



Design Engineering
10060 Goethe Road
Sacramento, CA 95827

AutoCAD Standards
August 1, 2018

Sacramento Area Sewer District AutoCAD Standards

August 1, 2018

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I. INTRODUCTION

The intent of this document is to provide standard AutoCAD guidelines for generating CAD drawings for the Sacramento Area Sewer District (SASD) personnel. Consultants or contractors creating CAD drawings for SASD shall follow these guidelines. Any drawings created for SASD, which do not conform to these guidelines, will not be accepted. Any changes or variations to the guidelines must have prior approval by SASD before implementation.

II. GENERAL REQUIREMENTS

SOFTWARE

All consultants and contractors creating or editing drawings for SASD will use AutoCAD 2013 or later.

DRAWING NAME & SHEET NUMBERING CONVENTION

All drawings, with the exception of externally referenced drawings, that are created for SASD shall follow the naming convention provided in this document. Drawings which are externally referenced into other drawings (such as base maps or topographic maps) need only be descriptively named for ease of identification.

- The standard for a drawing file name will be a 3-part text string. The first part will be a 4-digit facility number¹ or contract number. The second will be a single letter designating the discipline used in the drawing followed by a 4-character abbreviation representing the drawing type. The last portion will be two digits incrementing sequentially for each drawing type used in the set. No other prefixes or suffixes shall be used.

Ex.: S011-EDETL-01

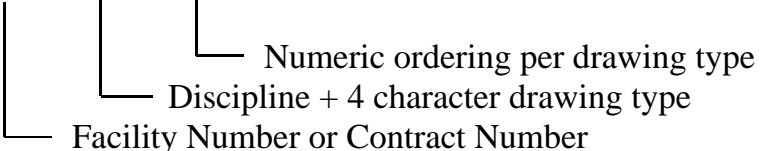


Diagram illustrating the naming convention for the example file name S011-EDETL-01:

- Facility Number or Contract Number (S011)
- Discipline + 4 character drawing type (EDETL)
- Numeric ordering per drawing type (01)

- The drawing file name will be used to reference other sheets in each discipline set.
- If multiple sheets are contained in a single drawing file the name within the “FILE NAME” portion of the each title block must conform to this naming convention.

¹Facility number shall be the first option. Use the contract number if facility number is not available.

List of Abbreviations for Discipline/Group:

- 1 G-General
- 2 A-Architectural
- 3 | C-Civil
- 4 | S-Structural
- 5 | | M-Mechanical
- 6 | | | E-Electrical
- 7 | | | I-Instrumentation/Control Systems
- 8 | | | F-Fire Protection
- 9 L-Landscape |
- 10 T-Traffic Control
- 11 **R-Road/Highway**
- 12 **W-Water**
- 13 **D-Drainage**
- 14 **X-Removal/Demolition**
- 15 **P-Cathodic Protection**

Those disciplines that are listed below other disciplines may be placed on the highest vertically in-line discipline sheet if consolidation is desired.

List of Abbreviations for Drawing Type:

Descriptions for abbreviations

If there are duplicate drawing types on one page, use the abbreviation that appears first on the individual discipline list. The abbreviations that are unique are separated for clarity by discipline.

Common to more than one discipline group:

- INDX** Index - An ordered reference list of the contents of the drawing package. This sheet could also have the location and vicinity maps, and the sheet maps. (Use INDX if combined with General Notes)
- NOTE** Notes – General notes, usually repeated in each section.
- SCHD** Schedules- A drawing sheet showing itemized lists of equipment within the discipline.
- SYMB** Symbols – Standard Abbreviations and Symbols that apply specifically to the discipline. Other sections may contain Standard Abbreviation and Symbol sheets containing information pertinent to the section in which they appear. Electrical drawings use ISA Standard S5.1.

- SITE** Site – Location and Vicinity Maps, Arial Views, Plan drawings showing the site and the site layout. The electrical conduit layout or routing diagrams is shown as an overlay to the “A” or “C” site plan.
- SECT** Section – Drawings that provide a greater level of detail for the components showed in the plan/elevation drawings. For example: a single cabinet showing the front, side and or rear mounted components possibly with dimensions.
- DETL** Detail – Drawings as their name implies, that give specific views, dimensions, and generally provides a greater level of detail for the parts, pieces, or components shown in the Elevation or Section drawings.
- SCHD** Schedules – A drawing sheet showing nameplate information, bill of materials, conduit lists, components or piping materials shown in tabular form.
- PIPE** Pipe- On-site piping and plumbing.

