained by AutoCAD and do not appear on the lists as standard layers.

Standard Layer Naming Format

The following diagram (below) outlines the basic layer name format as defined by the AIA Guidelines. The layer list, complete with color and linetype values are outlined on the next several pages.



Architectural Layers

Name	Description	Color	Lineweight	Linetype
0	-	7	0.0240"	Continuous
DEFPOINTS		240	0.0020"	Continuous
A-ANNO-DIMS	Dimensions	221	0.0100"	Continuous
A-ANNO-LEGN	Legend	171	0.0020"	Continuous
A-ANNO-NOTE	Notes & Leaders	211	0.0130"	Continuous
A-ANNO-NPLT	Non-printing	7	0.0240"	Continuous
A-ANNO-REVS	Revisions Marks	213	0.0130"	Continuous
A-ANNO-SYMB	Annotation/Section Marks	111	0.0130"	Continuous
A-ANNO-TTLB	Titleblock	111	0.0130"	Continuous
A-AREA	Area	173	0.0020"	Continuous
A-AREA-BDRY	Boundary	140	0.0100"	Continuous
A-AREA-GRPS	Groups	203	0.0100"	Continuous
A-AREA-GRPS- IDEN	Group Tags	211	0.0130"	Continuous
A-AREA-IDEN	Area Tags	131	0.0130"	Continuous
A-AREA-SPCE	Area Space	34	0.0130"	Continuous
A-BEAM	Beams	80	0.0100"	Continuous





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Name	Description	Color	Lineweight	Linetype
A-FURN-D	Demolition Furniture	191	0.0050"	HIDDEN
A-FURN-E	Existing Furniture	240	0.0020"	Continuous
A-FURN-IDEN	Furniture Tags	11	0.0130"	Continuous
A-FURN-PLNT	Plants - Indoor	92	0.0080"	Continuous
A-GLAZ	Windows	92	0.0080"	Continuous
A-GLAZ-ASSM	Window Assemblies	102	0.0100"	Continuous
A-GLAZ-CURT	Curtain wall layouts	130	0.0130"	Continuous
A-GLAZ-D	Demolition Windows	191	0.0050"	HIDDEN
A-GLAZ-E	Existing Windows	92	0.0080"	Continuous
A-GLAZ-IDEN	Window Tags	91	0.0080"	Continuous
A-GLAZ-UNIT	Curtain Wall Units	112	0.0130"	Continuous
A-GRID	Column Grids	173	0.0020"	CENTER2
A-GRID-IDEN	Column Grid Tags	91	0.0080"	CENTER2
A-GRID-LAYO	Layout grids	193	0.0050"	DASHED2
A-MASS	Massing Elements	210	0.0130"	Continuous
A-MASS-GRPS	Massing Groups	130	0.0130"	Continuous
A-MASS-SLCE	Massing Slices	240	0.0020"	DASHED2
A-PKNG	Parking Symbol	190	0.0050"	Continuous
A-PKNG-CARS	Vehicles	242	0.0020"	Continuous
A-PLNT	Plants, Outdoor	82	0.0100"	Continuous
A-POLY	AecPolygons	180	0.0020"	Continuous
A-ROOF	Roofs	20	0.0150"	Continuous
A-ROOF-SLAB	Roof Slabs	22	0.0150"	Continuous
A-SECT	Sections	240	0.0020"	Continuous
A-SECT-IDEN	Section Marks	243	0.0020"	Continuous
A-SITE	Site	20	0.0150"	Continuous
A-SITE-UTIL	Site Utilities	190	0.0050"	Continuous
A-SLAB	Toilet Partition	162	0.0020"	Continuous
A-STRM	Drainage	190	0.0050"	Continuous
A-TOIL-PART	Toilet Partitions	150	0.0050"	Continuous
A-WALL	Walls	50	0.0240"	Continuous
A-WALL-CHAS	Chase Walls	32	0.0130"	Continuous
A-WALL-D	Demolition Walls	191	0.0050"	HIDDEN
A-WALL-E	Existing Walls	136	0.0150"	Continuous
A-WALL-FIRE	Fire Walls	14	0.0100"	Continuous
A-WALL-IDEN	Wall Tags	213	0.0130"	Continuous
A-WALL-INTR	Wall, Interior	136	0.0150"	Continuous
A-WALL-OPEN	Wall Opening	172	0.0020"	Continuous





Structural Layers

Name	Description	Color	Lineweight	Linetype
0		7	0.0240"	Continuous
DEFPOINTS		240	0.0020"	Continuous
S-ANNO-DIMS	Dimensions	231	0.0050"	Continuous
S-ANNO-LEGN	Schedule	171	0.0020"	Continuous
S-ANNO-NOTE	Notes & Leaders	136	0.0150"	Continuous
S-ANNO-REVS	Revisions Marks	213	0.0130"	Continuous
S-ANNO-SYMB	Annotation/Section Marks	111	0.0130"	Continuous
S-ANNO-TTLB	Titleblock	111	0.0130"	Continuous
S-BOLT	Bolts	151	0.0050"	Continuous
S-BRCE-PLAN	Brace Plan	7	0.0240"	HIDDEN
S-BRKS	Brakes	221	0.0100"	Continuous
S-BRNG	Borings	129	0.0170"	Continuous
S-CONC	Concrete	72	0.0130"	Continuous
S-DETL-HIDE	Detail Lines Hidden	1	0.0020"	HIDDEN
S-DETL-PATT	Hatch Pattern	1	0.0020"	Continuous
S-DETL-XLIT	Detail Lines Extra Light	1	0.0020"	Continuous
S-DETL-LITE	Detail Lines Light	2	0.0100"	Continuous
S-DETL-MEDM	Detail Lines Medium	3	0.0130"	Continuous
S-DETL-HEVY	Detail Lines Heavy	5	0.0170"	Continuous
S-DETL-XHVY	Detail Lines Extra Heavy	6	0.0200"	Continuous
S-DPRS	Depression	240	0.0020"	Continuous
S-ELEV	Elevations	140	0.0100"	Continuous
S-ELEV-IDEN	Elevation marks	143	0.0100"	Continuous
S-EQPM	Equipment	90	0.0080"	Continuous
S-FLOR-CONC-PADS	Concrete pads	240	0.0020"	Continuous
S-FLOR-FENC	Fencing	80	0.0100"	FENCELINE2
S-FNSH-LINE	Finish Line	240	0.0020"	ACAD_ISO12W100
S-FPRF	Fireproofing	240	0.0020"	Continuous
S-FTNG-PLAN	Footing Plan	129	0.0170"	Continuous
S-GRAD-BEAM	Grade Beam	136	0.0150"	HIDDEN2
S-GRID	Column grids	173	0.0020"	CENTER2
S-GRID-IDEN	Column grid tags	101	0.0100"	Continuous
S-HNGR-SPRT	Hanger Support	220	0.0200"	Continuous
S-HTCH	Hatch	240	0.0020"	Continuous
S-HTCH-BRCK	Hatch Brick	240	0.0020"	Continuous
S-HTCH-CONC	Hatch Concrete	240	0.0020"	Continuous
S-HTCH-ERTH	Hatch Earth	240	0.0020"	Continuous
S-HTCH-GRUT	Hatch Grout	240	0.0020"	Continuous
S-HTCH-GRVL	Hatch Gravel	240	0.0020"	Continuous
S-HTCH-INSL	Hatch insulation	240	0.0020"	Continuous
S-HTCH-MSNR	Hatch Masonry	240	0.0020"	Continuous
S-HTCH-STEL	Hatch Steel	240	0.0020"	Continuous
		0	0.0020	





