

**U.S. Army Corp of Engineers, South Atlantic Division
Jacksonville District**

South Florida Water Management District

December 7, 2003

**Engineering and Design
JOINT A/E/C DRAFTING MANUAL, 4th Edition**

Summary of Changes

1. 1st Edition, August 30, 2003 none, original edition
2. 2nd Edition, October 7, 2003 added file name conventions as para. 21, renamed para. 21 to para. 22, removed requirement for marking correct graphics from para. 7.a., revised para. 17, revised para. 1.c., revised para. 1.d., revised para. 2., revised para.4., revised para. 7.b., revised para. 12., document title changed to "JOINT A/E/C DRAFTING MANUAL, 2nd Edition"
3. 3rd Edition, November 7, 2003; Added appendix A; Adoption Notice of included documents, para. 18-23 renumbered, revised para. 18., revised para. 17, revised para. 23, revised para. 20, revised para. 14, revised para. 6.i.
4. 4th Edition, December 7, 2003; Revised para. 6, revised para. 8, added para. 6.k.

1. Purpose

- a. This drafting standard is prepared and issued for use by the Jacksonville District, South Florida Water Management District, contractors and all agencies in preparing engineering drawings.
- b. The scope of this manual includes all contract plans prepared for civil projects. Except those projects that have specific technical manuals, regulations, and other guidance provided for under separate publications for federal agencies.
- c. This manual is founded on the Tri-Service A/E/C CADD Standard; ERDC/ITL TR-01-6, Tri-Service Architects-Engineers Deliverable Standards; TR-95-1, and the Tri-Service CADD Details Report; TR-93-1 as specified in this document for the preparation of all construction contract plans completed or administered by the Jacksonville District and South Florida Water Management District.
- d. This manual and the Jacksonville District/CERP design manual shall have precedence over the Tri-Service A/E/C CADD Standard. Subject matter included in this manual shall be implemented according to the guidance contained within this manual. Subjects not included in this manual or the CERP Design manual shall be

implemented according to the guidance found in the Tri-Service A/E/C CADD Standard and the documents included by reference in Appendix A.

2. Applicability

This manual establishes policy, guidance, and responsibility for the preparation of drawings made by or prepared under the supervision of the Jacksonville District. It is applicable to the District Office and all agencies under contract with the Jacksonville District. This document is required adherence for all organizations (Federal or State) or those under contract to said organizations when preparing electronic designs or the Comprehensive Everglades Restoration Plan (CERP) project.

3. Application of Standards

There are various forms of A/E/C CADD Standard application software available to the user. These products with some configuration, allow the user to use a menu system to utilize the CADD Standard-compliant drawing creation and drafting.

4. Policy

All personnel associated with the preparation of drawings should become familiar with this manual and the Tri-Service A/E/C CADD Standard, ERDC/ITL TR-01-6. Everyone shall fully utilize this manual and the A/E/C CADD Standard as specified in this manual to prepare drawings so that understanding and conformity by others will require little effort. These standardized procedures will enable full utilization of combined efforts to achieve common goals. If the work requires information not contained in this manual or the Tri-Service A/E/C CADD Standard, ERDC/ITL TR-01-6, consult with your supervisor or Project Engineer for guidance.

5. Preparation of Contract Plans

a. Contract plans shall be prepared on a Computer Aided Design and Drafting (CADD) system whenever feasible. The Jacksonville District Office and all agencies under contract with the Jacksonville District shall prepare contract plans using the Bentley Microstation software, Version 8.1 or later. South Florida Water Management District and all agencies under contract with the South Florida Water Management District shall prepare contract plans using Auto Desk AutoCAD software, Release 2000i or later.

b. The number of Drawings should be kept to a minimum. To achieve maximum economy when preparing contract drawings, omit all unnecessary details and avoid

repetitive presentation. Include only those details that are necessary to ensure full understanding of the contract requirements.

c. Avoid excessive sectioning and the repetition of views, dimensions, and notes. From both a contractual point of view and that of economy in the drafting process, it is better to show a requirement only once.

6. Standard Practices

a. The site plan shall show all work/construction limits applicable to the project. Right-of-way and work limits and access to those limits shall be clearly delineated on the drawings. Indicate other topographic detail that may be affected by or may restrict the construction.

b. General and detail plans of canals, channels, locks, dams, and similar structures will be oriented with the direction of water flow from top to bottom of the sheet, if practicable, or from left to right. Longitudinal sections of locks, spillways, and similar structures will be oriented with the flow of water from left to right. Cross sections shall be shown as if the observer were looking downstream. Riverbanks are always determined as being right bank or left bank by facing in direction of the water flow.

c. General maps and site plans shall be oriented with north toward the top of the sheet. Vicinity maps shall be orientated in the same manner as the main map or the principal plan on the drawing.

d. For existing projects, general plans, elevations, and longitudinal sections of channels, locks, dams, and similar hydraulic control structures shall be orientated to match existing project drawings.

e. Drawings shall be prepared so that all elements on the drawing are created to appear at the correct size when printed on a full size sheet.

f. The use of unusual scales should be avoided. The scale, or scales, to which drawings are prepared, shall be indicated on the drawing. The scale of each view, detail, or section drawn shall be indicated by a reference to a graphic scale located on the drawing. The graphic scale reference shall be entered directly below the title of the detail, view, or section using the format "SCALE: *scale ID letter*" under the title. In the case of diagrams, pictorials, and other drawings not prepared to any scale the word "N.T.S." shall be entered after "SCALE" under the detail, view or section title, for example: "SCALE: N.T.S."

g. When plans of large buildings or structures must be placed on two or more sheets to maintain proper scale, the total plan shall be placed on one sheet at a smaller scale. Appropriate key plans and match lines shall appear on segmented drawings. Key plans shall be used to relate large-scale plans to total floor plans and

individual buildings and complexes of buildings. Key plans shall be placed in a convenient location and shall indicate represented plan area by crosshatching.

h. Do not overemphasize the use of cross-hatching or patterns. Indicate only enough to clearly designate the material. Hatching and pattern indications for walls and other continuous features should be shown clearly at the beginning and end. Intermittent indications may be required over long distances. Consider using cross-hatching/patterning only at the outline edges of the feature.

i. When record as-built drawings from previous contracts are deemed necessary for information purposes only, the words "FOR REFERENCE ONLY" shall be printed in bold letters immediately above the title block or as near thereto as practical. The original title blocks shall not be changed. All reference only drawings shall be identified as such and listed in the Index of Drawings as "REFERENCE ONLY-name of record as-built drawing." Additionally, the index drawing shall have the following note included "THREE-QUARTER SIZED DRAWINGS SHOWN ARE CONTRACT DRAWINGS FROM PREVIOUS PROJECTS AND MAY NOT REPRESENT CURRENT CONDITIONS. THESE DRAWINGS ARE INCLUDED FOR REFERENCE ONLY. THESE REFERENCE DRAWINGS ARE NOT TO SCALE AND SHALL NOT BE USED TO DETERMINE LINEAR OR ANGULAR MEASUREMENTS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING REFERENCE DRAWING INFORMATION USED DURING THE PERFORMANCE OF THIS CONTRACT. ALL KEY NOTES, GENERAL NOTES, AND NEW DETAILS SHOWN BESIDE OR BELOW THE REFERENCE DRAWINGS APPLY TO THIS CONTRACT."

j. When record as-built drawings from previous contracts are deemed necessary for information only purposes, but have been destroyed or are missing. A developed current condition drawing may be prepared as a substitute. Any drawing created as a developed current condition drawing will be marked with the statement "DEVELOPED CURRENT CONDITION FOR INFORMATION ONLY, CONDITIONS, ARRANGEMENTS, AND APPLICATION HAVE NOT BEEN VERIFIED."

k. The drawing index sheet shall include the following standard note; "ALL GRAPHIC SCALES SHOWN ON DRAWINGS IN THIS SET ARE ONLY APPLICABLE WHEN DRAWINGS ARE PLOTTED TO FULL-SIZE SCALE."

7. Redline Procedures

a. The engineer or drawing checker shall mark-up check prints using the following scheme of notations:

Red – indicates correction, revision, or addition is required

Green – indicates information to the technician or draftsman

Purple – indicates deletion

b. The designer or draftsman shall mark-up redline prints with a yellow high liter as each correction, revision, or addition is accomplished. Once all corrections, revisions, or additions are completed the redline print and a current check print of the drawing will be returned to the engineer or drawing checker.

8. Plan Set Revisions

a. Drawing revisions during the contract advertisement period are amendments. Revisions after award of a construction contract are modifications.

b. All revisions shall be flagged by a revision symbol. The revision symbol should be positioned adjacent to the change or revision. Revision symbols shall be uppercase letters in alphabetical sequence. The letters "I", "O", "Q", and "X" shall not be used. When revisions are numerous enough to exhaust the alphabet, the revision following "Z" shall be "AA", followed by "AB" and so on. The drawing index sheet shall be updated to include a revision symbol at the index listing for that drawing. When numerous changes are made to one area on the sheet and the revision symbols crowd the drawing, use a single revision symbol at the subtitle or title of the view.

c. How many times or locations the revision symbol is used on the drawing shall be indicated in the Number column of the Revision Block.

d. Location of the revision symbol on the drawing shall be shown in the Zone column of the Revision Block.

e. A short description shall be placed in the Revision Block. When a drawing is to be changed by amendment and the change is to be furnished to bidders descriptively, the wording in the Revision Block Description column shall be "TO CONFORM" to the amendment. When amendment changes are to be furnished to bidders through issuing a revised drawing and the amendment documents together. The wording in the Revision Block Description column shall be "TO ACCOMPANY" the amendment.

f. Examples of amendment and modification revisions:

1. Modification; "THIS DRAWING ADDED MODIFICATION SUFFIX "A""
2. Amendment; "REVISED TO CONFORM TO AMENDMENT NO 0002"
3. Amendment; "REVISED TO ACCOMPANY AMENDMENT NO 0005"

g. Filenames of modified or amended drawings will remain unchanged.

h. When a drawing is to be replaced because of a change, the revision letter next in sequence shall be entered in the Revision Block. The description of the change

shall be entered in the description column or reference made to a change authorization document describing the change. The following note shall be added to the drawing immediately above the Title Block "THIS DRAWING REPLACES PREVIOUS DRAWING CONTAINING REVISIONS "?" THROUGH "?"". The replaced drawing shall have the word "SUPERSEDED" added to the old original beside the title block. The drawing file that has been replaced shall have 'superseded' added at the end of the file name.

i. When drawings are added to or deleted from an existing advertised/awarded contract project, a revision symbol shall be placed on the index of drawings sheet adjacent to the added drawing. For deleted drawings, a line should be drawn through the index listing for that drawing with the word "deleted" inserted at the end of the title. The revisions block of the index sheet should also be flagged and the addition/deletion noted.

9. Contract Plans Arraignment

Contract plan discipline designator drawing index sequence required by the National CAD Standard and A/E/C CADD Standard to be used for construction drawings:

	Design Discipline	Drawing Designator
1.	General	G
2.	Hazardous materials	H
3.	Survey and mapping	V
4.	Geotechnical	B
5.	Civil	C
6.	Landscape	L
7.	Structural	S
8.	Architectural	A
9.	Interiors	I
10.	Equipment	Q
11.	Fire Protection	F
12.	Plumbing	P
13.	Mechanical	M
14.	Electrical	E
15.	Telecommunications	T
16.	Repair and Rehabilitation	R

10. Drawing Identification Numbers

a. Each drawing, except for the cover page, contained in the contract plans set shall have a drawing identification number assigned to it. The drawing identification

number will consist of a maximum of 5 characters. These characters, without the space, shall be used as the last 4 characters of the drawing file name.

b. Drawing identification numbers shall consist of the Discipline Drawing Designator as the first character, followed by a space. Next character is reserved for the Discipline/Project Subdivision number, when needed. Last 2 characters are used for the Drawing Discipline Sequence Number and is mandatory.

c. The Discipline Drawing Designator is used to divide contract plans into design disciplines. Some examples are:

V	Survey
C	Civil

d. The Discipline/Project Subdivision number is used to divide a discipline into sub-disciplines or to divide the Drawing Identification numbers into multiple reaches, structures, cuts, etc. Use of the Discipline/Project Subheading number is limited to projects requiring subdivision of a design discipline or containing multiple sites or facilities. Some examples are:

Subdivision of a design discipline;

S 101	Structures-Concrete
S 201	Structures-Reinforcement

Subdivision of a project;

C 101	Civil-Site Plan STA #1
C 201	Civil-Site Plan STA #2
E 101	Electrical-Power Plan PS #1
E 201	Electrical-Power Plan PS #2

e. The Drawing Discipline Sequence Number shows the sequence of each drawing within in the design discipline or discipline subdivision. Numbers 1 through 9 shall be preceded by a zero. Some examples are:

C 01	Topographic Plan
C 02	Site Plan
C 03	Alignment Plan
Q 101	Slide Gate Plan
Q 102	Slide Gate Details
Q 201	Trash Rack Plan and Elevation
Q 202	Trash Rack Sections

11. Drawing Notes

a. Notes shall be concise statements using the simplest words and phrases for conveying the intended meaning.

b. Reference documents shall be cited using “per”, “conforming to”, “as specified”, and “in accordance with.” The word “shall” establishes a mandatory requirement.

The word “will” establishes a declaration of purpose on the part of the design agency. The words “should” or “may” are used when it is necessary to express nonmandatory provisions.

- c. Indefinite terms such as “and/or”, “etc.”, “e.g.”, and “i.e.” shall not be used.

12. MicroStation Design File Units

- a. Microstation Units are:
 - Microstation “J”
A/E/C MU:ft, SU:in,
Civil, survey, mapping MU:ft, SU:Th,

 - Microstation V8
A/E/C Ft, In
Civil, survey, mapping Ft, Th: custom units 1000.0000 Th = 1.000000 Feet
- b. Working unit settings using AutoCAD software from Auto Desk.
 - A/E/C Architectural
Civil, Survey, Mapping Engineering

13. Model Files and Sheet Files

- a. Definitions:
 - Model file; design file containing graphics representing the physical world, relating to a particular design discipline category. Model files are drawn at real world scale and typically represent an existing or proposed object or surface as seen in plan view, elevation, section, etc. Model files do not contain any plot scale dependent information such as text, dimensions, or graphic symbols based upon text size. A model does not contain any reference files, each model file is an independent group of graphic only information. For example; an HVAC plan containing only ducting, HVAC controls, and equipment symbols is a model file within in the Mechanical design discipline group. A border file is a special type of model file with it’s own set of rules representing the physical piece of paper.

Sheet file; design file presenting the entirety or portion of one or more model files and all drawing specific information needed to prepare a complete contract drawing. Sheet files are prepared at a specific plot scale. A sheet file will only contain the graphic elements needed to prepare a contract drawing. These graphic elements are usually limited to plot scale dependent items such as; text, dimensions, or graphic symbols based upon text size, drawing specific title block information, revision information, and graphic scales, etc. A sheet file does not contain any graphics representing the physical world.

b. Each contract drawing shall consist of an active sheet file, a referenced border file, and one or more referenced model files. Model files are prepared using the appropriate design discipline seed (Microstation) or template (AutoCAD) file. Contents of the design discipline model files are listed in the Jacksonville District Child Standard of appendix A of the Tri-Service A/E/C CADD Standard; ERDC/ITL TR-01-6.

14. Line Work Convention

Line work is the essential core of the presentation graphics used to prepare contract drawings. Line work used to prepare contract drawings by the Jacksonville District Office, South Florida Water Management District, and all agencies under contract to them shall conform to the Tri-Service A/E/C CADD Standard; ERDC/ITL TR-01-6; chapter 3. Line types specified by the Tri-Service A/E/C CADD Standard; ERDC/ITL TR-01-6 are included in the tsaec.rsc file for Microstation users and tsaec.lin for AutoCAD users. All line work elements in the drawing are created on the specified level using a line weight along with the line style, and color specified in the Jacksonville District Child Standard of appendix A of the Tri-Service A/E/C CADD Standard; ERDC/ITL TR-01-6.

a. FINE - 0.18mm, Microstation line weight 0

Hatching, cross hatching, and patterns.

Microstation colors: 1, 9, 10, and 40

AutoCAD colors: 5, 8

b. THIN - 0.25mm, Microstation line weight 1

Dimension lines, leader lines, key note leaders, line terminators, phantom lines, hidden lines, center lines, long break lines, grid lines, match lines, existing object line, and extension line. Minor division lines in tables and schedules. Dimension text, keynote text, general text, and schedule text with text size .080 (Leroy 80), .100 (Leroy 100).

Microstation colors: 2, 3, 12, 15, 21, 25, 26, 29, 30, and 72

AutoCAD colors: 3, 1

c. MEDIUM - 0.35mm, Microstation line weight 2

Minor proposed object lines, major division lines, heading divisions in tables and schedules. Dimension text, keynote text, general text, schedule text, and minor headings with text size of .120 (Leroy 120), .125 (1/8"), and .140 inch (140 Leroy).

Microstation colors: 4, 5, 18, 22, 23, 27, and 33

AutoCAD colors: 2, 6, 162, 22, and 82, 122

d. WIDE – 0.50mm, Microstation line weight 3

major proposed object lines, cut lines, section cutting plane lines, outer borders of tables, and schedules. Subtitle underlining and subtitles with text size of .175 (Leroy 175) and .188 (3/16").

Microstation colors: 6, 7, 16, 31, 41, 42, 45, and 46
 AutoCAD colors: 4, 203, 83, 163

e. EXTRA WIDE – 0.70mm, Microstation line weight 5
 Title underlining, schedule borders, headings, special object lines, elevation grade lines, building footprint outline, and work/construction limits. Text sizes of .200 (Leroy 200), .240 (Leroy 240), and .250 (1/4”).
 Microstation Colors: 0, 34, 37, and 38
 AutoCAD colors: 7

f. THICK – 0.90mm, Microstation line weight 6
 Microstation colors: 30
 AutoCAD Colors: 30

g. Option 1 – 1.00mm, Microstation line weight 7
 Major title underlining and separating areas of the drawing.

h. Option 2 – 1.40mm, Microstation line weight 10
 Border sheet outlines and cover sheet line work.

i. Option 3 – 2.00mm, Microstation line weight 15
 Border sheet outlines and cover sheet line work.

Comparison of Line Widths						
A/E/C CADD Standard			Rapidograph / Rotring Pen #	Leroy		Microstation Line Weight
Line Thickness	Width (mm)	Width (In)		Pen #	Width (mm)	
Fine	0.18	0.007	0000	0000	0.20	0
Thin	0.25	0.010	000	000	0.25	1
Medium	0.35	0.014	0	00	0.33	2
Wide	0.50	0.020	1	1	0.53	3
Extra Wide	0.70	0.028	2.5	2	0.71	5
Option 1	1.00	0.040	3.5	4	1.09	7
Option 2	1.40	0.055	6	5	1.39	10
Option 3	2.00	0.079	7	n/a	n/a	15

¹ The weight of Microstation lines remains constant when plotted, no matter if the design is scaled up or down
² Pens not standard for ink pen plotters

j. Line Types/Styles
 All line types/styles used in the model file or sheet file shall conform to the Tri-Service A/E/C CADD Standard. Refer to Tri-Service A/E/C CADD Standard, Appendix A and B for level assignments of line types/styles.

k. Line Color

The default color table supplied with Microstation shall be used for the creation of all drawings. Refer to the Tri-Service A/E/C CADD Standard, Appendix A and B for color assignments to levels.

- l. Centerlines should extend uniformly and distinctly a short distance beyond the object or feature of the drawing unless a longer extension is required for dimensioning or for some other purpose.
- m. Symmetry lines should extend uniformly and distinctly a short distance beyond the object or feature of the drawing. The line of symmetry is identified by two short parallel lines drawn at right angles near each end of the line of symmetry.
- n. Dimension lines are used to indicate the extent and direction of dimensions and are terminated with arrowheads. Arrowheads should be drawn within the limits of the dimension line if possible. Where inadequate space is available, the arrowheads may be shown outside the dimensional limit.
- o. Extension lines are used to indicate the point or line on the drawing to which the dimension applies.
- p. Leader lines are used to direct notes, dimensions, or symbols on the drawing. A leader is a straight inclined line, not vertical or horizontal, except for a short horizontal portion extending to the center of the height of the first or last letter or digit of the note. Leader lines should not be bent in any way unless unavoidable. Terminate leader lines with: a loop if they end on a dimension line; with a dot 1.5mm minimum plotted diameter, if they end within outlines of an object; with an arrowhead, if they end on the outline of an object.

15. Text Styles/Fonts

- a. Monotext font should be used for schedules any other situation when text fields need to be aligned. AutoCAD users shall use the monotext font. Microstation users shall use Font #3.
- b. Proportional font shall be used for general text, notes, dimensions, titles, subtitles, and labels. AutoCAD users shall use the Romans font with a width factor of 0.8. Microstation users shall use the Working Font.
- c. Slanted font shall be used for waterway feature names and any other text needing to be distinguished from the other text. AutoCAD users shall use the Romans font with the oblique angle set to 21.0 degrees. Microstation users shall use Font #23 with the oblique angle set to 21.0 degrees.
- d. Filled font shall be used for cover sheet project titles and subtitles. AutoCAD users should use Swiss true-type font. Microstation users shall use Font #43.

16. Lettering

a. Lettering on drawings shall be legible and scaled correctly to the full size plotted drawing. Either inclined or vertical lettering shall be used based upon the subject matter. The preferred slope for the inclined letters is 5 in 2 or about 68 deg. Uppercase letters shall be used for all lettering on drawings unless the subject matters requires otherwise.

b. Feature designations

1. Planimetric

Area Names

BENCH MARK DESIGNATIONS

Building Names

Cemeteries

COUNTY NAMES

DIMENSIONS

GRID DESIGNATIONS

HIGHWAY SYMBOL NUMBERS

HIGHWAY, ROAD & TRAIL NAMES

Island Names

PLATEAUS

LEGENDS

LIMITS OF CONSTRUCTION

MATCH LINES

MONUMENTS

NAVIGATION AIDS

NOTES

PROPERTY CORNERS

PROPOSED WORKS

PUBLIC UTILITIES

RAILROAD NAMES

SCALES

STATE NAMES

STREETS

TITLES

TOWN NAMES

TOWNSHIP & RANGES

TRIANGULATION STATIONS

2. Hydrographic and Topographic

Bays

Bridges Causeways

CANALS

Coves

Creeks

CENTERLINE DESIGNATIONS

CHANNEL NAMES

CONTOUR NUMBERS

CUT DESIGNATIONS

Dams

GROUND ELEVATIONS

Inlets

Jetty

LAKES

LEVEES

Marshes

OCEANS

Sounds

STATION & RANGES

STRUCTURE NUMBERS

Swamps

WATER SOUNDINGS

RIVER NAMES

RIVER MILES

PROJECT DEPTHS

Reservoirs

Right-of-way designations

17. Text Conventions

a. Abbreviations

To save space, do not use a period after commonly abbreviated words such as max, min, typ, spa, etc. Use a period only after abbreviations that spell a word, such as no., and abbreviations that are not commonly recognized. The ampersand symbol shall not be used in titles, subtitles, and notes, always use the word “and.”

b. Dimensions

Generally, architectural construction dimensions are shown in feet and inches. Decimals of a foot should be used where dimensions are being set by surveying equipment, such as beam spacing, foundation locations, and structure widths.

c. Commas

Use commas to separate blocks of three digits or any number with four or more digits.

d. General notes:

1. ALL GENERAL NOTES SHALL BE NUMBERED.
2. STANDARD PUNCTUATION AND GRAMMER RULES APPLY .
3. FOR MULTILINE NOTES THE SECOND AND SUCCESSIVE LINES SHALL BE INDENTED TO SHOW THEY BELONG TO THE SAME NOTE.

e. Text and local notes:

LOCAL NOTES SHOULD BE LOCATED AS CLOSE AS POSSIBLE TO THE DETAIL THEY ARE DESCRIBING
LOCAL NOTES SHOULD BE CONNECTED TO THE DETAIL BY A LEADER LINE WITH THE CORRECT TERMINATOR
AVOID EXCESSIVLY LONG LEADER LINES BY REPEATING THE LOCAL NOTE AT EACH LOCATION IT IS NEEDED

f. Dimensions:

4'-5"
234.34'
8"

g. Symbology data fields:

A (inside symbol)
S 3/1 (inside symbol)
2 (inside symbol)
SLOPE (with symbol)

h. headings:

GRAPHIC SCALES (underlined)
NOTES: (underlined)
LEGEND: (underlined)
SYMBOLS: (underlined)

Schedule and table column headings

i. Section and detail sub-titles:

SECTION D-D (underlined)

Schedule and table titles

j. Detail grouping title:

SLIDE GATE (double underlined)

k. Markings

For special item, management, and processes markings, for example:

SUPERSEDED

DUPLICATE ORIGINAL

CRITICAL SAFETY ITEM

AS-BUILT

REFERENCE DRAWING

18. Text Height

Text Feature	A&B ¹		D,E &F ¹	
	Size	Weight	Size	Weight
General notes	.080"/#80	0.25mm	.125"/#125	0.35mm
Text & local notes	.080"/#80	0.25mm	.125"/#125	0.35mm
Dimensions	.080"/#80	0.25mm	.125"/#125	0.35mm
Symbology data fields	.080"/#80	0.25mm	.125"/#125	0.35mm
Headings	.100"/#100	0.25mm	.140"/#140	0.35mm
Sub-titles	.125"/#125	0.35mm	.175"/#175	0.50mm
Titles	.175"/#175	0.50mm	.200"/#200	0.50mm
Status markings	.125"/#125	0.35mm	.175"/#175	0.35mm

¹. Drawing size identification

19. Drawing Note Conventions

a. General notes apply to the entire drawing or associated list. Local notes are notes that are located at the specific area or point of application. Requirements specified by local notes apply only to the areas or points indicated or called out in the note. Key Notes are notes that apply at the specific area or point of application but are too lengthy or complicated to place within the graphic area.

b. General notes shall be numbered consecutively as a single list starting with 1. Filling in voids (open spaces) to accommodate deletions is not required. Note numbers of deleted notes shall not be reused.

- c. Reference to standardization or other technical documents shall be by basic identifier, excluding revision level, except where identification of a specific issue is essential to drawing interpretation.
- d. Notes shall not include contractual requirements, such as statements of costs; time and place of delivery; methods of payment; and requirements for submission, approval, or distribution of data or reports.
- e. General notes, keynotes, and local notes shall use a justification of top-left and a line spacing of 1.8.

20. Border Sheets

- a. Full-sized drawings can be developed as ANSI-E (34"x44") sized drawings or ANSI-D (22"x34") sized drawings. All drawings shall utilize the standard Corps of Engineers Jacksonville District title block. Half-sized drawings of the ANSI-E size sheet are to be printed on ANSI-C size sheet (17"x 22") plotted at 50%. Half-sized drawings of the ANSI-D size sheet are to be printed on ANSI-B size sheet (11"x 17") plotted at 50%.
- b. The standard Corps of Engineers Jacksonville District title block has been populated with placeholders for project and drawing information. Placeholders in the title block file is intended to be edited as appropriate for a specific project and each drawing.
- c. Standard configuration areas of the border have been pre-set and **are not** to be changed.
 - 1. Border line work; level: G-ANNO-TTLB; color varies. The normal status of this level is ON.
 - 2. Corps logo; level: G-ANNO-SYMB; color varies. The normal status of this level is ON.
 - 3. Border/title block text; level: G-ANNO-TEXT-TTLB; color yellow. The normal status of this level is ON.
 - 4. Plot shape; level: G-ANNO-PSHP; color gray (9) and red (2); style (1). The normal status of this level is ON.
 - 5. Neat image frame; level: G-ANNO-FRME; color yellow. The normal status of this level is ON.
- d. The project data editable border place holders **require editing** for each project. Project specific title block text; level: G-ANNO-TEXT-PROJ; color green (2). The normal status of this level is ON.

- e. The drawing data editable border place holders **require editing** for each drawing.
 - 1. Drawing data title block text; level: G-ANNO-TEXT-DRWG; color orange (6). The normal status of this level is ON.
 - 2. Uniform Drawing System (UDS) optional plotting information; G-ANNO-TEXT-UDS; color magenta. This level will not be used by the Corp of Engineers and is provided only as an option to other agencies and contractors. The normal status of this level is OFF.
- f. Border referencing procedure for Microstation users:
 - 1. Copy the standard border file and place it in the project specific directory using file naming standards (i.e. S319_BRDR.dgn).
 - 2. Edit green text in G-ANNO-TEXT-PROJ and save. This text is common on all drawings in the same project (i.e. project name).
 - 3. Then, reference this edited border file to each project drawing file.
 - 4. After the border is referenced, copy text on G-ANNO-TEXT-DRWG, color orange (6) which describes drawing specific information (i.e. dwg no., dwg name, etc). To do this, **copy** these text elements into the active project drawing file and **turn off** G-ANNO-TEXT-DRWG in the referenced border file using the level manager.
- g. Plotting for Microstation users:
 - 1. Microstation users shall use the printer driver file named AEC_FULLRtl.plt to plot in accordance with the A/E/C CADD Standard.
 - 2. Fence the trim line shape and plot fence element using ANSI-E or ANSI-D for full size and ANSI-C or ANSI-B for half size sheets.
 - 3. The shape found around the trim line location of the border drawings is to use for batch plotting processes.
 - 4. Don't change element attributes because they are critical for successful plotting procedures.

21. Symbology Convention

- a. Symbols and conventions serve two purposes. One is to simplify the drawing and improve comprehension. The other is to follow or establish a national standard

which is easily recognized and acceptable. Symbols shall always be shown in the legend on the drawing where it is first used or on a general symbols, notes, and abbreviations drawing.

b. All symbology used to prepare contract drawings shall conform to the Tri-Service A/E/C CADD Standard; ERDC/ITL TR-01-6, Appendix D. Microstation users shall use the A/E/C CADD Standard Symbols .dgn cell libraries. AutoCAD users shall use the A/E/C CADD Standard Symbols .dwg files.

22. File Name Convention

a. File naming convention for sheet files or stand alone design files shall be one to ten character project identification code, followed by the 'under bar' character, followed by a one character discipline code, followed by a two to four character drawing number code. All single digit drawing number codes shall be preceded by a zero character in the file name. Examples are:

1. SHARKSLGH_G01.DGN Index drawing for Shark Slough project.
2. SHARKSLGH_S0101.DGN Structure "A" site plan of Shark Slough project.
3. SHARKSLGH_S0201.DGN Structure "B" site plan of Shark Slough project.
4. SHARKSLGH_E0101.DGN One-line diagram for structure "A".

b. The file naming convention for model files shall be; the letter "r", one to ten character project identification code, followed by a one character discipline code, followed by an 'under bar' character, followed by a four to six character model file identification. Examples are:

1. rL-1001C_CNTR.DGN Levee 1001 plan of levee contours.
2. rS-2000S_STRUC.DGN Structure 2000 precast gate structure.

c. Border file naming conventions are a one to ten character project identification code, followed by the 'under bar' character, followed by "BRDR". Example is:

1. SHARKSLGH_BRDR.DGN Shark slough contract plans border.

d. File naming convention for project cover sheet files shall be one to ten character project identification code, followed by the 'under bar' character, followed by "COVR". Example is:

1. SHARKSLGH_COVR.DGN Shark slough contract plans cover sheet.

23. Microstation Drawing Sheet Element Size

a. Sheet scale 1"=1'

active scale:12

text, dimensions, notes: 0:1.5

title: 0:2.4

subtitle: 0:2.1

section callout (3/8"): 0:4.5, dia.

