



# CAD DRAWING STANDARD

CAD/GIS SERVICES

**REVISION: 7/17/18**

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## I) BEGINNING A NEW DRAWING

### *Chugach Electric Prototype Drawing*

An AutoCAD prototype drawing can be provided by CAD/GIS Services and is to be used when beginning a new drawing for all departments and all consulting firms.

The provided Prototype drawing will contain standard Chugach Electric (Chugach) layers, line types, colors, blocks, settings, etc. When work is delivered to Chugach, the CAD drawing file, X-References, images, excel files, blocks and .ctb plot style files shall be included in the drawing package delivered to Chugach (if applicable, X-References shall be bound). The mask portion of any text masking shall be on its own layer, color yellow. **No yellow shall be used in the drawing with the exception of masking.** Model Space scale is 1:1 and the Title Block shall reside on the Layout tab when appropriate.

## II) DRAWING SETUP

The following are the standard defaults, unless otherwise defined within the prototype drawing:

### *A. Layers*

BLOCK	GREEN, CONTINUOUS, ALL BLOCKS
CONDUCTOR	BLUE, CONTINUOUS, 0.35 LINEWEIGHT
DIM	BLUE, DIM. LINES & LEADERS
DWG-GRID	GRAY #9, HIDDEN2, DEFAULT LINEWEIGHT
DWG-GRID TIC MARKS	RED, CONTINUOUS, DEFAULT LINEWEIGHT
GROUND LINE	RED, CONTINUOUS, 0.35 LINEWEIGHT
MASKING	YELLOW, ALL MASKING SEPARATE LAYER FROM TEXT
POLES	RED, CONTINUOUS, 0.35 LINEWEIGHT
POLE NUMBER TEXT	BLACK/WHITE
REV CLOUD PREVIOUS	BLUE, CONTINUOUS, CLOUD
REV CLOUD CURRENT	PURPLE, CONTINUOUS, CLOUD
REV NUMBER PREVIOUS	RED, CONTINUOUS, REV TRIANGLE
REV NUMBER CURRENT	RED, CONTINUOUS, REV TRIANGLE
TBLOCK	BLUE, TITLE BLOCK
TBLOCK TEXT	BLACK/WHITE
TEXT	BLACK/WHITE, NOTES, ALL OTHER TEXT & TEXT WITH LEADER LINES
VIEWPORT	COLOR 201, CONTINUOUS
AC	BLUE, CONTINUOUS, ALL AC CIRCUITS
CT	CYAN, CONTINUOUS, ALL CT CIRCUITS
DC	RED, CONTINUOUS, ALL DC CIRCUITS
PRIMARY	BLACK, 0.015" CONTINUOUS, ALL PRIMARY CIRCUITS & BUS

**B. Line Types**

<b>Name</b>	<b>Description</b>	<b>Color</b>	<b>Line type</b>
CONT	CONTINUOUS	RED	CONTINUOUS
CONT-THK	.015 WIDE CONTINUOUS	WHITE	PLINE
HIDDEN	A,0.1,-0.15	CYAN	HIDDEN
DASH	,0.5,-0.15	CYAN	DASHED
CENTER	A,0.6,-0.1,0.1,-0.1	CYAN	CENTER
PHANTOM	A,0.5,-0.1,0.15,-0.1,0.15,-0.1	MAGENTA	PHANTOM
BLOCK	CONTINUOUS	GREEN	CONTINUOUS
AC	CONTINUOUS	BLUE	CONTINUOUS
CT	CONTINUOUS	CYAN	CONTINUOUS
DC	CONTINUOUS	RED	CONTINUOUS
PRIMARY	.015 WIDE CONTINUOUS	WHITE	CONTINUOUS
PT	.015 WIDE CONTINUOUS	MAGENTA	CONTINUOUS
TEXT	CONTINUOUS	WHITE	CONTINUOUS
DIM	CONTINUOUS	BLUE	CONTINUOUS
TBLOCK	CONTINUOUS	BLUE	CONTINUOUS
REV	.015 WIDE CONTINUOUS	BLUE	CONTINUOUS

**Dimension Variables (DIM VARS)**

DIMASO	ON
DIMASZ	0.140
DIMCLRD	BLUE
DIMCLRE	BLUE
DIMCLRT	WHITE
DIMEXE	0.062
DIMEXO	0.062
DIMSCALE	1 = 1
DIMTEXT	0.1
DIMTXSTY	= SIMPLEX

**Unit of Measurement**

Units of Measure	Type = Decimal, Precision = 0.0000
Decimal Degrees	Type = Decimal Degrees, Precision = 0
Direction for East	East 3 o'clock = 0
Drawing Units	Inches

**Text**

All text	Upper case unless noted otherwise.
Primary headings	Romant, 0.187; White
Subheadings	Simplex, 0.125; White
The word "NOTES:"	Simplex,.125; White
Remainder of text or notes	Simplex, 0.10; White
Masking portion of all text on its own layer	Color Yellow

**Blocks**

1. Create all blocks on layer 0, at a scale of 1 to 1. All blocks shall be inserted on the layer named "BLOCK".
2. A set of blocks will be provided by Chugach.

*\*\*All contractor created blocks shall be furnished to Chugach.*

**Spatial Standards**

Drawings that are showing field facilities shall comply with the "CAD/GIS Spatial Data Standards" as appropriate. The minimum acceptable standard for a CAD drawing is incorporated below in AutoCAD. This coordinate standard can be assigned using the "AK83-4F" code:

**Datum and Coordinate System**

Name: NAD 1983 Alaska State Plane Zone 4 FIPS (Federal Information Processing Standards) 5004 (US Survey Feet)

Select "AK83-4F" from the Coordinate System Ribbon using the Assign button.

Please refer to the Survey Section of the "CAD /GIS Spatial Data Standards" for best practice when utilizing locations that can be surveyed.