G - General

- CVRS** Cover Sheet- This drawing will hold the title & district information, the contract and consultant information, board of directors and engineer signature information.
- FLOW** Flow- Process, Flow & Hydraulic information for overall project.

A – Architectural

- ELEV** Elevations- Used primarily for Architectural plans showing the facing of the structure.

C – Civil

- SSPP** Sanitary Sewer Systems- Plan & Profile Sheets.
- RELC** Relocations- Detailed design of any utilities to be relocated by the project.
- SWPP** Storm Water Pollution Prevention- Storm Water pollution prevention plans.
- ENVR** Environmental Condition- (May occasionally be used in other disciplines)

S – Structural

- FDTN** Foundation- Foundation and pile pattern plans.
- PLAN** Plan- Structure layout plans.

M-Mechanical

HVAC Heating Ventilation & Air Conditioning- Plans specific to HVAC.

ODOR Odor- Foul air handling equipment plans.

E – Electrical & Instrumentation/Control Systems

- Abbreviation ordering for Electrical / Instrumentation only. These abbreviations shall be used in the order they appear. If the drawing is to be placed on another sheet, it should go onto the drawing that appears above it. The drawing can only go onto another drawing type within each group. Each group is ordered to start with the basic structure. The other drawings in the list provide a greater level of detail. The **BOLD** abbreviations are the minimum required drawings in a set.

INDX

- NOTE
- SYMB

SITE

- PIDD
- BLCK

ELEV

- SECT
- DETL
- SCHD

SGLD

- POWR
- WIRD
- CTRL
- LOOP
- SCHM
- LOGC
- COND

PIDD Piping & Instrumentation Drawing – The primary schematic drawing used for laying out a process control installation showing the process flow from left to right.

BLCK Block – A diagram of a system in which principal parts are represented by suitably annotated geometrical figures to show basic functions of the parts and functional relationships. Usually reserved for complex multistage control circuits such as cascade P&ID control circuits or computer systems.

ELEV Elevation – Plan or Elevation drawings showing the overall layout and the location of the major components to the facility. For example: a row of electrical cabinets.

- SGLD** Single Line Diagram – An elementary diagram of the primary power supply from the source to the individual breakers in the MCC. Drawings to include: One-Line Diagrams and Three Phase line diagrams.
- POWR** Power Distribution / Power Panels – Drawings that provide a greater level of detail than that shown for the wiring and components in the Single Line Drawing.
- CTRL** Control Diagrams – Schematic representations of a single control circuit in a control apparatus. Wiring Diagrams that show the actual wiring of a portion of the overall wiring diagram, focusing on a single control function.
- WIRD** Wiring Diagram – A diagram showing the specific physical interconnections between the component parts in an assembly. Includes the interconnection drawings that show the actual wiring between assemblies, chassis, or racks.
- LOOP** Loop Diagrams – Schematic representations of a complete analog current loop circuit. Wiring Diagrams that show the actual wiring of a portion of the overall, focusing on a single analog current loop function from the supply side of the power supply, through the current generator and other elements and continuing to the return side of the power supply. This drawing uses ISA Standard S5.4.
- SCHM** Schematic – A diagram showing the electrical equivalent of a circuit. This drawing may not represent the actual wiring and physical layout of the circuit but it is electrically accurate. This type drawing is usually reserved for electronic circuits rather than an electrical circuit. For example: The schematic drawing of the internal circuit board of a power supply or a battery charger.
- LOGC** Logic Diagram – A Boolean logic diagram showing the designed function of the control circuits. This drawing uses ISA Standard S5.2.
- COND** Connection Diagram – A wiring diagram used during the construction phase of the SCADA project that shows the wiring from the existing station interface terminal strips. These terminal strips provided a convenient, documented, and repetitive location for the contractor to land the wiring to the new RTU panels. These drawings do not appear in new construction.