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Name	Description	Color	Lineweight	Linetype
S-MECH-OPNG	Mechanical Opening	30	0.0130"	Continuous
S-METL-DECK	Metal Deck Section	150	0.0050"	Continuous
S-METL-DECK-PLAN	Metal Deck Plan	51	0.0100"	Continuous
S-MISC	Miscellaneous	240	0.0020"	Continuous
S-OPNG	Opening	12	0.0130"	Continuous
S-PILE-CAPS-PLAN	Pile Caps Plans	12	0.0130"	Continuous
S-PILE-CAPS-SECT	Pile Caps Section	12	0.0130"	Continuous
S-PNTR	Penetration	12	0.0130"	Continuous
S-PRTY-LINE	Property-Line	12	0.0130"	PHANTOM2
S-RFNG	Reinforcing	12	0.0130"	Continuous
S-ROOF	Roofs	20	0.0150"	Continuous
S-ROOF-CPNG	Roof, Coping	21	0.0150"	Continuous
S-ROOF-CRNC	Roof, Cornice	219	0.0130"	Continuous
S-ROOF-SLAB	Roof Slabs	22	0.0150"	Continuous
S-SCHD	Schedule	12	0.0130"	Continuous
S-SCHD-INFO	Schedule, Information	12	0.0130"	Continuous
S-SCHD-LOAD	Schedule, Load	12	0.0130"	Continuous
S-SCHD-TEXT	Schedule, Text	12	0.0130"	Continuous
S-SECT-IDEN	Section marks	243	0.0020"	Continuous
S-SLAB-EDGE-PLAN	Slab Edge Plan	72	0.0130"	Continuous
S-SLAB-SECT	Slab Sections	30	0.0130"	Continuous
S-STEL-PLAN	New Steel Plans	220	0.0200"	Continuous
S-STEL-SECT	New Steel Sections	136	0.0150"	Continuous
S-STUD	Studs	150	0.0050"	Continuous
S-TTLE	Title Text	136	0.0150"	Continuous
S-WALL	Walls	50	0.0240"	Continuous
S-WALL-CHAS	Wall Chases	32	0.0130"	Continuous
S-WALL-D	Walls, Demolition	82	0.0100"	DASHED
S-WALL-E	Walls, Existing	136	0.0150"	Continuous
S-WALL-FIRE	Fire Wall Pattern	14	0.0100"	Continuous
S-WALL-IDEN	Wall tags	201	0.0100"	Continuous
S-WALL-OPEN	Wall openings	172	0.0020"	Continuous
S-WALL-PLAN	Wall Plans	72	0.0130"	Continuous
S-WALL-SECT	Wall Section	51	0.0100"	Continuous
S-WMSH	Wiremesh	72	0.0130"	MESH
S-WPRF	Waterproofing	240	0.0020"	Continuous





Electrical Layers

Name	Description	Color	Lineweight	Linetype
0		7	0.0240"	Continuous
DEFPOINTS		240	0.0020"	Continuous
E-ALRM	Fire Alarm	136	0.0150"	Continuous
E-ALRM-BELL	Fire Alarm Device, Bell	136	0.0150"	Continuous
E-ALRM-DEVC	Fire Alarm Device	136	0.0150"	Continuous
E-ALRM-HORN	Fire Alarm Device, Horn	136	0.0150"	Continuous
E-ALRM-PANL	Fire Alarm Device, Panel Board	136	0.0150"	Continuous
E-ALRM-PULS	Fire Alarm Device, Pullstation	136	0.0150"	Continuous
E-ALRM-SMOK	Fire Alarm Device, Smoke Detector and/or Heat Sensor	136	0.0150"	Continuous
E-ALRM-STRB	Fire Alarm Device, Strobe Light	136	0.0150"	Continuous
E-ANNO-LABL	Label	231	0.0050"	Continuous
E-ANNO-NOTE	Notes	72	0.0130"	Continuous
E-CABL	Cable Trays	30	0.0130"	Continuous
E-CABL-FTNG	Cable tray fittings	30	0.0130"	Continuous
E-CNDT	Conduit	30	0.0130"	Continuous
E-CNDT-FTNG	Conduit fitting	30	0.0130"	Continuous
E-DETL-HIDE	Detail Lines Hidden	1	0.0020"	HIDDEN
E-DETL-PATT	Hatch Pattern	1	0.0020"	Continuous
E-DETL-XLIT	Detail Lines Extra Light	1	0.0020"	Continuous
E-DETL-LITE	Detail Lines Light	2	0.0100"	Continuous
E-DETL-MEDM	Detail Lines Medium	3	0.0130"	Continuous
E-DETL-HEVY	Detail Lines Heavy	5	0.0170"	Continuous
E-DETL-XHVY	Detail Lines Extra Heavy	6	0.0200"	Continuous
E-DEVC	Electrical Device	22	0.0150"	Continuous
E-DEVC-AUXL	Electrical Device, Auxiliary	242	0.0020"	Continuous
E-DEVC-CAMR	Electrical Device, Camera	72	0.0130"	Continuous
E-DEVC-FRSC	Electrical Device, Fire Rescue	242	0.0020"	Continuous
E-LITE	Electric	140	0.0100"	Continuous
E-LITE-CLNG	Ceiling Lighting	120	0.0170"	Continuous
E-LITE-IDEN	Electrical tags	141	0.0100"	Continuous
E-LITE-SWCH	Electrical switches	140	0.0100"	Continuous
E-LITE-WALL	Wall lighting	142	0.0100"	Continuous
E-LVEL	Electrical Line, Low Voltage	114	0.0130"	Continuous
E-LVEL-AUXL	Electrical Line, Low Voltage, Auxiliary	10	0.0130"	Continuous
E-LVEL-CAMR	Electrical Line, Low Voltage, Camera	72	0.0130"	Continuous
E-LVEL-FRSC	Electrical Line, Low Voltage, Fire Rescue	15	0.0130"	Continuous
E-LVEL-INTR	Electrical Line, Low Voltage, Intrusion	74	0.0130"	Continuous
E-LVEL-PADD	Electrical Line, Low Voltage, Public Address System	30	0.0130"	Continuous
E-LVEL-TELE	Electrical Line, Low Voltage, Telephone	39	0.0130"	Continuous
E-POWR	Power	32	0.0130"	Continuous
E-POWR-EQPM	Electrical Equipment	22	0.0150"	Continuous