**III) ENDING A DRAWING****A. Ending Parameters**

All drawings provided to Chugach shall be ended with the following parameters saved:

1. Purge all un-needed items.
2. Verify all x-refs and images are bound or included in package.
3. Before ending the drawing 'ZOOM EXTENTS'.
4. Text Style set to SIMPLEX.
5. Set plotter configuration to "NONE".
6. Send Plot Style (.ctb file) with package.

## IV) USE OF EXISTING AUTOCAD RECORD DRAWINGS WITHIN PROJECTS

Chugach currently uses AutoCAD Map 3D 2017. Chugach will not be responsible to provide existing AutoCAD drawings in a release newer than AutoCAD Map 3D 2017. Chugach will accept drawings in formats that can be opened and saved in AutoCAD Map 3D 2017.

## V) USE OF EXISTING RASTERIZED RECORD DRAWINGS WITHIN PROJECTS

Existing rasterized record drawings are in CALS Group IV format with a .gp4 file extension. Edits to these drawings are to be made with AutoCAD using AutoCAD Map Raster Design 2012. All standards within this document, which can be used with raster files, shall be applied.

When the edit results in two files, keep both files (one file has the edits in vector format and the second file is the remaining raster portion of the original drawing as a hybrid file). Chugach will decide whether to redraw the remaining raster portion after a project is “as-built”.

## VI) CHANGES TO THE DRAWINGS

See Attachment A for an example of where information from sections VI A-D is to be provided.

### A. Design/Construction/As Built Revisions

1. The bottom left corner of the drawing has a “Revision” area. This revision area is used during DESIGN, CONSTRUCTION, and AS BUILT process only. When changes are made to the drawing during the DESIGN phase, capitalized alpha revisions are entered into the revision area, (see Table 1).

Table 1

NO.	DESIGN/CONSTRUCTION/AS BUILT REVISION	DWN. BY/DATE	REVIEWED MGR/SUPV/DATE	APPROVED DIRECTOR/DATE
A	PRELIMINARY DESIGN - TO ADD 75 MVA XFMR	D&L/3-3-12	RF/3-3-12	JDS/3-3-12
B	FINAL DESIGN	D&L/4-2-12	SW/4-9-12	JDS/4-10-12
C	IN-HOUSE REVIEW	SW/5-1-12	SW/5-4-12	JDS/5-5-12

2. Editing of a markup drawing being passed back and forth between the edit originator and a Chugach CAD/GIS Operator does not constitute a new revision in the revision block. The date above the drawing title block (far right corner) shall be updated each time an edited drawing is plotted and passed from the Chugach CAD/GIS Operator back to the edit originator.

3. When the DESIGN has been approved for bidding/construction, all alpha revisions are removed. Revision 0 ISSUED FOR CONSTRUCTION is placed in the revision area. Any addendums shall be numbered 0-1, 0-2, etc., with the addendum number and a brief description in the comments area. Any change orders shall be continued in consecutive order 0-3, 0-4, etc., with the change order number and a brief description in the comments area. "As built" by various entities shall also follow numerically in sequence, 0-5, 0-6, etc. with a description of the entity and/or extent of the As Built (see Table 2).

Table 2

NO.	DESIGN/CONSTRUCTION/AS BUILT REVISION	DWN. BY/DATE	REVIEWED MGR/SUPV/DATE	APPROVED DIRECTOR/DATE
0	ISSUED FOR CONSTRUCTION	PA/5-12-11	SW/5-15-11	JDS/5-16-11
0-1	ADDENDUM #1	RF/6-1-12	SW/6-3-12	JDS/6-5-12
0-2	CHANGE PER ICOR #444	GC/7-15-12	RF/7/16/12	JDS/7-16-12
0-3	CHANGE PER ICOR #446	GC/8-1-12	RF/8-4-12	JDS/8/10/12
0-4	AS BUILT BY CONSTRUCTION CONTRACTOR	D&L/9-15-12	SW/9-20-12	JDS/9-20-12
0-5	AS BUILT BY ARELAY SHOP≅	TH/10-15-12	RF/10-30-12	JDS/11/1/12
0-6	AS BUILT BY AOPS≅	GH/12-1-12	AL/12-15-12	JDS/12/15/12

4. If there is a handwritten signature or initials in the various columns of the revision block on the marked up original, the drafter shall add them to the electronic file, i.e. the name or initials and the date.
5. **SIGNED AND DATED CERTIFICATION STAMP:** If a signed and dated certification stamp is placed on the drawing, a note that describes the certification shall be added to the notes area within the body of the drawing above the Design Revision area if possible. Examples: A.) Design certified for construction by (first name, middle initial, last name), (license number), (firm worked for), (date on stamp). B.) Design certified for mfg./fabrication by first name, middle initial, last name), (license number), (firm worked for), (date on stamp). C.) "As-built" certified by first name, middle initial, last name), (license number), (firm worked for), (date on stamp). When the construction and as-built phases are complete ONLY the Certification notes from a PE will remain on the drawing and all others will be removed.
6. When the CONSTRUCTION and AS-BUILT phases are complete, **all** revisions are deleted from the bottom left revision area and a summary revision shall be placed in the "Record Revision" area (see table 3, rev. 3).

## B. Record Revisions

1. All record drawing revisions shall be entered under 'Record Revision' in the title block. All new revisions will be entered in numerical sequence starting at the top and working down through all revision lines, (see Table 3).

- The Project Engineer will submit signed "AS-BUILT" drawings for Record Revision. Typically, the Project Description will be used as the revision description, unless otherwise noted by the Project Engineer. The drafter shall type in the date and name or initials as provided by the Project Engineer in the appropriate areas and add a new revision accordingly, to include a work order number and when available the Work Plan Number.

