

**METRA SIGNAL SPECIFICATION**  
**FOR**  
**SIGNAL ENGINEERING CADD DRAWINGS**  
**SECTION NO. 34 42 04**  
**JULY 3, 2015**



# ENGINEERING DEPARTMENT

## EDQMP FORM/PROCEDURE APPROVAL RECORD

### SIGNAL SPECIFICATION TITLE: SIGNAL ENGINEERING CADD DRAWINGS SECTION NO. 34 42 04

Revised By:

Developed By:



Mark Delaney  
Sr. Signal Engineer  
Signal Engineering

Date: 7/2/15

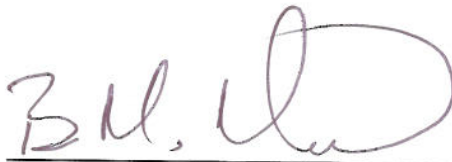
Reviewed By:



George Gounaris  
Director Signal Engineering

Date: 7-2-15

Approved By:



Bruce Marcheschi  
Chief Engineering Officer

Date: 7/2/15

Issue Date: 7/3/15

Revision Level: 2



SECTION 34 42 04  
SIGNAL ENGINEERING CADD DRAWINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. This Metra Signal Engineering Computer Aided Design and Drafting (CADD) Section defines the CADD requirements used in planning, design, construction and maintenance of Metra Signal System.
2. This Section defines the format and process to be used in preparing Design, Issued for Construction (IFC), Issued for Bid (IFB) and In-Service CADD drawings / files.
3. Any deviation from these CADD requirements and standards shall require written approval from the Director of Metra Signal Engineering.
4. This Section is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.02 DEFINITIONS

- A. CADD: Computer Aided Design and Drafting.
- B. CC: Center Center.
- C. CD: Compact Disk.
- D. IFB: Issued For Bid.
- E. IFC: Issued For Construction
- F. In-Process Drawing: Design drawings that have not yet reached the Final Drawing status
- G. LC: Left Center
- H. Metra: Northeast Illinois Railroad Corporation.
- I. MS-RFDIR: Microsoft Reference File Directory
- J. RC: Right Center:
- K. TPC: Third Party Contractor
- L. UD: User Departments
- M. USB: Universal Serial Bus

### 1.03 QUALITY ASSURANCE / QUALITY CONTROL

- A. User Departments (UD), Third Party Contractors (TPC), and any other party involved in the planning, design, or oversight of Metra projects shall produce all CADD files on a CADD system that shall be fully compatible with Metra's workstations running Bentley System's Microstation version 8.1 software operating in V7 workmode.
- B. Drawings shall be checked / verified by qualified personnel to ensure accuracy.

### 1.04 SUBMITTALS

- A. The electronic CADD files shall be submitted to Metra for approval when the In-Service Plans or IFB Plans are submitted, and at any other time during the project upon Metra request. The CADD files shall be provided to Metra in Microstation V7 design file format.
- B. Files should be compressed using Microstation's "Compress Design" command prior to delivery. Files must be delivered to Metra on a CD or a USB flash drive.
- C. A printed list of all contents is to accompany the CD / flash drive.
- D. Hardcopies of the CADD files shall be submitted to Metra as directed by Metra.

## PART 2 PRODUCTS

### 2.01 CREATING DESIGN FILES

- A. All design files for use in IFB plan sets must be created as "D" size (24" x 36") drawings.
- B. All design files for use in IFC plan sets must be created as "B" sized (11" x 17") drawings.
- C. If there is a need to produce plans in sizes other than the aforementioned, Metra shall be contacted for approval in writing and the appropriate seed file and reference border will be furnished by Metra upon approval.
- D. Metra will provide the seed file, reference border file, cell library and color table at award of contract and again at any time a change is made. These files shall not be altered.
- E. Files provided by Metra:
  - 1. sigbseed.dgn - This is the seed file to be used for creating all Metra design files. Copying and modifying of previously submitted work will not be allowed. The "SAVE SETTINGS" command shall not be used in any design file. This seed file establishes the settings and parameters as required by this specification.
  - 2. sigbbord.dgn - Reference border for "B" size prints. This file shall not be used to create a design file. It is referenced to the design file and shall not be copied onto the design file. The reference attachments settings shall not "Save Full Path" or "Locate" the reference border file. If the border file is kept in the



3.04 GLOBAL ORIGIN

- A. The global origin is the point on the design file where the coordinates 0.0 are assigned with respect to the design plane.
- B. The location of the global origin in the seed file has been set to the equivalent of the lower left corner of the finished print.

3.05 ELEMENT ATTRIBUTES

- A. The following element attributes shall be adhered to.

- 1. Level
  - a. LV = 1 All element placement.
- 2. Color
  - a. CO = 0 The color white shall be used except as noted.
  - b. CO = 3 Red - OUT circuit changes - (active fill color 3).
  - c. CO = 4 Yellow - IN circuit changes - (active fill color 244).
- 3. Style
  - a. LC = 0 Main drawing lines, symbols and all text.
  - b. LC = 1 Dotted line (when needed).
  - c. LC = 7 Multiple contact lines and centerlines.
- 4. Weight
  - a. WT = 1 All element placement.
- 5. Class
  - a. Primary All element placement.

3.06 TEXT

- A. The following element attributes shall be adhered to.

- 1. Text Font
  - a. Engineering font #3 shall be used.
  - b. All text will be in upper case letters.

2. Text Size

a. General Text, Notes, Equipment Description and line tagging

i.	Height	0.0750
ii.	Width	0.0750
iii.	Line Spacing	0.0375
iv.	Line Length	255
v.	Interchar Spacing	0.0000
vi.	Slant	0.0

b. Components names, heading and title block information.

i.	Height	0.1000
ii.	Width	0.1000
iii.	Line Spacing	0.0500
iv.	Line Length	255
v.	Interchar Spacing	0.0000
vi.	Slant	0.0

3. Text Placement

- a. All text shall be placed with the unit lock ON.
- b. Wire tag text shall be centered 2 units above wires.
- c. Line tags shall be aligned using left justification.
- d. "Enter data fields" shall be used where provided.

4. Text Justification

- a. The preferred justification settings are:
  - i. TXJ = LC, CC, or RC
  - ii. TNJ = LC, CC, or RC

3.07 CELLS

- A. Metra's most current cell library shall be used for all cells.
- B. Design files using cells from an out-of-date cell library will be rejected.
- C. If a cell is proposed to be used and is not contained in Metra's Cell Library, it must be sent to Metra for review. Written approval from Metra must be received before the cell is used in a design file.
- D. All new cells must follow the existing Cell Library features provided by Metra.

3.08 VIEW ATTRIBUTES

- A. The following view attributes shall be adhered to:



VIEW ATTRIBUTES		
	VIEW 5	VIEW 1
ACS TRIAD	OFF	OFF
BACKGROUND	OFF	OFF
CAMERA (dimmed)	N/A	N/A
CLIP BACK (dimmed)	N/A	N/A
CLIP FRONT (dimmed)	N/A	N/A
CLIP VOLUME	ON	ON
CONSTRUCTIONS	OFF	ON
DIMENSIONS	ON	ON
DYNAMICS (3D)	ON	ON
DATA FIELDS	OFF	ON
DISPLAY SET	OFF	OFF
FAST CELLS	OFF	OFF
FAST CURVES	OFF	OFF
FAST FONT	OFF	OFF
FILL	ON	ON
GRID	OFF	ON
LEVEL SYMBOLOGY	OFF	OFF
LINE STYLES	ON	ON
LINE WEIGHTS	ON	ON
PATTERNS	ON	ON
TAGS	ON	ON
TEXT	ON	ON
TEXT NODES	OFF	OFF

3.09 FILE NAMING CONVENTION

- A. The filename assignment for a drawing shall use the following format:

sub1234.567  
 sub----- Subdistrict Abbreviation (from Section 12.2)  
 1234----- Mile Post (decimal point implied - M.P. 12.34)  
 .567----- Sheet Number (.001 will be first page)

EXAMPLE: jol2647.003  
 jol----- Joliet Subdistrict - Rock Island District  
 2647----- Mile Post 26.47  
 .003-- Third Sheet for location

- B. List of Subdistrict Abbreviations:

1. Burlington Northern
  - a. aur - Aurora Subdivision

2. Chicago South Shore and South Bend
  - a. ssl - South Shore Line
3. Illinois Center
  - a. her - Heritage Corridor
4. Metra Electric District
  - a. bis - Blue Island Subdistrict
  - b. scs - South Chicago Subdistrict
  - c. ups - University Park Subdistrict
5. Milwaukee District
  - a. elg - Elgin Subdivision
  - b. fox - Fox Lake Subdivision (including C&M Sub.)
6. Rock Island District
  - a. bev - Beverly Subdistrict
  - b. jol - Joliet Subdistrict
  - c. sws - Southwest Subdistrict
7. Union Pacific
  - a. gen - Geneva Subdivision
  - b. har - Harvard Subdivision
  - c. ken - Kenosha Subdivision
  - d. mch - McHenry Subdivision
8. Wisconsin Central
  - a. ncs - North Central Service

3.10 TITLE BLOCK INFORMATION (SEE 3.14 FOR EXAMPLE)

A. MAIN TITLE: (east end of line) TO (west end of line)  
specific location description  
page description

1. EXAMPLE: CHICAGO TO JOLIET  
264-265 SIGNAL LOCATION  
TRACK TWO ELECTROCODE

- B. REFERENCE: (First Print Number) THRU (Last Sheet Number)
  - 1. EXAMPLE: 26.47 SH. 1 THRU SH. 4
- C. DATE: Estimated date for delivery of plans (use the same on all pages).
- D. DESIGNED: Company name or logo is to be used - Designer's initials are optional. It must fit space allotted.
- E. DRAWN: Company name or logo is to be used - CADD operator's initials are optional. It must fit space allotted.
- F. CHECKED: Will be filled in by Metra.
- G. APPROVED: Will be filled in by Metra.
- H. DISTRICT: District abbreviation (see paragraph J below for abbreviations).
- I. PRINT NUMBER: (mile post) SH. (sheet number)
  - 1. EXAMPLE: 26.47 SH. 3
- J. List of Districts:
  - 1. Metra Electric District
    - a. ME/BI - Blue Island Subdistrict
    - b. ME/SC - South Chicago Subdistrict
    - c. ME - University Park Subdistrict
  - 2. Milwaukee District
    - a. MWW - Elgin Subdivision
    - b. MW/N - Fox Lake Subdivision (including C&M Sub.)
  - 3. Rock Island District
    - a. RI/S - Beverly Subdistrict
    - b. RI - Joliet Subdistrict
    - c. SWS - Southwest Subdistrict

### 3.11 PLOTTING

- A. View 5 is Metra Signal Engineering's standard plotting view.
- B. All finished plots shall be 11" x 17" unless otherwise requested by Metra.
- C. All plots shall be clear and legible. Drawings shall be supplied per project specifications.

- D. The margins around the "B" size design border will be as follows:
  - 1. 1.25"- Left
  - 2. 0.25" - Right
  - 3. 0.25" - Top
  - 4. 0.25" - Bottom
  
- E. Line widths will be plotted as:
  - 1. WT=0 - .025mm
  - 2. WT=1 - .175mm
  - 3. WT=2 - .350mm
  - 4. WT=3 - .525mm
  - 5. WT=4 - .700mm
  - 6. WT=5 - .875mm
  - 7. WT=6 - 1.050mm
  - 8. WT=7 - 1.225mm
  - 9. WT=8 - 1.400mm
  - 10. WT=9 - 1.575mm
  - 11. Higher weights are not used by Metra Signal.
  
- F. Colors will be plotted as:
  - 1. CO=0 - black
  - 2. CO=1 - blue
  - 3. CO=3 - red
  - 4. CO=4 - yellow
  - 5. All other colors shall be plotted as black.
  
- G. Construction prints shall use the RED=OUT / YELLOW=IN color scheme.
  
- H. If a color plotter is used, the circuit changes (red and yellow) must be clearly identifiable and easy to read.
  
- I. Special pen tables or plotting files shall not be permitted without prior written approval.

- J. Ability for Metra to plot files.
  - 1. All files will be plotted using view 5 attributes and either Microstation's "PLOT" command or Interplot software.
  - 2. Data fields, grid, and text nodes will not be plotted.
  - 3. Metra has developed and uses plot settings files to enable the highlighting of yellow elements.
  - 4. Copies of the Metra Signal Engineering plot settings files may be requested but will not be adapted by Metra for external use.

### 3.12 BASIC LAYOUT FOR SIGNAL DRAWINGS

- A. Drawings shall be oriented with Chicago to the right as shown on the Typical Drawings.
- B. Contractor logos or other Contractor symbols shall not appear within the border of the drawing.
- C. Notes shall be located as far toward the right border of the drawing as possible as shown on the Typical Drawings.
- D. Drawings shall not be crowded or cluttered and shall be arranged for easy reading. In consideration of this requirement, adequate amounts of information shall be shown on each page.
- E. Complete circuits shall be shown on each drawing as far as possible.
- F. Circuit continuations shall not be used unless approved in writing by the Engineer.
- G. When continuations are used, they shall be clear and specific and shall include the identity of the continuation sheet.
- H. Line circuits shall be arranged to geographically match the track layout.
- I. Relay contacts shall be lined up one below the other as far as practicable. Circuit clarity is the primary objective, and takes precedence over the alignment of contacts.
- J. Stick contacts shall line up under the coil of the controlling relay.
- K. Track and Signal Plans shall show the survey station for all signals, turnouts, crossovers, track cut sections, station platforms, track connections, shunts, milepost markers, highway grade crossings, pedestrian crossings and equipment house/case.
- L. Print numbering shall follow milepost location.
  - 1. A separate set of plans shall be furnished for each house/case location.
  - 2. A location with two or more pipe-connected houses/cases shall be considered as one location.
  - 3. Drawings shall show what equipment and circuitry is within each house/case.

4. Locations connected by cable shall be considered as separate locations with unique milepost number.
- M. The arrangement of circuitry shall be such that no more than two wires shall be shown connected to a single terminal or contact pin. A uniform method shall be used to show the actual location of double wire connections when it is not desirable to show both wires at the point of termination.
- N. Circuit drawings shall provide sufficient information by means of contacts and terminal numbering to easily enable the tracing and testing of such circuits.

### 3.13 DRAWING DEVELOPMENT


- A. This section outlines the process by which drawings for Metra Signal Projects are developed. During the project, drawings will be submitted for review as required by Metra. Specific information is required depending upon the type and stage of the project.
  1. In-Process Drawings
    - a. These drawings will be submitted as required using the In-Process revision tracking detailed in Paragraph 3.14.A.
    - b. The In-Process Drawing Phase will continue until approved by Metra.
    - c. In-Process Drawings, at this stage will be used in one of two ways.
      - i. As part of an procurement package. Drawings issued as part of a procurement package will skip paragraph 3.13.A.2 and proceed to paragraph 3.13.A.3.
      - ii. As part of a construction project. Drawing issued for a construction project will proceed to paragraph 3.13.A.2.
  2. Issued for Construction (IFC) Drawings
    - a. On projects where the In-Process Drawings are to be issued for construction (IFC), upon completion and approval of the design, the plans will be released as IFC Plans.
    - b. These plans will note the revision appropriately in the In-Process revision block and the "CREW" stamp will be added to the drawings at the bottom of the In-Service Revision Block.
      - i. This stamp will be used to designate plan sets to the appropriate personnel (CREW, FOREMAN, RECORD, AS-BUILT, etc.). This is done by use of the different plot setting files during the printing process.
    - c. Any revisions to the IFC drawings will be noted accordingly in the In-Process revision block.

- d. When IFC Phasing Plans are required, an additional note is added to the drawings. This note will be added directly above the Title Block and as far right as possible, staying inside the drawing border.
  - e. This note will read "PHASE NO. X, STAGE NO. XX" with the phase and stage number determined either by the contract specifications or an approved phasing work plan submitted by the designer.
  - f. These phase and stage numbers are to be noted in the revision description.
3. Final Drawings
- a. Metra Signal has two classifications of Final Drawings. These two classifications are detailed below.
  - b. Issued for Bid (IFB) Drawings
    - i. In-Process Drawings that are to be included in a procurement package, when completed and approved, will be classified as IFB Plans.
    - ii. IFB plans will have the In-Process revision block removed and the IFB revision block added.
    - iii. Any Revisions made to drawings after issuance of the original IFB Plans will have these revisions tracked on the IFB revision block and will be issued to bidders as an addendum.
  - c. In-Service Drawings
    - i. In-Service Drawings are to be used as a record of the actual signal system design as it is installed and operating.
    - ii. When IFC Drawings are returned to the designer, the designer will then correct the plans as noted on the IFC plan set, removing all color and the "CREW" stamp.
    - iii. An In-Service drawing revision will be added in the In-Service Revision Block on sheets that were existing before the project.
    - iv. The plans will then be submitted for approval.
    - v. When approved, In-Service plans will be issued for distribution. At this time the plan set will have the In Process revision block removed.

3.14 CHECKING AND APPROVAL OF PLANS

A. In-Process Signal Plans

1. All Submittals of Signal Plans will have an In-Process revision block located on the bottom of the border directly to the left of the Title Block (refer to the figure below).

					 SIGNAL ENGINEERING CHICAGO, ILLINOIS			
					REFERENCE			DATE
								mm/dd/yy
					DESIGNED	DRAWN	CHECKED	APPROVED
					DISTRICT			PRINT NUMBER
								SH.
F1	01/01/15	PM	MD	IN-SERVICE SET				
C2	11/19/14	PM	MD	SIG ASPECT CHANGE				
C1	10/10/14	PM	MD	IFC DISTRIBUTION				
D2	09/05/14	PM	MD	100% SUBMITTAL				
D1	11/12/13	PM	MD	INITIAL SUBMITTAL				
REV	DATE	BY	APP	DESCRIPTION				

2. This revision block will be used to track revisions from initial design to either IFB or In-Service Plans, depending upon type of work being performed.
3. The following information will be included in this revision block:
  - a. Revision Column
    - i. Drawing revision levels shall be entered in this column. The revision level will be a 2 character alpha-numeric identifier with the first character being an alpha identifier that specifies they type of submittal. Use the following alpha identifiers:
      - ii. D = Design Plans
      - iii. C = Issued for Construction Plans
      - iv. F = Final Signal Plans
    - v. The second character will be a numeric identifier that will specify the number of the revision type, starting with 1 and increasing with each additional submittal of that type.
  - b. Date Column
    - i. The date on which a given revision of a drawing set is developed shall be entered in this column.
  - c. BY and APP Columns
    - i. The initials of the designer who made the revision shall be entered in the "BY" column.
    - ii. The initials of the person who has the authority to approve the revision shall be entered in the "APP" column.



d. Description Column

- i. A short description of the submittal shall be entered into this column to adequately define the revision.

B. IFB Signal Plans

- 1. Signal Plans that are issued for IFB will use the IFB Revision Block (figure to the right).
- 2. The IFB Revision Block will be located directly above the Title Block.
- 3. This revision block will be used to track issuance of the IFB Plan set and any revisions to the IFB plan set.

B	04/15/2015	ADDENDUM 1
A	04/15/2015	ISSUED FOR BID
Revision	Date	Description
		
BLUE ISLAND TO JOLIET JOLIET MMRTC IMPROVEMENTS ROUTES & ASPECTS		
PROJECT:	CD 1 MMRTG CD-10	DATE: 04/19/15
DESIGNED BY:	CHKD BY:	APPROVED BY:
RI		CD 1

4. The following information will be included in this revision block

a. Revision Column

- i. Drawing revision levels shall be entered in this column. The revision level will be a single alpha character identifier starting with A and incrementing through the alphabet.

b. Date Column

- i. The date on which a given revision of a drawing set is developed shall be entered in this column

c. Description Column

- i. A short description of the submittal shall be entered into this column to adequately define the revision.
- ii. This description will be "ISSUED FOR BID" on the initial IFB Drawings and for subsequent submittals will consist of the addendum number.

C. All design, construction and final plans must be reviewed by Metra to ensure they conform to all Metra Signal Engineering drawing standards. Metra may request a sample of the CADD files at any time of a project for review.

END OF SECTION 34 42 04