Name	Description	Color	Lineweight	Linetype
E-POWR-JBOX	Junction box	22	0.0150"	Continuous
E-POWR-PANL	Panel board	22	0.0150"	Continuous
E-POWR-SWBD	Switch board	22	0.0150"	Continuous
E-POWR-WALL	Electrical power	130	0.0130"	Continuous
E-PROT-EQPM	Fire system equipment	90	0.0080"	Continuous
E-SCHM	Schematic	42	0.0170"	Continuous
E-SCHM-SYMB	Schematic symbol	122	0.0170"	Continuous
E-SECT-IDEN	Section Marks	72	0.0130"	Continuous
E-WIRE	Electrical Wire	30	0.0130"	Continuous

Fire Protection Layers

Name	Description	Color	Lineweight	Linetype
0		7	0.0240"	Continuous
DEFPOINTS		240	0.0020"	Continuous
F-CO2S	CO2 System	212	0.0100"	Continuous
F-DETL-HIDE	Detail Lines Hidden	1	0.0020"	HIDDEN
F-DETL-PATT	Hatch Pattern	1	0.0020"	Continuous
F-DETL-XLIT	Detail Lines Extra Light	1	0.0020"	Continuous
F-DETL-LITE	Detail Lines Light	2	0.0100"	Continuous
F-DETL-MEDM	Detail Lines Medium	3	0.0130"	Continuous
F-DETL-HEVY	Detail Lines Heavy	5	0.0170"	Continuous
F-DETL-XHVY	Detail Lines Extra Heavy	6	0.0200"	Continuous
F-HALN	Halon System	212	0.0100"	Continuous
F-IGAS	Inert Gas System	212	0.0100"	Continuous
F-PROT	Fire Protection System	212	0.0100"	Continuous
F-SPRN	Fire Protection Sprinkler System	212	0.0100"	Continuous





Mechanical Layers

Name	Description	Color	Lineweight	Linetype
0		7	0.0240"	Continuous
DEFPOINTS		240	0.0020"	Continuous
M-ACID	Industrial waste piping system	200	0.0100"	Continuous
M-AFFS	Aqueous film forming foam system	200	0.0100"	Continuous
M-ANNO-DIMS	Dimensions and Leaders	221	0.0100"	Continuous
M-ANNO-LEGN	Legend	171	0.0020"	Continuous
M-ANNO-NOTE	Notes & Text	136	0.0150"	Continuous
M-ANNO-REVS	Revisions Marks	213	0.0130"	Continuous
M-ANNO-SYMB	Annotation/Section Marks	111	0.0130"	Continuous
M-ANNO-TEXT	Schedule, Text	136	0.0150"	Continuous
M-ANNO-TTLB	Titleblock	111	0.0130"	Continuous
M-BKGD	Backgrounds	253	0.0150"	Continuous
M-BOIL-FEED	Boiler Feed Pipe	220	0.0200"	Continuous
M-BRIN	Brine system	200	0.0100"	Continuous
M-CMPA	compressed air system	200	0.0100"	Continuous
M-CMPH	High pressure compressed air system	200	0.0100"	Continuous
M-CMPL	Low pressure steam system	200	0.0100"	Continuous
M-CNDW	Condense water system	200	0.0100"	Continuous
M-CNDW-EQPM	Cooling towers	200	0.0100"	Continuous
M-CNDW-PIPE	Condense water piping	132	0.0130"	Continuous
M-CONC	Concrete Pads	51	0.0100"	Continuous
M-CWTR	Chilled water system	200	0.0100"	Continuous
M-CWTR-EQPM	Chilled water equipment	200	0.0100"	Continuous
M-CWTR-PIPE	Chilled water piping	132	0.0130"	Continuous
M-DENT	Dental system	200	0.0100"	Continuous
M-DETL-HIDE	Detail Lines Hidden	1	0.0020"	HIDDEN
M-DETL-PATT	Hatch Pattern	1	0.0020"	Continuous
M-DETL-XLIT	Detail Lines Extra Light	1	0.0020"	Continuous
M-DETL-LITE	Detail Lines Light	2	0.0100"	Continuous
M-DETL-MEDM	Detail Lines Medium	3	0.0130"	Continuous
M-DETL-HEVY	Detail Lines Heavy	5	0.0170"	Continuous
M-DETL-XHVY	Detail Lines Extra Heavy	6	0.0200"	Continuous
M-DETL-IDEN	Detail Marks	213	0.0130"	Continuous
M-DUAL	Dual Temperature system	200	0.0100"	Continuous
M-DUST	Dust and fume collection system	200	0.0100"	Continuous
M-EQPM-PIPE	Fuel system	220	0.0200"	Continuous
M-EXHS	Exhaust system	200	0.0100"	Continuous
M-EXPN-JONT	Expansion joint	51	0.0100"	Continuous