Table 3

NO.	RECORD REVISION	TECH / DWN. BY	WP#	WO# APPROVED	RECORD APPROVED	DATE
1	AS-BUILT - CONTRACTOR	D&L		E1120378	JDS	04/14/10
2	DRAWN TO CAD - CONTRACTOR	D&L			JDS	09/4/10
3	ADD NEW TRANSFORMER	HP/EK/2-11	1001.345EN	E0920050	SW	03/14/11
4	ADD 2-1 TIME DELAY	MT/LP/8-11		E0920050	SW	09/1/11
5	AB-BUILT PER SHAWN WENDLING	GC		E1120376	SW	1/13/13

- Once the revision block is filled, the oldest revision will be dropped and all revisions moved up to make room for the new revision (Table 4).

Table 4

NO.	RECORD REVISION	TECH/ DWN BY	WP#	W.O. APPROVED	RECORD APPROVED	DATE
2	DRAWN TO CAD - CONTRACTOR	D&L			DG	09/8/01
3	INSTALLED NEW TRANSFORMER	HP/EK/2-18-04	1001.345EN	E0412365	SW	03/4/04
4	INSTALLED 2-1 TIME DELAY	MT/LP/6-18-04		E0412365	SW	09/16/04
5	AS-BUILT PER SHAWN WENDLING	GC			JDS	11/1/04
6	SWEC - GROUND GRID RELOCATED	D&L/7-16-10		E0913412	RF	08/10/10
7	AS -BUILT PER RYAN FREY	GC		E1016222	RF	12/14/10

- The Standard As-built Drawing Colors:

RED	CHANGE
GREEN	DELETE
BLUE	ADD



### C. *Clouds (around revised areas on the drawings)*

1. **New drawings:** When the “AS-BUILT” process is complete and the record revision (revision number 1) block is completed, all cloud layers will be turned off in new Chugach drawings.

2. **Existing record drawings:**

*DESIGN:* The previous record revision cloud layer and triangles with record revision number layer shall be turned off on the drawing at the beginning of the DESIGN phase. During the DESIGN phase all revisions shall be clouded on the drawing with a triangle and corresponding capitalized alpha revision on the correct cloud and revision layer.

*ISSUED FOR CONSTRUCTION:* When a drawing moves to “Issued for Construction” (revision 0), all clouds where changes occurred shall remain visible. All capitalized alpha characters within triangles shall be change to a 0 (zero).

*AS-BUILT:* When the construction is complete and the drawing is as-built, the current latest cloud layer will remain on, the previous cloud layer will be turned off and all the revision number triangles will remain on. There will be two cloud layers and two revision number layers to accommodate the layer on layer off process. See II Drawing Setup, Layers for correct naming and color for clouds and revision numbers.

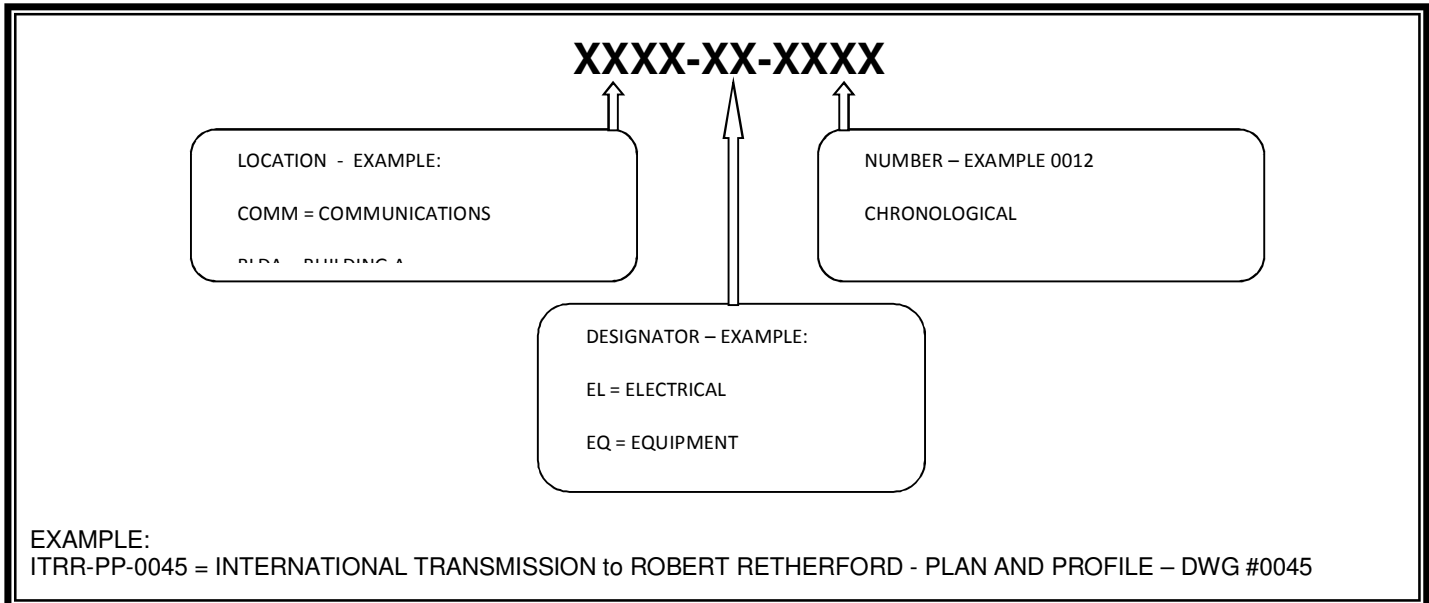
3. When the revision block area of the drawing becomes full, the earliest (top) revision shall be deleted. The triangle and cloud on the drawing which corresponds to that revision shall be removed, (see table 4).

## VII) **SUBMITTING THE FINAL DRAWINGS/PROJECT TO CHUGACH ELECTRIC**

1. Each CAD project shall be submitted in version from AutoCAD Map 3D 2017.
2. Documentation shall be provided listing new layers and blocks created during the project with a brief description of each.
3. An electronic copy shall be provided to Chugach containing the CAD file, all x-references, all images, world files, excel files, blocks and .ctb Plot Styles used and/or created during the project.
4. Projects that use a single electronic CAD file with multiple layout tabs as sheets in the set of drawings shall be limited to those that require match-lines, i.e. transmission line plan and profile sheets. X-referenced drawing shall be used on projects that have separate sheets for various layers within the project; examples would be substations with sheets for the ground grid, foundations, equipment, outlines, conduit, buildings, etc. All X-References shall be bound to the drawing when appropriate and an electronic file containing the X-Reference shall be provided to Chugach.
5. Reference the current version of the U.S. National CAD Standard for Architecture, Engineering, & Construction for any standards not specifically addressed within this document.

## VIII) DRAWING NUMBERING

1. Drawing Numbers shall be issued for **SUBSTATIONS, TRANSMISSION LINES, SUBMARINE CABLES, POWER PLANTS AND HEADQUARTER BUILDINGS** by Chugach CAD/GIS Services Staff via the responsible Chugach Project Engineer using the following format:



2. Chugach's CAD/GIS Services is the **SOLE SOURCE** provider of drawing numbers. There are **NO EXCEPTIONS** to this numbering process. All numbers shall be distributed by Chugach's CAD/GIS Services staff.

## IX) DRAWING NUMBER – PREVIOUS/REFERENCE

The Drawing Number area of the drawing's title block is to be completed for each drawing (see Attachment A). The following choices are available:

1. **New** – Include the word "NEW" and date when the drawing is new.
2. **Previous-Reference - Drawing Number** if the drawing is being re-numbered. Often a manufacture's number, an A/E firm's project numbers, or an old Chugach record drawing number are placed here when the drawing is renumbered per Chugach's standard numbering scheme.

## X) Drawing Title Block Lines 1 to 5

The first three lines of the drawing number in the Title Block are part of the CEA drawing database and must meet the required format. The last two lines describe the contents of the drawing. Chugach CAD/GIS Services Staff can provide the proper information format for the first three lines which are dependent on the type of drawing (Transmission, Substation, Communications, etc.).

DRAWING NAME:		138KV TRANSMISSION LINE GRAVEL JCT - NEW SEWARD HWY JCT PLAN & PROFILE 34.5 KV & 138KV OVERHEAD CIRCUITS
DRAWING NO. - PREVIOUS/REFERENCE		GJSH-PP-0001_0001
DRAWING NO. - PREVIOUS/REFERENCE		GJSH-PP-0001_0001
DRAWING NO.:		GJSH-PP-0001
SHEET 0001 OF 2		PAGE /

## XI) Large Project Schema for Meridian Import via Excel Spreadsheet

1. When an AS-BUILT project will result in the need to mass import a large number of CAD drawings, the editing contractor shall request from the Project Engineer an Excel spreadsheet provided by CAD/GIS Services for importing the drawings into Meridian in mass.

## XII) Transmission Drawings General Guidelines

### TRANSMISSION CAD DRAWING GENERAL GUIDELINE

Revision Date: 7/17/18

1. As-built color standard:
  - RED – Add
  - GREEN – Delete
  - BLUE – Note for information / Do not add to drawing
2. No YELLOW on drawing. Yellow cannot be seen using a color printer.
3. Use current CEA Title Block – Request current Title Block and numbers from CAD/GIS Services via your CEA contact.

4. Current CEA CAD version **AutoCAD Map 3D 2017 (Save all drawings to this version)**.
5. Title Block resides in the LAYOUT not Model Space.
6. Verify the CONFIDENTIAL stamp is on Title Block and text follows the guidelines, taking care of spacing, dash marks, periods, etc. as required by our drawing database Meridian.  
Correct example:



7. ALL TEXT is to be **MTEXT**.  
Any text or text blocks with masking must have the masking portion on its own layer and be color yellow.
8. Use **slash in all dates** (no dash). EXAMPLE 06/29/18
9. Format for adding alphabetical POLE NUMBER code is (MTEXT) and justified correctly:

Example:

**HPPT 44-12** in Model Space  
(AlphaAlphaAlphaAlphaSPACENumberDashNumber)

**STR HPPT 44-2 to HPPT 45-4** on Title Block line

Pole numbers are to be on layer POLE NUMBER layer COLOR White

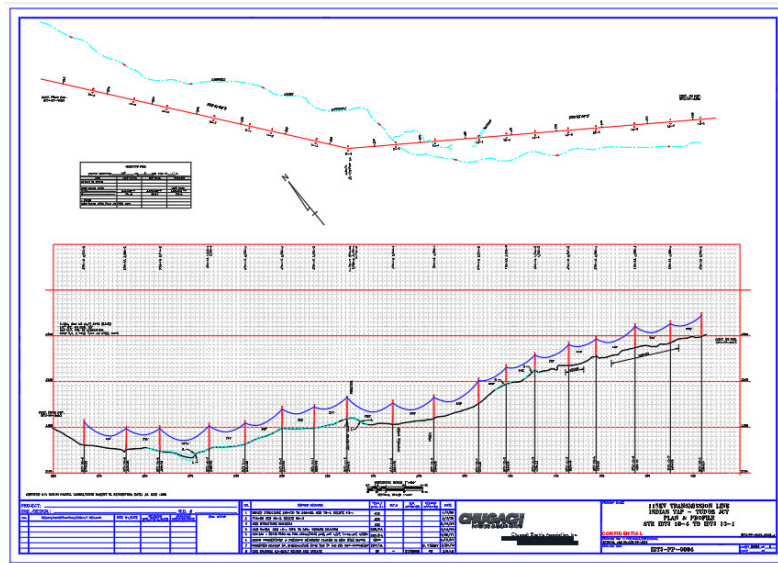


10. Scale Bar and North arrow reside in MODEL SPACE (Insert a scale bar with a reasonable and useable scale length).
11. All elements in MODEL SPACE should be grouped together and 1:1 where applicable.
12. PLAN & PROFILE elements: PLAN is on TOP and the PROFILE is on the BOTTOM.

- If a grid is involved (Example PP drawings) all of the VERTICAL AND HORIZONTAL grid lines should be on the same layer name "GRID" Color Gray9 Linetype HIDDEN2. Use red GRID TIC lines on the outside of the grid and tic marks at the horizontal stations on GRID-TIC layer. One horizontal line to be red at elevation tick mark location. Use GRID-TEXT layer for all grid text. Place structure information justified to the top red line as displayed in the example OR on top of the red line (justified to the red line) as space allows. Put structure code/number and structure station inside the bottom red line at structure station. Add structure number and station to PLAN VIEW (TOP) next to pole symbol (circle). From the centerline of the pole in the GRID, put Station Leader, color white, continuous line to the bottom station line. All text to be MTEXT and justified appropriately.

EXAMPLE:

	GRID					9	HIDDEN2	—	Defa... 0	Color_9
	GRID-TEXT					wh...	Continu...	—	Defa... 0	Color_7
	GRID-TEXT STATIONS					wh...	Continu...	—	Defa... 0	Color_7
	GRID-TIC					red	Continu...	—	Defa... 0	Color_1

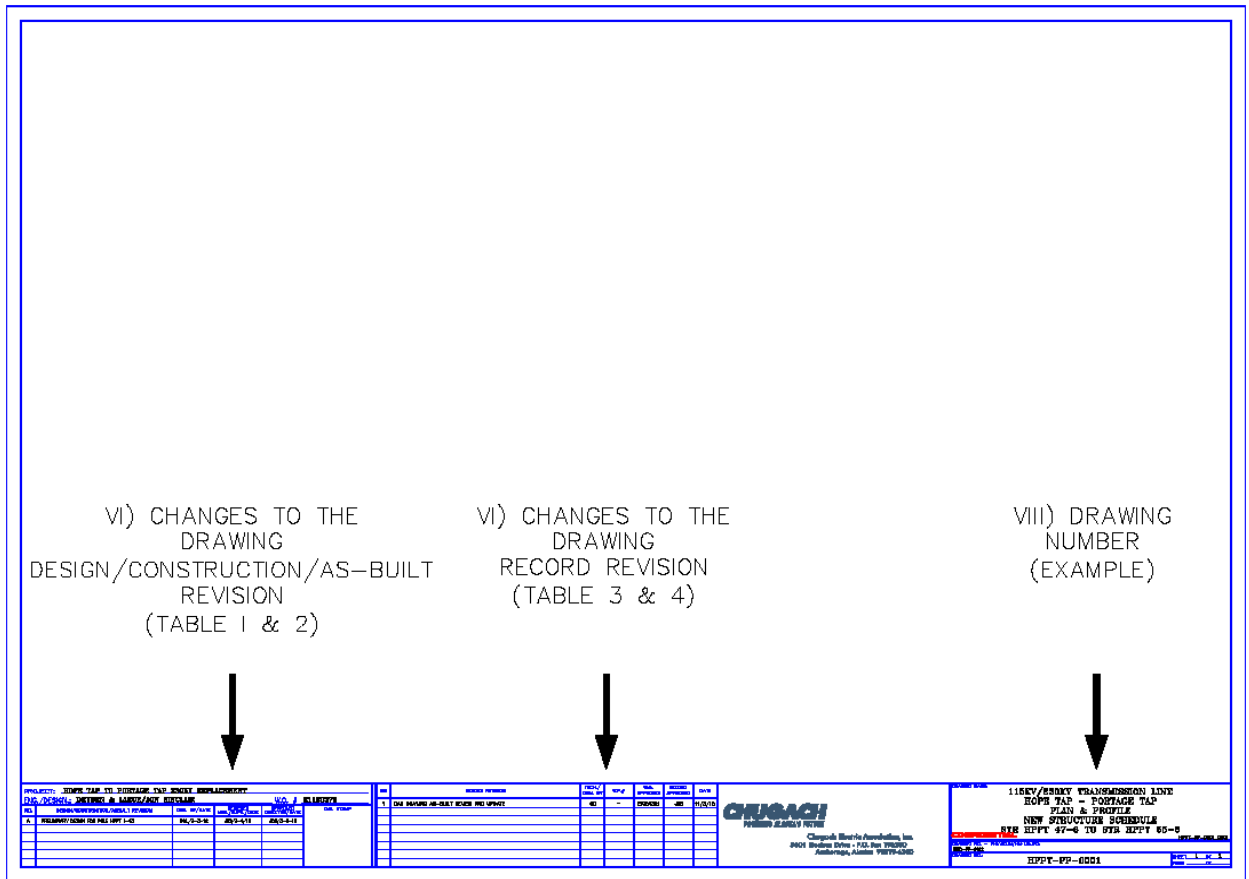


- Verify all viewports and/or text in the LAYOUT will plot at the appropriate font size (the same font size of other elements) on the plotted drawing sheet AND use the same font type for similar items in the layout. The layout should look "balanced".

15. Layer Example:

S...	Name	Fre...	O...	L...	Color	Linetype	Lineweig...	Trans...	Plot Style	Plot
	0				wh...	Continu...	— Defa...	0	Color_7	
	ACCESS				192	CENTER2	— Defa...	0	Color_192	
	ALIGNMENT				red	Continu...	— Defa...	0	Color_1	
	CONDUCTOR 1				blue	Continu...	— 0.35...	0	Color_5	
	CONDUCTOR 2				ma...	Continu...	— 0.35...	0	Color_6	
	CONDUCTOR MARKER BALLS				red	Continu...	— 0.00...	0	Color_1	
	CONDUCTOR SPLICE				red	Continu...	— 0.00...	0	Color_1	
	CONT 1				red	Continu...	— Defa...	0	Color_1	
	CONT 2				red	Continu...	— Defa...	0	Color_1	
	DIM				blue	Continu...	— Defa...	0	Color_5	
	FISH_STREAM				cyan	PHANTO...	— Defa...	0	Color_4	
	GRID				9	HIDDEN2	— Defa...	0	Color_9	
	GRID-TEXT				wh...	Continu...	— Defa...	0	Color_7	
	GRID-TEXT STATIONS				wh...	Continu...	— Defa...	0	Color_7	
	GRID-TIC				red	Continu...	— Defa...	0	Color_1	
	GROUND LINE PROFILE				wh...	Continu...	— 0.30...	0	Color_7	
	IMPASS				96	Continu...	— Defa...	0	Color_96	
	NORTH ARROW				wh...	Continu...	— Defa...	0	Color_7	
	POLE LEADER				wh...	Continu...	— 0.30...	0	Color_7	
	POLE NUMBERS				wh...	Continu...	— 0.25...	0	Color_7	
	POLE-STRUCTURE-PROPOSED				red	Continu...	— Defa...	0	Color_1	
	POLE-STRUCTURES				red	Continu...	— 0.50...	0	Color_1	
	ROAD				wh...	CENTER2	— Defa...	0	Color_7	
	ROW				ma...	HIDDEN2	— Defa...	0	Color_6	
	SCALE BAR				wh...	Continu...	— Defa...	0	Color_7	
	SECTION LINE				wh...	Continu...	— Defa...	0	Color_3	
	TB TEXT				wh...	Continu...	— Defa...	0	Color_7	
	TBLOCK				blue	Continu...	— Defa...	0	Color_5	
	TEXT				wh...	Continu...	— Defa...	0	Color_7	
	TEXT BACKSPAN				wh...	Continu...	— Defa...	0	Color_7	
	TEXT PI NUMBER				wh...	Continu...	— Defa...	0	Color_7	
	TEXT-DWG				wh...	Continu...	— Defa...	0	Color_7	
	TOWNSHIP LINE				blue	Continu...	— Defa...	0	Color_5	
	TRAILS				gr...	DASHD...	— Defa...	0	Color_3	
	VIEWPORT				201	Continu...	— Defa...	0	Color_201	
	WETLAND				140	Continu...	— Defa...	0	Color_140	
	WOLOGO				159	Continu...	— Defa...	0	Color_159	

# Attachment A



Chugach Electric  
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# CAD / GIS Spatial Data Standards

Last Revision Date: May 21, 2014

**Vision:** *Establish collection standards that affirm GIS as the visualization tool to integrate corporate information assets and facilitate data visualization and analysis.*

Chugach Electric Association, Inc.  
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P.O. Box 196300  
Anchorage, AK 99519-6300



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# CAD /GIS - Spatial Data Standards

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# CAD /GIS - Spatial Data Standards

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## 1. Introduction

The following document describes the spatial data standards of Chugach Electric Associations, Inc. (Chugach). The intent is to describe the:

- Coordinate System and Map Projection standard for delivered electronic data,
- Format of GPS and electronic survey data delivered in AutoCAD,
- Format of delivered electronic GIS data, project files, maps, and metadata.

This document is a reference guide for Chugach and Contractor employees working on behalf of Chugach; it specifies the standards for CAD/GIS spatial data deliverables. Any deviation from these specifications set forth in this document **MUST BE APPROVED PRIOR TO DATA COLLECTION**. This requirement ensures that the data collected will be viable when it enters Chugach's GIS records. When you request a deviation it enables us to evaluate and update this standards document as necessary. This document is intended to be a "living document" which will be updated as technology changes or as the standards adopted by Chugach change. In either case, we welcome your comments and specific feedback upon the Spatial Data Standards that follow.

# CAD /GIS - Spatial Data Standards

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## 2. Coordinate System, Datum & Map Projection

The standard coordinate system, datum and map projection currently used in Chugach's GIS is Alaska State Plane Zone 4 NAD 83 (2002) also known as the (CORS96) realization.

NOTE: The term 'realization' is the National Geodetic Service's official name for revisions to the NAD83 system; however, 'epoch' is more commonly used in its place throughout the industry with the occasional use of 'revision' and 'datum tag'. Chugach has elected to use the term 'epoch' when referring to NGS realizations.

### a. Map Projection

The map projection that best serves Chugach facilities is Transverse Mercator. The specified coordinate system, datum and map projection is used by all of Chugach's GIS-based Transmission and Distribution Design and Mapping products.

Maps may be delivered to Chugach in other projections, with advance approval by the CAD/GIS manager.

### b. Datum, Coordinate System & Projection Information

Name: NAD 1983 Alaska State Plane Zone 4 FIPS (Federal Information Processing Standards) 5004 (US Survey Feet)

Projection: Transverse\_Mercator

#### i. **Map Projection Parameters**

Projection: Transverse\_Mercator

False\_Easting: 1640416.666667

False\_Northing: 0.000000

Central\_Meridian: -150.000000

Scale\_Factor: 0.999900

Latitude\_Of\_Origin: 54.000000

Linear Unit: Foot\_US (0.304800609601219)

#### ii. **Geographic Coordinate System**

Name: GCS\_North\_American\_1983

Angular Unit: Degree (0.017453292519943295)

Prime Meridian: Greenwich (0.000000000000000000)

#### iii. **Datum**

Name: D\_North\_American\_1983

Spheroid: GRS\_1980

Semimajor Axis: 6378137.000000000000000000

Semiminor Axis: 6356752.314140356100000000

Inverse Flattening: 298.257222101000020000

### c. NAD 27 to NAD 83 Conversion

The State Plane grid coordinates is a mathematical conversion that translates latitude and longitude into a Cartesian (or map) Northing (Y) and Easting (X) coordinate system, and this transformation must maintain the same datum tag (NAD83, NAD27, etc...) as the origin latitude and longitude coordinates. Following the conversion into State Plane (NAD27) a Lat-Long (NAD27) can be converted into State Plane (NAD83), using the NADCON conversion for Alaska.

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Chugach's original ArcINFO coverages were stored in Alaska State Plane Zone 4 NAD27. These coverages were converted in June 2003 to Alaska State Plane Zone 4 FIPS 5004 (US Survey Feet), NAD83 (CORS96) (2002) using ESRI's ArcToolbox, and the **NAD\_1927\_to\_NAD\_1983\_Alaska** algorithm, to avoid the 400ft errors that the standard NAD\_1927\_to\_NAD\_1983\_NADCON creates. Chugach stores our Spatial Database in an Oracle GeoDatabase. The Municipality of Anchorage's GIS data is also stored in the Alaska State Plane Zone 4 (it is Chugach's understanding that the Datum is NAD83 (CORS96) (2002).

**NOTE: Some State and Federal data may still be stored in the NAD27 Datum. If you utilize NAD27 data it will be necessary to convert your deliverable information into Chugach's standard datum. The NADCON datum conversion algorithm specific for Alaska will be used.**

NADCON is a very common algorithm, which is included in projection software such as ESRI ArcCatalog, Intergraph Projection Manager, Tralaine and others. NADCON works very well for transforming data which spans a large geographic area such as Chugach's distribution and transmission network.

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## GIS Data Deliverable Standards

The following standard is a guide for delivering GIS data to Chugach. These standards are designed to allow Chugach to easily import GIS data into their Oracle/SDE database.

### d. Data Format

GIS Data delivered to Chugach will be submitted in the currently installed version of ArcGIS in a personal or file geodatabase format. The use of feature datasets is encouraged within the personal or file geodatabase. Requests to deliver data in formats other than personal or file geodatabase must be approved by the GIS manager.

### e. Map Production

All GIS map products shall be completed using the currently installed version of ArcMap. Maps must be delivered to Chugach in MXD format. All data used to create maps must be contained within a personal or file geodatabase and delivered to Chugach. MXD's must be able to locate all data and attached files when transferred to Chugach. Maps must contain the following information:

- Chugach Logo
- All GIS map products shall display the copyright (©) symbol as follows: Copyright Chugach Electric Association, Inc. ©
- Chugach Disclaimer –  
“**Chugach** does not warrant the accuracy or completeness of the information contained on this map. The map may not be suitable for user's particular purpose. When accuracy is necessary for any purpose, it is the responsibility of the user to request locates of **Chugach** facilities. This map was produced for Chugach by [insert Engineering/Survey Firm Name].”

### f. Metadata

Complete ESRI metadata in the personal or file geodatabase will be required for each feature dataset or feature class. All fields listed as required in the metadata are to be filled out and detail the data acquisition and transformation processes utilized with the data being submitted to Chugach. In addition to populating, the Description Tab as shown in the sample of FGDC metadata below with the **REQUIRED** sections in bold, (which is important to Chugach long-term; it is vital that the Attributes Tab be populated, as it will allow us to know the meaning of the data represented in a given feature class.

NOTE: If you are editing metadata in ArcCatalog this can be found on the Attribute Tab inside the Entity Attribute Tab. It is imperative that column definitions be input and should include all value defaults and named domains. This information is the most important information for long term maintenance of the collected data being handed over to Chugach.

Identification\_Information:

Citation:

Citation\_Information:

Originator: **REQUIRED: The name of an organization or individual that developed the data set.**

Publication\_Date: **REQUIRED: The date when the data set is published or otherwise made available for release.**

Title:

Geospatial\_Data\_Presentation\_Form: vector digital data

Online\_Linkage:

Description:

Abstract: **REQUIRED: A brief narrative summary of the data set.**

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Purpose: **REQUIRED: A summary of the intentions with which the data set was developed.**

Time\_Period\_of\_Content:  
Time\_Period\_Information:  
Single\_Date/Time:  
Calendar\_Date: **REQUIRED: The year (and optionally month, or month and day) for which the data set corresponds to the ground.**

Currentness\_Reference: **REQUIRED: The basis on which the time period of content information is determined.**

**Status:**  
Progress: **REQUIRED: The state of the data set.**  
Maintenance\_and\_Update\_Frequency: **REQUIRED: The frequency with which changes and additions are made to the data set after the initial data set is completed.**

Spatial\_Domain:  
Bounding\_Coordinates:  
West\_Bounding\_Coordinate: **REQUIRED: Western-most coordinate of the limit of coverage expressed in longitude.**  
East\_Bounding\_Coordinate: **REQUIRED: Eastern-most coordinate of the limit of coverage expressed in longitude.**  
North\_Bounding\_Coordinate: **REQUIRED: Northern-most coordinate of the limit of coverage expressed in latitude.**  
South\_Bounding\_Coordinate: **REQUIRED: Southern-most coordinate of the limit of coverage expressed in latitude.**

Keywords:  
Theme:  
Theme\_Keyword\_Thesaurus: **REQUIRED: Reference to a formally registered thesaurus or a similar authoritative source of theme keywords.**  
Theme\_Keyword: **REQUIRED: Common-use word or phrase used to describe the subject of the data set.**

Access\_Constraints: **REQUIRED: Restrictions and legal prerequisites for accessing the data set.**  
Use\_Constraints: **REQUIRED: Restrictions and legal prerequisites for using the data set after access is granted.**  
Native\_Data\_Set\_Environment: Microsoft Windows 2000 Version 5.0 (Build 2195) Service Pack 3; ESRI ArcCatalog 8.2.0.700

Spatial\_Data\_Organization\_Information:  
Direct\_Spatial\_Reference\_Method: Vector

Distribution\_Information:  
Resource\_Description: Downloadable Data

Metadata\_Reference\_Information:  
Metadata\_Date: 20030425  
Metadata\_Contact:  
Contact\_Information:  
Contact\_Organization\_Primary:  
Contact\_Organization: **REQUIRED: The organization responsible for the metadata information.**  
Contact\_Person: **REQUIRED: The person responsible for the metadata information.**  
Contact\_Address:  
Address\_Type: **REQUIRED: The mailing and/or physical address for the organization or individual.**  
City: **REQUIRED: The city of the address.**  
State\_or\_Province: **REQUIRED: The state or province of the address.**  
Postal\_Code: **REQUIRED: The ZIP or other postal code of the address.**  
Contact\_Voice\_Telephone: **REQUIRED: The telephone number by which individuals can speak to the organization or individual.**

Metadata\_Standard\_Name: FGDC Content Standards for Digital Geospatial Metadata  
Metadata\_Standard\_Version: FGDC-STD-001-1998  
Metadata\_Time\_Convention: local time  
Metadata\_Extensions:  
Online\_Linkage: <http://www.esri.com/metadata/esriprof80.html>  
Profile\_Name: ESRI Metadata Profile

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## 3. Survey (AutoCAD) Deliverable Standards

The following standards are a guide to use when submitting survey data stored in an AutoCAD drawing file.

### a. Format

The AutoCAD format is a (.dwg) file that is no more than two (2) previous platforms release behind the most current version of AutoCAD.

NOTE: A platform release is defined as a change to the .dwg file format and not necessarily the incremental release of updated AutoCAD software.

### b. Block and Data Dictionary

With the submittal of AutoCAD mapping to Chugach, a data dictionary describing the layer naming convention and a copy of blocks used will be required. The data dictionary should list all layers in the drawing and describe what is present on the layer, list all blocks in the file, and include a title or description of the block. If the block is per a certain industry standard (i.e., ANSI, etc.), indicate the standard used. Any inserted blocks or XREF files should be listed in data dictionary.

### c. Projection Information

#### c.1 Horizontal Projection Information

The map projection will be required to be documented for the data set. If a plant (or local) grid is used, tie coordinates to NAD 1983 (2003) (CORS96) epoch Alaska State Plane Zone 4 FIPS 5004 (US Survey Feet) will be required.

#### c.2 Vertical Projection Information

All vertical data shall be based on the most current geoid, unless otherwise specified.

### d. Plant Grid

Chugach also uses a “plant grid” for construction projects. Plant Grid may also be referred to as a construction grid or a local coordinate system. When using the plant grid it will be necessary to establish at a minimum 3 control points at opposite sides of the Plant Grid which have both plant grid coordinates and Alaska State Plane Zone 4 NAD83 (2003) (CORS96) epoch coordinates established. This will allow Chugach to scale and rotate the data used in the plant grid so that it can be incorporated with Chugach’s existing GIS data.

#### d.1 Linear Projects

Linear Projects, such as transmission lines, shall incorporate the requirements noted above in 3.d and shall require an additional control point for every line-mile included in the scope of the project.

### e. Survey Datum

The datum used for survey purposes will be NAD83 (2003) (CORS96) epoch; this level of precision is specified to ensure that the coordinates referenced will be re-creatable when the NGS CORS Multi-Year Solution is implemented, by Chugach.



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## 4. Conventional and GPS (RTK) Survey Standards

The following standards are a guide to use when using GPS survey techniques on Chugach projects. All surveying must meet the minimum requirements set out in the ASPLS; Standards of Practice for Professional Land Surveyors.

### a. Electronic Data Collection

Chugach recognizes that some of the field data may be electronically collected and printed out on supplemental sheets rather than being written by hand in the field book. If used, these supplemental sheets must be initialed by the Party Chief or GPS Operator, referenced in the field book, kept with the field book, and are considered part of the field book.

### b. Minimum Standards and Limitation of Use for GPS Technology

We require the use of Bureau of Land Management standards as set forth in their publication: Standards for the Positional Accuracy of Cadastral Surveys When Using Global Navigation Satellites Systems (GNSS), February 23, 2009. See Attachment 1.

### c. GPS Deliverables

The following are required:

- Station Observation Logs (and Field Notes for conventional surveying)
- Digital Raw GPS Data (for Trimble that would be a .dat file)
- Copies of all processing reports produced by GPS processing software (like Trimble Geomatics Office and OPUS)
- Survey Report containing the following:
  - Equipment used
  - Methodology used
  - Control used
  - Datum used
  - Issues with the survey

### d. Emerging GPS Technologies

Chugach recognizes the dynamic nature of GPS surveying in the areas of real time positioning, quick ambiguity determination and "on the fly" initializing. Chugach's specifications are not intended to hinder the integration of advancements which may be beneficial, efficient, and accurate to our program, but rather, to guarantee the degree of confidence, reliability, and repeatability for verification that Chugach considers necessary in the performance of Cadastral Surveys.

Chugach encourages the presentation and discussion of these emerging technologies when considered a viable option in the performance of specific projects or portions of projects. In these instances the Chugach GPS standards must guide the formulation of procedures that maintain the degree of confidence, reliability, and repeatability in the final product that Chugach attains in the current standards. These procedures must closely reflect the approach that follows the professional standards and accepted procedures of the established surveying community.