L-Landscape

- IRRG** Irrigation Plan- Irrigation plans.
- PLNT** Planting Plan- Plans showing planting detailed locations of all vegetative matter to be planted.

T-Traffic Control

- CTCP** Construction Traffic Control Plan- Drawings that contain traffic control plans specific to the construction.
- TSSP** Temporary Stripping & Signal Plan- Plans showing temporary construction period stripping or signals plans.

R-Road/Highway

- ROAD** Road and Highway Plans- Road design symbols, Road sections, Plan and Profiles, Stripping Plans, Miscellaneous Details and Traffic Signal Plans.

W-Water

- WTRS** Water Supply- Plan and Profile sheets, Cross Sections, Construction Details and Standard Details.

D-Drainage

- DRAN** Drainage- Plan and Profile sheets, Cross Sections, Construction Details and Standard Details.

X-Removal/Demolition

- DEMO** Demolition Plans- Plans for the demolitions of any facilities to be removed by the project.

P-Cathodic Protection

(no drawing type abbreviation unique to this discipline)

- Use [“AIA CAD Layer Guidelines”](#) by “The American Institute of Architects Press” as a guide/reference. Any additional drawing types need to be approved by SASD.

STANDARDIZED SHEET NUMBERING:

- The sheet number shall be the sequential number of the sheets placement within the sheet set.
- The drawing number shall be the letter designating the discipline followed by the page number within the discipline sub set. The total number of sheets within the discipline sub set shall be placed to the right of the drawing number.

Example:

PROJECT TITLE	CONTRACT NO. _____ XXXX	SCALE
SHEET TITLE 1 SHEET TITLE 2 SHEET TITLE 3	FILE NAME _____ XXXX-XXXX-XX	HOR: N/A VER: N/A
	DRAWN _____ NAME	SHEET 10
	DESIGNED _____ NAME	C15 / 30
CHECKED _____ NAME		
	SHEET DATE MAR. 18, 2004	OF 100 SHEETS

Sheet 10 of 100 total sheets & sheet 15 of 30 sheets within the “Civil” sub set

STANDARD COVER SHEETS

The prototype cover sheet drawing shall be used for all SASD projects. This drawing, as well as those described in the next section, are available for download at the SASD website’s “Standards & Specifications” page (<http://www.sacsewer.com/standards-specifications>). The cover sheet contains the SASD logo. In addition an area has been set aside for the names of the Board of Directors, a title area, contract number and an area for the appropriate signatures. These areas are to be updated as needed by the user and kept current for each set of contract documents. There is a consultant logo area in the lower left-hand corner. The logo used shall not exceed 6” wide by 4” high. (See Exhibit 1).

STANDARD LOCATION AND SHEET LAYOUT PAGE

SASD has developed a prototype for the 2nd page of the set that has areas predetermined for the sheet layout, location of project and index of drawings. This sheet shall be used for those items and can be duplicated if needed. (See Exhibit 2) General notes can be placed on this sheet as well. The prototype-drawing name is the SASD-bdr-pg2.dwg.

STANDARD TITLE BLOCKS AND BORDERS

SASD has developed a prototype border drawing that is also available for download. (See Exhibit 4) There are many parameters set within the prototype drawing that must be maintained. This is the standard border and title block used by SASD and is required on all "D" size drawings. If the border block is exploded or modified in any way, its visual appearance must remain intact. If any portion of the border block is externally referenced into the sheet drawings, it must conform to the Standard regarding external references on page 13 of this booklet.

There is an area on the title block that is set aside for a company logo. The area is fixed and changes to size and location are not allowed. A logo may be designed or an existing logo modified to fit into this area.

There are three areas within the title block that are layer controlled for visibility. All layers are clearly named for easy recognition.

1. The right hand stamp area will toggle between an engineering stamp area and a survey information box.
 - ❖ Layer names:

Stamp-second	-Second engineering stamp
Survey	-Survey information box

2. The grid area will toggle between a 40-scale grid and a 50-scale grid.
 - ❖ Layer names:

Grid-40_primary	-40 scale grid
Grid-40_secondary	-40 scale grid
Grid-50_primary	-50 scale grid
Grid-50_secondary	-50 scale grid

All entries in the border are attributes and can be edited with the AutoCAD command ATE.