Name	Description	Color	Lineweight	Linetype
M-FUEL	Fuel system	200	0.0100"	Continuous
M-FUME	Fume system	200	0.0100"	Continuous
M-HOTW	Hot water heating system	200	0.0100"	Continuous
M-HOTW-PIPE	Hot water piping	132	0.0130"	Continuous
M-HVAC	HVAC system	200	0.0100"	Continuous
M-HVAC-BRCH	HVAC Breeching	72	0.0130"	DASHED2
M-HVAC-CONT	HVAC	214	0.0130"	Continuous
M-HVAC-EQPM	HVAC Equipment	72	0.0130"	Continuous
M-HVAC-LINR	HVAC Liner	23	0.0150"	Continuous
M-HVAC-RTRN	HVAC Return Duct	7	0.0240"	Continuous
M-HVAC-SPLY	HVAC Supply Duct	7	0.0240"	Continuous
M-HYDR	Hydraulic System	200	0.0100"	Continuous
M-INEX	Industrial exhaust system	200	0.0100"	Continuous
M-INSL	Insulating transformer oil	200	0.0100"	Continuous
M-LGAS	system Laboratory gas system	200	0.0100"	Continuous
M-LUBE	Lubricating oil system	200	0.0100"	Continuous
M-MDGS	Medical gas system	200	0.0100"	Continuous
M-MKUP	Make-Up air system	200	0.0100"	Continuous
M-NGAS	Natural gas system	200	0.0100"	Continuous
M-PIPE-VALV	Pipe Valve	220	0.0100"	Continuous
M-PLUM-PIPE	Plumbing Pipe	193	0.0200"	Continuous
M-RAIR	Relief air system	200	0.0030	Continuous
M-RCOV-PIPE	Energy Recovery piping	132	0.0100"	Continuous
M-REFG	Refrigeration System	200	0.0130	Continuous
M-REFG-PIPE	·	132	0.0100"	Continuous
M-RWTR	Refrigeration System Piping Ram Water System	200	0.0130	Continuous
M-SMOK	Smoke Extraction System	200	0.0100"	Continuous
M-SPCL	•	200	0.0100"	Continuous
M-STDN	Special System	200	0.0100"	Continuous
M-STEM	Station Drainage System Steam System	220	0.0100"	Continuous
M-STND-DUCT-FLEX	HVAC Duct Flex	112	0.0200	
				Continuous Continuous
M-STND-DUCT-FTNG	HVAC Duct Custom Fitting HVAC Air Coolers	112 100	0.0130"	Continuous
M-STND-EQPM-ACOL M-STND-EQPM-		100	0.0100" 0.0100"	Continuous
AHUN	HVAC Air handling Units	100	0.0100	Continuous
M-STND-EQPM-COIL	HVAC Coils	100	0.0100"	Continuous
M-STND-EQPM-COLL	HVAC Collectors	100	0.0100"	Continuous
M-STND-EQPM- COND	Piping Condensers	132	0.0130"	Continuous
M-STND-EQPM-	HVAC Dampers	100	0.0100"	Continuous
DAMP M-STND-EQPM-	HVAC Dehumidifiers	100	0.0100"	Continuous
DHUM				





Name	Description	Color	Lineweight	Linetype
M-STND-EQPM- ECON	HVAC Economizer	100	0.0100"	Continuous
M-STND-EQPM-FANS	HVAC Fans	100	0.0100"	Continuous
M-STND-EQPM-FILT	HVAC Filters	100	0.0100"	Continuous
M-STND-EQPM- FURN	HVAC Furnace	100	0.0100"	Continuous
M-STND-EQPM- HTPM	HVAC Heat Pumps	100	0.0100"	Continuous
M-STND-EQPM-HTRS	HVAC Unit Heaters	100	0.0100"	Continuous
M-STND-EQPM- HUMD	HVAC Humidifiers	100	0.0100"	Continuous
M-STND-EQPM-LVRS	HVAC Louvers	100	0.0100"	Continuous
M-STND-EQPM- TERM	HVAC Terminals	100	0.0100"	Continuous
M-STND-EQPM-VVAT	HVAC Variable Volume Air Terminals	100	0.0100"	Continuous





Piping Layers

Name	Description	Color	Lineweight	Linetype
0		7	0.0240"	Continuous
DEFPOINTS		240	0.0020"	Continuous
P-ACID-VNTS	Acid, Alkaline, Oil, Waste Piping, Vents	132	0.0130"	Continuous
P-ANNO-DIMS	Dimensions	240	0.0020"	Continuous
P-ANNO-NOTE	Notes	136	0.0150"	Continuous
P-AREA-DETL	Area Detail	72	0.0130"	Continuous
P-DETL-HIDE	Detail Lines Hidden	1	0.0020"	HIDDEN
P-DETL-PATT	Hatch Pattern	1	0.0020"	Continuous
P-DETL-XLIT	Detail Lines Extra Light	1	0.0020"	Continuous
P-DETL-LITE	Detail Lines Light	2	0.0100"	Continuous
P-DETL-MEDM	Detail Lines Medium	3	0.0130"	Continuous
P-DETL-HEVY	Detail Lines Heavy	5	0.0170"	Continuous
P-DETL-XHVY	Detail Lines Extra Heavy	6	0.0200"	Continuous
P-DOMW	Domestic Cold Water	136	0.0150"	DCW
P-DRAN	Drain	220	0.0200"	Continuous
P-EQPM	Domestic Cold Water - Equipment	12	0.0130"	Continuous
P-FIXT	Fixtures	136	0.0150"	Continuous
P-OUTL	Blow-up Details	136	0.0150"	DASHED
P-PIPE	Piping	132	0.0130"	Continuous
P-PIPE-FTNG	Pipe Custom Fitting	132	0.0130"	Continuous
P-PIPE-GAS	Piping, Gas	129	0.0170"	Continuous
P-PIPE-HOTW	Piping, Hot Water	220	0.0200"	DHW
P-PIPE-HTWC	Piping, Hot Water, Circulation	220	0.0200"	DHWC
P-PIPE-MISC	Miscellaneous	136	0.0150"	Continuous
P-SANR	Sanitary System	240	0.0020"	Continuous
P-SANR-STRM	Sanitary System, Storm Drain Piping	220	0.0200"	Continuous
P-SANR-UNDR	Sanitary System, Underground Piping	49	0.0260"	DASHED
P-SANR-WAST	Sanitary System, Waste Piping	240	0.0020"	Continuous
P-STRM	Storm System	220	0.0200"	Continuous
P-UPDN	Up/Down Fittings	136	0.0150"	Continuous
P-VALV	Valves	136	0.0150"	Continuous
P-VENT	Vents	220	0.0200"	VENT
P-XREF	X-reference	7	0.0240"	Continuous





Appendix B

Pen Assignments (per SCA-FULL.ctb)

Colors Used (By Weight)

Color	Lineweight
1	0.0020"
161	0.0020"
162	0.0020"
171	0.0020"
172	0.0020"
173	0.0020"
180	0.0020"
181	0.0020"
240	0.0020"
242	0.0020"
243	0.0020"
150	0.0050"
151	0.0050"
152	0.0050"
190	0.0050"
191	0.0050"
193	0.0050"
231	0.0050"
232	0.0050"
90	0.0080"
91	0.0080"
92	0.0080"
97	0.0080"
2	0.0100"
13	0.0100"
14	0.0100"
51	0.0100"
80	0.0100"
81	0.0100"
82	0.0100"
100	0.0100"