Pay item mark (3/8"): 0:4.5, square

Section/Elevation bubble (5/8"):7.5,
dia

b. Sheet scale 1"=5'

active scale:60

text, dimensions, notes: 0:7.5

title: 1:3

subtitle: 0:10.5

section callout (3/8"): 1:10.8, dia.

Pay item mark (3/8"): 1:10.8, square

Section/Elevation bubble (5/8"): 5:0,
dia.

c. Sheet scale 1"=10'

active scale:120

text, dimensions, notes: 1.25

title: 2.0

subtitle: 1.75

section callout (3/8"): 3.75, dia.

Pay item mark (3/8"): 3.75, square

Section/Elevation bubble (5/8"): 6.25,
dia.

d. Sheet scale 1"=20'

active scale:240

text, dimensions, notes: 2.5

title: 4.0

subtitle: 3.5

section callout (3/8"): 7.5, dia.

Pay item mark (3/8"): 7.5, square

Section/Elevation bubble (5/8"): 12.5,
dia.

e. Sheet scale 1"=40'

active scale:480

text, dimensions, notes: 5.0

title: 8.0

subtitle: 7.0

section callout (3/8"): 15.0, dia.

Pay item mark (3/8"): 15.0, square

Section/Elevation bubble (5/8"): 25.0,
dia.

f. Sheet scale 1"=50'

active scale:600

text, dimensions, notes: 6.25

title: 10.0

subtitle: 8.75

section callout (3/8"): 18.75, dia.

Pay item mark (3/8"): 18.75, square

Section/Elevation bubble (5/8"):
31.25, dia.

g. Sheet scale 1"=100'

active scale:1200

text, dimensions, notes: 12.5

title: 20.0

subtitle: 17.5

section callout (3/8"): 37.5, dia.

Pay item mark (3/8"): 37.5, square

Section/Elevation bubble (5/8"): 62.5,
dia.

h. Sheet scale 3"=1'- 0"

active scale:4

text, dimensions, notes: 0:0.5
title: 0:0.8
subtitle: 0:0.7
section callout (3/8"): 0:1.5, dia.
Pay item mark (3/8"): 0:1.5, square
Section/Elevation bubble (5/8"):
0:2.5, dia.

i. Sheet scale 1 1/2"=1'- 0"

active scale:8

text, dimensions, notes: 0:1
title: 0:1.6
subtitle: 0:1.4
section callout (3/8"): 0:3, dia.
Pay item mark (3/8"): 0:3, square
Section/Elevation bubble (5/8"): 0:5,
dia.

j. Sheet scale 3/4"=1'- 0"

active scale:16

text, dimensions, notes: 0:2
title: 0:3.2
subtitle: 0:2.8
section callout (3/8"): 0:6, dia.
Pay item mark (3/8"): 0:6, square
Section/Elevation bubble (5/8"): :10,
dia.

k. Sheet scale 1/2"=1'- 0"

active scale:24

text, dimensions, notes: 0:3
title: 0:4.8
subtitle: 0:4.2
section callout (3/8"): 0:9, dia.
Pay item mark (3/8"): 0:9, square
Section/Elevation bubble (5/8"): 1:3,
dia.

l. Sheet scale 3/8"=1'- 0"

active scale:32

text, dimensions, notes: 0:4
title: 0:6.4
subtitle: 0:5.6
section callout (3/8"): 1:0, dia.
Pay item mark (3/8"): 1:0, square
Section/Elevation bubble (5/8"): 1:8,
dia.

m. Sheet scale 1/4"=1'- 0"

active scale:48

text, dimensions, notes: 0:6
title: :9.6
subtitle: 0:8.4
section callout (3/8"): 1:6, dia.
Pay item mark (3/8"): 1:6, square
Section/Elevation bubble (5/8"): 2:6,
dia.

n. Sheet scale 1/8"=1'- 0"

active scale:96

text, dimensions, notes: 1:0
title: 1:7
subtitle: 1:5
section callout (3/8"): 3:0, dia.
Pay item mark (3/8"): 3:0, square
Section/Elevation bubble(5/8"): 5:0,
dia.

APPENDIX A

Adoption Notice of Reference Documents

1. ASME Y14.100
2. ASME Y14.2M
3. ASME Y14.1
4. ACI Detailing Manual, publication SP-66
5. Uniform Drawing System, Modules 1-8 of the National CAD Standard