DRAWING ATTRIBUTES

Attributes are used to guarantee text style, text height, text placement, and also to generate database files from CAD drawings.

DRAWING TRANSFER

All CAD drawings and/or raster files submitted to SASD must be on CD or DVD. All raster files shall be submitted in TIFF format, un-compressed. All Plot Style Tables (stb) and/or Color-Dependent Plot Style Tables (ctb) as well as any SASD approved non-standard fonts used shall also be submitted.

III. CAD OPERATIONS

GENERAL REQUIREMENTS

The final delivered drawings shall meet the following criteria:

1. The "ACAD" menu saved in the drawing.
2. The current layer set to zero. **(Do not draw on layer 0.)**
3. All drawings, including external references, will be purged of all unused blocks, layers, and line types.
4. Zoomed to the drawing limits as they are set in the prototype.

AutoCAD drawing variables are already set in the prototype drawing file. All drawings shall utilize this prototype. All entity colors and line types shall be set to "bylayer" and not set by each entity.

To use the prototype drawings the operator shall open the appropriate drawing and using the command "saveas" shall save to a drawing name as described in the naming convention portion of this booklet. The model shall then be created in model space. To view the model in paper space, the operator shall scale the viewport in paper space according to the guidelines in Figure 1 (page 12).

PAPER SIZE/BORDER

Use a paper size of 34" x 22". The prototype border drawing is part of these standards and may not be modified without prior approval by SASD. All drawings submitted to SASD shall use this border drawing. (See Exhibit 3). Filename: the SASD-bdr.dwg.

PAPER/MODEL SPACE

General:

Use of paper space and model space is required. The prototype drawing file is set up with one viewport set. Tilemode can be turned on and the drawing completed in model space. Scale can be set using Zoom, Xp or within the Properties window. Scaling guidelines are listed in Figure 1 (page 12) for using paper and model space.

Drawing units shall be set to decimal. It is suggested that one AutoCAD unit in model space equal one foot. When in paper space, one AutoCAD unit is equal to one inch.

Schematics and Non-scaled Drawings:

All drawings not drawn to a particular scale will be drawn at 1"=1'. These drawings shall be drawn in model space.

Scaled Drawings using Paper and Model Space:

All drawings using Paper and Model Space shall be drawn full scale in model space. The prototype drawing is set with the border, working area, and viewport in paper space. All dimensions will be placed in model space with the appropriate text height. All general notes, view notes, lists or charts will be placed in paper space. Any notes in model space shall match the text height of notes in paper space where appropriate.

SCALES- STANDARD SCALE FACTORS

General:

Setting the scale of the viewport will set proper scale. A chart of standard scale factors for viewport scale factors is provided in Figure 1 (page 12). These are the only scales allowed for drawings submitted to SASD. The scale should be determined before beginning a drawing so text height can be calculated.

Scale	Zoom XP Scale Factor	Standard Text	Title & Subtitle Text
1"=50'-0"	.020	5.00	6.00
1"=40'-0"	.025	4.00	4.80
1"=20'-0"	.050	2.00	2.40
1"=10'-0"	.100	1.00	1.20
3/4"=1'-0"	.750	0.13	0.16
1/2"=1'-0"	.500	0.20	0.24
3/8"=1'-0"	.375	0.27	0.32
1/4"=1'-0"	.250	0.40	0.48
1/8"=1'-0"	.125	0.80	0.96
1"=1'-0"	1.00	0.10	0.12
2"=1'-0"	2.00	0.05	0.06

(Figure 1)

- ❖ Figure 1 suggests that one AutoCAD unit is equal to 1' in model space and one AutoCAD unit is equal to 1" in paper space.

On D size (34x22) drawings, standard text must not be smaller than 0.1 inches high when plotted at full size. Titles and subtitles shall be no smaller than 0.12 inches high. The table above list text heights for each scale factor. The scale factor will also be used for LTSCALE and DIMSCALE.