Color	Linovyoight
Color	Lineweight
101	0.0100"
102	0.0100"
103	0.0100"
140	0.0100"
141	0.0100"
142	0.0100"
143	0.0100"
200	0.0100"
201	0.0100"
203	0.0100"
212	0.0100"
221	0.0100"
3	0.0130"
10	0.0130"
11	0.0130"
12	0.0130"
15	0.0130"
30	0.0130"
32	0.0130"
34	0.0130"
39	0.0130"
72	0.0130"
74	0.0130"
110	0.0130"
111	0.0130"
112	0.0130"
114	0.0130"
130	0.0130"
131	0.0130"
132	0.0130"
210	0.0130"

Color	Lineweight
211	0.0130"
213	0.0130"
214	0.0130"
219	0.0130"
20	0.0150"
21	0.0150"
22	0.0150"
23	0.0150"
136	0.0150"
250	0.0150"
251	0.0150"
252	0.0150"
253	0.0150"
254	0.0150"
255	0.0150"
5	0.0170"
42	0.0170"
120	0.0170"
122	0.0170"
129	0.0170"
6	0.0200"
220	0.0200"
7	0.0240"
50	0.0240"
49	0.0260"



Screen 100%

100% 100%

100%

100%



91

0.0080"



Colors Used (By ACI Color Index)

Color	Lineweight	Screen	Color	Lineweight
1	0.0020"	100%	92	0.0080"
2	0.0100"	100%	97	0.0080"
3	0.0130"	100%	100	0.0100"
5	0.0170"	100%	101	0.0100"
6	0.0200"	100%	102	0.0100"
7	0.0240"	100%	103	0.0100"
10	0.0130"	100%	110	0.0130"
11	0.0130"	100%	111	0.0130"
12	0.0130"	100%	112	0.0130"
13	0.0100"	100%	114	0.0130"
14	0.0100"	100%	120	0.0170"
15	0.0130"	100%	122	0.0170"
20	0.0150"	100%	129	0.0170"
21	0.0150"	100%	130	0.0130"
22	0.0150"	100%	131	0.0130"
23	0.0150"	100%	132	0.0130"
30	0.0130"	100%	136	0.0150"
32	0.0130"	100%	140	0.0100"
34	0.0130"	100%	141	0.0100"
39	0.0130"	100%	142	0.0100"
42	0.0170"	100%	143	0.0100"
49	0.0260"	100%	150	0.0050"
50	0.0240"	100%	151	0.0050"
51	0.0100"	100%	152	0.0050"
72	0.0130"	100%	161	0.0020"
74	0.0130"	100%	162	0.0020"
80	0.0100"	100%	171	0.0020"
81	0.0100"	100%	172	0.0020"
82	0.0100"	100%	173	0.0020"
90	0.0080"	100%	180	0.0020"

100%

181

0.0020"

Color	Lineweight	Screen
190	0.0050"	100%
191	0.0050"	100%
193	0.0050"	100%
200	0.0100"	100%
201	0.0100"	100%
203	0.0100"	100%
210	0.0130"	100%
211	0.0130"	100%
212	0.0100"	100%
213	0.0130"	100%
214	0.0130"	100%
219	0.0130"	100%
220	0.0200"	100%
221	0.0100"	100%
231	0.0050"	100%
232	0.0050"	100%
240	0.0020"	100%
242	0.0020"	100%
243	0.0020"	100%
250	0.0150"	80%
251	0.0150"	65%
252	0.0150"	50%
253	0.0150"	35%
254	0.0150"	20%
255	0.0150"	5%

^{*}shown only for used colors





Appendix C

Shortcuts and LISP Routines Library

The purpose of this in-house Library Documentation Manual is to establish a consistent method of access to specific in-house related CAD customization. Please note the following LISP Commands have been depreciated. Contact the CADD Unit for more information.

SCA AutoLISP Library

LISP COMMAND	AutoCAD COMMAND	Description Of Lisp Function
3DARRAY	3DARRAY	Creates a rectangular or polar array around a user specified axis
ATTREDEF		This program allows you to redefine a Block and update the Attributes associated with any previous insertions of that Block. All new Attributes are added to the old Blocks and given their default values. All old Attributes with equal tag values to the new Attributes are redefined but retain their old value. And all old Attributes not included in the new Block are deleted.
ANNOT		Annotate a line with angle and distance.
ARCDOT		Creates an Arc dimension leader line with Dot pointer.
ARCLDR		Creates an Arc Dimension leader line with Arrow pointer.
AUTONUM		Consecutive number generator with distance and angle.
BRACKET		Draws a curved, round or square bracket by entering two endpoints and a radius.
BU		Creates a bubble with text leader and knee point.
CASECHG		Converts text from Lower case to Upper case or Upper to Lower
CHGJUST	JUSTIFYTEXT	Changes the justification of existing text.
CHGSIZE		This allows you to select text and change its style properties, Width etc.
CHT		Text processor operating in a global manner on all text entities that the user selects; e.g., the Height, Justification, Location, Rotation, Style, Text, and Width can be changed globally or individually.
CL		Creates center lines for circles
CLIP		This lisp will clip out a part of the drawing like a cookie cutter
CLOUD	REVCLOUD	Creates a revision cloud.
CONTXT		Continues text paragraphs by selecting last string of text.
COPYRT	MOCORO	Creates a copy then rotates.
DDMEDIT		Multiple text edits. (Also see "qe")
DLINE	MLIN	General purpose "double-line/arc" generator. It performs automatic corner intersection cleanups, as well as a number of other features.
DWG-LABLE		Creates a drawing tag to insert User ID, Date and Filename.





