

California High-Speed Train Project



TECHNICAL MEMORANDUM

CADD GUIDELINES TM 1.1.5

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System Level Technical and Integration Reviews

The purpose of the review is to ensure:

- Technical consistency and appropriateness
- Check for integration issues and conflicts

System level reviews are required for all technical memorandums. Technical Leads for each subsystem are responsible for completing the reviews in a timely manner and identifying appropriate senior staff to perform the review. Exemption to the system level technical and integration review by any subsystem must be approved by the Engineering Manager.

System Level Technical Reviews by Subsystem:

Systems: NOT REQUIRED _____
Print Name: _____ Date _____

Infrastructure: NOT REQUIRED _____
Print Name: _____ Date _____

Operations: NOT REQUIRED _____
Print Name: _____ Date _____

Maintenance: NOT REQUIRED _____
Print Name: _____ Date _____

Rolling Stock: NOT REQUIRED _____
Print Name: _____ Date _____

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ABSTRACT

This document presents guidelines for the development of Computer Aided Design and Drafting (CADD) drawings for the preliminary design of the California High Speed Train Project (CHSTP). These guidelines are intended for use by designers in advancing the design of the high-speed train system using uniform drawing parameters that promote quality and consistency across the project's disciplines and geographic regions.

This CADD Guidelines document is intended to provide the basic CADD parameters required to develop design drawings for the high-speed rail alignment, facilities, and systems. The document includes guidance on the following parameters:

- Drawings Standards
 - Drawing preparation
 - Drawing format and border
 - Working units
 - Drawing data levels
- Software Platforms
- File Management
 - Drawing file naming convention
 - Directory structure
- File Types
 - Seed files
 - Master files
 - Working files
 - Sheet files
 - Resource files

Guidelines for the development and maintenance of electronic files and information are also included in this document. Concurrent with the release of this guidelines document, drawing files containing the CHSTP drawing border will be made available for use by designers in preparing project drawings.

1.0 INTRODUCTION

1.1 PURPOSE OF GUIDELINES DOCUMENT

The purpose of this guidelines document is to establish uniform policies and procedures for the design, drafting, and management of electronic files and information for the California High Speed Train Project (CHSTP) drawing delivery process. These guidelines will be issued for use by the designers in advancing the preliminary design using uniform CADD drawing parameters that promote drawing quality and consistency across the project's design disciplines and geographic regions.

This manual presents the methods and standards that are to be used to develop project CADD drawings for the design for the CHSTP.

This CADD Guidelines document is intended to provide the basic CADD parameters required to advance the design of the alignment for the overall corridor. It is anticipated that this initial release will be expanded, revised as required and re-issued as the development of the project progresses and as software and drawing standards are updated.

1.2 APPROACH

The CHSTP project will utilize the MicroStation V8 software platform and generally follow the current California Department of Transportation (Caltrans) CADD Users Manual and associated CADD standards. These standards will be supplemented, augmented, and superseded as necessary to accommodate the requirements of CHSTP. If a required CADD standard is not specified by Caltrans, the CHSTP Program Management Team (PMT) will provide the standard to be followed for the project.

Note that the Caltrans CADD Users Manual is currently being updated to document changes from Metric to English CADD Standards. These changes reflect the current Caltrans development and delivery process for projects being developed in U.S. Customary Units (English) and MicroStation. The update to the Caltrans CADD manual is being completed incrementally and will only be available on the Caltrans Internet pages. As sections are completed, they will be dated and posted to the website. When previously updated sections require corrections or additions, there will be a new date and a link to the Errata document. When all the sections of the manual are finished, the CADD Users Manual will be printed and available at the Caltrans Publications Distribution Unit.

<http://www.dot.ca.gov/hq/oppd/cadd/usta/ppman/toc.htm>

1.3 GENERAL INFORMATION

1.3.1 Definition of Terms

The following technical terms and acronyms are used in this document and have specific connotations with regard to the CHSTP.

Seed files A CADD template file that contains settings such as the project global origin and working units and does not contain design elements.

Resolution The 'worst-case' accuracy for the design environment that occurs at the very outer limits of the working area/plane/volume.

Acronyms

| | |
|----------|--|
| CADD | Computer Aided Design and Drafting |
| CCS | California Coordinate System |
| Caltrans | California Department of Transportation |
| CHSTP | California High-Speed Train Project |
| DGN | MicroStation V8 design file |
| NIST | National Institute of Standards and Technology |
| PDF | Portable Document Format |
| PMT | Program Management Team |

1.3.2 Units

The California High-Speed Train Project is based on U.S. Customary Units consistent with guidelines prepared by the California Department of Transportation and defined by the National Institute of Standards and Technology (NIST). U.S. Customary Units are officially used in the United States, and are also known in the US as “English” or “Imperial” units. In order to avoid confusion, all formal references to units of measure should be made in terms of U.S. Customary Units.

2.0 CADD STANDARDS

2.1 GENERAL

This document presents guidelines for the development of CADD drawings and drawing files for the preliminary design of the CHSTP. Designers advancing the preliminary design shall develop CADD drawings in accordance with these common CADD parameters in order to promote drawing quality and consistency across the project's geographic sections.

2.2 DRAWING STANDARDS

Persons creating CHSTP drawings shall be responsible for adhering to the conventions set forth in this document. Requirements not stated in this document shall follow Caltrans CADD Standards located in Caltrans Plans Preparations Manual.

<http://www.dot.ca.gov/hq/oppd/cadd/usta/ppman/toc.htm>

2.2.1 Drawing Preparation

Design for CHSTP project will be based on common California Coordinate System (CCS) vertical datum as described in the latest version of Caltrans Surveys Manual (Chapter 4, Survey Datums).

http://www.dot.ca.gov/hq/row/landsurveys/SurveysManual/04_Surveys.pdf

Printed alignment drawings will be prepared at the following (full size drawing) scales:

- 15% Design Level:
 - Horizontal 1"=200'; Vertical 1"=20' For undeveloped areas
 - Horizontal 1"=200'; Vertical 1"=20' For developed areas
 - Horizontal 1"=100'; Vertical 1"=10' In constrained urban areas
 - Horizontal 1"=50'; Vertical 1"=5' At stations and special study areas and as appropriate to achieve design level
- 30% Design Level:
 - Horizontal 1"=100'; Vertical 1"=10' for undeveloped, developed and constrained urban areas
 - Horizontal 1"=50'; Vertical 1"=5' At stations and special study areas and as appropriate to achieve design level
 - Structural & Architectural Scales per Caltrans Structural Seed file http://www.dot.ca.gov/hq/oppd/cadd/rsc_files/webpage.php and as appropriate to achieve design level

These scales are recommended and are to be confirmed with the Environmental Manager and Regional Manager. Other drawings types will be developed at scales commensurate with industry standards.

2.2.2 Drawing Format

2.2.2.1 Deliverables

CADD files for the alignment plans shall be available for transmittal in the following format:

- MicroStation V8 design files (DGN) format
- Adobe Acrobat portable document format (PDF)

Printed plan sets will be prepared at the following sizes.

- 11" x 17" drawings (half size)
- 22" x 34" drawings (full size plotted on 24" x 36")

Electronic submittals are required to review the files in a common platform and provide use of full-color graphics, easy navigation, and the ability to turn levels on and off for easier viewing.

2.2.2.2 Borders

Preliminary engineering drawings will conform to Caltrans CADD standard border dimensions and will incorporate CHSTP border information and appropriate design consultant information. CHSTP border as shown in Appendix B is available on the CHSTP ProjectSolve site.

https://ww2.projectsolve2.com/eRoom/SFOF/CAHSRProgramMgmt/0_21ef7

2.2.2.3 Titles

The following information will be included in the title block of each drawing:

CALIFORNIA HIGH-SPEED TRAIN PROJECT
SEGMENT DESIGNATION
ALIGNMENT / OPTION

2.3 SOFTWARE PLATFORMS

2.3.1 CADD Software

Drawings prepared for the preliminary design will be prepared using MicroStation V8 or subsequent version release.

2.3.2 Design Applications Software

The use of design application software (i.e., InRoads, CAiCE, and GeoPak) in the development of alignments for the 15% Design level is at the discretion of the designer.

2.3.3 Base Mapping

High resolution, ortho-rectified aerial photogrammetry and 3D elevation data are commercially available and can be obtained from Intermap Technologies® for use as base mapping for the 15% Design level.

Engineering surveys and mapping for the post-15% Design level will meet the requirements defined in Technical Memorandum 1.1.4 – Engineering Surveys and Mapping.

2.3.4 CADD Resource Files

The CADD environment requires setup of the following resource files to achieve uniformity.

- **Seed files:** A seed file is a CADD template file that contains settings such as the project global origin and working units and does not contain design elements. Use of a project seed file with customized settings eliminates the need to establish drawing settings each time a CADD file is created. When creating a new design file, the appropriate seed file will be selected and copied to the desired folder and renamed based on the file naming conventions in Section 3.4. Caltrans seed files include: global origin, units – the 6 files represent the state 6 zones as designated by Caltrans MicroStation V8 standards for a 2-D or 3-D environment. For design files that fall within two zones, use the seed file which encompasses the majority of design. Caltrans state zone designations are included in Appendix A.
- **State Zones and Seed files:** MicroStation V8 seed files are provided for 6 zones that cover the state. Zones 1, 2, 3, 4, 5, and 6 cover the proposed CHSTP alignment corridor and include “zone tiles”: 1, 2, 3, 4, 5, and 6 per Caltrans standard. Appendix A presents the state zone maps for use in identifying appropriate seed files.

Resolution of the MicroStation V8 design environment establishes size and accuracy of these planes. Changing the resolution changes the size of existing geometry in the model and is not recommended.

- **Accuracy and Resolution:** The Resolution setting defines the worst-case accuracy for the design environment, which occurs at the very outer limits of the (very large) working area/volume. For example, working to a “worst case” accuracy of 0.0001 meters, the size of the design plane/cube is 900 million kilometers along each axis. Actual accuracy is many millions of times better when drawing near the origin of the design plane/cube, which is the usual situation.

Each CHSTP seed file name includes the California Zone unit, the reference to 6 primary planes of coverage and format:

- Z4 Zone 4, Plane (primary)
- MU US Survey Units
- 2d or 3d Eseed 2-D or 3-D English seed file
- Structure Seed Structures & Architecture
- V8.dgn MicroStation V8 format

CHSTP drawing files will be 2-D files. 3-D seed files are provided for support of design applications.

2D and 3D Seed files are found on the Caltrans site:

http://www.dot.ca.gov/hq/oppd/cadd/rsc_files/webpage.php

- Cell library: (*.cel and/or *.dgnlib) with CALTRANS standard symbology cells, templates of tables, standard note format, standard level library set up.
- Resource files: (*.rsc) to include font format, are posted in the Caltrans site.
- Color table: drives standard colors to be used for Caltrans work.
- Standard and Custom Line Style Resource File: (*.rsc) standard and custom lines styles particular to Caltrans plans production. A Line Style scale PDF is in support of scale factors for plans production.

Please note new resource file updates to V8 files PDF included on the Caltrans site to review specific changes to the above file types.

Designers using CAiCE and GIS at their discretion to support conceptual and final design file documentation can find supporting resources and documentation files in this same location below.

These files may be retrieved from the following location:

http://www.dot.ca.gov/hq/oppd/cadd/rsc_files/webpage.htm

Units Definition file: The MicroStation Units.def file has been edited for U.S. Survey Foot as the English unit. The working units, master/sub unit definitions (Units.def file) for all CADD Drawings are based on the seed file provided by the PM. For V8 MicroStation files, the unit names will be:

- Master Units (MU)-----Survey Feet (FT)
- Sub Units (SU)-----Tenths (TN)
- Resolution: -----10,000 per Foot
- Working Area (each axis): -----170,591,236 Miles

2.4 DRAWING PREPARATION BEST PRACTICES

The information in the EZ-Guide (for quick reference only) comes from the CADD Users Manual and Plans Preparation Manual. Note that any changes, modifications or additions to Caltrans standards, conventions or work flow processes will be included only in the CADD Users Manual or Plans Preparation Manual and not in the EZ-Guide, which should be used only as a quick reference since the EZ-Guide has not been updated since March 2006.

2.4.1 Color and Line Weights

Line weights, line styles and graphical representations of features shall conform to the Caltrans CADD Users Manual, Plans Preparation Manual and the Standard Plans. Use Caltrans leveling convention and color tables. Following the Caltrans leveling convention from the inception of a drawing is the most efficient way of handling and sharing electronic information throughout the entire project delivery process.

2.4.2 Line Styles

Line Styles depict a recognizable pattern used mainly to distinguish existing features or objects from proposed features on no-dropout levels.

2.4.3 Text, Abbreviations and Symbology

Abbreviations, Acronyms and Symbols shall conform to CHSTP standards and augmented by Caltrans Standard Plans A10A through A10D, H1 and H2 and ES-1A through ES-1C.

2.5 FILE MANAGEMENT AND DIRECTORY STRUCTURE

Regional Designers will establish and maintain an electronic CADD file structure and file folders that promote efficient and effective storage and retrieval of active and archived CADD files.

2.6 CADD FILE TYPES

Design efforts will result in the creation of numerous CADD files, including reference files, sheet files, and working files. For the CHSTP, these standards will evolve to accommodate software, hardware, and project advancement at logical conversion or upgrade points. The different file types and general usage are discussed below.

2.6.1 Master Files

Master (base) files are intended as overlays to other CADD files are typically used to share design data between disciplines and designers. Typically master files include survey, mapping topography, utilities, and track alignment.

Master files contain specific design information in one continuous file and are referenced to sheet files. Additional or modified design information within a master file will automatically update in the sheet files. Master files are tied to the project coordinate system and shall not be moved, rotated, or scaled in order to preserve the coordinate system within the file and allow other master files to be attached coincident to each other. Master files shall not be nested. Nesting shall occur in sheet files with saved views.

See Section 2.7.1 for Master File Naming Convention.

2.6.2 Sheet Files

Sheet files will contain only sheet dependent information such as title block information, north arrow, bar scales, dimensions, and general notes. Master files within saved views are attached to the sheet files and clipped to display design information particular to that sheet. Information viewed in the sheet can be manipulated with level controls. Drawings containing details, sections, and elevations will be drawn within sheet files. Details, sections, and elevations will be drawn to a scale as required to convey the necessary design information and design intent. Sheet files incorporate necessary design information to create a design discipline drawing for inclusion in a specific deliverable plan set. Plotting for drawings will be done from the sheet files.

See Section 2.7.2 for Sheet File Naming Convention.

2.6.3 Working Files

Working files may be used by designers to develop various options for alignment, structures, or other facilities and may become either a reference file or sheet file. Working files will contain information to be used for design, calculation support, or "DRAFT" purposes only. Working files are not for inclusion in a specific deliverable plan set, nor are they to be referenced from any plan sheet file. Reference files may be attached as necessary. Working files maintain a design (.DGN) file extension.

Designers use working files to prepare various options and/or concepts of a design to avoid confusion and interference with reference files currently in use for actual deliverables. Using working files maintains a record of alternative conceptual design options that may have validity for the future but are not deemed "deliverables". CHSTP CADD standards apply to all CADD files including working files. Working files contain project design information prepared only in support of the creation of design discipline drawings or calculations. Working drawings to be plotted for any purpose, including temporary use, inclusion in calculation sets, etc. will be clearly labelled "Working Drawing – DRAFT -" within the electronic file such that a clear distinction can be made from reference or sheet file plots.

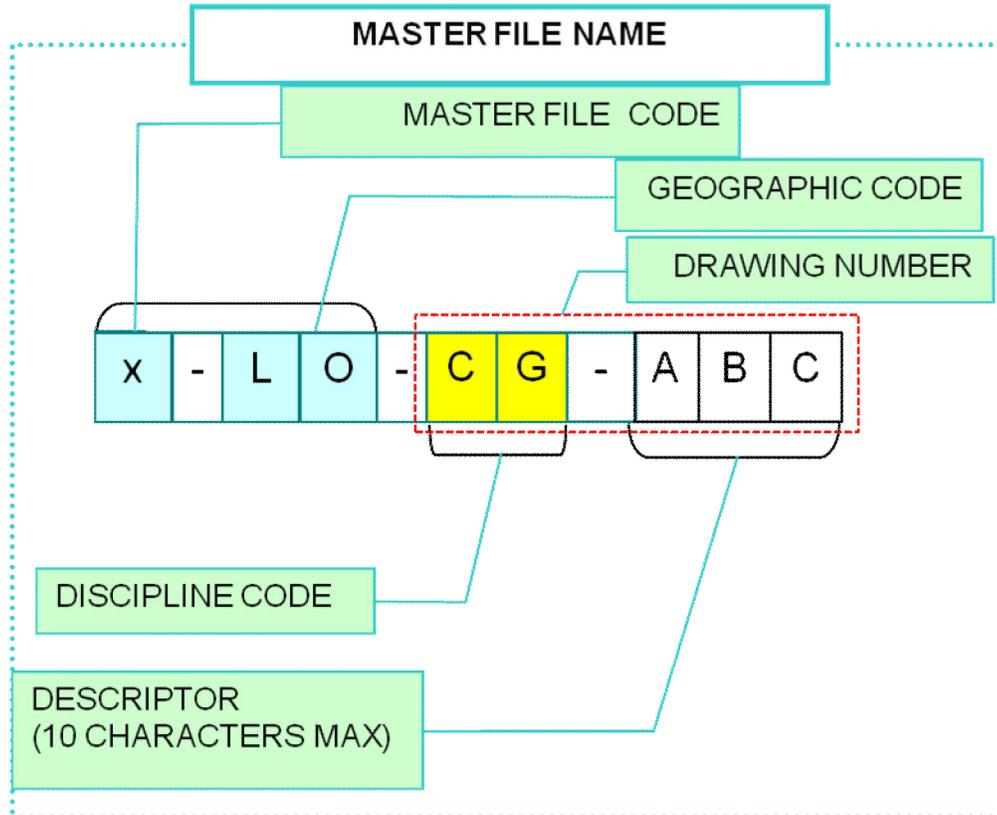
See Section 2.7.3 for Working File Naming Convention.

2.7 FILE NAMING CONVENTIONS

This section describes the naming conventions for various file types.

2.7.1 Master File Naming Convention

Master files are named using fifteen characters (plus the three-character extension “dgn”) based on the following template:



Master File Naming

Example: Palmdale to Los Angeles, Civil Drawing, Track Alignment, 200 scale

X-PL-C-ALIGN-200.dgn

Geographic Location Code (two characters)

The SECOND through FOURTH characters indicate the geographical location of a specific proposed project facility as follows:

Geographic Code

| Segment Identifier | Segment Code |
|---------------------------|---------------------|
| San Francisco to San Jose | FJ |
| San Jose to Merced | JM |
| Altamont Pass | AJ |
| Sacramento to Merced | SM |
| Merced to Fresno | MF |
| Fresno to Bakersfield | FB |
| Bakersfield to Palmdale | BP |
| Palmdale to Los Angeles | PL |
| Los Angeles to Anaheim | LO |
| Los Angeles to San Diego | LD |

Discipline Code (DC) (one OR two characters)

The FIFTH character indicates the design discipline:

| | CHSTP DISCIPLINE CODE | | DISCIPLINE DESIGNATORS DESCRIPTION |
|-----|-----------------------------|-----|---------------------------------------|
| | 1ST | 2ND | |
| ARC | A | | ARCHITECTURE |
| | A | B | GENERAL |
| | A | D | DEMOLITION |
| | A | E | ELEMENTS |
| | A | F | FINISHES |
| | A | G | GRAPHICS |
| | A | I | INTERIORS |
| | A | J | BUILDINGS |
| | A | K | USER DEFINED |
| | A | S | SITE |
| GEN | B | | GENERAL |
| CIV | C | | CIVIL |
| | C | B | GENERAL |
| | C | D | DEMOLITION |
| | C | G | GRADING |
| | C | H | HYDROLOGY |
| | C | I | CONSTRUCTION STAGING |
| | C | J | USER DEFINED |
| | C | P | PAVING |
| | C | R | ROADWAYS |
| | C | S | SITE |
| | C | T | GRADE SEPARATION/CROSSINGS |
| ELE | E | | ELECTRICAL |
| | E | B | GENERAL |
| | E | D | DEMOLITION |
| | E | I | INSTRUMENTATION |
| | E | J | USER DEFINED |
| | E | L | LIGHTING |
| | E | P | POWER |
| | E | S | SITE |
| | E | T | TELECOMMUNICATIONS |
| | E | Y | AUXILIARY SYSTEMS |

| | CHSTP DISCIPLINE CODE | | DISCIPLINE DESIGNATORS DESCRIPTION |
|--------|-----------------------|-----|------------------------------------|
| | 1ST | 2ND | |
| FIR | F | | FIRE PROTECTION |
| | F | A | DETECTION AND ALARM |
| | F | B | GENERAL |
| | F | J | USER DEFINED |
| | F | M | DETECTION AND ALARM |
| | F | X | FIRE SUPPRESSION |
| GEO | G | | GEOTECHNICAL |
| | G | B | GENERAL |
| | G | J | USER DEFINED |
| SIGNLS | H | | SIGNALIZATION |
| | H | B | GENERAL |
| | H | J | USER DEFINED |
| | H | K | USER DEFINED |
| IND | I | | INDUSTRIAL |
| | I | B | GENERAL |
| | I | E | EQUIPMENT |
| | I | V | VEHICLE |
| | I | J | BUILDINGS |
| | I | K | USER DEFINED |
| LAN | L | | LANDSCAPING |
| | L | B | GENERAL |
| | L | D | DEMOLITION |
| | L | I | IRRIGATION |
| | L | J | USER DEFINED |
| | L | L | LIGHTING |
| | L | P | PLANTING |
| | L | R | RELOCATION |
| | L | S | SITE |
| MECH | M | | MECHANICAL |
| | M | B | GENERAL |
| | M | D | DEMOLITION |
| | M | H | HVAC |
| | M | I | INSTRUMENTATION |
| | M | J | USER DEFINED |
| | M | P | PIPING |
| | M | S | SITE |

| | CHSTP DISCIPLINE CODE | | DISCIPLINE DESIGNATORS DESCRIPTION |
|------|-----------------------------|-----|---------------------------------------|
| | 1ST | 2ND | |
| | | | |
| MF | M | # | MAINTENANCE FACILITY |
| | M | 1 | TBD |
| | M | 2 | TBD |
| | | | |
| OPTN | O | | OPERATIONS |
| | O | B | GENERAL |
| | O | J | USER DEFINED |
| | | | |
| PLU | P | | PLUMBING |
| | P | D | DEMOLITION |
| | P | J | USER DEFINED |
| | P | P | PIPING |
| | P | Q | EQUIPMENT |
| | P | S | SITE |
| | | | |
| COMM | Q | | COMMUNICATIONS |
| | Q | A | AUDIO VISUAL |
| | Q | B | GENERAL |
| | Q | C | CLOCK AND PROGRAM |
| | Q | I | INTERCOM |
| | Q | J | USER DEFINED |
| | Q | K | USER DEFINED |
| | Q | M | MONITORING |
| | Q | N | DATA NETWORKS |
| | Q | T | TELEPHONE |
| | Q | Y | SECURITY |
| | | | |
| RW | R | | RIGHT-OF-WAY |
| | R | B | GENERAL |
| | R | J | USER DEFINED |
| | R | K | USER DEFINED |
| | | | |
| STR | S | | STRUCTURAL |
| | S | B | GENERAL |
| | S | D | DEMOLITION |
| | S | F | FRAMING |
| | S | J | BUILDING |
| | S | K | USER DEFINED |
| | S | S | SUBSTRUCTURES |
| | S | T | BRIDGES |
| | S | V | VIADUCTS |

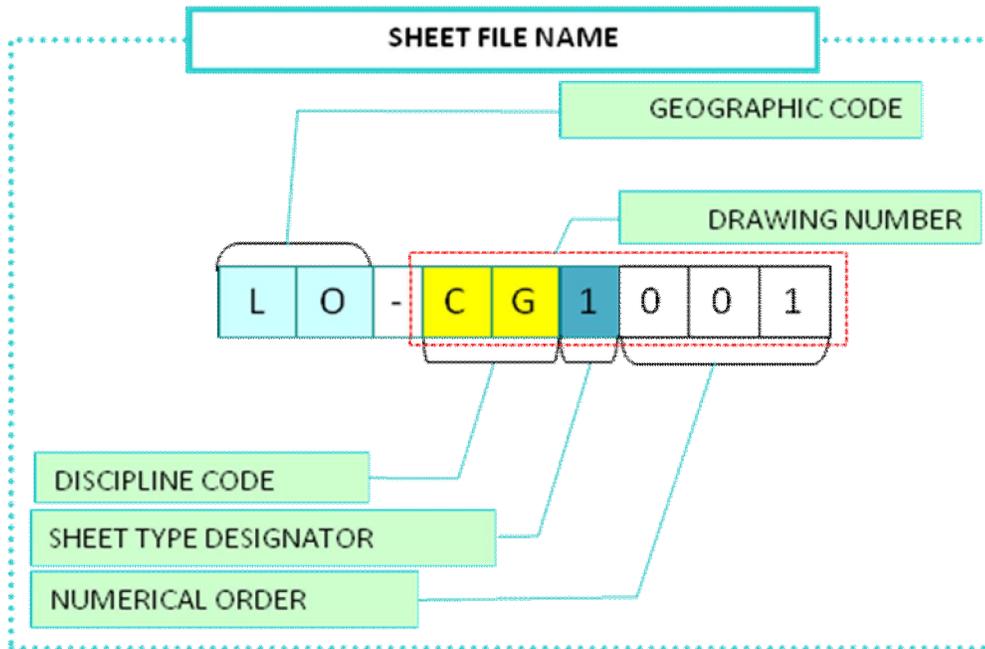
| | CHSTP DISCIPLINE CODE | | DISCIPLINE DESIGNATORS DESCRIPTION |
|-------|-----------------------|-----|------------------------------------|
| | 1ST | 2ND | |
| | | | |
| TRA | T | | TRACKWORK |
| | T | B | GENERAL |
| | T | C | TRAIN CONTROL (AUTOMATIC) |
| | T | H | SIGNALIZATION |
| | T | I | INTEGRATION / INTERFACE |
| | T | J | USER DEFINED |
| | T | L | YARD CONTROL |
| | | | |
| UTIL | U | | UTILITIES |
| | U | B | GENERAL |
| | U | J | USER DEFINED |
| | | | |
| SUR | V | | SURVEY |
| | V | B | GENERAL |
| | V | J | USER DEFINED |
| | | | |
| OCS | W | | OVERHEAD CONTACT SYSTEM |
| | W | B | GENERAL |
| | W | J | USER DEFINED |
| | | | |
| ETOPO | X | | EXISTING TOPOGRAPHY |
| | X | B | GENERAL |
| | X | J | USER DEFINED |
| | | | |
| TPWR | Y | | TRACTION POWER |
| | Y | B | GENERAL |
| | Y | J | USER DEFINED |
| | | | |
| SYSG | Z | | SYSTEM GENERAL |
| | Z | B | GENERAL |
| | Z | J | USER DEFINED |

Content Descriptor

The SIXTH through FIFTEENTH characters indicate the type of information generally contained in the reference file (i.e. Alignments, Layouts, Profiles, Topometric, Right-of- Way, etc.). The descriptor shall not contain special characters in it and must remain unchanged throughout the design process. All Alpha characters not used shall be used at designer's discretion.

2.7.2 Sheet File Naming Convention

Sheet File names will be named using nine characters (plus the three-character extension “.dgn”) based on the following template:



Sheet File Naming

Example: Los Angeles to Palmdale, Civil Drawing, Drawing 1000, Maintenance Facility (M1 - M5 Depending on Type of Facility) Where Applicable.

PL-CG-1000-M1.dgn

Drawing Number

The drawing number to be shown in the title block will be a derivative of discipline code and sequence number in the set.

Example: CADD Filename: PL-CG-1000-M1.dgn
 Drawing Number to be shown in Title Block: CG1000

Sequence Number (0000)

The FIFTH through EIGHTH characters indicate the sequence number as established by the CHSTP PM. The sequence number will be assigned in series format, with blocks of drawings reserved for a specific drawing type or discipline as indicated in the following table:

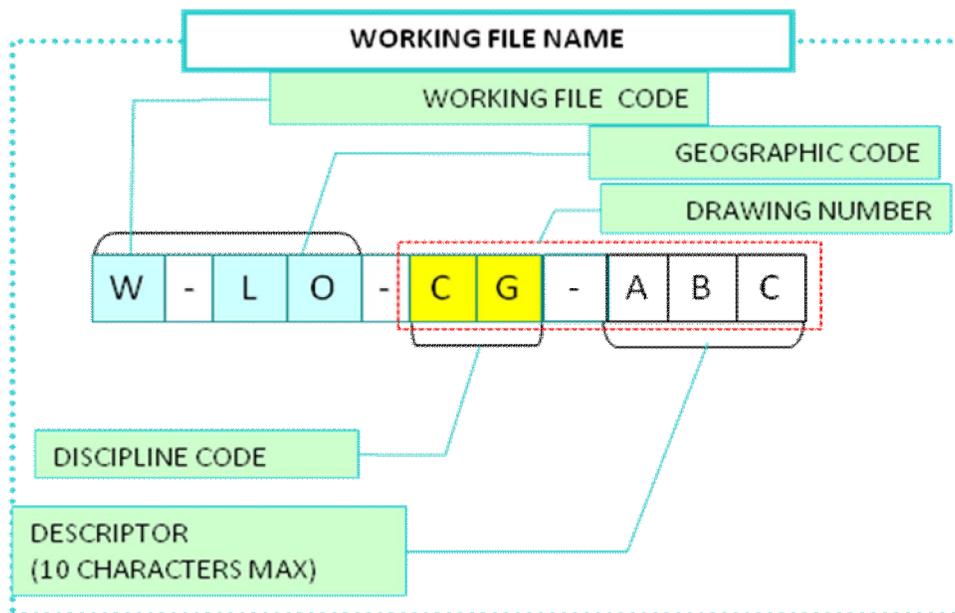
Sequence Number

| <i>Sequence Order</i> | <i>Drawing Type</i> |
|-----------------------|---|
| 0 | General Drawings (Title Sheet, Drawing Index, Notes, Legends and Abbreviations) |
| 1 | Plans and Profiles |
| 2 | Elevations |
| 3 | Sections |
| 4 | Large Scale Views |
| 5 | Details |
| 6 | Schedules, Schematics and Diagrams |
| 7 and 8 | User Defined |
| 9 | 3D Representations |

Note: Designers are to confirm sequence number as this may vary depending on the contract and/or deliverable.

2.7.3 Working File Naming Convention

Working file names will be similar to reference file names (with the recognition that they may become reference files), with a “W” as the file designator. Working files are named using fifteen characters (plus the three-character extension “.dgn”) based on the following template:



Working File Naming

Example: Merced to Fresno, Structures Drawing, Elk Grove Bridge Design in Progress

W-MF-ST-ELKGR-BRDG.dgn

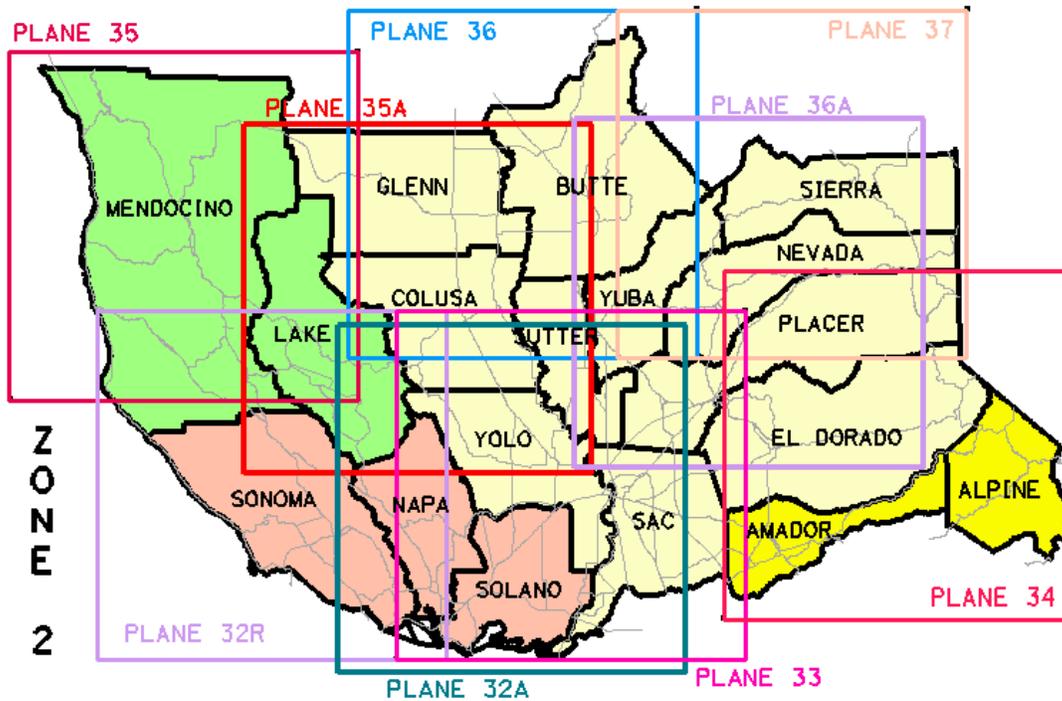
3.0 SOURCE INFORMATION AND REFERENCES

1. Caltrans CADD Users Manual
<http://www.dot.ca.gov/hq/oppd/cadd/usta/caddman/default.htm>
2. Caltrans Plans Preparations Manual
<http://www.dot.ca.gov/hq/oppd/cadd/usta/ppman/toc.htm>
3. CHSTP Technical Memorandum TM 1.1.4 – Engineering Surveys and Mapping
https://ww2.projectsolve2.com/eRoom/SFOF/CAHSRProgramMgmt/0_3eb7e
4. CHSTP Technical Memorandum 15% Design Scope Guidelines
https://ww2.projectsolve2.com/eRoom/SFOF/CAHSRProgramMgmt/0_3eb90

APPENDIX A: CALTRANS STATE ZONE MAPS

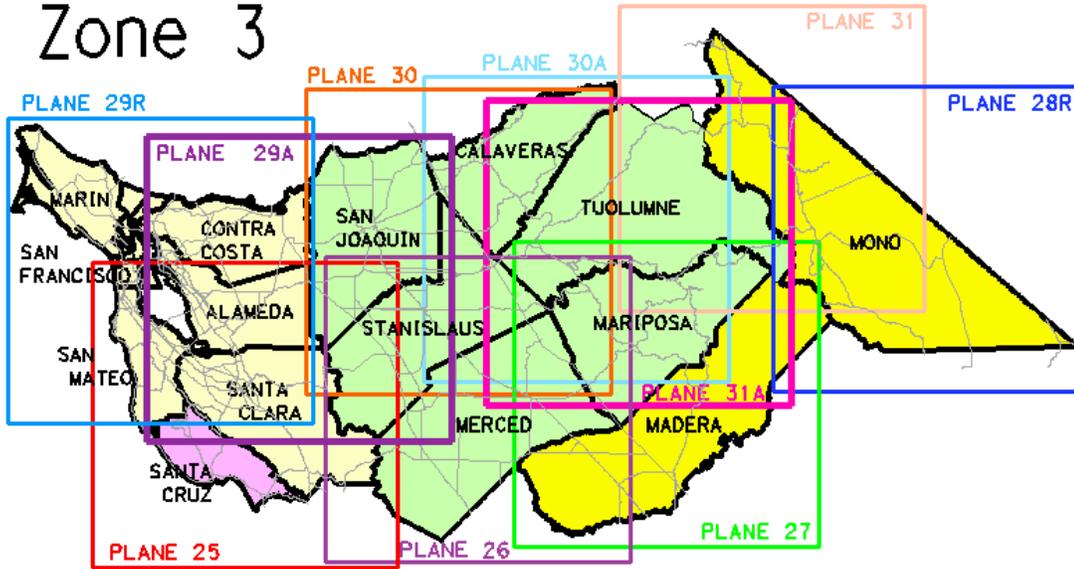
Caltrans State Zone Maps are presented in Appendix A.

http://www.dot.ca.gov/hq/oppd/cadd/rsc_files/webpage.php



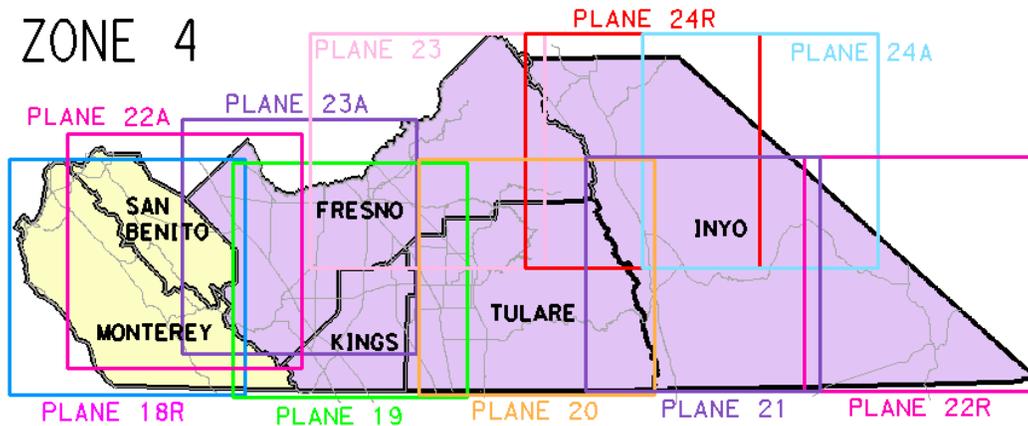
| PLANES-English | X CENTER | Y | X GLOBAL ORIGIN | Y |
|-----------------------|----------|---------|-----------------|--------------|
| 32R Sonoma | 6280000 | 1982000 | 6065251.6352 | 1767251.6352 |
| 32A Solano / Napa | 6576000 | 1966000 | 6361251.6352 | 1751251.6352 |
| 33 Yolo | 6648000 | 1982000 | 6433251.6352 | 1767251.6352 |
| 34 El Dorado | 7052000 | 2032000 | 6837251.6352 | 1817251.6352 |
| 35 Mendocino | 6171000 | 2302000 | 5956251.6352 | 2087251.6352 |
| 35A Colusa/Glenn/Lake | 6460000 | 2213000 | 6245251.6352 | 1998251.6352 |
| 36 Butte | 6589000 | 2354000 | 6374251.6352 | 2139251.6352 |
| 36A Yuba/Nev/Placer | 6868000 | 2219000 | 6653251.6352 | 2004251.6352 |
| 37 Sierra | 6921000 | 2354000 | 6706251.6352 | 2139251.6352 |

Zone 3

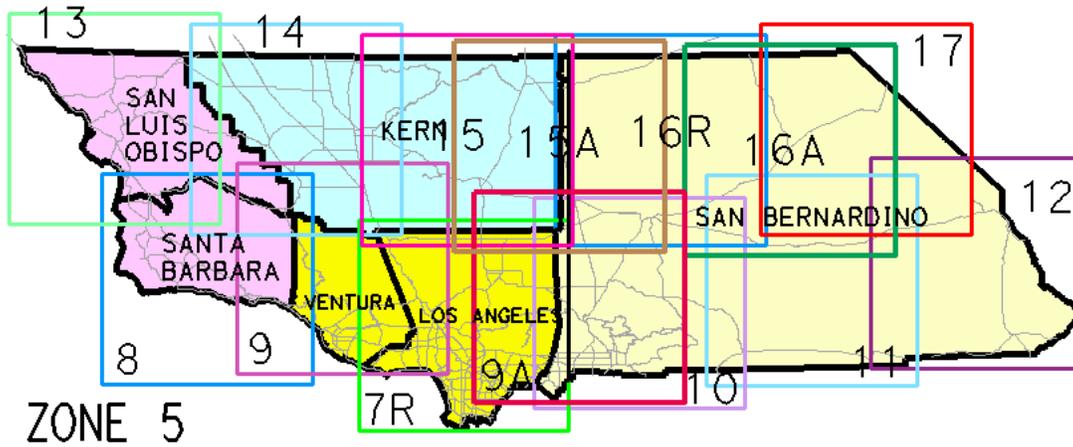


| PLANES-English | X CENTER | Y | X GLOBAL ORIGIN | Y |
|--------------------|----------|---------|-----------------|--------------|
| 25 Santa Clara | 6163000 | 1906000 | 5948251.6352 | 1691251.6352 |
| 26 Merced | 6492000 | 1914000 | 6277251.6352 | 1699251.6352 |
| 27 Madera | 6757000 | 1935000 | 6542251.6352 | 1720251.6352 |
| 28R Mono South | 7122000 | 2154000 | 6907251.6352 | 1939251.6352 |
| 29R S. F. Bay Area | 6045000 | 2109000 | 5830251.6352 | 1894251.6352 |
| 29A Contra Costa | 6239000 | 2084000 | 6024251.6352 | 1869251.6352 |
| 30 Stanislaus | 6464000 | 2150000 | 6249251.6352 | 1935251.6352 |
| 30A Tuolumne | 6684000 | 2168000 | 6469251.6352 | 1953251.6352 |
| 31 Mono North | 6905000 | 2268000 | 6690251.6352 | 2053251.6352 |
| 31A Tuolumne | 6719000 | 2134000 | 6504251.6352 | 1919251.6352 |

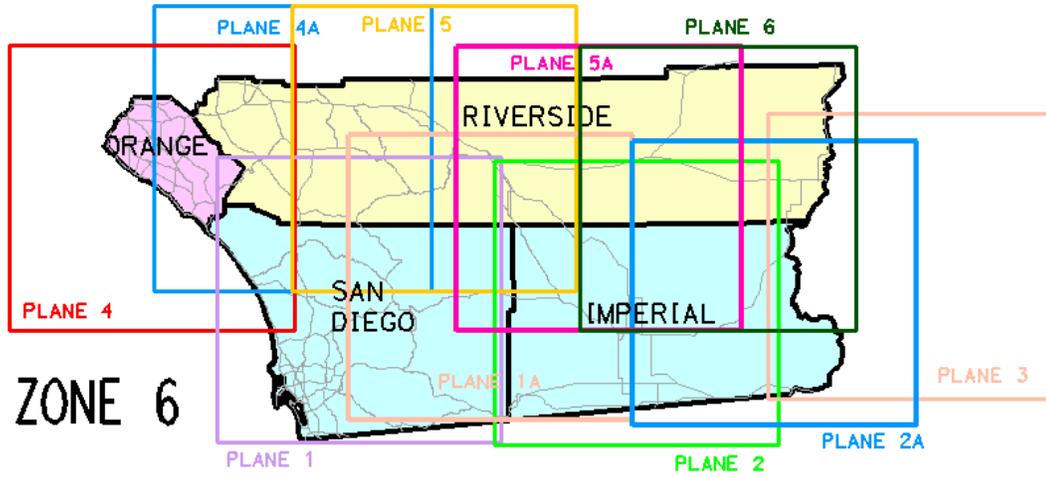
ZONE 4



| PLANES-English | X CENTER | Y | X GLOBAL ORIGIN | Y |
|----------------|----------|---------|-----------------|--------------|
| 18R Monterey | 5892000 | 2016000 | 5677251.6352 | 1801251.6352 |
| 19 Kings | 6299000 | 2010000 | 6084251.6352 | 1795251.6352 |
| 20 Tulare | 6641000 | 2016000 | 6426251.6352 | 1801251.6352 |
| 21 Inyo SW | 6945000 | 2022000 | 6730251.6352 | 1807251.6352 |
| 22R Inyo SE | 7346000 | 2022000 | 7131251.6352 | 1807251.6352 |
| 22A San Benito | 5997000 | 2063000 | 5782251.6352 | 1848251.6352 |
| 23 Fresno | 6441000 | 2247000 | 6226251.6352 | 2032251.6352 |
| 23A Fresno | 6207000 | 2090000 | 5992251.6352 | 1875251.6352 |
| 24R Inyo N | 6835000 | 2247000 | 6620251.6352 | 2032251.6352 |
| 24A Inyo NE | 7050000 | 2247000 | 6835251.6352 | 2032251.6352 |



| PLANES-English | X CENTER | Y | X GLOBAL ORIGIN | Y |
|----------------------|----------|---------|-----------------|--------------|
| 7R Los Angeles | 6476000 | 1927000 | 6261251.6352 | 1712251.6352 |
| 8 Santa Barbara | 5951000 | 2021000 | 5736251.6352 | 1806251.6352 |
| 9 Ventura | 6227000 | 2043000 | 6012251.6352 | 1828251.6352 |
| 9A LA/SanBernardino | 6710000 | 1985000 | 6495251.6352 | 1770251.6352 |
| 10 San Bernadino SW | 6831000 | 1972000 | 6616251.6352 | 1757251.6352 |
| 11 San Bernadın S | 7184000 | 2018000 | 6969251.6352 | 1803251.6352 |
| 12R San Bernadino SE | 7518000 | 2053000 | 7303251.6352 | 1838251.6352 |
| 13 San Luis Obispo | 5763000 | 2350000 | 5548251.6352 | 2135251.6352 |
| 14 Kern West | 6133000 | 2326000 | 5918251.6352 | 2111251.6352 |
| 15 Kern East | 6482000 | 2305000 | 6267251.6352 | 2090251.6352 |
| 15A Kern E/San Bern | 6671000 | 2291000 | 6456251.6352 | 2076251.6352 |
| 16R San Bernadino NW | 6875000 | 2305000 | 6660251.6352 | 2090251.6352 |
| 16A San Bernadino NE | 7140000 | 2283000 | 6925251.6352 | 2068251.6352 |
| 17 San Bernadino NE | 7295000 | 2326000 | 7080251.6352 | 2111251.6352 |



| PLANES-English | X CENTER | Y | X GLOBAL ORIGIN | Y |
|-----------------------|----------|---------|-----------------|--------------|
| 1 San Diego | 6380000 | 1987000 | 6165251.6352 | 1772251.6352 |
| 1A San Diego/Imperial | 6578000 | 2021000 | 6363251.6352 | 1806251.6352 |
| 2 Imperial | 6799000 | 1983000 | 6584251.6352 | 1768251.6352 |
| 2A Imperial/Riverside | 7007000 | 2012000 | 6792251.6352 | 1797251.6352 |
| 3 Arizona | 7212000 | 2053000 | 6997251.6352 | 1838251.6352 |
| 4 Orange | 6068000 | 2156000 | 5853251.6352 | 1941251.6352 |
| 4A Orange/Riverside | 6280000 | 2216000 | 6065251.6352 | 2001251.6352 |
| 5 Riverside W | 6493000 | 2216000 | 6278251.6352 | 2001251.6352 |
| 5A Riverside Central | 6742000 | 2155000 | 6527251.6352 | 1940251.6352 |
| 6 Riverside E | 6922000 | 2155000 | 6707251.6352 | 1940251.6352 |

APPENDIX B: DRAWING BORDER

Link to the DGN file for the CHSTP Border follows:

https://ww2.projectsolve2.com/eRoom/SFOF/CAHSRProgramMgmt/0_48e9b

APPENDIX C: CELL LIBRARY

Link to Cell Libraries on Project Solve follows:

https://ww2.projectsolve2.com/eRoom/SFOF/CAHSRProgramMgmt/0_8056a

APPENDIX D: DGNLIB

CHSTP DGNLIB Levels

Caltrans Existing Level 0 - 999 (Modified to Address Rail Components)

| <u>Name of layer</u> | <u>Number</u> | <u>Description</u> |
|---|---------------|------------------------------------|
| 0 Default | | |
| 1 Control | 1 | (Includes Survey Monuments) |
|  | | |
| 999 Stage 20 Anno | 999 | Stage 20 Const & Temp Traffic Anno |

Track:

| <u>Name of layer</u> | <u>Number</u> | <u>Description</u> |
|--|---------------|--------------------|
| 1000 Undefined | 1000 | Undefined |
|  | | |
| 1099 Undefined | 1099 | Undefined |

Traction Power Substation System:

| <u>Name of layer</u> | <u>Number</u> | <u>Description</u> |
|---|---------------|--------------------|
| 1100 Undefined | 1100 | Open |
|  | | |
| 1199 Undefined | 1199 | Open |

Overhead Contact System:

| <u>Name of layer</u> | <u>Number</u> | <u>Description</u> |
|---|---------------|--------------------|
| 1200 Undefined | 1200 | Open |
|  | | |
| 1299 Undefined | 1299 | Open |

Signaling System:

| <u>Name of layer</u> | <u>Number</u> | <u>Description</u> |
|---|---------------|--------------------|
| 1300 Undefined | 1300 | Open |
|  | | |
| 1399 Undefined | 1399 | Open |

Communication System:

| <u>Name of layer</u> | <u>Number</u> | <u>Description</u> |
|---|---------------|--------------------|
| 1400 Undefined | 1400 | Open |
|  | | |
| 1499 Undefined | 1499 | Open |

Train Control System:

| <u>Name of layer</u> | <u>Number</u> | <u>Description</u> |
|---|---------------|--------------------|
| 1500 Undefined | 1500 | Open |
|  | | |
| 1599 Undefined | 1599 | Open |

Link to DGNLIB on Project Solve follows:

https://ww2.projectsolve2.com/eRoom/SFOF/CAHSRProgramMgmt/0_816d8