LAYER NAMES

The names used for layers shall be descriptive in nature. Do not use numbers or nondescript lettering. The American Institute of Architects produces [CAD Layer Guidelines](#) which can be used as a tool in layer naming. **All drawings supplied to SASD shall have all unused layers purged.**

FONTS

All fonts shall be from the AutoCAD standard fonts supplied with the software. SASD must approve any other font before use and a font file shall be provided to SASD. This also includes fonts unique to other AutoCAD based Autodesk programs. If there is doubt about whether a font is AutoCAD standard the file for that font should be submitted with the drawing files.

LINE TYPES

A line type is a specific sequence of alternating line segments and spaces. Line types shall be assigned to layers. Do not assign line types by entity. The length of segments and spaces of a line type varies in size depending on how the AutoCAD system variable "LTSCALE" is set. The LTSCALE should be set according to the insertion scale factor specified in the "Scales-Standard Scale factors" section of the Standards. The ltscale can be set for individual objects as needed. In paper space set ltscale and psltscale to 1.

All line types other than the AutoCAD standard line types must be approved by SASD and a file must be provided including each line type used. This also includes line types unique to other AutoCAD based programs from Autodesk. If there is doubt about whether a line type is AutoCAD standard the file for that line type should be submitted with the drawing files.

VIEWS & UCS

Three-dimensional drawings are not used. Do not modify UCS settings. All drawings shall remain in plan view using the default AutoCAD World UCS. To modify the orientation of a particular view use the DVIEW command.

Any drawing not in compliance with these standards shall be rejected and returned for correction. Plotted sheets will not be approved until drawing files are correct.

EXTERNAL REFERENCES

All external references (Xref's) and inserted images must be placed in the same directory as the drawing file. All Xref items shall be attached on layer zero.

PLOTTING

The consultant shall provide all stb and/or ctb files used for plotting to SASD. To ensure SASD has the correct final plot layer settings; the consultant shall save these settings at the time of plotting. The layer settings can be saved using the "Layer States" manager.