LISP COMMAND	AutoCAD COMMAND	Description Of Lisp Function	
ELHALF		Creates a half ellipse	
IDEN		Identifies a point and inserts a text string showing coordinate location.	
IDLYR		This routine repeatedly prompts you for an entity, and reports the layer each entity is on. If the entity is part of a Block or Xref, the layer the Block or Xref is on is reported as well. A null pick or <return> ends the routine.</return>	
ISLY	LAYISO	Isolates a layer by selecting an entity on the layer to be selected.	
LEXPLODE		Explodes and copies to replace exploded entity.	
MCI		Places and increments columns of text at a specified spacing and increment.	
MCV1		English units to metric unit conversion.	
MCV2		Metric units to English unit conversion.	
MEXT	EXTEND	Multiple extends	
MLEAD		Dimension leader line with multiple lines of text	
MOVERT	MOCORO	Moves selection set then rotates.	
MVP		Makes a Viewport on Layer Defpoints within Paperspace	
PGB	PURGE	Purge all BLOCKS from drawing file.	
PLUD	PEDIT	Allows users to toggle the selected polylines between the two modes of linetype generation, either generation between the vertices or the new method, along the completed polyline.	
PPHATCH		Pick Points hatch.	
PREFIX		If you need to precede (prefix) several text strings with a prefix, this routine allows you to do so. You would be prompted for what you would want to put in front of these strings, and then select the text.	
PVIEW		Creates a perspective view.	
PW	MPEDIT	Changes the width of multiple polylines	
QA		Attribute Edit (Quick Attribute Edit)	
QE		Multiple text edit (Quick Edit)(Also see "ddmedit")	
RGA	REGENALL	Regen All Viewports.	
RTCOPY	MOCORO	Creates a Copy by first rotating.	
RTMOVE	MOCORO	Rotates selection set then moves.	
SETLYR		Sets current layer by picking an entity on the desired layer.	
SIZE		This is used to scale blocks that have already been inserted, and their scale needs to be changed. It will prompt to select objects, ask what is the name of the block to change, and ask for the scale factor. It will then scan the selected objects and if blocks are found under the given name, they will be scaled to the user's scale factor entered. All blocks under the given name will scale, BUT their insertion point will remain the same.	
TP		Allows various text to be selected and automatically rejustified along the Y position of the Selected point	







LISP COMMAND	AutoCAD COMMAND	Description Of Lisp Function
T1	LAYOUT TAB	Toggles Tilemode to 1
T0	LAYOUT TAB	Toggles Tilemode to 0
TCHANGE		Changes multiple text string properties characteristics
UNDSCR		Updates text strings with underlines
VR		View Restore alias.
VS		View Save alias.

Keyboard Shortcuts

Shortcut	Command
3A	3DARRAY
3DMIRROR	MIRROR3D
3DNavigate	3DWALK
3DO	3DORBIT
3DP	3DPRINT
3DPLOT	3DPRINT
3DW	3DWALK
3F	3DFACE
3M	3DMOVE
3P	3DPOLY
3R	3DROTATE
3S	3DSCALE
Α	ARC
AC	BACTION
ADC	ADCENTER
AECTOACAD	ExportToAutoCAD
AA	AREA
AL	ALIGN
3AL	3DALIGN
AP	APPLOAD
APLAY	ALLPLAY
AR	ARRAY
ARR	ACTRECORD
ARM	ACTUSERMESSAGE
ARU	ACTUSERINPUT
ARS	ACTSTOP
ATI	ATTIPEDIT
ATT	ATTDEF

Shortcut	Command	
ATE	ATTEDIT	
В	BLOCK	
ВС	BCLOSE	
BE	BEDIT	
ВН	HATCH	
ВО	BOUNDARY	
BR	BREAK	
BS	BSAVE	
BVS	BVSTATE	
С	CIRCLE	
CAM	CAMERA	
CBAR	CONSTRAINTBAR	
CH	PROPERTIES	
CHA	CHAMFER	
СНК	CHECKSTANDARDS	
CLI	COMMANDLINE	
COL	COLOR	
COLOUR	COLOR	
CO	COPY	
СР	COPY	
CPARAM	BCPARAMETER	
CREASE	MESHCREASE	
CSETTINGS	CONSTRAINTSETTINGS	
СТ	CTABLESTYLE	
CUBE	NAVVCUBE	
CYL	CYLINDER	
D	DIMSTYLE	
DAL	DIMALIGNED	





Shortcut	Command	
DAN	DIMANGULAR	
DAR	DIMARC	
JOG	DIMJOGGED	
DBA	DIMBASELINE	
DBC	DBCONNECT	
DC	ADCENTER	
DCE	DIMCENTER	
DCENTER	ADCENTER	
DCO	DIMCONTINUE	
DCON	DIMCONSTRAINT	
DDA	DIMDISASSOCIATE	
DDI	DIMDIAMETER	
DED	DIMEDIT	
DELCON	DELCONSTRAINT	
DI	DIST	
DIV	DIVIDE	
DJL	DIMJOGLINE	
DJO	DIMJOGGED	
DL	DATALINK	
DLI	DIMLINEAR	
DLU	DATALINKUPDATE	
DO	DONUT	
DOR	DIMORDINATE	
DOV	DIMOVERRIDE	
DR	DRAWORDER	
DRA	DIMRADIUS	
DRE	DIMREASSOCIATE	
DRM	DRAWINGRECOVERY	
DS	DSETTINGS	
DST	DIMSTYLE	
DT	TEXT	
DV	DVIEW	
DX	DATAEXTRACTION	
Е	ERASE	
ED	DDEDIT	
EL	ELLIPSE	
ER	EXTERNALREFERENCES	
ESHOT	EDITSHOT	
EX	EXTEND	
	EXTEND	

Shortcut Command EXP EXPORT EXT EXTRUDE F FILLET FI FILLET FI FILTER FREEPOINT POINTLIGHT FSHOT FLATSHOT G GROUP -G GROUP GCON GEOMCONSTRAINT GD GRADIENT GENERATESECTION SECTIONPLANETOBLOCK GEO GEOGRAPHICLOCATION GR DDGRIPS H HATCH -H HATCH HE HATCHEDIT HI HIDE I INSERT IAD IMAGEADJUST IAT IMAGEATTACH ICL IMAGECLIP IM IMAGE IMP IMPORT IN INTERSECT INF INTERFERE IO INSERTOBJ QVD QVDRAWING QVDC QVDRAWING QVDC QVDRAWING QVDC QVDRAWING QVDC QVLAYOUT QVLC QVLAYOUT LINE LA LAYER LAS LAYERSTATE LE QLEADER LEN LENGTHEN LESS MESHSMOOTHLESS LI LIST LINEWEIGHT LWEIGHT		
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LI LIST	LEN	LENGTHEN
	LESS	MESHSMOOTHLESS
LINEWEIGHT LWEIGHT	LI	LIST
	LINEWEIGHT	LWEIGHT





Shortcut	Command	
LMAN	LAYERSTATE	
LS	LIST	
LT	LINETYPE	
LTYPE	LINETYPE	
LTS	LTSCALE	
LW	LWEIGHT	
M	MOVE	
MA	MATCHPROP	
MAT	MATERIALS	
ME	MEASURE	
MEA	MEASUREGEOM	
MI	MIRROR	
ML	MLINE	
MLA	MLEADERALIGN	
MLC	MLEADERCOLLECT	
MLD	MLEADER	
MLE	MLEADEREDIT	
MLS	MLEADERSTYLE	
MO	PROPERTIES	
MORE	MESHSMOOTHMORE	
MOTION	NAVSMOTION	
MOTIONCLS	NAVSMOTIONCLOSE	
MS	MSPACE	
MSM	MARKUP	
MT	MTEXT	
MV	MVIEW	
NORTH	GEOGRAPHICLOCATION	
NORTHDIR	GEOGRAPHICLOCATION	
NSHOT	NEWSHOT	
NVIEW	NEWVIEW	
0	OFFSET	
OP	OPTIONS	
ORBIT	3DORBIT	
OS	OSNAP	
Р	PAN	
PA	PASTESPEC	
RAPIDPROTOTYPE	3DPRINT	
PAR	PARAMETERS	
PARAM	BPARAMETER	
PARTIALOPEN	PARTIALOPEN	

Shortcut (Command	
	PEDIT	
· -	PLINE	
· -	POINT	
	HIDEPALETTES	
	POLYGON	
	SHOWPALFTTES	
	PROPERTIES	
	PROPERTIESCLOSE	
	PROPERTIES	
	PREVIEW	
	PLOT	
	PSPACE	
	POLYSOLID	
	PUBLISHTOWEB	
	PURGE	
	PYRAMID	
	QUICKCALC	
	QUICKCUI	
	REDRAW	
	REDRAWALL	
	RENDERCROP	
	REGEN	
	REGENALL	
	RECTANG	
REFINE N	MESHREFINE	
REG F	REGION	
REN F	RENAME	
REV F	REVOLVE	
RO F	ROTATE	
RP F	RENDERPRESETS	
RPR F	RPREF	
RR F	RENDER	
RW F	RENDERWIN	
S S	STRETCH	
SC S	SCALE	
SCR S	SCRIPT	
SE [DSETTINGS	
SEC S	SECTION	
SET S	SETVAR	
SHA S	SHADEMODE	





Shortcut	Command	
SL	SLICE	
	MESHSMOOTH	
SMOOTH		
SN	SNAP	
SO	SOLID	
SP	SPELL	
SPL	SPLINE	
SPLANE	SECTIONPLANE	
SPLAY	SEQUENCEPLAY	
SPLIT	MESHSPLIT	
SPE	SPLINEDIT	
SSM	SHEETSET	
ST	STYLE	
STA	STANDARDS	
SU	SUBTRACT	
Т	MTEXT	
TA	TABLET	
ТВ	TABLE	
TEDIT	TEXTEDIT	
TH	THICKNESS	
TI	TILEMODE	
ТО	TOOLBAR	
TOL	TOLERANCE	
TOR	TORUS	
TP	TOOLPALETTES	
TR	TRIM	
TS	TABLESTYLE	
UC	UCSMAN	
UN	UNITS	
UNCREASE	MESHUNCREASE	
UNI	UNION	
V	VIEW	
VGO	VIEWGO	
VPLAY	VIEWPLAY	
-V	VIFW	
VP	DDVPOINT	
-VP	VPOINT	
VS	VSCURRENT	
VSM	VISUALSTYLES	
-VSM	VISUALSTYLES	
W	WBLOCK	
vv	VV DLOCK	

Shortcut	Command	
WE	WEDGE	
WHEEL	NAVSWHEEL	
Χ	EXPLODE	
XA	XATTACH	
XB	XBIND	
-XB	XBIND	
XC	XCLIP	
XL	XLINE	
XR	XREF	
-XR	XREF	
Z	ZOOM	





Appendix D

AutoCAD Express Tools

The AutoCAD Express Tools are a library of productivity tools designed to help you extend the power of AutoCAD. They cover a wide range of AutoCAD functions, including: layer management, dimensioning, drawing, object selection, and object modification.

Express Tool Commands

NAME	CLI Command	Description
Command Alias Editor	ALIASEDIT	Launches an editor for aliases stored in the acad.pgp file
Align Space	ALIGNSPACE	Aligns model space objects in different viewports with each other or with objects in paper space
Arc-Aligned Text	ARCTEXT	Creates text following a selected arc
Import Attribute Information	ATTIN	Inserts attribute information into the drawing
Export Attribute Information	ATTOUT	Extracts attribute information from the drawing
Extend to Nested Objects	BEXTEND	Extends to objects nested in blocks and external references
Replace block with another block	BLOCKREPLACE	Replaces all inserts of one block with inserts of another
Convert block to xref	BLOCKTOXREF	Converts a specified block and all of its inserts to an xref
Break-line Symbol	BREAKLINE	Creates polylines and inserts break- line symbol





NAME	CLI Command	Description
Trim to Nested Objects	BTRIM	Trims to objects nested in blocks and external references
Explode Attributes to Text	BURST	Explodes block and converts attributes to text
DrawOrder by color	CDORDER	Arranges draw order of objects based on color
Change URLs	CHURLS	Modifies URL addresses
Extended Clip	CLIPIT	Adds arc, circle, and polyline capability to XCLIP
Close All Drawings	CLOSEALL	Closes all open drawings
Multiple Copy	СОРҮМ	Copies objects multiple times with options to repeat, divide, measure, and array
Dimstyle Export	DIMEX	Saves dimension styles to a file
Dimstyle Import	DIMIM	Imports dimension styles saved to a file using DIMEX
Reset Dim Text Value	DIMREASSOC	Re-associates dimensions
Dwg Editing Time	EDITTIME	Tracks total active editing time in drawing
Extended Offset	EXOFFSET	Enhances OFFSET
Extended Plan	EXPLAN	Enhances PLAN
Flatten objects	FLATTEN	Converts 3D geometry to 2D
Fast Select	FS	Selects objects that touch a specified object
Get Selection Set	GETSEL	Selects specific types of objects
Edit Image	IMAGEEDIT	Launches an image editor application for editing a selected image
Merge Layout	LAYOUTMERGE	Merges the objects from other layouts into one layout and saves corresponding views
Make Linetype	MKLTYPE	Creates a linetype based on selected objects