CONTRACT DRAWINGS FOR

PROJECT TITLE

BOARD OF DIRECTORS

JEANNIE BRUINS
 LARRY CARR
 SUE FROST
 PATRICK HUME
 PATRICK KENNEDY

ROBERT MCGARVEY
 ANDY MORIN
 DON NOTTOLI
 SUSAN PETERS
 PHIL SERNA

DATE OF PROJECT

CONSULTANT LOGO

APPROVAL RECOMMENDED: _____ RCE xxxxx DATE _____
xxxxxx, NAME OF CONSULTANT/ENGINEER

APPROVAL RECOMMENDED: _____ RCE 61943 DATE _____
PATRICK SCHROEDER, PRINCIPAL ENGINEER

APPROVAL RECOMMENDED: _____ RCE 53170 DATE _____
ROSEMARY CLARK, SASD DIRECTOR OF OPERATIONS

APPROVED: _____ RCE 51861 DATE _____
PRABHAKAR SOMAVARAPU, DISTRICT ENGINEER

ENCROACHMENT APPROVAL

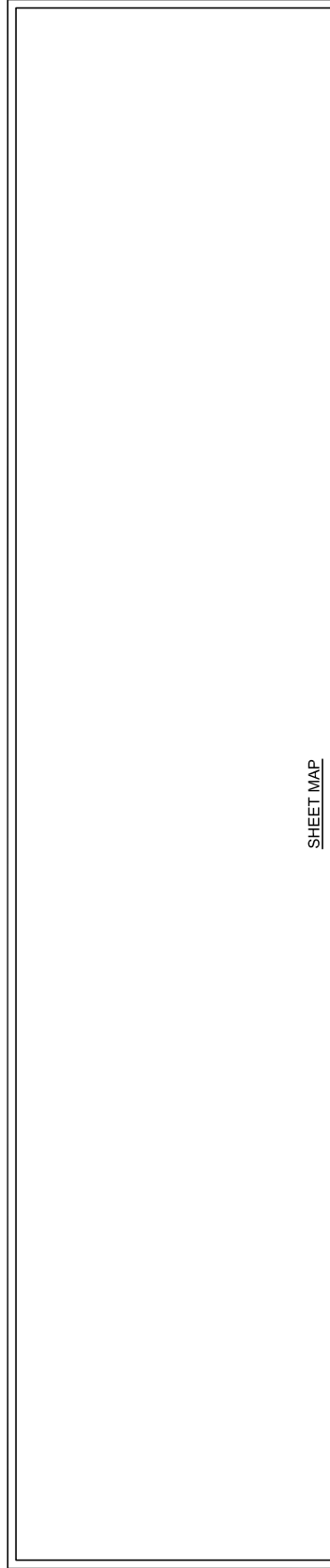
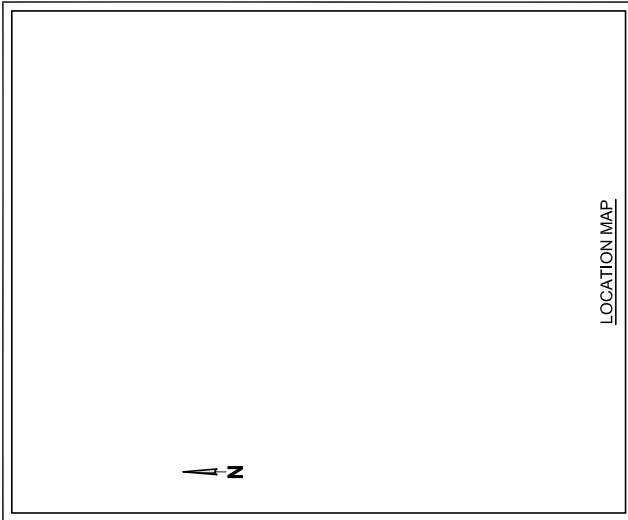
APPROVED: _____
REZA MOGHISSI
 TRANSPORTATION DIVISION CHIEF,
 COUNTY OF SACRAMENTO, RCE 52805

CONTRACT NO. XXXX

Standard Cover Sheet

INDEX OF SHEETS

DRAWING NO.	SHEET NO.	TITLE
1	G1	GENERAL COVER SHEET
2	G2	
3	C1	CIVIL



<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV.</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	REV.	DESCRIPTION	BY	DATE																	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;"> SURVEY B.M.: _____ ELEV.: _____ DESC. _____ PLANS DATE: _____ DATE: _____ </td> </tr> </table>		SURVEY B.M.: _____ ELEV.: _____ DESC. _____ PLANS DATE: _____ DATE: _____	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;"> CONSULTANT LOGO SUBMITTED: _____ DATE: _____ APPROVED: _____ DATE: _____ </td> </tr> </table>		CONSULTANT LOGO SUBMITTED: _____ DATE: _____ APPROVED: _____ DATE: _____	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"> PROJECT NAME SHEET TITLE 1 SHEET TITLE 2 SHEET TITLE 3 </td> <td style="text-align: center;"> CONTRACT NO. _____ FILE NAME _____ DRAWN BY _____ DESIGNED BY _____ CHECKED BY _____ SHEET DATE AUGUST 1, 2018 </td> </tr> </table>	PROJECT NAME SHEET TITLE 1 SHEET TITLE 2 SHEET TITLE 3	CONTRACT NO. _____ FILE NAME _____ DRAWN BY _____ DESIGNED BY _____ CHECKED BY _____ SHEET DATE AUGUST 1, 2018	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"> SCALE HOR: N/A VER: N/A DIST: 1" = 100' 02/3 OF 100 SHEETS </td> </tr> </table>	SCALE HOR: N/A VER: N/A DIST: 1" = 100' 02/3 OF 100 SHEETS
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SCALE HOR: N/A VER: N/A DIST: 1" = 100' 02/3 OF 100 SHEETS																															

Standard Location and Sheet Layout Page

										CONTRACT NO. _____ FILE NAME _____ DRAWN _____ DESIGNED _____ CHECKED _____ SHEET DATE AUGUST 1, 2018	SCALE HOR: N/A VER: N/A TOTAL OF 10 SHEETS 65 / 30

PROJECT NAME SHEET TITLE 1 SHEET TITLE 2 SHEET TITLE 3		CONSULTANT LOGO SACRAMENTO AREA SEWER DISTRICT		SURVEY B.M.: _____ ELEV.: _____ DESC. _____ PLANS: _____ DATE: _____	
				SUBMITTED: _____ DATE: _____ APPROVED: _____ DATE: _____	



REV.	DESCRIPTION	BY	DATE

Standard Title Block and Border