NAME	CLI Command	Description
Make Shape	MKSHAPE	Creates a shape based on selected objects
Move/Copy/Rotate	MOCORO	Moves, copies, rotates, and scales objects
Move Backup Files	MOVEBAK	Moves saved AutoCAD backup files to a directory
Multiple Object Stretch	MSTRETCH	Stretches objects with multiple selection windows
Copy Nested Objects	NCOPY	Copies objects nested inside blocks and external references
Delete duplicate objects	OVERKILL	Cleans up overlapping geometry by removing duplicated and/or unneeded objects
Convert PLT to DWG	PLT2DWG	Imports HP-GL files into the current drawing session
Update Drawing Property Data	PROPULATE	Updates, lists, and clears drawing property information
Attach Leader to Annotation	QLATTACH	Associates a leader to an annotation object
Global Attach Leader to Annotation	QLATTACHSET	Associates selected leaders with a likely annotation
Detach Leaders from Annotation	QLDETACHSET	Disassociates selected leaders from an annotation
Quick Exit	QQUIT	Closes all drawings and exits
Redefine Path	REDIR	Redefines the paths in external references, images, shapes, and fonts
Find and Replace URLs	REPURLS	Replaces URL addresses with others
Revert to Original	REVERT	Closes the current drawing and reopens the original version
Remote Text	RTEXT	Inserts or edits a remote text object





Real-Time UCS RTUCS Changes the UCS in real time Save All Drawings SAVEALL Saves all open drawings Show URLS SHOWURLS Shows the location of embedded URL addresses Convert Shape to Block SHP2BLK Converts from a shape definition to a block definition Super Hatch SUPERHATCH Uses images, blocks, external references, or wipeouts as hatch patterns System Variable Editor SYSVDLG Launches an editor for system variables Change Text Case TCASE Changes the case of selected text Enclose Text with Object TCIRCLE Surrounds text or multiline text with circles, slots, or rectangles Automatic Text Numbering TCOUNT Adds sequential numbering to text objects Text Fit TEXTFIT Fits text between specified points Text Mask TEXTMASK Places a mask behind selected text Unmask Text TEXTUNMASK Removes a mask from behind selected text Toggle Frames TFRAMES Toggles frames for images and wipeouts Justify Text TJUST Justifies text created with MTEXT and ATTDEF Rotate Text TORIENT Rotates text, multiline text, and block a	NAME	CLI Command	Description
Show URLs SHOWURLS Shows the location of embedded URL addresses Convert Shape to Block SHP2BLK Converts from a shape definition to a block definition Super Hatch SUPERHATCH Uses images, blocks, external references, or wipeouts as hatch patterns System Variable Editor SYSVDLG Launches an editor for system variables Change Text Case TCASE Changes the case of selected text Enclose Text with Object TCIRCLE Surrounds text or multiline text with circles, slots, or rectangles Automatic Text Numbering TCOUNT Adds sequential numbering to text objects Text Fit TEXTFIT Fits text between specified points Text Mask TEXTMASK Places a mask behind selected text Unmask Text TEXTUNMASK Removes a mask from behind selected text Toggle Frames TFRAMES Toggles frames for images and wipeouts Justify Text TJUST Justifies text created with MTEXT and ATTDEF Rotate Text TORIENT Rotates text, multiline text, and block attribute objects to new orientation Convert Text to Mtext TXT2MTXT Converts text created with TEXT or DTEXT to multiline text	Real-Time UCS	RTUCS	Changes the UCS in real time
Convert Shape to Block SHP2BLK Converts from a shape definition to a block definition Super Hatch SUPERHATCH Uses images, blocks, external references, or wipeouts as hatch patterns System Variable Editor SYSVDLG Launches an editor for system variables Change Text Case TCASE Changes the case of selected text Enclose Text with Object TCIRCLE Surrounds text or multiline text with circles, slots, or rectangles Automatic Text Numbering TCOUNT Adds sequential numbering to text objects Text Fit TEXTFIT Fits text between specified points Text Mask TEXTMASK Places a mask behind selected text Unmask Text Text Mask TEXTUNMASK Removes a mask from behind selected text Toggle Frames TFRAMES Toggles frames for images and wipeouts Justify Text TJUST Justifies text created with MTEXT and ATTDEF Rotate Text TORIENT Rotates text, multiline text, and block attribute objects to new orientation Convert Text to Mtext TXT2MTXT Converts text created with TEXT or DTEXT to multiline text Explode Text	Save All Drawings	SAVEALL	Saves all open drawings
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Unmask Text TEXTUNMASK Removes a mask from behind selected text Toggle Frames TFRAMES Toggles frames for images and wipeouts Justify Text TJUST Justifies text created with MTEXT and ATTDEF Rotate Text TORIENT Rotates text, multiline text, and block attribute objects to new orientation Convert Text to Mtext TXT2MTXT Converts text created with TEXT or DTEXT to multiline text Explode Text TXTEXP Explodes text into polylines	Text Fit	TEXTFIT	Fits text between specified points
Toggle Frames TFRAMES Toggles frames for images and wipeouts Justify Text TJUST Justifies text created with MTEXT and ATTDEF Rotate Text TORIENT Rotates text, multiline text, and block attribute objects to new orientation Convert Text to Mtext TXT2MTXT Converts text created with TEXT or DTEXT to multiline text Explode Text TXTEXP Explodes text into polylines	Text Mask	TEXTMASK	Places a mask behind selected text
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Convert Text to Mtext TXT2MTXT Converts text created with TEXT or DTEXT to multiline text Explode Text TXTEXP Explodes text into polylines	Justify Text	TJUST	
Explode Text TXTEXP Explodes text into polylines	Rotate Text	TORIENT	
	Convert Text to Mtext	TXT2MTXT	
List Viewport Scale VPSCALE Lists the scale of a selected viewport	Explode Text	TXTEXP	Explodes text into polylines
	List Viewport Scale	VPSCALE	Lists the scale of a selected viewport





NAME	CLI Command	Description
Synchronize Viewports	VPSYNC	Synchronizes one or more viewports with a master viewport
Attach Xdata	XDATA	Attaches extended object data (xdata) to an object
List Object Xdata	XDLIST	Lists the extended object data (xdata) attached to an object
List Xref/Block Properties	XLIST	Displays properties of objects nested in blocks and external references
Express Tools Web site		Launches web browser and loads the AutoCAD Express Tools Web site
Express Tools Newsgroup		Launches a news reader and displays the AutoCAD Express Tools newsgroup
Autodesk Products and Support Website		Launches a web browser and displays the Autodesk Products website
Express Tools FAQ		Displays an FAQ for AutoCAD Express Tools
Help		Displays Help for the AutoCAD Express Tools





NOTES: