

# **Sandia National Laboratories CADD Standards Manual**

**December 2005**

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## Acronyms and Abbreviations

<b>A/E</b>	Architect/Engineer
<b>A/E/S</b>	Architectural/Engineering/Surveying
<b>ASCII</b>	American Standard Code for Information Interchange
<b>BMHA</b>	Building Modification Hazard Assessment
<b>CADD</b>	Computer-Aided Drafting and Design
<b>CCTV</b>	Closed Circuit Television
<b>DOE</b>	Department of Energy
<b>EPPA</b>	Emergency Preparedness Public Address
<b>ESD</b>	Existing Site Data
<b>ESR</b>	Engineering Standards Request
<b>FGIS</b>	Facilities Geographic Information System
<b>FMOC</b>	Facilities Management and Operations Center
<b>HVAC</b>	Heating, Ventilating, and Air Conditioning
<b>LAN</b>	Local Area Network
<b>MGE</b>	Modular Geographic Information System Environment
<b>NMSP</b>	New Mexico State Plane
<b>OSAD</b>	Operational Space Analysis Database
<b>QA</b>	Quality Assurance
<b>RFI</b>	request for information
<b>Sandia/NM</b>	Sandia National Laboratories/New Mexico
<b>SRN</b>	Sandia/NM Restricted Network
<b>UDS</b>	Uniform Drawing System

# Chapter 1 - Introduction to the Facilities CADD Standards Manual

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## 1.1 Introduction

The *Facilities CADD Standards Manual* was produced by Sandia National Laboratories/New Mexico (Sandia/NM) Facilities Management and Operations Center (“Facilities”). It is a supplement to the *Facilities Design Standards Manual* and contains specific information related to Facilities Computer-Aided Drafting and Design (CADD) standards and processes. It is not intended as documentation of the general use of standard software. For general use information, refer to the documentation supplied with the software.

This *Facilities CADD Standards Manual* consists of an introduction; a general chapter describing information about buildings, file management, drawing symbology, cell libraries, and processes; and other chapters that address standards specific to the landscaping, architecture, engineering, fire protection, telecommunications, security, controls, and asbestos management disciplines. In addition, the civil/utility chapters contain information needed to create exterior drawings. Sub-headings are tabbed, and attachments provide forms and additional supporting information.

Adherence to this CADD standards manual is a requirement for all individuals and companies creating or modifying any Facilities CADD files.

## 1.2 Document Updates

It is the responsibility of assigned individuals to incorporate the latest updates issued by Sandia/NM into their copy of the *Facilities CADD Standards Manual*. For off-site contracted firms, it is the responsibility of the delegated representative to forward all updates of the *Facilities CADD Standards Manual* to everyone in the company and to all subcontractors required to use this manual.

As information changes, updates to this manual will be issued in the form of changed pages. Changed pages include a date in the footer. A complete list of revised pages will be provided at the time of issue.

## 1.3 CADD Standards Revision Process

The *Facilities CADD Standards Manual* is not intended to be static. Modifications and updates will be made as processes, software, and procedures change. Comments and suggestions are encouraged so that updates will reflect the needs of Facilities CADD system users.

Anyone may submit a formal proposal for a CADD standards revision using the Engineering Standards Request (ESR) form. ESRs may also be submitted through e-mail as follows:

- To locate the ESR form, connect a drive to the Standards share directory  
\\london\Stdu\Forms\Standards change request
- Save the ESR\_form.doc file in your local hard drive (the Standards directory is read-only)
- Open the file ESR\_form.doc and fill out the fields
- Note the chairperson of the appropriate discipline

- Compose an e-mail message to the chairperson
- Attach the filled-out ESR form, and send the message to the discipline chairperson

The Facilities Engineering Standards Program evaluates the ESR and provides feedback to the requester whether or not the proposal is accepted. If accepted, the proposal is researched and implemented by the appropriate CADD standards development team.

## 1.4 Manual Notation Conventions

The following notation conventions are followed in this manual:

- Computer commands and file names are shown in `Courier` type  
 Examples:  
`Project Wise` (computer program name)  
`ESR_form.doc` (file name)
- Information to be typed by the operator and special characters are shown enclosed in angle brackets (<>)  
 Example:  
`<return>` (the return or enter key)  
`<filespec>` (the specification of a file)
- Actions to be performed by the operator are enclosed in square brackets ([ ])  
 Example:  
`[select checkout button]` (point to the checkout button and press the mouse button)

## 1.5 Definitions

Data	Information, the components of products, and the products themselves
Database	A collection of information organized for easy retrieval. Databases are organized into a hierarchy of files having a predetermined structure and organization that can be communicated, interpreted, or processed by a specific application
ESR	Engineering Standards Request form. Facilities form to allow request for changes to any Engineering or CADD standard
Facilities	Facilities Maintenance and Operations Center 10800 (FMOC), the Sandia/NM center responsible for planning, design, construction, maintenance, and operation of facilities and infrastructure
Font	Text resource file
FGIS	Facilities Geographic Information System

Key Plan	Reduced building plan outline that identifies associated floor plan area and sheet information
Macro	Software program that automates often-used sequence of operations
QA	Quality Assurance
Reference File	A design file that is attached to and viewed simultaneously with the active design file. Reference files can be viewed as part of an active design file, but cannot themselves be modified
Raster graphics	Raster graphics, or bit-mapped graphics, are digital images stored as arrays of pixels for display and modification. In raster data there are no lines, circles, or text – only pixels that are grouped to give the appearance of these elements
Seed file	A template used to create new design files. The new file will have identical settings as that of the seed file
Vector graphics	<p>Vector elements are graphical objects that have a precise direction, length, and shape. The vector graphical objects can be points, lines, cells, rectangles, circles, splines, text, ellipses, etc.</p> <p>In addition to the vector entities, digital drawings may also contain symbols and details (cell), reference drawings, and reference database files</p>
Workspace	Custom MicroStation environment or configuration. For Sandia/NM Facilities, this is called sn1 with supporting files in the Bentley/Workspace/Projects/SNL and Bentley/Workspace/Interfaces directories

## Chapter 2 - General Requirements

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## 2.1 Introduction

All files submitted to Facilities shall follow the file management, drawing symbology, cell libraries, process descriptions, and discipline-specific standards described in this manual.

Graphic files created or modified for Facilities shall be generated using the following software:

- All new graphic files shall be created using MicroStation V8.
- Some existing raster graphics files require IRASB or IRASC to view and show removals of existing elements.
- Changes to existing raster files shall be made in MicroStation V8 vector format.
- These software requirements do not apply to contracts for off-site CADD support for Operational Space Analysis Database (OSAD) or Facilities Geographic Information System (FGIS). For these software requirements refer to the contract.

*For information only:* The following software is currently being used on-site at Sandia/NM Facilities:

### Operating System

- Windows 2000

### Graphic Applications

- MicroStation V8
- IRASB
- IRASC ???
- IPLOT Version 10 Client and Server ???
- Project Layout (P-Layout) ???
- MicroStation Geographics

## 2.2 Access to Facilities CADD Server

Authorized CADD operators are allowed access to the Facilities CADD servers for the purposes of checking out CADD drawings for modification or reference, checking in modified drawings, and other information systems activities. To obtain a Sandia/NM domain user account and password, call Sandia/NM Password Control at 845-9465. For access to the CADD servers, contact the Facilities Technical Support Systems Department 10851. Update???

## 2.3 How to Find Drawing Files

- On-site staff have the capability to search and view drawings in the facilities document management system - ProjectWise. This system should always be your first source for locating all electronic drawings and raster files.
- Off-site Architect/Engineers (A/Es) have the ability to use kiosk machines in the Facilities Technical Library for locating all Facilities electronic drawings and raster files.
- ProjectWise is available on the Library kiosk to view-only access to graphic files located on the CADD file servers. A Sandia/NM domain user account and password must be

obtained before using this machine. For additional instructions on use of this software contact Facilities Technical Support Systems Department 10851. Update??

## 2.4 CADD Files Check-in/Check-out Request

For tracking purposes, all CADD files must be formally checked out before they are used and checked in after they are modified. On-site CADD Technicians connected to the Facilities Sandia/NM Restricted Network (SRN) use ProjectWise to check-out and check-in files.

Off-site contractors are assigned a CADD Technician as a point-of-contact for all files being checked in and out of ProjectWise. All drawing requests need to be made through the on-site Project CADD Coordinator, who will then forward to the assigned CADD Technician for check-in and check-out.

### **Check-out—On-site operators and firms directly connected to the Facilities Local Area Network (LAN).**

Check-out is accomplished through ProjectWise.

### **Check-out—Off-Site firms not directly connected to the Facilities LAN.**

1. Compile a list of needed drawings using the Drawing Request form (refer to Attachment A). This list should include the following items:
  - Name of requester and company
  - Phone number and e-mail address
  - Drawing number
  - Project title
  - System code (see system codes in the Master Files section)
  - Name of Sandia/NM project leader
  - Building number or location
  - Service order/project number
  - Expected Return Date
2. Submit list via fax or e-mail to the Project CADD . There will be a 24-hour turnaround time for needed files; more time may be needed for larger amounts of data.
3. Pick up files when ready. If files are already checked out and unavailable for update, contact the operator/firm who has the file checked out and request that it be checked-in to the Sandia/NM Facilities CADD servers. Update??

**Check-in**

Verify that the new graphic file name and title block description match the Document Management fields exactly. For on-site operators or A/E firms connected to the Facilities LAN, check-in is accomplished through ProjectWise. Off-site A/Es should always make backups of all project-related files before having their files checked in. Files checked out for reference only should not be returned or checked-in.

**2.5 Obtaining New Drawing File Numbers**

All CADD plot files must have an official Uniform Drawing System (UDS) file name assigned to them by (Facilities Technical Support Systems, 845-9313). Please contact Amy or Lisa to reserve drawing numbers. Please verify that the graphic title block information matches the reserved drawing information (use the request form in Attachment B).

**2.6 Deliverable File Requirements**

Sandia/NM retains unrestricted ownership of all data, designs, records, graphics, and supporting tools used in project creation. Sandia/NM also has the right to provide any of this information to other organizations as it deems appropriate. The AE deliverable to the onsite CADD Point of Contact will include redlines, 1 set of check prints and the electronic drawing files on CD.

Project Design Leaders have the right to request electronic files of project work at any time for the purposes of inspection, including quality assurance and standards compliance checks. See Attachment C, Quality Assurance Process.

Vector and raster CADD files may contain reference graphic files and reference database files. These files will not include device or directory specifications in their path names. New file numbers should have been reserved in ProjectWise prior to the start of the project (refer to Section 2.5, Obtaining New Drawing File Numbers).

All graphics files shall be saved with the following view parameters:

- “Fit all” graphic elements in view 1
- Remove all unnecessary graphics outside the border area
- Save file parameters.
- “Design history” must be turned on

**2.7 Data Transfer Requirements**

All project files shall be delivered on one of the physical media noted below. No electronic-mail submissions will be accepted.

**Media** –Data shall be exchanged using one of the following media:

- CD-ROM for large amounts of data
- 3½-inch diskette for smaller amounts of data.

**Labels** – each diskette or CD-ROM shall be labeled and accompanied by a letter of transmittal with the following information:

- Hard copy list of filenames and file description
- Date of submission
- Building numbers
- Project number.

All V7 files must be converted to V8, contact Facilities Technical Support Systems, for conversions.

## 2.8 Drawing File Types

The drawing file types described in this section and the standards described in Section 2.9 apply to all disciplines *except* Civil/Exterior Utilities and External Power and Telecommunications. For information on Civil/Exterior Utilities requirements, refer to Chapter 3.

Facilities uses three major graphic file types: master files, master cut files, and plot files.

- One master file is created per system, per floor.
- The master cut file consists of a clipped portion of the referenced architectural master floor plan, a border file, and generic information such as a north arrow, column grid tags, match lines, key plan, etc. The master cut file is the template for all plot files in that location of the floor plan.
- The plot file is the electronic representation of the drawing to be plotted.

### 2.8.1 Master Files

Each discipline (architectural, mechanical, etc.) and each system (architectural floor plan, HVAC, etc.) has a master file (Figure 2-1). Each system uses its own level assignments. All Master files must be drawn at 1 to 1 (1/4 scale) regardless of plot file scaling. Master files contain the system's components for an entire floor, except for sheet-specific information as defined on master cut files and plot files. The file naming convention for a master file is:

BBBBDFSS.dgn where:

- BBBB is the project code  
 For permanent buildings, the project code is the building number, e.g., 0962, 0887, etc.  
 For mobile offices, the project code is M followed by the MO number, e.g., MO154 has project code M154  
 For transportable buildings (T-buildings), the project code is T followed by the T-building number (padded with leading 0s to make four digits), e.g. T2 has project code 00T2 and T50 is 0T50.  
 For substations, the project code is SB followed by the substation number, e.g., substation 35 has project code SB35.

- D is the discipline, as follows:  
 A architectural

- S structural
- M mechanical
- E electrical
- C controls
- H asbestos
- F fire protection
- F is the floor code; use floor number or B for basement, Z for mezzanine, A for attic,  
P for penthouse, R for roof
- ENL Enlarged master plan (ie; enlarged mech equipment room master plan)

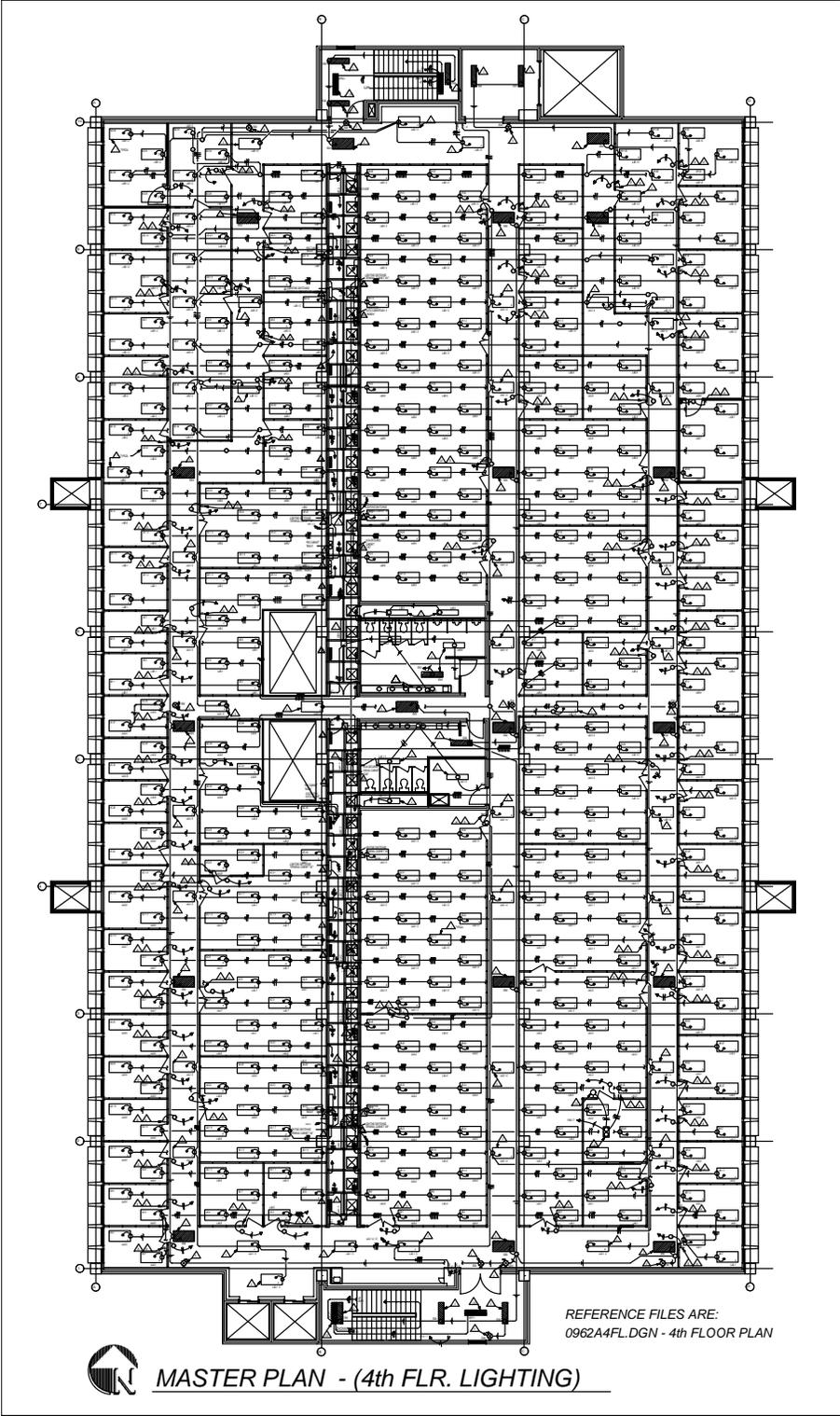


Figure 2-1. Master File

SS is the system code (see System Codes, below)  
 dgn is the standard extension for all master files

**Example:**

0870E1LT.dgn

where

**Building 870**

E electrical  
 1 first floor  
 LT lighting floor plan  
 dgn standard design file extension

**Floor Codes**

1, 2, 3, 4... floor level  
 A attic  
 B basement  
 M mezzanine  
 P penthouse  
 R roof  
 T trench plans

**System Codes (also the logical names)**

KEY KEY PLAN – all floors are located in one file

**Structural (discipline is S)**

FN Foundation Plan  
 TR Trench Plan  
 FF Floor Framing Plan  
 RF Roof Framing Plan  
 BC Bridge Crane Plan

**Architectural (discipline is A)**

LY Layout Plan – furniture (old name: 1\_LY.dgn)  
 EQ Laboratory Equipment Layout Plan – (\*old name: 1\_EQ.dgn)  
 GR Grading Plan/Plot Plan – Civil/Site (see Chapter 3)  
 ST Site Plan – Civil/Site (see Chapter 3)  
 GD Grid Plan  
 FL Floor Plan  
 PR Partition Plan (for existing drawings only. For new drawings, partitions are shown on master floor plan)  
 RC Reflected Ceiling Plan  
 RO Roof Plan

FT            Flooring Textile

Mechanical (discipline is M, P, and D)

ST	Site Plan (see Chapter 8)	GS	Gases and Process Gases Plan
PP	Plan and Profile (see Chapter 8)	LQ	Process Liquids Plan (discipline is D)
DA	HVAC & Exhaust Plan above ceiling	HA	HVAC Piping above
DB	HVAC & Exhaust Plan below ceiling	HB	HVAC Piping below
RO	Mechanical Roof Plan (composite)	PL	Plumbing Plan (discipline is P)

Electrical (discipline is E)

PD	Electrical Site Power Distribution (see Chapter 9)
FE	Fire Alarm Electrical
GR	Grounding
LN	Lightning Protection
LT	Lighting
PW	Power
RC	Receptacle (for existing/old projects only)
UD	Underfloor Duct (for existing/old projects only)
OL	One-line
PP	Exterior Plan and Profile (see Chapter 9)
PS	Panel Schedules (for existing drawings only. New panel schedules are in Excel on the Sandia/NM server)
RO	Electrical Roof Plan (composite)

Fire Protection (discipline is F) (Per Eng. Standards manual)

FA	Fire Protection Plan above ceiling	FB	Fire Protection Plan below floor
FP	Fire Protection Plan occupied space		
FX	Fire Protection Sprinkler systems		

Special Systems (discipline is E)

RD	Radiation/Gas Detection Systems
MD	Toxic Gas Monitoring System
H2	Hydrogen Gas Monitoring System

Telecommunications (discipline is T)

AC	Access Control (TY)
IA	Intrusion Alarm (TY)
CB	Voice/Open Data-existing PDS-black PBX-black LAN
CR	PDS-red-existing
PA	Intercom—Emergency Preparedness Public Address (EPPA) and other public address
BR	communication Black/Red (for new buildings/projects)

Controls (discipline is MI)

CT	Control Floor Plan (1/4-inch scale). For files created before May 1997, code is FL
MP	Mechanical Room Plan (1/2-inch scale)
CD	Control Diagrams
SO	Sequence of Operation
LD	Ladder Diagrams

Asbestos (discipline is H)

AP	Asbestos Survey Plan
CT	Asbestos Ceiling Tile Plan
RO	Roof Plan
AT	Attic Space Plan

Miscellaneous

HZ	Building Modification Hazard Assessment (BMHA)
SP	Space Planning
I	Inspection/Infrastructure Assessment

**2.8.2 Master Cut Files**

Master cut files (Figure 2-2) are standard templates used to create plot files. The Sandia/NM design Architect or Engineer will supply to the A/E firm the Master Cut Files and Key Plans that will be included in a drawing package. The Master cut file references the architectural master floor plan file, master key plan, and the border file. Master cut files contain the following generic elements:

- North arrow
- Title block general information
- Piece mark
- Match line continuation cells
- Keyed notes/general notes piece mark
- Other information that is to appear on every sheet.

Master cut files are assigned drawing numbers from ProjectWise and they follow Sandia/NM's modified version of the Uniform Drawing System (UDS). Refer to section 2.5 Obtaining New Drawing File Numbers.

Master cut files can be done in either 1/4 & 1/8 scale for only Architectural & Structural. SNL Project Manager must give approval for 1/8 scale. Mechanical, electrical, & Piping need to be 1/4 scale, separate 1/4 & 1/8 scale master cut files must be created for the two scaling options. Refer to Master cut files level schema in Chapter 6, under Architectural.

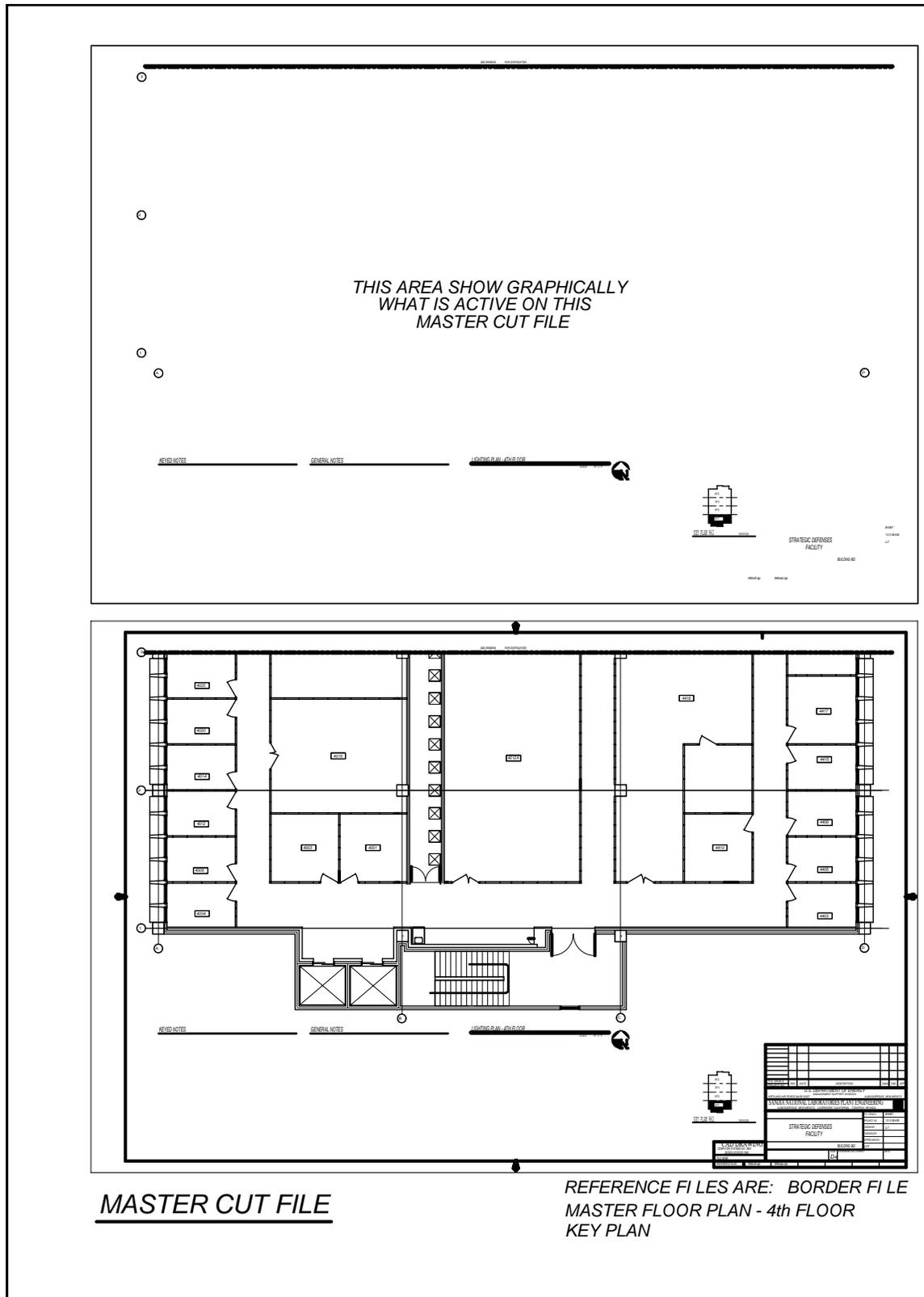


Figure 2-2. Master Cut File

### 2.8.3 Plot Files

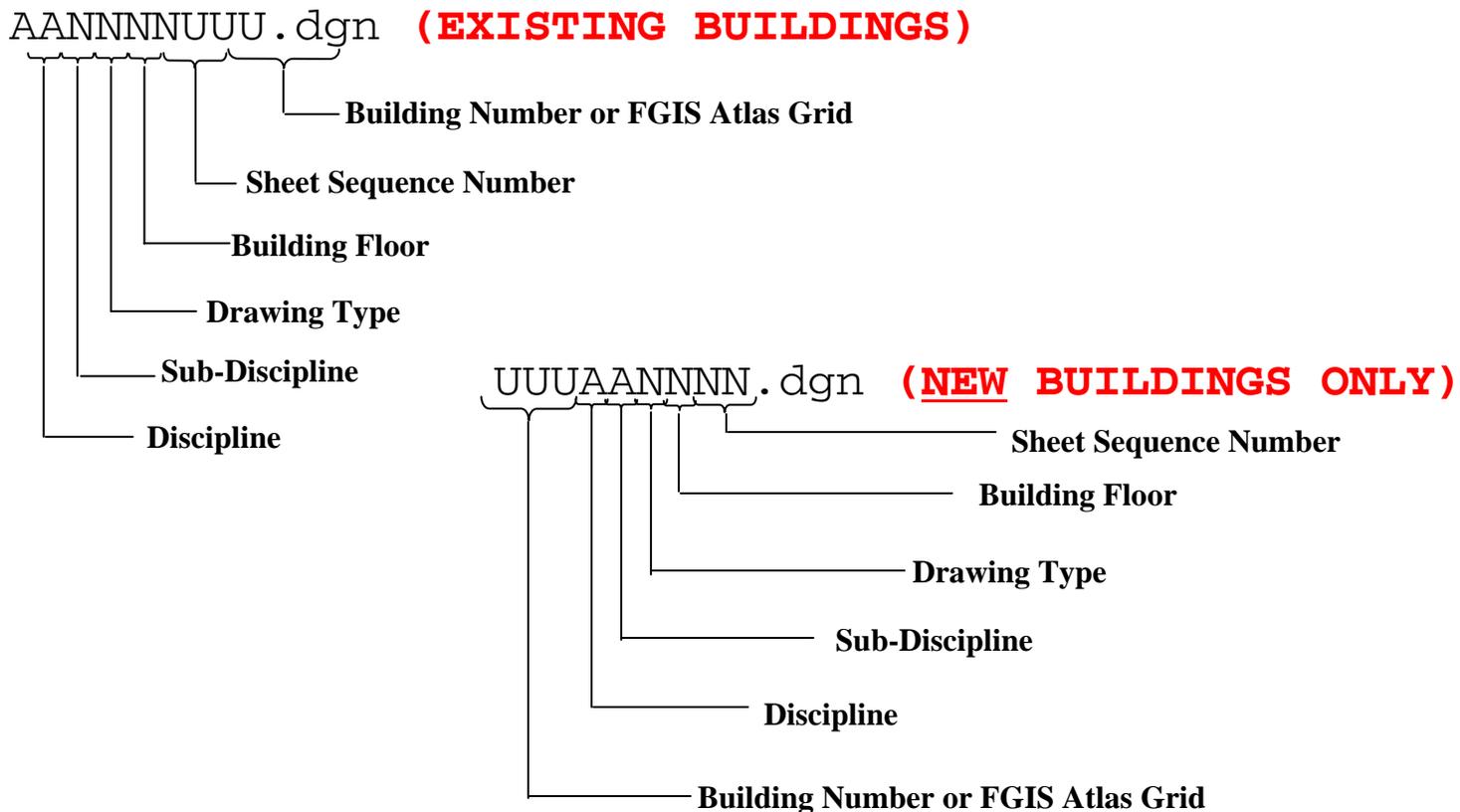
Plot files (Figure 2-3) are the final CADD project files to be plotted. Use reference file, level symbology, to set all Floor Plan graphics to a weight of "0". This will allow the plot file utility discipline (i.e. Electrical/Mechanical Systems) emphasis and standout over the floor plan.

Individual building plot files contain the following active elements

- Construction ballooning and notes
  - New work should always be ballooned; Sandia/NM will not accept shading to identify new work.
- Revision indicators
- Existing symbol indicators
- Keyed and general notes
  - All notes should pertain to the active plot file; Sandia/NM will not accept plot files with generic keyed notes
- Drawing-specific title block information
- Drawing titles
- Drawing continuation numbers

For additional requirements in naming plot files, refer to Section 2.5, Obtaining New Drawing File Numbers. Sandia/NM Facilities follows a version of the Uniform Drawing System (UDS) file-naming convention standard for all plot files.

#### *Sandia/NM Facilities Drawing System*



## *Sandia/NM Facilities Drawing System*

### Discipline

**A**ANNNUUU . dgn

### Disciplines

<b>A</b>	Architectural
<b>B</b>	Geotechnical
<b>C</b>	Civil
<b>D</b>	Process
<b>E</b>	Electrical
<b>F</b>	Fire Protection
<b>G</b>	General
<b>H</b>	Hazardous Materials
<b>I</b>	Interiors
<b>L</b>	Landscape
<b>M</b>	Mechanical
<b>O</b>	Operations
<b>P</b>	Plumbing
<b>Q</b>	Equipment
<b>R</b>	Resource
<b>S</b>	Structural
<b>T</b>	Telecommunications & Security
<b>V</b>	Survey/Mapping
<b>W</b>	Civil Work (Exterior Utilities)
<b>X</b>	Other Disciplines
<b>Y</b>	Multi Disciplines
<b>Z</b>	Contractor/Shop Drawings

All Schedules for all Disciplines  
should use a dash (-)

Multi-Disciplines in one drawing  
use a dash (-)

**Sub-Discipline**

**A**ANNNUUU.dgn

- Multi-disciplines in one drawing use a dash:

**A**-NNNUUU.dgn

**Sub-Disciplines****A-Architectural**

Discipline	Sub-Discipline	Description of Suggested Names	Content
A	<b>D</b>	Architectural Demolition	Protection and removal
	<b>E</b>	Architectural Elements	General Architectural, Floor Plans, Sections, Details, Schedules
	<b>F</b>	Architectural Finishes	<i>Tile &amp; Carpet</i>
	<b>G</b>	Architectural Graphics	<i>Reflected Ceilings</i>
	<b>I</b>	Architectural Interiors	<i>Partitions</i>
	<b>S</b>	Architectural Site	
	-	Multi-Disciplines	

**B-Geotechnical**

Discipline	Sub-Discipline	Description of Suggested Names	Content
B			

**C-Civil**

Discipline	Sub-Discipline	Description of Suggested Names	Content
C	<b>D</b>	Civil Demolition	Structure removal and site clearing
	<b>G</b>	Civil Grading	Excavation, grading, drainage, retention ponds
	<b>I</b>	Civil Improvements	Pavers, flagstone, exterior tile, furnishings, retaining walls, and water features, <i>permanent signing, striping and bumpers.</i>
	<b>P</b>	Civil Paving	Roads, bridges, drives and parking lots
	<b>S</b>	Civil Survey (Site)	Plats, topographic, dimension control, <i>layouts</i>

**C-Civil**

Discipline	Sub-Discipline	Description of Suggested Names	Content
	<b>T</b>	Civil Transportation	Waterway construction, wharves, docks, trams, railway systems, and people movers
* SEE "W"	<b>U</b>	Civil Utilities	Water, sanitary sewer, storm sewer, power, and telecommunications

**D-Process (Used for detailing building user processes)**

Discipline	Sub-Discipline	Description of Suggested Names	Content
D	<b>D</b>	Process/ Plumbing Demolition	Protection, termination, and removal.
	<b>E</b>	<i>Process Electrical</i>	<i>Electrical exclusively associated with a process and not the facility</i>
	<b>I</b>	<i>Process Instrumentation</i>	<i>Instrumentation, measurement, recorders, devices and controllers (electrical and mechanical)</i>
	<b>J</b>	<i>Process Gasses</i>	<i>Piping, valves, insulation, tanks, pumps (compressed air)</i>
	<b>K</b>	<i>Process Shop Drawings</i>	
	<b>P</b>	Process Liquids Piping	Piping, valves, insulation, tanks, pumps
	<b>Q</b>	Process Equipment	Systems and equipment for thermal, electrical, materials handling, assembly and manufacturing, nuclear, power generation, chemical, refrigeration, and industrial processes
	<b>S</b>	Plumbing Site	Extension and connections to Civil Utilities
	-	Multi-Disciplines	

**E-Electrical (See W for electrical exterior site lighting and exterior power)**

Discipline	Sub-Discipline	Description of Suggested Names	Content
E	<b>D</b>	Electrical Demolition	Protection, termination, and removal
E	<b>I</b>	Electrical Instrumentation	Controls, relays, instrumentation, and measurement devices

**E-Electrical (See W for electrical exterior site lighting and exterior power)**

Discipline	Sub-Discipline	Description of Suggested Names	Content
*	<b>J</b>	Receptacle	Not used (except in existing buildings). See EP for new buildings
	<b>K</b>	<i>Under floor</i>	<i>Under floor</i>
	<b>L</b>	Electrical Lighting	
	<b>P</b>	Electrical Power	Power, Receptacle
	<b>Q</b>	Electrical Equipment	Equipment
	<b>S</b>	Electrical Site	<i>Lightning, grounding, and low voltage (&lt;600V)</i>
*	<b>T</b>	Electrical Telecommunications	Telephone, network, voice and data cables
	<b>Y</b>	Electrical Auxiliary Systems	Alarms, nurse call, security, CCTV, PA, music, clock, and program
	-	Multi-Disciplines	

**F-Fire Protection**

Discipline	Sub-Discipline	Description of Suggested Names	Content
F	<b>A</b>	Fire Detection and Alarm	
	<b>J</b>	Toxic Gases	Toxic Gases Monitoring System, Life Safety
	<b>X</b>	Fire Suppression	Fire extinguishing systems and equipment
	-	Multi-Disciplines	

**G-General**

Discipline	Sub-Discipline	Description of Suggested Names	Content
G			<i>Master Cut Files, Key Plans, Evacuation Maps</i>
	<b>C</b>	General Contractual	Phasing, schedules, contractor staging areas, fencing, haul routes, erosion control, temporary and special requirements
	<b>I</b>	General Information	Drawing Index, Code Summary, Symbol Legend, Orientation Maps
	<b>J</b>	General Utilities Space Management	All interior utility locations, routing space designations
	<b>R</b>	General Resource	Photographs, soil borings

**H-Hazardous Materials**

Discipline	Sub-Discipline	Description of Suggested Names	Content
H	<b>A</b>	Asbestos	Asbestos abatement, identification, or containment
	<b>C</b>	Chemicals	Toxic chemicals handling, removal or storage
	<b>L</b>	Lead	Lead piping or paint removal
	<b>P</b>	PCB	PCB containment and removal
	<b>R</b>	Refrigerants	Ozone depleting refrigerants

**I-Interiors**

Discipline	Sub-Discipline	Description of Suggested Names	Content
I	<b>D</b>	Interior Demolition	
	<b>F</b>	Interior Furnishings	
	<b>G</b>	Interior Graphics	Murals and visuals
	<b>N</b>	Interior Design	
	-	Multi-Disciplines	

**L-Landscape**

Discipline	Sub-Discipline	Description of Suggested Names	Content
L	<b>C</b>	Hardscape	Fountains, Shade Structures, Water Features, Special Rock
	<b>D</b>	Landscape Demolition	Protection and removal of existing landscaping
	<b>I</b>	Landscape Irrigation	
	<b>P</b>	Landscape Planting	

**M-Mechanical (See W for mechanical exterior site conditions)**

Discipline	Sub-Discipline	Description of Suggested Names	Content
M	<b>D</b>	Mechanical Demolition	Protection, termination, and removal
	<b>H</b>	Mechanical HVAC	Ductwork, air devices, equipment and <i>exhaust</i>
	<b>I</b>	Mechanical Instrumentation <i>Controls</i>	Instrumentation and controls

**M-Mechanical (See W for mechanical exterior site conditions)**

Discipline	Sub-Discipline	Description of Suggested Names	Content
	<b>J</b>	<i>Exhaust Only Systems</i>	<i>Use only when Exhaust is deviled out</i>
	<b>P</b>	Mechanical Piping	Chilled and heating water, steam, tower water
	<b>Q</b>	Mechanical Equipment	Equipment
	<b>S *</b>	Mechanical Site	Utility tunnels and piping between facilities,
	-	Multi-Disciplines	

**P-Plumbing**

Discipline	Sub-Discipline	Description of Suggested Names	Content
P	<b>L</b>	Plumbing	Domestic water, sanitary and storm drainage fixtures

**Q-Equipment**

Discipline	Sub-Discipline	Description of Suggested Names	Content
Q	<b>A</b>	Athletic Equipment	Gymnasium, exercise, aquatic, and recreational
*	<b>B</b>	Bank Equipment	Vaults, teller units, ATMs, drive-through
*	<b>C</b>	Dry Cleaning Equipment	Washers, dryers, ironing, and dry cleaning
*	<b>D</b>	Detention Equipment	Prisons and jails
*	<b>E</b>	Educational Equipment	Chalkboards, library
	<b>F</b>	Food Service Equipment	Kitchen, bar, service, storage, and processing
*	<b>H</b>	Hospital Equipment	Medical, exam, and treatment
	<b>L</b>	Laboratory Equipment	Science labs, planetariums, observatories
	<b>M</b>	Maintenance Equipment	Housekeeping, window washing, and vehicle servicing
	<b>P</b>	Parking Lot Equipment	Gates, ticket and card access
*	<b>R</b>	Retail Equipment	Display, vending, and cash register
*	<b>S</b>	Site Equipment	Bicycle racks, benches, playgrounds
*	<b>T</b>	Theatrical Equipment	Stage, movie, rigging systems
*	<b>V</b>	Video/Photographic	Television, darkroom, and studio

**Q-Equipment**

Discipline	Sub-Discipline	Description of Suggested Names	Content
		Equipment	
*	<b>Y</b>	Security Equipment	Access control and monitoring, surveillance
	-	Multi-Disciplines	

**R-Resource**

Discipline	Sub-Discipline	Description of Suggested Names	Content
R	<b>A</b>	Resource Architectural	Existing facility architectural drawings
	<b>C</b>	Resource Civil	Surveyor's information and existing civil drawings
	<b>E</b>	Resource Electrical	Existing facility electrical drawings
	<b>M</b>	Resource Mechanical	Existing facility mechanical drawings
	<b>S</b>	Resource Structural	Existing facility structural drawings
	-	Multi-Disciplines	

**S-Structural**

Discipline	Sub-Discipline	Description of Suggested Names	Content
S	<b>B</b>	Structural Substructure	Foundation, piers, slabs, and retaining walls
	<b>D</b>	Structural Demolition	Protection and removal
	<b>F</b>	Structural Framing	Floors and roofs
	<b>S</b>	Structural Site	

**T-Telecommunications**

Discipline	Sub-Discipline	Description of Suggested Names	Content
T	<b>A</b>	Audio Visual	Cable, music, and CCTV systems
	<b>C</b>	Clock and Program	Time generators and bell program systems
	<b>I</b>	Intercom	Intercom and public address systems
	<b>J</b>	<i>Red Data Network</i>	<i>Red/black telecommunications</i>
	<b>M</b>	Monitoring	Monitoring, alarm systems, <i>special alarms</i>
	<b>N</b>	Data Networks	Network cabling, equipment <i>and black telecommunications</i> , Telephone systems, wiring, and equipment
	*Existing only		

**T-Telecommunications**

Discipline	Sub-Discipline	Description of Suggested Names	Content
	<b>Y</b>	Security	Access control and alarm systems, <i>Intrusion alarm</i>
	-	Multi-Disciplines	

**V-Survey/Mapping**

Discipline	Sub-Discipline	Description of Suggested Names	Content
V	<b>A</b>	Aerial Photos	<i>Photogrammetry</i>
	<b>D</b>	Demolition	
	<b>E</b>	<i>Electrical</i>	<i>Traffic Signals</i>
	<b>F</b>	Field Survey	<i>Design Topo</i>
	<b>G</b>	Natural Gas	
	<b>H</b>	<i>Chilled Water</i>	
	<b>I</b>	Digital Survey	
	<b>J</b>	<i>Lighting</i>	<i>Parking Lot and Street Lighting</i>
	<b>K</b>	<i>Boundary</i>	<i>Land Use Permits, DOE Boundaries, Survey Const. Monuments</i>
	<b>L</b>	LP Gas	
	<b>M</b>	<i>Steam and Condensate</i>	
	<b>O</b>	Fiber Optic	
	<b>P</b>	Power	
	<b>R</b>	Storm Sewer	
	<b>S</b>	Sanitary Sewer	
	<b>U</b>	Combined Utilities	
	<b>V</b>	<i>Environmental</i>	<i>Monitor Wells, ER Sites</i>
	<b>W</b>	Water	

**W-Civil Work (Exterior Utilities)**

Discipline	Sub-Discipline	Description of Suggested Names	Content
W	<b>D</b>	Demolition	
	<b>E</b>	<i>Electrical</i>	<i>Traffic Signals, Telecommunications</i>
	<b>G</b>	Natural Gas	
	<b>H</b>	<i>Chilled Water</i>	<i>Tower Water, Reclamation Water</i>
	<b>J</b>	<i>Lighting</i>	<i>Street and Parking Lot Lighting</i>
	<b>L</b>	LP Gas	<i>Oil</i>
	<b>M</b>	<i>Steam and Condensate</i>	
	<b>O</b>	Fiber Optic	
	<b>P</b>	Power	

**W-Civil Work (Exterior Utilities)**

Discipline	Sub-Discipline	Description of Suggested Names	Content
	<b>R</b>	Storm Sewer	
	<b>S</b>	Sanitary Sewer	
	<b>U</b>	Combined Utilities	
	<b>V</b>	Cable TV	
	<b>W</b>	Water	

**X-Other Disciplines**

Discipline	Sub-Discipline	Description of Suggested Names	Content
X			

**Y-Multi Disciplines**

Discipline	Sub-Discipline	Description of Suggested Names	Content
Y	<b>I</b>	Controls	e.g. Mechanical and Electrical Controls

**Z-Contractor/Shop Drawings**

Discipline	Sub-Discipline	Description of Suggested Names	Content
Z			

**Drawing Type**

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## Drawing Types

- 0 General (symbols legend, notes, etc)
- 1 Plans (plan view ¼-inch scale)
- 2 Elevations (vertical view)
- 3 Sections, Wall sections (sectional views)
- 4 Large Scale Views (plans, elevations, stair sections, or sections that are not details)
- 5 Details

- 6 Schedules/Equipment Lists
- 7 Diagrams
- 8 Plan and Profiles
- 9 3D Representations (isometrics, perspectives, photographs)

### **Building Floor**

AANNNNUUU . dgn

(Single Story Buildings use number 1. Existing and old drawings will show this as a 0.)

Floor Number

- B Basement
- 1 First Floor
- 2 Second Floor
- 3 Third Floor
- 4 Fourth Floor
- 5 Fifth Floor
- P Penthouse
- R Roof
- M Mezzanine
- U Under Floor
- Z Basement Mezzanine

### **Sheet Sequence Number**

AANNNNUUU . dgn

Sheet Sequence Number

Numeric count of Discipline, Discipline Modifier, and Sheet Type Designator

- 01
- 02
- 99

### **Building Number or FGIS grid number**

AANNNNUUU . dgn

Building Number

No preceding “0”; example: “963” would be 963

Use entire building number; example: 6585A

FGIS Grid Numbers

Exterior files not associated with a building will use the FGIS Grid numbers  
Example: F12

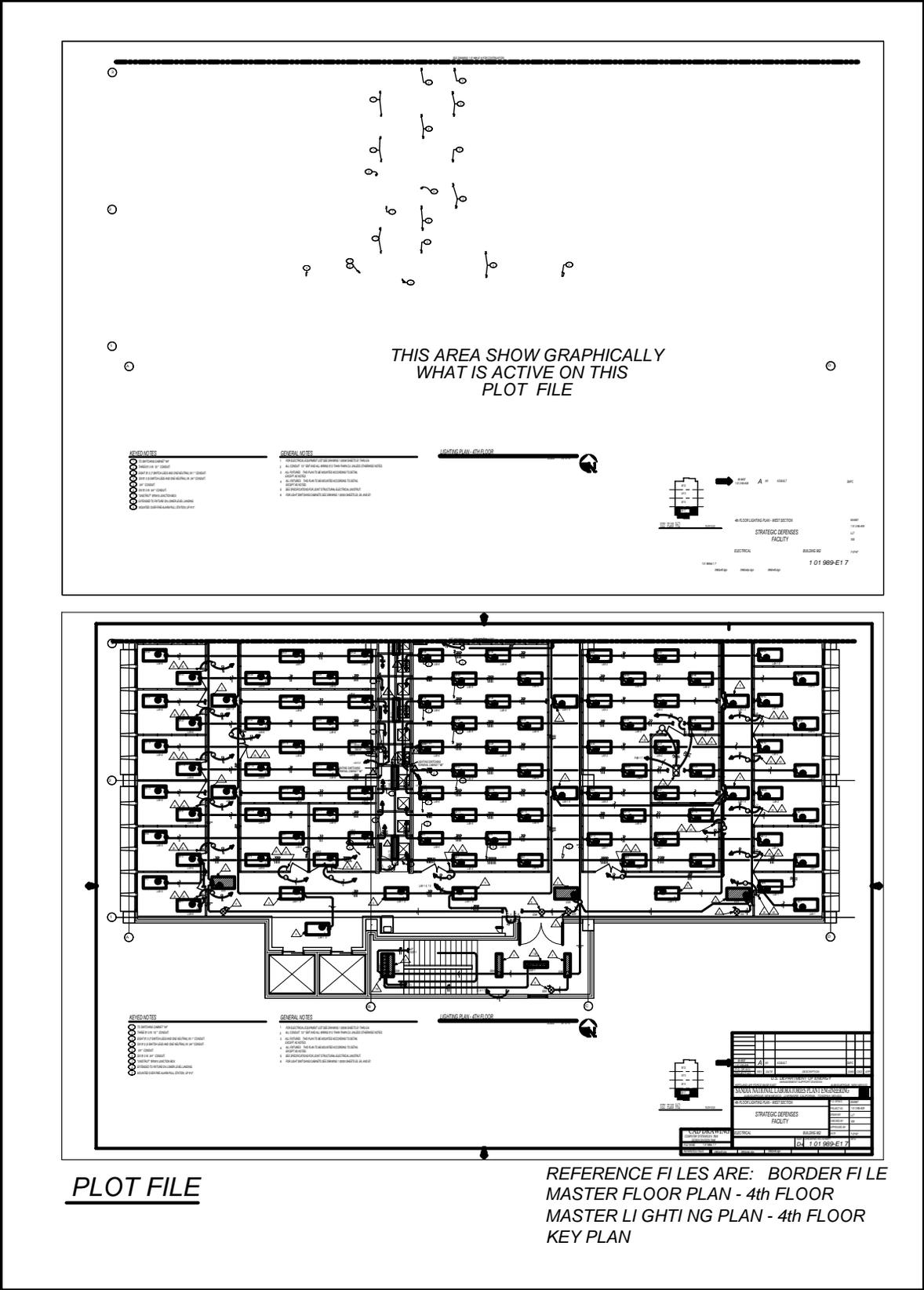


Figure 2-3. Plot File

## Master File/Plot File Symbology Locations

<u>Item</u>	<u>Master Files</u>	<u>Plot Files</u>
Equipment Symbology and Text	X*	
Conduit Symbology and Text	X*	
Elevation Designations and Text	X	
System Element and Text	X	
Dimensions	X**	X**
Sections and Details	X***	X***
General Note Mark and Text		X
Keyed Note Mark and Text		X
Keyed Note Symbology		X*

**General Note:** Facilities CADD Standards assign each element to exactly one master plan. Elements shall be active only in their assigned master plans. The element assignments are shown in the level schema in each discipline section. To show an element on a master file other than the one to which it is assigned, reference in the assigned master plan and turn off the unwanted levels.

### Special Notes:

- \* Place leader line and terminator with level and symbology of associated note.
- \*\* As a general rule, place dimensions on the master plan with associative dimensioning and, as needed, on the plot file.
- \*\*\* Section and detail markers may be placed in either master plans or plot files.

### 2.8.4 Key Plans

The key plan shall be referenced into the master cut file. The procedure for creating a master key plan drawing is as follows:

1. Create a master Key Plan drawing. Key plans are assigned drawing numbers from Project Wise and they follow Sandia/NM's modified version of the Uniform Drawing System (UDS). Refer to section 2.5 Obtaining New Drawing File Numbers.
2. Reference in the master floor plan, you may copy info out of the reference to create the key plan with properties below: After you have copied the info from the reference file detach it. Properties for the elements in the key plan. Use new level names.
  - ARCH\_BLDGFT - Building footprint
  - ARCH\_GRID\_COL - Column grid centerlines (optional)
  - ARCH\_GRDTAG - Column grid tags and text (optional)
  - ARCH\_MATCH - Match lines, break lines, targets
  - GEN\_KEY - Sheet or Area text and title
  - GEN\_NORTH - North Arrow
  - GEN\_KEYPLAN1 - Cross Hatching for Area 1 ....
  - GEN\_KEYPLAN26 - Cross Hatching for Area 26

- ARCH\_BLDGFT - color and style = bylevel, weight = 5
  - ARCH\_GRID\_COL - color and style and weight = bylevel
  - ARCH\_GRDTAG - color and style and weight = bylevel
  - ARCH\_MATCH - color and style and weight = bylevel
  - GEN\_KEY - color and style = bylevel, weight = 2
  - GEN\_NORTH - color and style and weight = bylevel
  - GEN\_KEYPLAN1 - color and style = bylevel, weight = 2
  - GEN\_KEYPLAN26 - color and style = bylevel, weight = 2
3. Scale down the foot print so that it fits to the left and above the title block. Note the scale for all associated floor plans.
  4. After all the areas and levels have been assigned, the operator can turn off all the levels except the levels they need on for that particular sheet. Changing the level name allows the operator to assign the crosshatched areas to different areas using the new level names.  
Example:     GEN\_KEYPLAN1 - for area 1 or sheet 1  
                  GEN\_KEYPLAN26 - for area 26 or sheet 26
  5. After the key plan has been created, attach it to the master cut files with correct levels being turned on for that sheet or area.

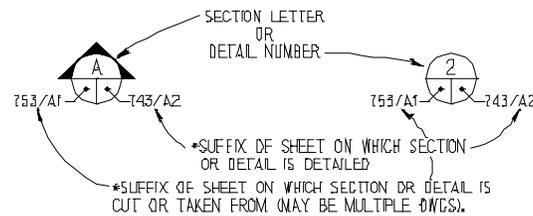
### 2.8.5 Border Files

The standard border sheet size is 24 by 36 inches (D+). Facilities uses one standard border file, `border3.dgn`. The file contains several different size borders within it. The common one used is 24- by 36-inch (D+) border sheet for the generation of plot and master cut files, 22- by 34-inch (D) for consistency with some existing drawing sheets, and 30- by 42-inch (E) for use only under the direction of the Project Manager. Boundary clip the selected border and place the fence about ¼ inch outside the dotted cutting edge.

### 2.8.6 Details and Sections

Details and sections shall be presented separately from all other drawings types. Elements shall be active in the plot file (**no referenced master files**). Details and sections do not have level schemas. Follow the corresponding floor plan schemas when feasible. Refer to the level schema for plan drawings in the appropriate discipline-specific section of this manual.

Details and sections may vary in scale, depending on the type and quantity of information on them. Details and sections may be scaled by temporarily changing the working units. Details may also be drawn outside the border at 1:1 scale. Fence scale the detail and move it to the desired location within the border. Detail sheets shall be plotted at ¼ inch = 1 foot 0 inches, unless otherwise noted in file specific information cell. Details and sections shall be properly labeled and cross-referenced. Sections shall be labeled using upper-case letters and details are numbered.



## Master Laboratory Equipment Layout

The architectural discipline generates a master file showing the location of all laboratory equipment. The laboratory equipment layout file (system code = eq) is referenced by all other disciplines. Modifications, additions, and removals are made only in the one master equipment file.

### 2.8.7 Schedules

The file `schedule.dgn` (Figure 2-4) contains the mechanical and electrical equipment lists, electrical conduit schedules, architectural master door and window schedule, and the master room finish schedule. All systems in a discipline are included on a single reference file.

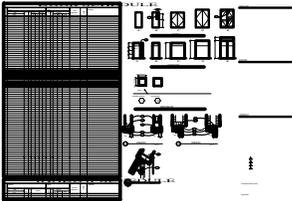
Check out `schedule.dgn` from ProjectWise as a reference file and attach it to the plot file. Fence copy the schedule into the plot file. When adding items to the schedule, do not duplicate numbers already on a record drawing schedule.

The door/window and room finish schedules contain blank listings with data fields to simplify text input. Legend elements are intended for placement in the room finish schedule matrix to denote location of a required finish (North, South, East, West).

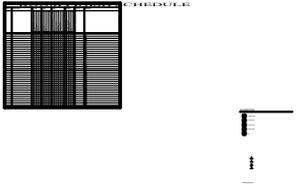
### 2.8.8 Roof Plan

Each discipline has a separate roof plan. Reference the master roof plans to each other to see the location of all equipment and structures. Special care should be taken to line up vertical pipes, vents, chases, equipment, and structural components with the floors below.

*D+ SCHEDULE*      *D+ SCHEDULE*  
ARCHITECTURAL

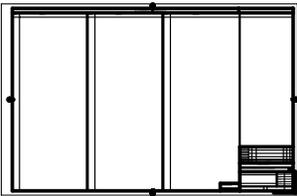
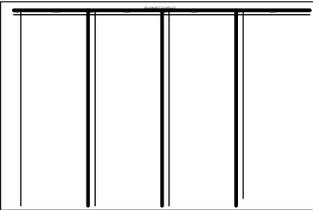


*DOOR SCHEDULE*

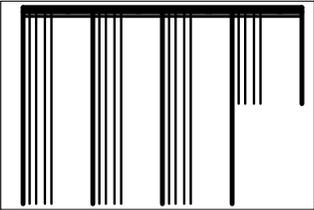


*ROOM FINISH SCHEDULE*

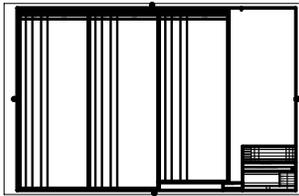
*D+ SCHEDULE*      *D SCHEDULE*  
MECHANICAL



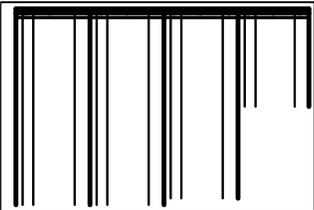
ELECTRICAL



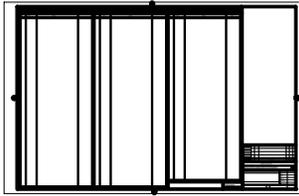
*CONDUIT SCHEDULE*



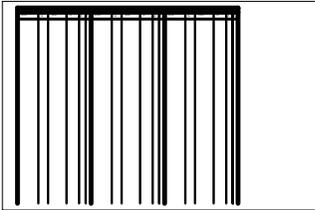
*CONDUIT SCHEDULE*



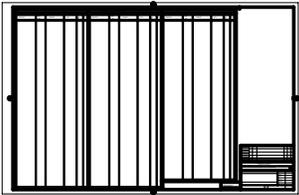
*EQUIPMENT LIST*



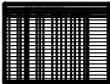
*EQUIPMENT LIST*



*PCC NAMEPLATE SCHEDULE*



*PCC NAMEPLATE SCHEDULE*



*MOTOR CONTROL CENTER SCHEDULE*

**Figure 2-4. Schedule.dgn**

## 2.9 System Standards

The following standards are generic for all building graphic requirements. Not included in this section are system standards for Civil/Exterior Utilities and Exterior Power and Telecommunications, which are in Chapter 3. Discipline-specific standards are covered in the discipline chapters.

### 2.9.1 Working Units

Working units for all building drawing files are as follows:

Master units = ft or '

Sub-units = in or "

Resolution, = 96,000

### 2.9.2 Cells

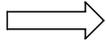
Building graphic cells are created at a scale of 1:1. Use the library `noting.cel` (Figure 2-5) for common cells used by all building disciplines when possible. Cell libraries for each discipline are noted in the following chapters. Cells not available in these libraries shall be created in accordance with the *Facilities CADD Standards Manual* and submitted through the ESR Process. All new cells created by an A/E must be created on system specific levels with A/E's initials included.

### 2.9.3 Drawing Scale

Drawing scale is 1:1. Architectural, mechanical, and electrical plans and schedules are plotted at a scale of ¼ inch = 1 foot 0 inches. Other drawings, such as elevations, sections and details, may be plotted at a scale other than ¼ inch = 1 foot; however, this information shall be documented in the file using the file-specific information cell. With SNL Project Manager approval, 1/8 scale is permitted for architectural & Structural plot file (plans). Mechanical, Electrical & Piping must be ¼ scale. Separate Master Cut Files must be created for the two scaling options. Refer to Master Cut File level schema in Chapter 6, Architectural. All Master files are to be drawn at 1 to 1 (1/4 scale).

### 2.9.4 North Arrow

Building master files shall be drawn with north pointing up. If the building warrants the north arrow pointing left, rotate the orientation on the master cut files and plot files by *view rotations* to the referenced building master files. Master cut files and plot files for any given building shall show the north arrow in the same orientation on all sheets.

<b>NOTING.CEL</b>		
<b>NAME</b>	<b>DESCRIPTION</b>	<b>CELL</b>
<i>ARROW</i>	<i>ARROW HEAD USED FOR LEADERING</i>	
<i>EL</i>	<i>NOTING "KEYED NOTE" ELLIPSE</i>	
<i>CIRC</i>	<i>NOTING "DOOR" SYMBOL</i>	
<i>SQ</i>	<i>NOTING "CONDUIT SCHEDULE" SQUARE</i>	
<i>SQ4</i>	<i>NOTING 4 CHARACTER "CONDUIT SCHEDULE" SQUARE</i>	
<i>TRI</i>	<i>NOTING "ELECTRICAL EQUIPMENT" TRIANGLE</i>	
<i>HEX</i>	<i>NOTING "MECHANICAL EQUIPMENT" HEXAGON</i>	
<i>DIA</i>	<i>NOTING "CONTROLS EQUIPMENT" DIAMOND</i>	
<i>REVTRI</i>	<i>REVISION TRIANGLE</i>	
<i>TBTRI</i>	<i>TITLE BLOCK REVISION TRIANGLE</i>	
<i>TBARRW</i>	<i>TITLE BLOCK REVISION IDENTIFIER</i>	
<i>NORTH</i>	<i>NORTH ARROW - UP</i>	
<i>NORTHL</i>	<i>NORTH ARROW - LEFT</i>	
<i>CONT</i>	<i>LEADERING CONTINUATION MARK</i>	
<i>SECARR</i>	<i>SECTION BUBBLE ARROW</i>	
<i>SEC</i>	<i>DETAIL / SECTION BUBBLE</i>	
<i>SECID</i>	<i>SECTION IDENTIFIER</i>	
<i>TARGET</i>	<i>ELEVATION TARGET</i>	

RC = NOTING.CEL

**Figure 2-5. Noting.cel**



NOTING.CEL			
NAME	DESCRIPTION		CELL
TTLSEC	SECTION BUBBLE FOR TITLES		
GENNOT	GENERAL NOTES COLUMN	GENERAL NOTES	
KEYNOT	KEYED NOTES COLUMN	KEYED NOTES	
LEGEND	LEGEND COLUMN	LEGEND	
TITLE	PIECE MARK	ARCHITECTURAL PLAN - AREA 10 SCALE: _____	
4SDTIT	4" SECTION/DETAIL COLUMN	 SECTION "AA" SCALE: 1/2"=1'-0"	
6SDTIT	6" SECTION/DETAIL COLUMN	 DETAIL B SCALE: 1/2"=1'-0"	
MATCH	MATCHLINE - FOR CONTINUATION SEE DRAWING		
DOT	DOT USED FOR LEADERING		•
BREAK	BREAK SYMBOL		†
BRKT	NOTING BRACKET		{
LNTAG	LINE IDENTIFIER TAG		⊞
POCONN	PT. OF CONN. FROM NEW TO EXIST. CONST.		⊗
POREM	END POINT OF REMOVAL		◊

RC = NOTING.CEL

**Figure 2-5. Noting.cel, continued**

## Font Resource File

Facilities has modified the default MicroStation font resource file. Therefore, `font.rsc`, `font_3`, is included in the Sandia/NM configuration files that are provided on request. The changes to the `font.rsc` file include the following:

### 2.9.5 Text

General text settings are as following:

- Font = 3
- Text height = :6
- Text width = :5
- Line weight = 1
- Line spacing = :3
- Line length = 127
- Text justification is top left.

Use the cell library `noting.cel` (Figure 2-5) for standard cells with data fields when possible. For additional heading not available in `noting.cel` use the following settings:

- Font = 3
- Text height = :9
- Text width = :7
- Line weight = 2

Text size may be adjusted as required to miscellaneous plans plotted at other than ¼-inch scale.

### 2.9.6 Reference Files

Reference files allow the designer to use other discipline's drawings without copying or recreating them. When referencing building master files, do not move the reference file and use the 2 letter master file system code as the logical name as shown in the following example:

RF = 0962a2fl.dgn, fl            where fl is the logical name for the floor plan  
 RF = 6920a2rc.dgn, rc            where rc is the logical name for the reflected ceiling plan.

Plot files are never permitted to be referenced into any other drawing files!

### 2.9.7 Levels

Refer to the discipline-specific sections of this manual for level schemas. User-defined levels are used where the standard level schemas do not accommodate design needs. **Contact the Project CADD Coordinator or Amy Rhutasel (845-9313) for approval of user-defined**

**levels.** User-defined levels must be system specific (defined) with A/E initials and also be documented in the graphic file using the file specific information cell.

Never reference plot files to any drawing!

### 2.9.8 Title Block

To complete the graphic drawing title block use the standard library `noting.cel`, cell `mastertag`, which contains tags. See Figure 2-6 for an example.

### 2.9.9 Line Weights

Standard line weight assignments for plans drawings are specified in the level schemas in the discipline-specific sections of this manual. Line weights for details and sections are drawn according to design needs.

### 2.9.10 Line Styles

Line style assignments for plan drawings are specified in the level schemas in the discipline-specific chapters of this manual. Line styles for details and sections are drawn according to design needs.

### 2.9.11 Color Tables

Colors are assigned by number and are specified in the level schemas in the discipline-specific sections of this manual. Color assignments for details and sections are drawn according to design needs. Facilities CADD standards include the following color tables:

<code>default.tbl</code>	architectural color table
<code>elec.tbl</code>	electrical color table
<code>hvac.tbl</code>	heating ventilating/air conditioning color table
<code>plmb.tbl</code>	plumbing color table
<code>gisp.ctb</code>	gis color table

### 2.9.12 Z Depth

The active Z-depth for all files is 0.0000, with depth lock on, except if the plan is to be used for a model.

### 2.9.13 Standard Drawings

See Section 2.4.6 of the Facilities Design Standards Manual for detailed information about standard drawings.

## 2.10 Standard Palette Menus

### 2.10.1 Introduction

To maximize the efficiency of the Facilities CADD system, a custom workspace (`sn1`) has been written. The SNL workspace includes custom tool boxes, tool frames, macros, user commands, and menu bars. The custom workspace is designed to be useful to all technicians, but its use is not mandatory. The following sections describe the capabilities and limitations of the standard palette menus.



### 2.10.2 Getting Started

A custom workspace for an organization as large as Facilities can contain several hundred programs, including MDL applications, user commands, cell libraries, and resource files. Off-site contract firms may obtain a copy of the workspace from the Facilities Technical Support Systems Department.

While the palettes are designed to be self-explanatory and easy to use, it is important to read and follow all prompts, since many execute MDL applications and user commands.

### 2.10.3 Custom Menus and Tool Boxes

When MicroStation starts, it displays a custom command window. For each design discipline, Sandia/NM provides several category submenus accessible under the Sandia/NM menu and a Maps pull-down menu to attach GIS graphic files. All of the submenus operate like standard MicroStation menus but perform special functions. Selecting each submenu loads that system's tool frame menu. Each individual tool frame can be pulled off to show the tool boxes available for that selection. The submenus are illustrated in the following figures:

<u>Discipline</u>	<u>Figure</u>
Architectural	2-7
Structural	2-8
Mechanical	2-9
Electrical	2-10
Controls	2-11
Civil/Site/Survey/Manholes	2-12
Maps	2-13
Planimetric Data	2-14
Planning Data	2-15
Transportation Data	2-16
Topographic Data	2-17
Utility Data	2-18
Survey Data	2-19
Misc. FGIS Data	2-20

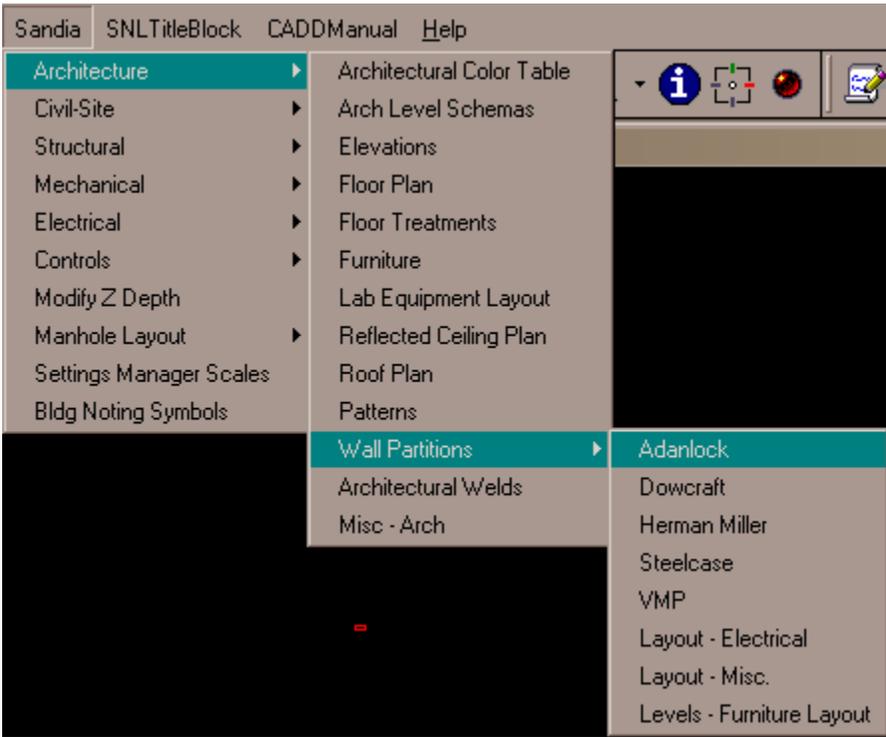
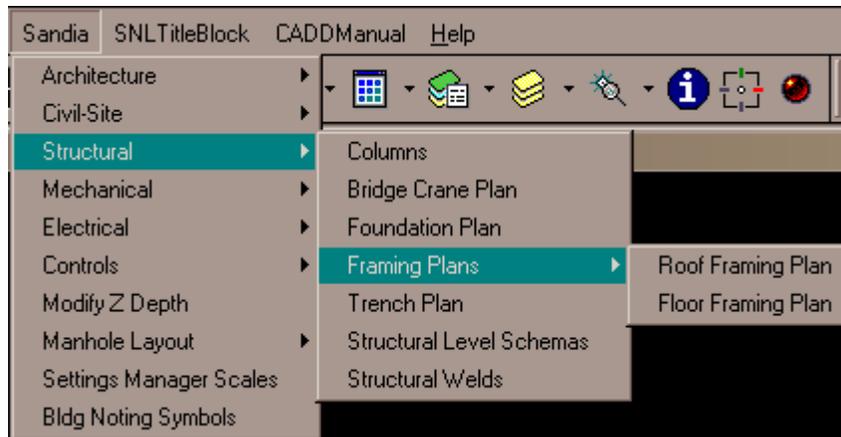
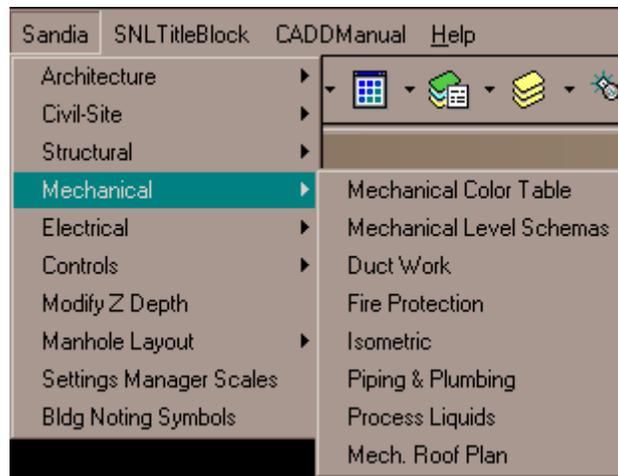


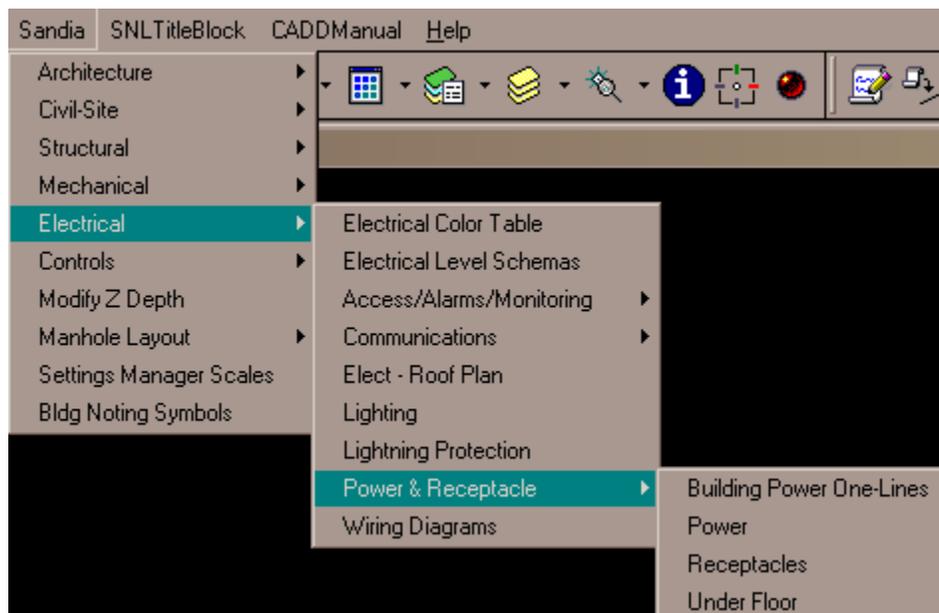
Figure 2-7. Architectural and Architectural Noting Submenu

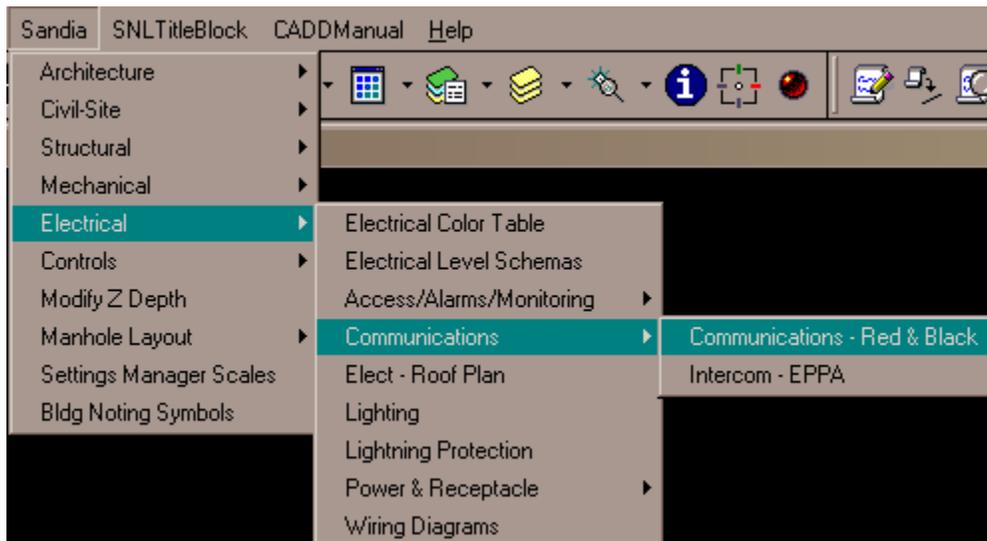
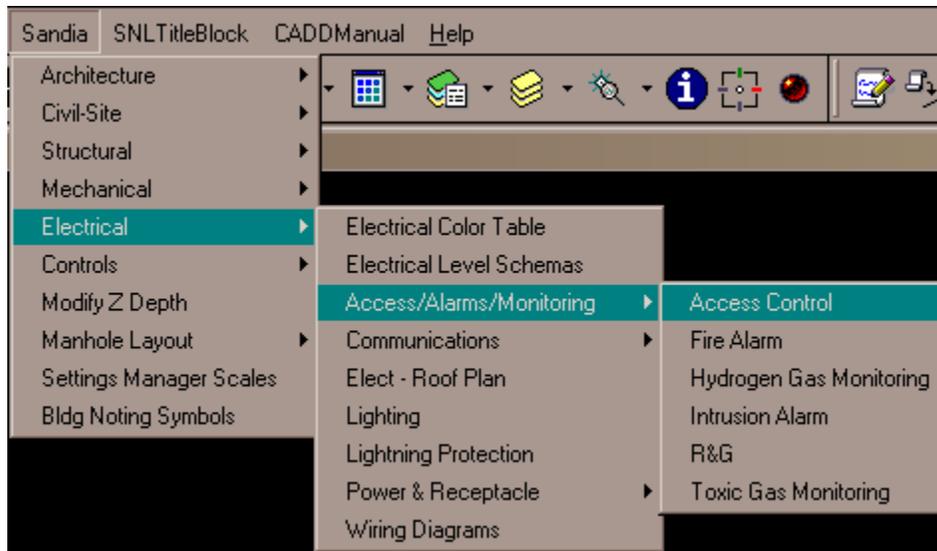


**Figure 2-8. Structural Submenu**

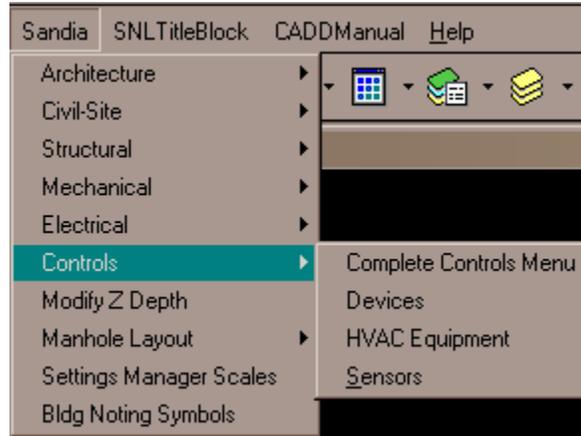


**Figure 2-9. Mechanical Submenu**

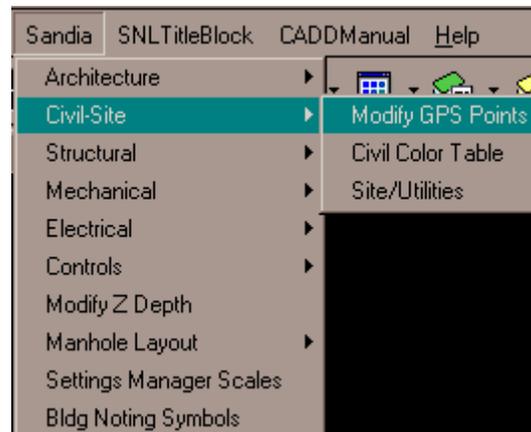
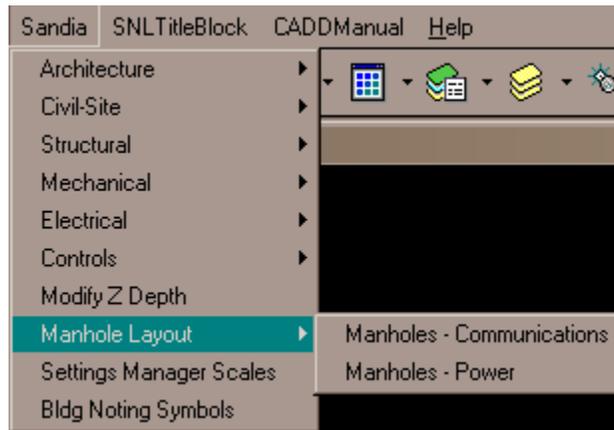




**Figure 2-10. Electrical Submenu**



**Figure 2-11. Controls Submenu**



**Figure 2-12. Civil/Site/Survey/Manhole Submenu**

### **Level Assignments**

The level schemas shown in this chapter are the standard element level definitions for general system files. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator for approval before using user-defined levels. All user-defined levels shall be identified using the File Specific Information (FSI) cell located in `noting.cel`.

General Noting Level Scheme

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
GEN_SHT	SHEET EDGE	0	1	0
GEN_NORTH	NORTH ARROW	0	0	0
GEN_TBLK	TITLE BLOCK INFORMATION (GENERIC)	0	0	1
GEN_KEY	KEY PLAN	0	0	0
GEN_GRID	COLUMN GRIDS	2	4	0
GEN_GRDTAG	COLUMN GRID TAGS AND ASSOCIATED TEXT	2	0	1
GEN_ESD-LWT0-15	LINE WEIGHT = 0 (.15)	9	0	0
GEN_ESD-LWT1-25	LINE WEIGHT = 1 (.25)	0	0	1
GEN_ESD-LWT2-25	LINE WEIGHT = 2 (.25)	2	0	2
GEN_ESD-LWT3-35	LINE WEIGHT = 3 (.35)	4	0	3
GEN_ESD-LWT4-50	LINE WEIGHT = 4 (.50)	7	0	4
GEN_ESD-LWT5-70	LINE WEIGHT = 5 (.70)	1	0	5
GEN_ESD-LWT6-80	LINE WEIGHT = 6 (.80)	5	0	6
GEN_SYMB	REFERENCE SYMBOLS AND TEXT - SECTION, DETAIL, & ELEVATION CUTS	0	0	1
GEN_SYMBTXT	REFERENCE SYMBOLS AND TEXT - SECTION, DETAIL, & ELEVATION CUTS	0	0	1
GEN_TARGET	TARGETS	0	0	1
GEN_NOTING	KEYED NOTES, GENERAL NOTES, LEADER LINES, TERMINATORS	0	0	1
GEN_TITLE	DRAWING COMPONENT TITLES, SCALES, & ASSOCIATED GRAPHICS	0	0	1
GEN_TTLSCL	DRAWING COMPONENT TITLES, SCALES, & ASSOCIATED GRAPHICS	0	0	1
GEN_TTLASC	DRAWING COMPONENT TITLES, SCALES, & ASSOCIATED GRAPHICS	0	0	1
GEN_LEGSCH	LEGEND AND SCHEDULE GRAPHICS	0	0	3
GEN_LSTXT	LEGEND AND SCHEDULE TEXT	0	0	1
GEN_DIMENSIONS	DIMENSIONS AND ASSOCIATED LEADER LINES AND TERMINATORS	3	0	0
GEN_USRDEF1	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_USRDEF2	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_USRDEF3	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_USRDEF4	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_CONSNTS1	CONSTRUCTION NOTES & BALLOONS - 1st REVISION	5	0	1
GEN_CONSBLN1	CONSTRUCTION NOTES & BALLOONS - 1st REVISION	5	0	6
GEN_CONSNTS2	CONSTRUCTION NOTES & BALLOONS - 2nd REVISION	37	0	1

## Chapter 3 - Civil/Site/Exterior Utility/Surveys, Power Manholes, Telecommunication Manholes

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## Section 3a – Civil/Site/Utility/Surveys Drawing Standards and Level Schema

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### 3a.1 Introduction

This section describes the CADD requirements for civil/site/utility/surveys drawing standards and level schema.

### 3a.2 Drawing File Types

Sandia/NM Civil Site Group uses two major graphic file types: Construction files and Survey files.

- The Construction file includes Survey and New Construction Data.
- Topographic Surveys and Boundary/Land Use Permit Surveys include measurement data of real property. Environmental surveys include data pertaining to location of monitoring wells or other areas of environmental concerns.

Existing Site Data (ESD) files sent out (hard copy and/or electronic files) to Architectural/Engineering/Surveying (A/E/S) firms generally contain one utility or planimetric system per file unless otherwise requested.

- ESD files include existing conditions for the selected Sandia/NM area. These files will be provided in a hard copy format unless otherwise specified by the assigned Sandia/NM Civil CADD coordinator. When the ESD files are provided in electronic format, these files ONLY represent data for reference (for clarification and infrastructure routing purposes). These files are not to be incorporated (referenced) into the design file. If data from the ESD files is needed in the construction files, it must be inserted manually into the construction file. The data must not be copied/referenced from the provided ESD files. See Section 3a.6, Sandia/NM Furnished Existing Site Data (ESD) File, for the procedure to request ESDs.

### 3a.3 Construction Files

Construction files are the final CADD files to be plotted. These files contain the new and existing data required to construct a project. This file is a stand-alone file where all the graphics are in an active format.

All Civil/Site/Utility and/or Survey systems work shall be based on ground distances and grid bearings, unless otherwise indicated. Final submittal requires that the drawing files be converted to the Sandia/NM grid-based coordinates by applying the project combined ground to grid factor. Stationing and other dimensions shall remain as ground distances.

### 3a.4 Site/Utility/Surveys CADD Drawing/Creation

Construction files and Survey Site files

1. Construction and Site Survey files shall be generated from the `gis_seed.dgn` seed file. The Civil/Site/Utility and/or the Survey Level Schema must be followed for the

creation of civil-related drawings; refer to the schemas at the end of this section. All new Site work shall be based on ground distances and grid bearings (gis\_seed.dgn) unless otherwise indicated. A/E/Ss shall maintain a Master file system in Title I and Title II to simplify changes and modifications to the design as the projects progresses:

2. Title I – a printed set of drawings shall be submitted for review (unless otherwise directed by the project manager).
3. Title II – a printed set of drawings shall be submitted for review (unless otherwise directed by the project manager).
4. Title III – a printed set of 11- by 17-inch drawings shall be submitted for review along with Electronic drawing files in MicroStation (.dgn) format. At this time electronic files shall be converted back to Sandia/NM grid-based coordinates by applying the project combined ground to grid factor. Electronic files must be stand-alone files, by copying all graphics active per construction plot file. No reference files shall be attached within the drawing files. The Sandia/NM supplied border file will also be copied into the drawing file as an active element. Failure to comply with the Civil/Site/Utility and/or Survey standards will result in incompatible and unacceptable files.

### 3a.5 Survey Files

1. Survey files are the final CADD files to be plotted. These files must contain the required survey data outlined in the Scope of Work for boundary/land use permit surveys, topographic surveys or environmental surveys.
  - Survey drawings will be provided electronically in MicroStation (.dgn) format to Sandia/NM prior to commencing the engineering design.
  - One 24- by 36-inch stamped Mylar and one 11- by 17-inch stamped Mylar hard copy will also be required (unless otherwise specified by the Project Manager).
  - In addition, a corresponding ASCII (.txt) file in an electronic format and a hard copy of the ASCII file will be required upon final submission.
  - All survey nodes shall be a “+” and all text nodes (point numbers, feature codes, elevations, and descriptions) must be at a 45° angle in legible format.
2. The electronic version of each survey drawing must contain all of the data that the ASCII file contains (control monuments, TBM, loop closures, etc.). This data shall be independent from the final submittal (plot file). Within the electronic graphic file this data shall be placed on user-defined levels. Sandia/NM intent is that the information used to gather the survey may be turned off independently from the actual Sandia/NM requested survey.
3. All surveys must comply with the Survey CADD drawings level schema enclosed at the end of this section.

### 3a.6 Sandia/NM Furnished Existing Site Data (ESD) File

Each ESD file reflects present conditions and approximate locations for exterior utilities, roads, sidewalks, fences, planimetrics, etc. An ESD file is a composite of the Facilities Geographic Information Systems (FGIS) maps. Each ESD files that is provided contains the following disclaimer: ***The location of utilities contained in these files is approximate and may not represent all utilities and/or accurate site conditions. The A/E/S or Sandia/NM designer shall***

*verify the actual vertical and horizontal locations of the underground utilities prior to the design. A topographic design survey shall be performed for all site related projects unless otherwise directed by the Sandia/NM project manager.*

1. Submit an ESD Request Form to CADD Coordinator. This form defines the geographic location and boundaries required, and include the Sandia/NM project leader's name, and the project number.
2. Sandia/NM CAD Technicians extract the requested data from the Master Sandia/NM/FGIS files to create the .esd file and then sends a copy to the Architectural/Engineering/Surveying (A/E/S) firm as required. These .esd files will be provided in MicroStation format. The data in these files resides on the levels and contains the colors and line types that Sandia/NM uses to maintain these infrastructure master Sandia/NM/FGIS files. This data is provided in this manner so that the A/E/S has the flexibility to manipulate these files (turn elements on and off and delete) as needed to fit the application.
3. The ESD files serve as the A/E/S Composite Master Site files from which the Construction files are created, in the event that a design topographic survey is not provided. When a topographic survey is performed, the ESD file is used to provide information that may not be indicated on the topographic survey. Any ESD data that is provided and incorporated into the construction file **must** be modified (levels 50-54, etc.) to conform to the Civil/Site/Utility and/or Survey CADD standards. Refer to the enclosed level schema. Do not return any ESD files in the final deliverable to Sandia/NM.
4. Project No. with task shall be provided for each esd request.

### **3a.7 Naming Files**

The convention for naming files is based on a Uniform Document System (UDS). Refer to Chapter 2 for the requirements and the process for obtaining new drawing numbers.

### **3a.8 Sandia/NM Supplied Border Files**

One Sandia/NM furnished file (bdut1.dgn) includes plan type drawing borders of varying scales. Another Sandia/NM furnished file (bdpp.dgn) includes plan and profile drawing borders of varying scales. Select the scale, which is appropriate to the desired plot scale. The selected border shall be copied into the plot file so that all data becomes active, and each border shall contain Sandia/NM tag data in the title block information section.

### **3a.9 Details and Sections**

Details and sections shall be active in the plot file (no referenced files). Details and sections for the exterior disciplines shall follow the corresponding site level schema. Refer to the Civil/Site level schema enclosed at the end of this section.

### 3a.10 Sketches

Sketches are used when the drawing is not required to be a permanent record drawing or when a new drawing is not warranted. Examples of sketches are Request for Information (RFI) or change order support documents, concept drawings, traffic control plans/phasing plans, detour(s) signage and striping, etc. In lieu of a drawing number, enter the word “sketch” followed by a suffix if more than one sketch is required. Contact the Sandia/NM Civil project CADD Coordinator for approval of the “sketch” naming convention.

The drawing as-built process will incorporate RFI and change order documents at project completion. This process updates the existing drawings to incorporate directed changes and usually does not require a new drawing.

### 3a.11 Seed File

The Sandia/NM Furnished Seed File is `gis_seed.dgn`. It is based on the New Mexico State Plane (NMSP) Coordinate System, New Mexico Central Zone, North American Datum 1927 and North American Vertical Datum 1929. Sandia/NM Seed File based on grid coordinates. All exterior plan work shall be based on ground distances and grid bearing unless otherwise indicated.

### 3a.12 Cell Libraries

Cells for construction plot files shall be scaled to match the plotting scale factor. Refer to Section 3a.16 for cell plotting scale factors. The standard site cell libraries include the following:

- `util.cel` All site/utility cell pertinent to file.

Cells not available in these libraries shall be created at 1:1 scale factor. Cells that are created for a specific project by an A/E should be stored in a miscellaneous Cell Library and submitted to Sandia/NM with the final deliverable. Sandia/NM will evaluate and consider possible implementation into the Sandia/NM `util.civil.cell` library.

### 3a.13 Global Origin

Use seed file `gis_seed.dgn`. Do not move location of ESD files. The site location must not change within the Sandia/NM coordinate system.

### 3a.14 Text Font

Facilities have modified the default MicroStation Font Resource File, `font.rsc`, `font001`, which is included in the Sandia/NM-provided configuration files. The changes to the `font.rsc` file include the following:

- Putting a slash through the number 0 to differentiate it from the letter O
- Adding a tick at the top of the number 1 to differentiate it from the letters l and I
- Substituting the degree (°) symbol for the caret (^) sign
- Substituting the diameter (Ø) symbol for the question mark (?)

### 3a.15 Text Styles

The final scale affects the text parameters for text entry. To maintain consistency, text shall be center justified, with text parameters (at various scales) as follows. The following table lists the scale factors used for text and cells for creating plot files using `bdu.tl.3D` and `bdpp.3D`:

Plotting Scale Factor		Cell	Text		
Name		AS=	TH=	TW=	LS=
Civil	4:1	1	.5	.4	.3
Civil	2:1	.5	.25	.2	.15
Civil	10:1	2.5	1.25	1	.75
Civil	20:1	5.	2.5	2	1.5
Civil	30:1	7.5	3.75	3	2.25
Civil	40:1	10.	5	4	3
Civil	50:1	12.5	6.25	5	3.75
Civil	60:1	15	7.5	6	4.5
Civil	100:1	25	12.5	10	7.5
Civil	200:1	50	25	20	1
Survey Date			1.64	1.64	
Survey Elevation			1.64	1.64	
Survey Feature Code			1.64	1.64	

### 3a.16 Levels

Refer to the Civil/Site/Utility and/or Survey level schema enclosed at the end of this section. User-defined levels are used when the standard level schema do not accommodate the design needs of a particular project. Contact the Sandia/NM Civil project CADD Coordinator for approval of user-defined levels. User-defined levels shall be documented in the graphic plot file using the file-specific information cell (`AC=FSI`) that resides outside the Sandia/NM supplied border files.

### 3a.17 Line Weights

Line weight assignments are specified in Civil/Site/Utility and/or Survey level schema enclosed at the end of this section. Line weights for details and sections are drawn according to design need.

### 3a.18 Line Styles

Line style assignments are specified in Civil/Site/Utility and/or Survey level schema enclosed at the end of this section.

### 3a.19 Color Table

Colors are assigned by number and are specified in the Civil/Site Level Schema at the end of this section. Use color table `gisd.ctb` for all site-related files.

### 3a.20 Z Depth

- Surveys (boundaries, topographic, utility) provided for Sandia/NM must hold “Z” depth as collected in the field.
- Sandia/NM supplied ESD files shall maintain 0.00 “Z” depth.
- Construction Plot files shall have a “Z” depth of 0.00 at time of final submittal. If any survey data is used to compile the construction plot file, the survey data must hold “Z” depth as collected in the field.
- Use “modify Z depth” to “flatten” files under the “Sandia” menu pull down.

### 3a.21 Sandia/NM Standard Drawings

Standard drawings are used to facilitate the design process by providing typical details and templates for incorporation into design packages. These files are not to be edited in any way or form. Do not check in standard drawings to the Sandia/NM CADD file server. When requested, the standard Drawings will be provided by the assigned CADD coordinator. If a standard file is modified for any reason it automatically becomes its own independent file and part of a Construction set. A new UDS number should be assigned to this file, or it will be considered to be unacceptable!

### 3a.22 How to Use Sandia/NM Standard Drawings

When it is necessary to create new composite detail files using certain details from Sandia/NM Standard drawings, A/Es must create a new file, copy/insert required details, and assign a new UDS drawing number.

Arch. Drawing Standards	Use Arch working units 12:8000
Site/utility Drawing Standards	Use Site/utility working units 1000:1

Do not mix standard architecture and site details.

*For additional information on using standard drawings, refer to Chapter 2, General Requirements.*

### **3a.23 View Rotation**

If a view must be rotated for clarity, use the command Change View Rotation. The coordinates shall remain true. Use this command to rotate a view while holding the coordinate system in place.

The MicroStation Rotate View Command is found under the Tools, View Control Pallete bar, menu

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- Electronic files submitted to Sandia/NM should maintain the coordinate system that Sandia/NM supplied with the ESD files or by using the `gis_seed.dgn` seed file unless specified otherwise by the Project Manager.
- Do not rotate border or Existing Site Data files.

Section 3a– Civil/Site/Utility/Surveys Drawing Standards and Level Schema

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
CIVIL_AFPL	AIR FORCE PROPERTY LINE	168	6	3
CIVIL_APATS	AREA PATTERNS-EXAMPLE:CONC.,GRAVEL AREA	0	0	0
CIVIL_ASPRD	ASPHALT ROAD	248	0	2
CIVIL_ASPWALK	ASPHALT WALKWAY	248	0	2
CIVIL_BLDG	NEW BUILDING FOOT PRINT	1	0	5
CIVIL_BLDGMISC	BUILDING OTHER	1	0	3
CIVIL_BLDGTX	BUILDING SYSTEM RELATED TEXT	1	0	2
CIVIL_BPATH	BICYCLE PATHS	248	0	2
CIVIL_CHILLMISC	CHILLED WATER MISC-TANKS,VALVE PITS ETC	6	0	2
CIVIL_CHILLTXT	CHILLED WATER ANNOTATIONS	6	0	2
CIVIL_CHILLWTR	CHILLED WATER-SUPPLY AND RETURN LINES	6	0	8
CIVIL_COMMH	COMMUNICATION MANHOLES,HANDHOLES,PULL BOXES, CABINETS ETC.	21	0	3
CIVIL_COMMLN	COMMUNICATION LINES- DUCT BANK, DIRECT BURY, ETC	21	0	8
CIVIL_COMMMISC	COMMUNICATION MISC.	21	0	0
CIVIL_COMMTXT	COMMUNICATION LINE ANNOTATIONS	21	0	2
CIVIL_CONCSW	CONC. SIDEWALK	248	0	2
CIVIL_CSTLMT	CONSTRUCTION LIMIT LINE	1	6	3
CIVIL_CURB	CURB AND GUTTER	248	0	2
CIVIL_DEMO	DEMOLITION- LINE WORK, HATCH PATTERNS ETC.	1	0	2
CIVIL_DEMOTXT	DEMOLITION ANNOTATIONS- ALL TEXT	1	0	2
CIVIL_DETAILS	SITE DETAILS - ALL GRAPHICS INCLUDING TEXT AND DIMENSIONS	0	0	0
CIVIL_DIMS	DIMENSIONS, ALL	100	0	1
CIVIL_BLADERD	BLADED DIRT ROAD	248	0	2
CIVIL_DRNCCHNL	DRAINAGE CONCRETE CHANNELS	28	0	5
CIVIL_DRNECHNL	DRAINAGE EARTH CHANNELS	28	0	5
CIVIL_DRNMISC	DRAINAGE MISCELLANEOUS	28	0	2
CIVIL_DRNPONDS	DRAINAGE -RETENTION PONDS,DETENTION PONDS,	28	0	2
CIVIL_ELEC	ELECTRICAL LINES, DUCT BANKS	10	0	8
CIVIL_ELECEQUIP	ELECTRICAL EQUIPMENT, SWITCHGEAR, TRANSFORMERS, PANELS ETC	10	0	3
CIVIL_ELECMH	ELECTRICAL MANHOLES	10	0	8
CIVIL_ELECMISC	ELECTRICAL MISCELLANEOUS	10	0	8
CIVIL_ELECOH	ELECTRICAL OVERHEAD LINES	10	0	8
CIVIL_ELECOHPP	ELECTRICAL LINE OVERHEAD POWER POLES,GUY WIRE ETC	10	0	8
CIVIL_ELECSEC	ELECTRICAL SECONDARY LOW VOLTAGE LINES	10	0	8
CIVIL_ELECSECMISC	ELECTRICAL SECONDARY MISC.,RECEPTACLES,PULLBOXES,ELEC.PANELS ETC	10	0	8
CIVIL_ELECSECTXT	ELECTRICAL SECONDARY ANNOTATIONS	10	0	2
CIVIL_ELECTXT	ELECTRICAL ANNOTATIONS	10	0	2
CIVIL_ESD_ELECT	ALL COMBINED EXISTING ELECT., COMM., STLTG., OVERHEAD POWER LINES	234	2	0
CIVIL_ESD_MECH	ALL COMBINED MECH., SEWER, STORM, WATERM THERMAL, GAS & STEAM	234	2	0
CIVIL_ESD_SITE	ALL OTHER EXISTING SITE COMPONENTS	234	0	0
CIVIL_ESD_STRUCT	ALL EXISTING BUILDINGS & STRUCTURES	234	0	1
CIVIL_ESD_TRANS	ALL EXISTING ROADS, CURB & GUTTER, PARKING LOTS, ETC.	234	0	0
CIVIL_GAS	GAS LINES	5	0	8
CIVIL_GASTXT	GAS SYSTEM- ALL ANNOTATIONS	5	0	2
CIVIL_GRD_TXT	GRADING ANNOTATIONS	130	0	2
CIVIL_GRD_MISC	GRADING MISCELLANEOUS	130	0	3

Section 3a– Civil/Site/Utility/Surveys Drawing Standards and Level Schema

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
CIVIL_GRD_CONTNEW	GRADING - CONTOURS NEW	130	0	3
CIVIL_FEN_BARBW	FENCING - BARBED WIRE	0	3	3
CIVIL_IRRIG	IRRIGATION LINES - ALL COMPONENTS	0	0	8
CIVIL_IRRIGTXT	IRRIGATION ANNOTATIONS	0	0	2
CIVIL_LDSCP	LANDSCAPING - ALL COMPONENTS	0	0	0
CIVIL_LEADER	TERMINATORS,LINE LEADERS	1	0	0
CIVIL_LEGEND	LEGENDS- GRAPHICS	1	0	0
CIVIL_LSCAPETXT	LANDSCAPING ANNOTATIONS	0	0	2
CIVIL_MATCHLN	MATCHLINES	0	6	3
CIVIL_NOTCELL	NOTING CELLS	0	0	0
CIVIL_NOTINGTXT	KEYED NOTES,LEGEND, GENERAL NOTES	0	0	2
CIVIL_PKGLOT	PARKING LOTS	248	0	2
CIVIL_PLTXT	PROPERTY LINE ANNOTATIONS	0	0	2
CIVIL_PROFEXIST	EXISTING PROFILE DATA	0	2	0
CIVIL_PROFNEW	PROFILE NEW DATA	0	0	3
CIVIL_PROFTXT	EXISTING PROFILE TEXT-ALL	0	0	2
CIVIL_RR	RAILROADS	1	0	1
CIVIL_RRTXT	RAILROAD TEXT	1	0	2
CIVIL_SAS	SEWER LINES	2	0	8
CIVIL_SASMH	SEWER MANHOLES	2	0	2
CIVIL_SASTEXT	SEWER SYSTEM - ALL ANNOTATIONS	2	0	2
CIVIL_SIGNS	ROAD SIGNS	136	0	2
CIVIL_SNLPL	SNL PROPERTY LINE	89	4	3
CIVIL_STEAM	STEAM LINES-SUPPLY & RETURN LINES	4	0	8
CIVIL_STEAMEXT	STEAM SYSTEM ALL ANNOTATIONS	4	0	2
CIVIL_STEAMMH	STEAM PITS - CONCRETE OUTLINE	4	0	3
CIVIL_STEAMMISC	STEAM MISC.	4	0	2
CIVIL_STORM	STORM DRAIN LINES	28	0	8
CIVIL_STORMMH	STORM DRAIN MANHOLES	28	0	8
CIVIL_STORMMISC	STORM DRAIN MISC. INLETS,RAIN WATER LEADERS	28	0	3
CIVIL_EXT_LIGHTING	SECURITY AND STREET LIGHTING	156	0	8
CIVIL_GRD_CONTTXT		130	0	2
CIVIL_GRD_CONTEXIST		130	2	0
CIVIL_FEN_WOODEN	FENCING - WOODEN	0	3	3
CIVIL_FEN_CHLNK	FENCING - CHAIN LINK	0	3	3
CIVIL_FEN_BLOCK	FENCING - BLOCK	0	3	3
CIVIL_FEN_TEMP	FENCING - TEMPORARY	0	3	3
CIVIL_SVYCNTL	CONTROL MONUMENTS, TIES, BENCHMARKS,TEXT	1	0	2
CIVIL_TLTXT	TITLE BLOCK TEXT	1	0	0
CIVIL_TRANSMISC	PARKING BUMPERS,GUARD RAILS,MISC.	0	0	0
CIVIL_WATER	WATER LINES	56	0	8
CIVIL_WATERMISC	WATER LINES,VALVES,REDUCERS,CONNECTORS REGULATORS ETC.	56	0	2
CIVIL_WATERTXT	WATER SYSTEM - ALL ANNOTATIONS	56	0	2
GEN_DIMENSIONS	DIMENSIONS AND ASSOCIATED LEADER LINES AND TERMINATORS	2	0	0

## Section 3b – Power Manholes Drawing Standards and Level Schema

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### 3b.1 Introduction

Power manhole drawings shall be generated using the Sandia/NM CADD Workspace Power Manhole Palette. Drawings shall be drawn at a 1:1 scale and shall be plotted at  $\frac{3}{4}$  inch = 1 foot 0 inches using the Sandia/NM supplied  $\frac{3}{4}$ -inch border. No reference files shall be attached; all elements shall be active. Refer to the sample manhole drawing at the end of this section for typical cells and elements that constitute a power manhole drawing.

### 3b.2 General File Requirements

This chapter includes requirements for drawing file types and standards only. For the following requirements and standards refer to Chapter 2:

- CADD Software Requirements
- Access to the Facilities CADD Server
- How to Find Drawing Files
- CADD Files Check-in/Check-out
- Obtaining New Drawing File Numbers
- Deliverable File Requirements
- Data Transfer Requirements

Refer to Chapter 2, Section 2.9.1 for working unit settings.

Refer to Chapter 2, Section 2.9.14 for use of standard drawings.

Refer to Chapter 2, Section 2.10 for general information on the Sandia/NM CADD Palette menus

### 3b.3 Construction Plot Files

Construction Plot files are the final CADD files to be plotted. Plot files contain new and existing data and specific project information required to construct a project.

#### 3b.3.1 Naming Plot Files

To obtain a new drawing number/file name refer to Chapter 2, Section 2.5, Obtaining New Drawing File Numbers. Sandia/NM Facilities follows a version of the Uniform Drawing System (UDS) file naming convention standard for all plot files.

Power Manhole Drawings are named as follows:

WP5101MH067 .dgn

Where

W = Discipline (Civil Works)

P = Sub Discipline (Power)

5 = Drawing Type

1 = Tech Area Manhole Location  
01 = Sequence Number  
MH067 = Manhole Number

To obtain new electrical manhole numbers, contact George Torrez at 844-6191

### **3b.3.2 Border Files**

Manhole drawings shall use the ¾-inch border file supplied in the Sandia/NM CADD Workspace Manhole Palette.

### **3b.3.3 Plot Files**

All of the noting cells, noting symbols, title block tag data, revision tag data, and text shall be inserted from the Sandia/NM CADD Workspace Power Manhole Palette, as these are automatically scaled to coincide with the ¾-inch border required for the manhole drawings.

## **3b.4 Cell Libraries**

The following cell library shall be used for power manhole drawings:

MHPWR.cel                      Manhole cell library

## **3b.5 Levels, Line Weights, and Line Types**

Refer to the level schema at the end of this section. User-defined levels, line weights, and line types are used when the standard schema do not accommodate design needs of a particular project. Contact the Sandia/NM Project CADD Coordinator for approval of user-defined levels. User-defined levels shall be documented in the graphic plot file using the file-specific information cell (AC=FSI).

Section 3b–Power Manholes Drawing Standards and Level Schema

Name	Description	ByLevel Color	ByLevelS tyle	ByLevel Weight
ELEC_PMH_FED4201	FEEDER 4201/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_WLOL	MH WALL OUTLINE/ GROUNDING/ RACKS/ PULL IRON/ SUMP & SUMP PUMP	0	0	0
ELEC_PMH_TBDY	T-BODY	3	0	1
ELEC_PMH_SWITCH		5	0	0
ELEC_PMH_SPLICE	FEEDER SPLICE	3	0	3
ELEC_PMH_REMOVALS	REMOVALS	216	0	3
ELEC_PMH_PINSUL	PORCELAIN INSULATOR	0	0	0
ELEC_PMH_OTLN	MH PLAN VIEW (OUTLINE) COVER/ LADDER/ VENTS/ DRAIN	0	0	0
ELEC_PMH_GNTX	GENERAL TEXT / BORDER	0	0	0
ELEC_PMH_FEDTERM	FEEDER TERMINATION	3	0	3
ELEC_PMH_FED4107	FEEDER 4107/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	120	0	3
ELEC_PMH_FED4106	FEEDER 4106/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	120	0	3
ELEC_PMH_FED4105	FEEDER 4105/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	120	0	3
ELEC_PMH_FED4104	FEEDER 4104/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	120	0	3
ELEC_PMH_FED4103	FEEDER 4103/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	120	0	3
ELEC_PMH_FED4102	FEEDER 4102/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	120	0	3
ELEC_PMH_FED4101	FEEDER 4101/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	120	0	3
ELEC_PMH_FED3802	FEEDER 3802/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	1	0	3
ELEC_PMH_FED3801	FEEDER 3801/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	1	0	3
ELEC_PMH_FED3707	FEEDER 3707/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	119	0	3
ELEC_PMH_FED3706	FEEDER 3706/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	119	0	3
ELEC_PMH_FED3705	FEEDER 3705/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	119	0	3
ELEC_PMH_FED3704	FEEDER 3704/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	119	0	3
ELEC_PMH_FED3703	FEEDER 3703/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	119	0	3
ELEC_PMH_FED3702	FEEDER 3702/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	119	0	3
ELEC_PMH_FED3701	FEEDER 3701/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	119	0	3
ELEC_PMH_FED3607	FEEDER 3607/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	215	0	3
ELEC_PMH_FED3606	FEEDER 3606/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	215	0	3
ELEC_PMH_FED3605	FEEDER 3605/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	215	0	3
ELEC_PMH_FED3604	FEEDER 3604/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	215	0	3
ELEC_PMH_FED3603	FEEDER 3603/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	215	0	3
ELEC_PMH_FED3602	FEEDER 3602/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	215	0	3
ELEC_PMH_FED3601	FEEDER 3601/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	215	0	3
ELEC_PMH_FED3507	FEEDER 3507/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	6	0	3
ELEC_PMH_FED3506	FEEDER 3506/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	6	0	3
ELEC_PMH_FED3505	FEEDER 3505/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	6	0	3
ELEC_PMH_FED3504	FEEDER 3504/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	6	0	3
ELEC_PMH_FED3503	FEEDER 3503/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	6	0	3

Section 3b--Power Manholes Drawing Standards and Level Schema

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
ELEC_PMH_FED3502	FEEDER 3502/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	6	0	3
ELEC_PMH_FED3501	FEEDER 3501/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	6	0	3
ELEC_PMH_FED308	FEEDER 308/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	253	0	3
ELEC_PMH_FED306	FEEDER 306/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	253	0	3
ELEC_PMH_FED304	FEEDER 304/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	253	0	3
ELEC_PMH_FED302	FEEDER 302/ T-BODY/ GROUNDING/ INSULATORS/ FEEDER LABELS	253	0	3
ELEC_PMH_DTBKNU	LIGHTS & RECPT/ MISC. PWR/ SPECIAL SYS.	0	0	0
ELEC_PMH_DTBK	DUCT BANK & FEEDER NUMBER ON DUCT BANK	0	0	0
ELEC_PMH_DRFNOTES	DRAFTING NOTES (NOT A PLOTTING LEVEL)	200	0	2
ELEC_PMH_FED4201	FEEDER 4201/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_FED4202	FEEDER 4202/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_FED4203	FEEDER 4203/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_FED4204	FEEDER 4204/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_FED4205	FEEDER 4205/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_FED4206	FEEDER 4206/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_FED4207	FEEDER 4207/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	71	0	3
ELEC_PMH_FED601	FEEDER 601/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	156	0	3
ELEC_PMH_FED602	FEEDER 602/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	156	0	3
ELEC_PMH_FED603	FEEDER 603/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	156	0	3
ELEC_PMH_FED701	FEEDER 701/T-BODY/GROUNDING/INSULATORS/FEEDER LABELS	9	0	3
ELEC_PMH_FED700		9	0	3
ELEC_PMH_FED702		9	0	3
ELEC_PMH_FED703		9	0	3
ELEC_PMH_FED604		156	0	3
ELEC_PMH_FED605		156	0	3
ELEC_PMH_FED606		156	0	3
ELEC_PMH_KNKOUT		53	0	2



## Section 3c – Telecommunication Manholes Drawing Standards and Level Schema

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### 3c.1 Introduction

Telecommunication manhole drawings shall be generated using the Sandia/NM CADD Workspace Manhole Palette. Drawings shall be drawn at a 3/4:1 scale and shall be plotted at 1/4 inch = 1 foot 0 inches using the Sandia/NM supplied 1/4-inch border. No reference files shall be attached; all elements shall be active, with the exception of the border file.

### 3c.2 General File Requirements

This chapter includes requirements for drawing file types and standards only. For the following requirements and standards refer to Chapter 2:

- CADD Software Requirements
- Access to the Facilities CADD Server
- How to Find Drawing Files
- CADD Files Check-in/Check-out
- Obtaining New Drawing File Numbers
- Deliverable File Requirements
- Data Transfer Requirements

### 3c.3 Construction Plot Files

Construction Plot files are the final CADD files to be plotted. Plot files contain new and existing data and specific project information required to construct a project.

### 3c.4 Naming Plot Files

To obtain a new drawing number/file name refer to Chapter 2, Section 2.5, Obtaining New Drawing File Numbers. Sandia/NM Facilities follows a modified version of the Uniform Drawing System (UDS) file naming convention standard for all plot files.

Telecommunication Manhole Drawings are named as following:

WE5101MH005 .dgn

Where

W = Discipline (Civil Works)  
E = Sub Discipline (Telecommunications)  
5 = Drawing Type  
1 = Tech Area Manhole Location  
01 = Sequence Number  
MH005 = Manhole Number

Telecommunication One-line Drawings are named as following:

WO5101MH005 . dgn (Fiber)

Where

W = Discipline (Civil Works)  
O = Sub Discipline (Telecommunications-one line fiber)  
5 = Drawing Type  
1 = Tech Area Manhole Location  
01 = Sequence Number  
MH005 = One line Number

For new Telecommunication manhole numbers, contact Anthony Ortiz at 844-6988

### **3c.5 Border Files**

Manhole drawings shall use the ¼-inch border file supplied in the Sandia/NM CADD Workspace Manhole Palette.

### **3c.6 Plot Files**

All of the noting cells, noting symbols, title block tag data, revision tag data, and text shall be inserted from the Sandia/NM CADD Workspace Manhole Palette, as these are automatically scaled to coincide with the ¼-inch border required for the manhole drawings.

### **3c.7 Cell Libraries**

The following cell library shall be used for telecommunication manhole drawings:

Manholes.cel                      Manhole cell library

#### **3c.7.1 Levels, Line Weights, and Line Types**

Refer to the project-specific level documentation in this chapter. User-defined levels, line weights, and line types are used when the standard schemas do not accommodate design needs of a particular project. Contact the Sandia/NM Project CADD Coordinator Amy Rhutasel for approval before using user-defined levels. All user-defined levels must be identified using the File Specific information cell located in noting.cel

Section 3c– Telecommunication Manholes Drawing Standards and Level Schema

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
COMM_ACCPR	COMM SYSTEMACCESS CONTROL COPPER	3	0	3
COMM_ACCPR_D	COMM SYSTEM ACCESS CONTROL COPPER DASHED	3	2	3
COMM_ACFBR	COMM SYSTEM ACCESS CONTROL FIBER	3	0	3
COMM_ACFBR_D	COMM FIBER SYSTEM ACCESS CONTROL DASHED	3	2	3
COMM_BLKCPR	BLACK COPPER	104	0	3
COMM_BLKCPR_D	BLACK COPPER DASHED	104	2	3
COMM_BLKCPRTXT	BLACK COPPER TEXT	1	0	1
COMM_BLKFBR	BLACK FIBER	65	0	3
COMM_BLKFBR_D	BLACK FIBER DASHED	65	2	3
COMM_BLKFBRTXT	BLACK FIBER TEXT	1	0	1
COMM_BLKRNGBR	BLACK RING FIBER	116	0	3
COMM_COAX	LAN COAX	1	0	3
COMM_COAX_D	LAN COAX DASHED	1	2	3
COMM_CPR	COMM SYSTEM COPPER	107	0	3
COMM_CPR_D	COMM SYSTEM COPPER DASHED	107	2	3
COMM_CPRTXT	COMM SYSTEM COPPER TEXT	1	0	1
COMM_FACPR	FIRE ALARM COPPER	2	0	2
COMM_FACPR_D	FIRE ALARM COPPER DASHED	2	2	2
COMM_FACPRTXT	FIRE ALARM COPPER TEXT	1	0	1
COMM_FAFBR	FIRE ALARM FIBER	2	0	3
COMM_FAFBR_D	FIRE ALARM FIBER DASHED	2	2	3
COMM_FBR	COMM FIBER	3	0	3
COMM_FBR_D	COMM FIBER DASHED	3	2	3
COMM_FBRTXT	COMM FIBER TEXT	1	0	1
COMM_IACOAX	COMM INTRUSION ALARM COAX	1	0	3
COMM_IACOAXTXT	COMM INTRUSION ALARM COAX TEXT	81	0	1
COMM_IACPR	COMM INTRUSION ALARM COPPER	6	0	3
COMM_IACPR_D	COMM INTRUSION ALARM COPPER DASHED	6	2	3
COMM_IACPRTXT	COMM INTRUSION ALARM COPPER TEXT	1	0	1
COMM_IAFBR	COMM INTRUSION ALARM FIBER	167	0	3
COMM_IAFBR_D	COMM INTRUSION ALARM FIBER DASHED	167	2	3
COMM_IAFBRTXT	COMM INTRUSION ALARM FIBER TEXT	1	0	1
COMM_LEAD	DOES NOT EXIST	0	0	0
COMM_MH	COMMUNICATION MANHOLES, ALL SIZES & DIMENSIONS	0	1	4
COMM_REDCPR	RED COPPER	139	0	3
COMM_REDCPR_D	RED COPPER DASHED	139	2	3

Section 3c– Telecommunication Manholes Drawing Standards and Level Schema

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
COMM_REDCPRTXT	RED COPPER TEXT	1	0	1
COMM_REDFBR	RED FIBER	119	0	3
COMM_REDFBR_D	RED FIBER DASHED	119	2	3
COMM_REDFBRTXT	RED FIBER TEXT	1	2	1
COMM_REDRNGFBR	RED RING FIBER	116	0	3
COMM_UNKCPR	UNKNOWN COPPER	7	2	3
CCT_CTRL_SYM	CONTROL DEVICE SYMBOLS, LEADER LINES, TERMINATORS	7	0	1
CCT_PNU SIG	PHEUMATIC SIGNAL	4	Pneumatic Signal	2
CCT_MISC	WAS Level 12, unknown	0	0	0
CCT_ELEC CTRL SIG	ELECTRICAL CONTROL SIGNAL	21	3	1
CCT_CTRL_DVS	CONTROL DEVICES	7	0	1
COMM_CMH_DTBK	COMM MANHOLE CONDUIT	0	0	2

## Chapter 4 - Landscaping

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## **4.1 Introduction**

This section describes the CADD requirements for landscaping systems. These requirements are still under development.

# Chapter 5 - Structural

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## 5.1 Introduction

New structural CADD files may be generated in enhanced Intergraph structural software. However these files cannot be invoked through the enhanced application when delivered to Sandia/NM. Structural software shall be *fully* compatible with Bentley MicroStation V8 and shall be consistent with this Facilities CADD Standards Manual. This includes all file structure(s), level schemas, line weights, and cells.

## 5.2 Level Assignments

The level schemas shown at the end of this section (see the tabbed Level Schemas section) are the standard element-level definitions for master files, details, and sections for each structural system. User-definable levels are available where the level schemas do not address system elements requiring placement within the master floor plan file. Contact the Project CADD Coordinator for approval before using user-defined levels. All user-defined levels shall be identified using the File Specific Information cell located in `noting.cel`, and shall be submitted with the design package as part of Title submittals for review.

Level schemas in this chapter are as follows:

Level Schema	Page
Bridge Crane Plan	5-3
Floor Framing Plan	5-4
Foundation Plan	5-5
Roof Framing Plan	5-6
Trench Plan	5-7

## 5.3 Cell Libraries

### 5.3.1 Standard Cells

The standard structural cell library is `snlstruct.cel`. If additional new cells are required, create a personal project cell library and submit it to the Project CADD Coordinator for approval before using new cells. Submit an Engineering Standards Request (ESR) to incorporate the cells into the `snlstruct.cel` library as required. This would only be necessary in the event of the need for incorporation of new *critical* elements otherwise overlooked during cell library creation. Graphical representations of the cells in `snlstruct.cel` are in the tabbed Structural Cell Libraries section.

### 5.3.2 Sections/Details

In sections and details, all graphic elements shall be active elements in the plot files. No referenced elements are permitted. All placed elements should be assigned those element attributes consistent with the master plan attribute and hierarchy requirements.

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
STRUCT_BJCL	BEAM/JOIST CENTERLINES	1	0	4
STRUCT_BJEDG	BEAM EDGES AND JOIST EDGES	6	2	2
STRUCT_BJTXT	BEAM AND JOIST TEXT	0	0	1
STRUCT_BMCL	BEAM CENTERLINE	1	0	4
STRUCT_BMS	GRADE BEAMS, SLABS, AND TRENCH WALLS	5	2	1
STRUCT_BRDG	BRIDGING	0	3	0
STRUCT_BRG	BEARING CORBEL/LEDGER	2	0	0
STRUCT_BRGBM	BRIDGE BEAM	23	0	2
STRUCT_BRGTX	BRIDGE CRANE TEXT	0	0	1
STRUCT_BSTXT	TEXT FOR BEAMS AND SUPPORTS	0	0	1
STRUCT_CATGRAT	CATWALK & GRATING PATTERN(CROSSHATCH FENCE)	14	0	2
STRUCT_CEJNT	CONTROL/EXPANSION JOINTS	0	0	0
STRUCT_EXPRFBM	EXPOSED ROOF BEAM	1	0	3
STRUCT_FNDGB	FOUNDATION GRADE BEAMS	6	0	2
STRUCT_FNDPED	FOUNDATION PEDESTALS	6	2	2
STRUCT_FNDSW	FOUNDATION STEMWALLS	6	2	2
STRUCT_LADR	LADDERS AND ASSOCIATED RAILING	3	0	1
STRUCT_MTLDK	METAL DECK SYMBOL	0	0	0
STRUCT_MTLRF	METAL ROOF	6	0	2
STRUCT_PARFRM	PARAPET FRAMING	4	0	2
STRUCT_PERM	PERIMETER SHAPE, REBAR PATTERNING	6	0	2
STRUCT_RFPENT	ROOF PENETRATION BRACING	1	0	3
STRUCT_RUNBM	RUNAWAY BEAM	5	0	2
STRUCT_SCFTG	SPOT/CONTINUOUS FOOTING	6	3	4
STRUCT_SLAB	SLABS AND ROOF DECKING	6	0	1
STRUCT_SLBHOL	SLAB HOLES	2	0	1
STRUCT_SLOPE	SLOPE ARROW FOR SLAB	0	0	1
STRUCT_THASM	TROLLEY AND HOIST ASSEMBLY	7	0	0
STRUCT_THRD	THREADED ROD	37	0	1
STRUCT_TRN	GRADE BEAMS, SLABS, AND TRENCH WALLS	5	0	1
STRUCT_UNISTR	UNISTRUT GRID	47	0	1
STRUCT_WAI	INTERIOR WALL EDGES (DIRECTLY ASSOCIATED WITH FRAMING PLAN)	4	0	2
STRUCT_COLS	STRUCTURAL COLUMNS	3	0	2
STRUCT_MISC		0	0	0
STRUCT_MISCPATT		0	0	0
STRUCT_TRN_CNCLD	GRADE BEAMS, SLABS, AND TRENCH WALLS	5	3	1

# Chapter 6 - Architectural

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## 6.1 Introduction

New architectural CADD files may be generated in enhanced Intergraph architectural software. Update? However, these files cannot be invoked through the enhanced application when delivered to Sandia/NM. Architectural software shall be *fully* compatible with Bentley MicroStation V8 and shall be consistent with the Sandia/NM CADD Standards Manual. This includes all file structure(s), level schemas, line weights, and cells.

## 6.2 Level Assignments

The level schemas shown in this chapter (see the tabbed Level Schemas section) are the standard element-level definitions for master files, details, and sections for each architectural system. User-definable levels are available where the level schemas do not address system elements requiring placement within the master floor plan file. Contact the Project CADD Coordinator for approval before using user-defined levels. All user-defined levels shall be identified using the File Specific Information cell located in `noting.cel`, and shall be submitted with the design package as part of Title submittals for review.

Level schemas in this chapter are as follows:

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Floor Plan	6-5
Furniture Layout	6-6
Laboratory Equipment Layout	6-7
Master Cut File	6-8
Flooring Treatment Plan	6-9
Reflected Ceiling Plan	6-10

## 6.3 Cell Libraries

### 6.3.1 Standard Cells

The standard architectural cell library is `snlarch.cel`. If additional new cells are required, create a personal project cell library and submit it to the Project CADD Coordinator for approval before using new cells. Submit an Engineering Standards Request (ESR) to incorporate the cells into the `snlarch.cel` library as required. This would only be necessary in the event of the need for incorporation of new *critical* elements otherwise overlooked during cell library creation. Graphical representations of the cells in `snlarch.cel` are in the tabbed Architectural Cell Libraries section.

### 6.3.2 Standard Furniture Layout Cells

Two standard cell libraries are used for furniture layout. File `catalog2d.cel` is used for Steelcase systems furniture. File `lseed.cel` is used for Herman Miller system furniture and standard, non-systems furniture placement. Graphical representations of the cells in `catalog2d.cel` and `lseed.cel` are in the tabbed Architectural Cell Libraries section.

#### **6.4 Sections/Details**

In sections and details, all graphic elements shall be active elements in the plot files. No referenced elements are permitted. All placed elements should be assigned those element attributes consistent with the master floor plan attribute and hierarchy requirements.

#### **6.5 Door/Window and Room Finish Schedule**

Refer to Section 2.8.7, Schedules.

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
ARCH_ACCESS	ASH CAN, LOCKER, ACCESSORIES	1	0	1
ARCH_ACCWA	DRAWING BOARDS / SCREENS	1	0	0
ARCH_ADDEN	ADDENDA AND BULLETIN BUBBLES	0	0	7
ARCH_BKSHLF	BOOK SHELVES, BINDER BINS	42	0	1
ARCH_WAID	WALL SYMBOL IDENTIFICATION	4	0	1
ARCH_BLDGFT	BUILDING FOOTPRINT - EXTERIOR WALL EDGES W/OUT SLABS	12	0	2
ARCH_BLDGPERM	BUILDING PERIMETER - INCLUDING SLABS, PADS, etc. (PERTAINING TO BLDG.)	12	0	2
ARCH_EST	FLOORING PATTERN (ELECTRO STATIC TILE)	4	0	0
ARCH_CASE	CASEWORK/MILLWORK (CABINETRY, SHELVING, COUNTERS, FIREHOSE CABINETS ETC.)	2	0	1
ARCH_CER	FLOORING PATTERN (CERAMIC TILE - VARIOUS SIZES)	3	0	0
ARCH_CLGHT	CEILING HEIGHT SYMBOLS AND TEXT	0	0	1
ARCH_CLGREF	CEILING REFERENCES - IRREGULAR CONFIGURATIONS AFFECTING PLAN - SOFFITS	7	2	0
ARCH_CLGSUP	SPECIAL CEILING SUPPORTS	7	0	1
ARCH_COLS	ALL COLUMNS - MAIN BUILDING & MEZZANINE	3	0	2
ARCH_COMP	COMPUTERS	44	0	2
ARCH_CRKT	ROOF CRICKETS	0	0	0
ARCH_CRPT	FLOORING PATTERN (CARPET)	15	0	0
ARCH_CRPT_SEAM	CARPET GRAPHICS (SEAMING PLAN)	6	0	2
ARCH_CRPTXT	CARPET TEXT/DIMENSIONS	6	0	1
ARCH_CWA	CURTAIN WALL MULLIONS AND GLASS	4	0	2
ARCH_CWACL	CURTAIN WALL CENTERLINE	1	2	0
ARCH_DCSHLF	DOWCRAFT SHELVES	59	0	1
ARCH_DNSPT	DOWN SPOUTS	4	0	2
ARCH_DPART	DEMOUNTABLE PARTITIONS (CELLS)	3	0	1
ARCH_DRAIN	SCUPPERS AND ROOF DRAINS	7	0	2
ARCH_DRID	DOOR OR HOLE SYMBOL (NUMBER)	4	0	1
ARCH_DRS	DOORS, SWINGS, AND HOLES	4	0	3
ARCH_DRSF	DOOR FRAMES	4	0	1
ARCH_DRSW	DOORS, SWINGS, AND HOLES	4	0	0
ARCH_DSNOTES	DESIGN NOTES FOR INFORMATION ONLY	11	0	1
ARCH_EQSTND	EQUIPMENT STANDS	3	0	2
ARCH_EQUIP	EQUIPMENT GRAPHICS - OTHER THAN LABORATORY	16	0	1
ARCH_EQUIPID	EQUIPMENT TAG/NUMBER	38	0	1
ARCH_ESYMB	ELECTRICAL EQUIPMENT SYMBOLS & TEXT	0	0	1
ARCH_EXP	CEILING PATTERN (EXPOSED CONSTRUCTION)	7	0	0
ARCH_FIXT	FIXTURE GRAPHICS	52	0	2
ARCH_FIXT_PLUMB	PLUMBING FIXTURES - TOILET, SINK, SHOWER, TUB, WATER COOLER, etc.	2	0	1
ARCH_FLEV	ELEVATORS	4	0	3
ARCH_FLEVST	ELEVATORS / STAIR FOOTPRINTS	4	0	2
ARCH_FLLE	RAISED FLOOR AND ASSOCIATED RAMPS AND STEPS	1	0	0
ARCH_FLRPAT	FLOOR PATTERNS	0	0	0
ARCH_FLRPERM	FLOOR PERIMETER	5	0	2
ARCH_FLRTXT	FLOOR TEXT	0	0	0
ARCH_FLST	STAIRS, HANDRAILS, HANDICAP LIFTS & ASSOCIATED BREAKLINES	1	0	0
ARCH_FRWA	WALL FIRE RATING - INDUSTRY STANDARD PATTERNS	0	0	0
ARCH_FUME	FUME HOODS	6	0	4
ARCH_FURN	FURNITURE GRAPHICS - OTHER THAN LABORATORY	15	0	1
ARCH_FURNID	FURNITURE TAG/NUMBER	37	0	1
ARCH_GBRACK	GAS BOTTLE RACK	0	0	2
ARCH_GLFR	WINDOWS - INCLUDING GLAZING, MULLIONS, FRAMES & SILLS	4	0	0

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
ARCH_GLID	WINDOW SYMBOL (LETTER)	4	0	1
ARCH_GLZ	WINDOWS - INCLUDING GLAZING, MULLIONS, FRAMES & SILLS	4	0	2
ARCH_GRDTAG	COLUMN GRID TAGS & TEXT	2	0	1
ARCH_GRID_CLG	CEILING PATTERN (GRID)	7	0	0
ARCH_GRID_COL	COLUMN GRID CENTERLINES	2	4	0
ARCH_GRPFT	GROUPING FOOTPRINT	8	0	2
ARCH_GRPID	GROUPING TAG/NUMBER	9	0	1
ARCH_GRPTXT	GROUPING TEXT	0	0	0
ARCH_GUTR	GUTTERS	4	0	2
ARCH_GYP	CEILING PATTERN (PLASTER/GYP. BOARD)	7	0	0
ARCH_HDRS	DOOR AND WINDOW HEADERS	7	0	0
ARCH_HMCL	HERMAN MILLER PARTITIONS CENTERLINES	28	0	1
ARCH_HMDCDR	HERMAN MILLER AND DOWCRAFT DOORS	58	0	1
ARCH_HMGLDR	HERMAN MILLER GLASS DOORS & PARTITIONS	14	0	1
ARCH_HMSHLF	HERMAN MILLER COUNTERTOPS, SHELVES AND FLIPPER DOORS	29	0	1
ARCH_HMSURF	HERMAN MILLER WORK SURFACES, DRAWERS	28	0	1
ARCH_INSTSYM	SYMBOLS INSTALL/CONST. DRAWING	32	0	1
ARCH_INSTXT	INSTALLATION TEXT FOR CASEWORK/MILLWORK	0	0	1
ARCH_JIB	JIB CRANE	5	0	1
ARCH_WA_MLINE		0	0	0
ARCH_LABCASE	LABORATORY CASEWORK/MILLWORK - BASE CABINETS	17	0	2
ARCH_LABCASEW	LABORATORY CASEWORK/MILLWORK - WALL MOUNTED	39	0	2
ARCH_LABFURN	LABORATORY FURNITURE (TABLES, BENCHES, CHAIRS, STOOLS)	30	0	2
ARCH_LADR	LADDERS AND ASSOCIATED RAILING	3	0	1
ARCH_LCTXT	TEXT FOR LABORATORY CASEWORK/MILLWORK - BASE CABINETS	17	0	1
ARCH_LCWTEXT	TEXT FOR LABORATORY CASEWORK/MILLWORK - WALL MOUNTED	39	0	1
ARCH_LEVEL	CHANGE INDICATION LEVEL	0	0	0
ARCH_LFBENCH	LAM FLOW BENCHES	18	0	4
ARCH_LFURTEXT	TEXT FOR LABORATORY FURNITURE	30	0	1
ARCH_MATCH	MATCHLINES	7	6	7
ARCH_MGPC	MATS, GRATING, PAVERS, CATWALK, etc.	42	0	1
ARCH_MISC	MISCELLANEOUS ITEMS PERIMETER SHAPE / OUTLINE	4	0	2
ARCH_MISC_CLGPAT	CEILING PATTERN (MISC. AREA PATTERN)	7	0	0
ARCH_MISCFURN	FURNITURE MISC. PRODUCTION	30	0	1
ARCH_MISCID	MISCELLANEOUS TAG/NUMBER	0	0	0
ARCH_MISCPAT	MISC. PATTERNS	0	0	0
ARCH_MISCSYM	SYMBOLS MISC. COMPONENT NUMBER	31	0	1
ARCH_MSymb	MECHANICAL SYMBOLS (HEXES) & TEXT	0	0	1
ARCH_NOTING	NOTES	0	0	0
ARCH_OCPTXT	OCCUPANT NAME TEXT	9	0	1
ARCH_OPE	OWNER PURCHASED EQUIPMENT	12	0	2
ARCH_OPETXT	TEXT FOR OWNER PURCHASED EQUIPMENT	12	0	1
ARCH_OPNG	SHAFTS & CHASE	4	0	2
ARCH_PARA	PARAPETS	4	0	1
ARCH_PLNPERM	PLANNING UNIT PERIMETER	6	0	2
ARCH_PLNTEXT	PLANNING UNIT TEXT	0	0	0
ARCH_PNTFP	PENTHOUSE FOOTPRINT	6	0	2
ARCH_REF	REFERENCE ELEMENTS NOT PLOTTED	61	0	0
ARCH_RFPEN	ROOF PENETRATIONS	99	0	2

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
ARCH_RFPENC	ROOF PENETRATIONS CROSSHAIRS	99	0	0
ARCH_RMID	ROOM NAME, NUMBER, UNDERLINE & BOX	2	0	1
ARCH_RMPERM	ROOM PERIMETER SHAPE	5	0	2
ARCH_RMPERTXT	ROOM PERIMETER TEXT	0	0	0
ARCH_ROOF	ROOF OVERHANG AND CANOPIES	4	2	1
ARCH_SEAT	SEATING GRAPHICS	21	0	1
ARCH_SEATID	SEATING TAG/NUMBER	0	0	0
ARCH_SHAFT	CEILING PATTERN (SHAFTS)	7	0	0
ARCH_SHT	DRAWING SHEET EDGE - DOTTED CUT LINE	0	1	0
ARCH_SKY	SKYLIGHTS / FRAMES	6	0	2
ARCH_SLOPE	ROOF SLOPE/CRICKET FLOW ARROWS	5	0	1
ARCH_SPBLK	SPLASH BLOCKS	42	0	1
ARCH_SPEC	SPECIFICATION SECTION NUMBERS - TYPICALLY NOT USED	0	0	1
ARCH_STLCL	STEELCASE PANEL CENTERLINES	10	0	1
ARCH_STLPNL	STEELCASE PANELS, FILLERS	40	0	1
ARCH_STLSURF	STEELCASE WORK SURFACES, KEYBOARD TRAYS	23	0	1
ARCH_STRWL	STAIR WALKLINE	3	3	0
ARCH_SWAI	STRUCTURAL INTERIOR WALL EDGES	4	0	2
ARCH_TEMP	TEMPORARY CEILING PATTERN (TO BE REMOVED)	11	0	0
ARCH_TILERF	FLOORING PATTERN - RAISED FLOOR (TILE)	13	0	0
ARCH_TPART	TOILET PARTITIONS & ACCESS RAILS	2	0	1
ARCH_UNIST	UNISTRUT FRAMEWORK	6	0	1
ARCH_USRDEF1	CEILING PATTERN (USER DEFINABLE)	7	0	0
ARCH_USRDEF2	CEILING PATTERN (USER DEFINABLE)	7	0	0
ARCH_USRDEF3	FLOORING PATTERN (USER DEFINABLE)	7	0	0
ARCH_VAT	FLOORING PATTERN (VAT - VINYL ASBESTOS TILE)	1	0	0
ARCH_VCT	FLOORING PATTERN (VCT - VINYL COMPOSITION TILE)	2	0	0
ARCH_WACAV	CAVITY WALL LINES	4	0	0
ARCH_WACL	WALL AND PARTITION CENTERLINES	1	3	0
ARCH_WAE	EXTERIOR WALL EDGES	4	0	2
ARCH_WAI	NON-STRUCTURAL INTERIOR WALL EDGES	4	0	2
ARCH_WAPAT	WALL PATTERNS	0	0	0
ARCH_WATMP	WALLS TO BE REMOVED - TEMPORARY CONSTRUCTION BARRIERS, etc.	4	2	1
ARCH_WDMTL	CEILING PATTERN (LINEAR WOOD/METAL)	7	0	0
ARCH_ZONEPERM	ZONE PERIMETER	7	0	2
ARCH_MARSTONE	FLOORING PATTERN (MARBLE,STONE,GRANITE)	6	0	0
ARCH_VHST	FLOORING PATTERN (VINYL SHEET GOODS - LINOLEUM, ETC.)	5	0	0
ARCH_CONC	FLOORING PATTERN (CONCRETE)	7	0	0
ARCH_PERGO	FLOORING PATTERN (PERGO)	9	0	0
ARCH_MTL	FLOORING PATTERN (STEEL / ALUMINUM - FREIGHT ELEVATOR, ETC.)	7	0	0
ARCH_CRPTRF	FLOORING PATTERN - RAISED FLOOR (CARPET)	12	0	0
ARCH_WOTRF	FLOORING PATTERN - RAISED FLOOR (W/OUT TREATMENT)	14	0	0
ARCH_SWA_MLINE		0	0	0
ARCH_HMTXT	HERMAN MILLER TEXT (cells)	0	0	1
ARCH_STLTXT	STEELCASE TEXT (cells)	0	0	1
ARCH_DPTXT	DEMOUNTABLE PART TEXT (cells)	0	0	1
ARCH_FURNTEXT	FURNITURE TEXT (cells)	0	0	1
ARCH_HMPRT	HERMAN MILLER PARTITIONS	14	0	0

## Chapter 7 - Fire Protection

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7.2	Level Assignments.....	7-2
7.3	Standard Cell.....	7-2
7.4	Fire Protection Master Files.....	7-2

## 7.1 Introduction

This section describes the CADD requirements for fire protection systems.

## 7.2 Level Assignments

The level schemas shown in this chapter are the standard element level definitions for each fire protection system's master file. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator for approval before using user-defined levels. All user-defined levels shall be identified using the File Specific Information cell located in `noting.cel`. Level schemas in this chapter are as follows:

<b>Level Schema</b>	<b>Page</b>
Fire Protection—Above	7-4
Fire Protection—Below	7-5
Fire Protection—Occupied Space	7-6
Fire Alarm Plan	7-7

## 7.3 Standard Cell

## 7.4 Fire Protection Master Files

Refer to flowcharts and elevation views in Figure 7-1.

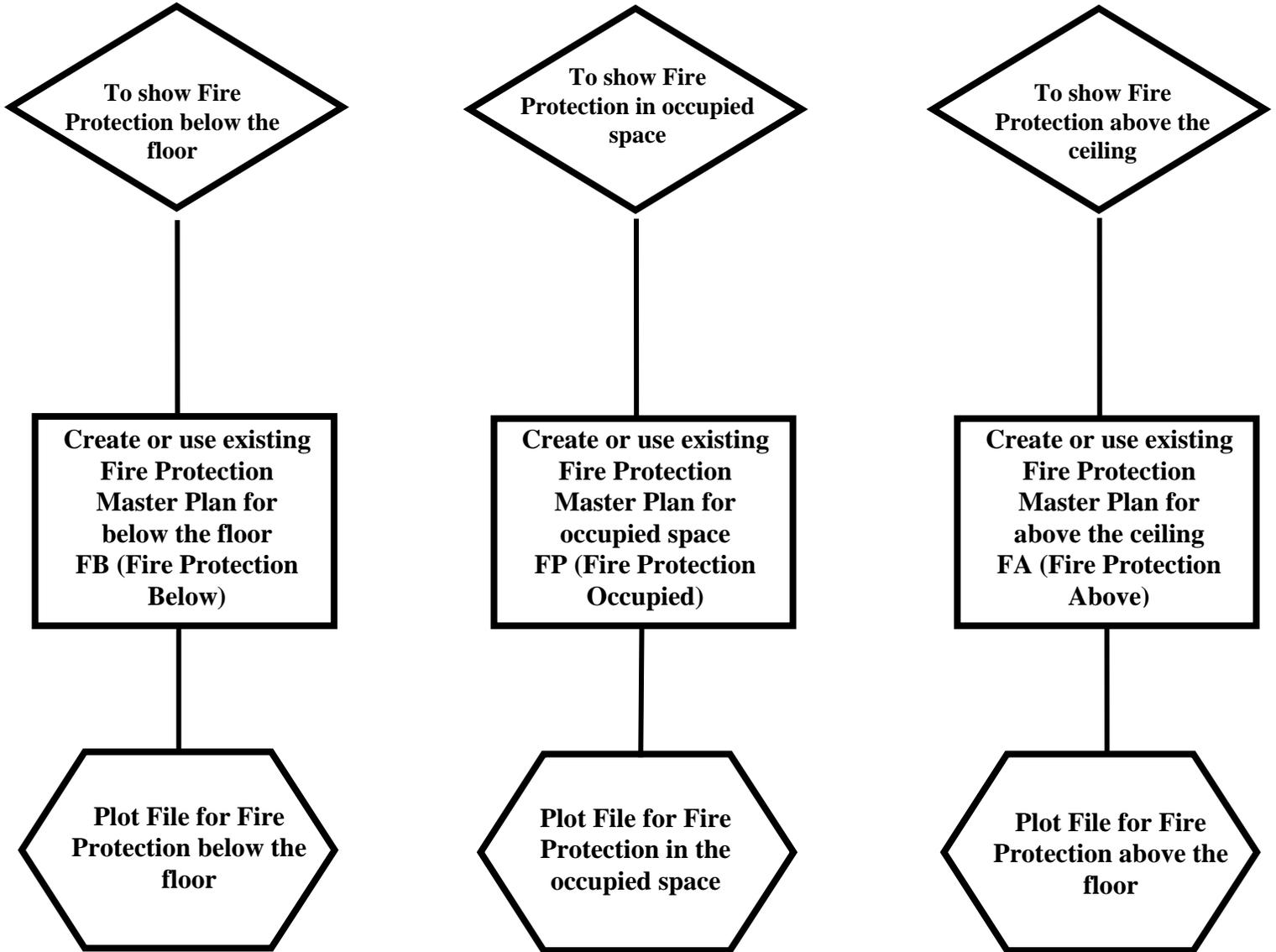


Figure 7-1. Fire Protection Flowchart (Elevation View)

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
FIRE_FMINDMN	FIRE MAIN,INDIRECT MAIN	3	0	3
FIRE_TEXT	TEXT, PIPE SIZES & HEAD SPACING DIMENSIONS	0	0	1
FIRE_SPRKHEAD	SPRINKLER HEADS	3	0	2
FIRE_DIM	DIMENSIONS	51	0	1
FIRE_FOAM	FOAM	4	0	3
FIRE_DRAIN	DRAIN	5	0	4
FIRE_SMKDET	SMOKE DETECTORS	0	0	0
FIRE_ROUTE	FIRE EVACUATION	3	0	6
FIRE_PSTAT	FIRE PULL STATION	3	0	1
FIRE_EXT	FIRE EXTINGUISHER	3	0	1
FIRE_CTLP	FIRE CONTROL PANEL	3	0	3
FIRE_WATER	FIRE WATER	1	0	1
FIRE_UTIL	FIRE UTILITIES	3	0	1
FIRE_DIAMOND	FIRE DIAMOND SYMBOL	3	0	0

## Chapter 8 - Mechanical

### Table of Contents

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<b>8.2 Level Assignments.....</b>	<b>8-2</b>
<b>8.3 Standard Cell.....</b>	<b>8-2</b>
<b>8.4 Mechanical Master Files.....</b>	<b>8-2</b>

## 8.1 Introduction

This section describes the CADD requirements for mechanical systems.

## 8.2 Level Assignments

The level schemas shown in this chapter are the standard element level definitions for each mechanical system's master file. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator, Amy Rhutasel, for approval before using user-defined levels. All user-defined levels shall be identified using the File Specific Information cell located in `noting.cel`. Level schemas in this chapter are as follows:

<b>Level Schema</b>	<b>Page</b>
HVAC & Exhaust Plan—Above	8-5
HVAC & Exhaust Plan—Below	8-6
HVAC Piping Plan—Above	8-7
HVAC Piping Plan—Below	8-8
Plumbing Plan	8-9
Gases & Process Gases Plan	8-10
Process Liquids Plan	8-11
Mechanical Roof Plan	8-12
Plot File	8-13

## 8.3 Standard Cell

The standard mechanical cell library is `snlmech.cel`. If additional new cells are required, create a personal project cell library and submit to the Project CADD Coordinator for approval before using new cells. Submit an Engineering Standards Request (ESR) to incorporate the cells into the `snlmech.cel` library. Graphical representations of the cells in `snlmech.cel` are shown in the tabbed Mechanical Cell Library section.

## 8.4 Mechanical Master Files

Project designs may require plot files and master files showing mechanical systems separated according to location, such as above ceiling, below ceiling, below raised floors, in occupied space, or in trenches. If this type of separation is needed for clarity, then separate master files shall be created. Refer to flowcharts and elevation views in Figures 8-1 and 8-2. Contact Project CADD Coordinator Amy Rhutasel before starting new building design for building requirements.

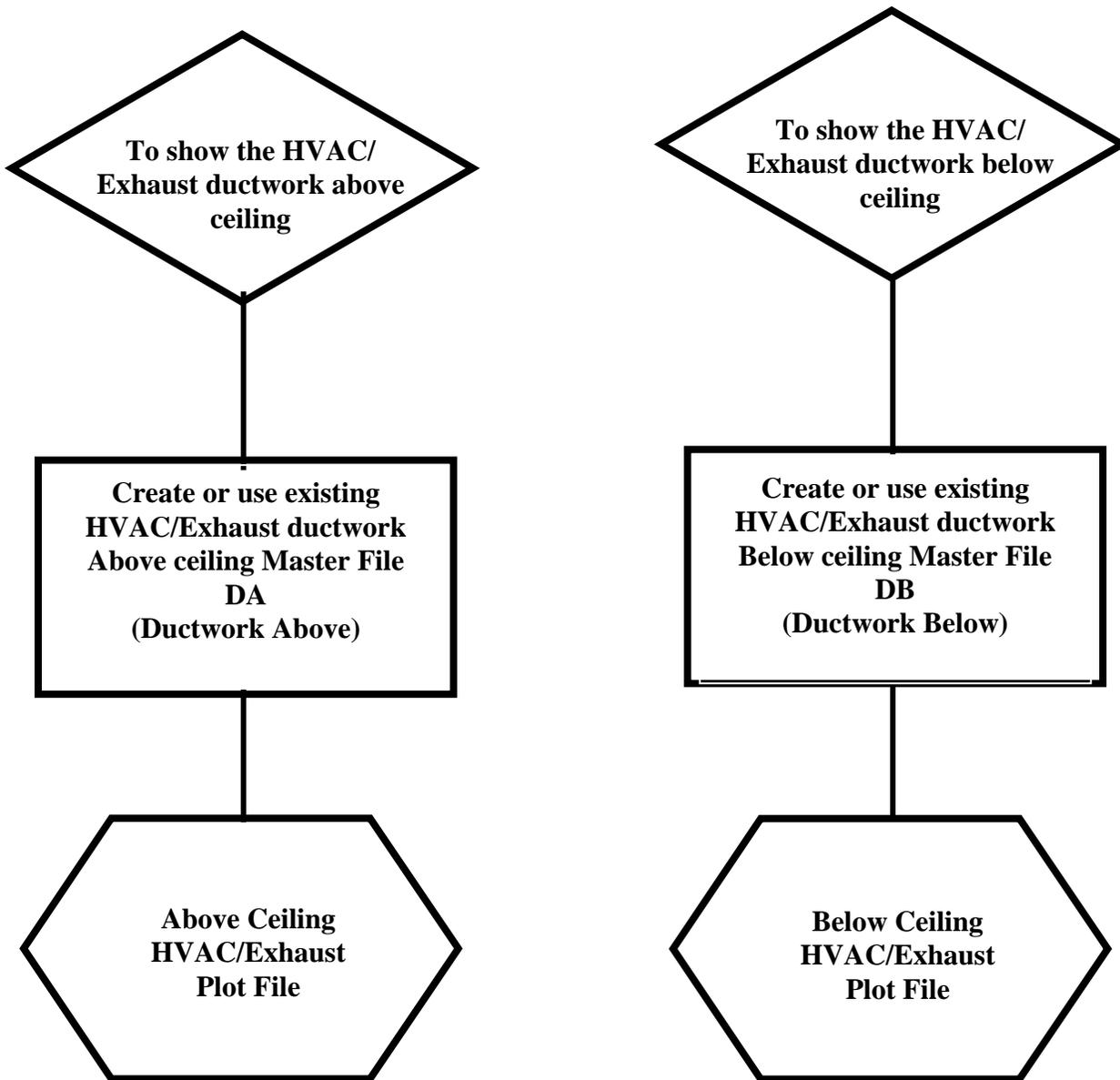
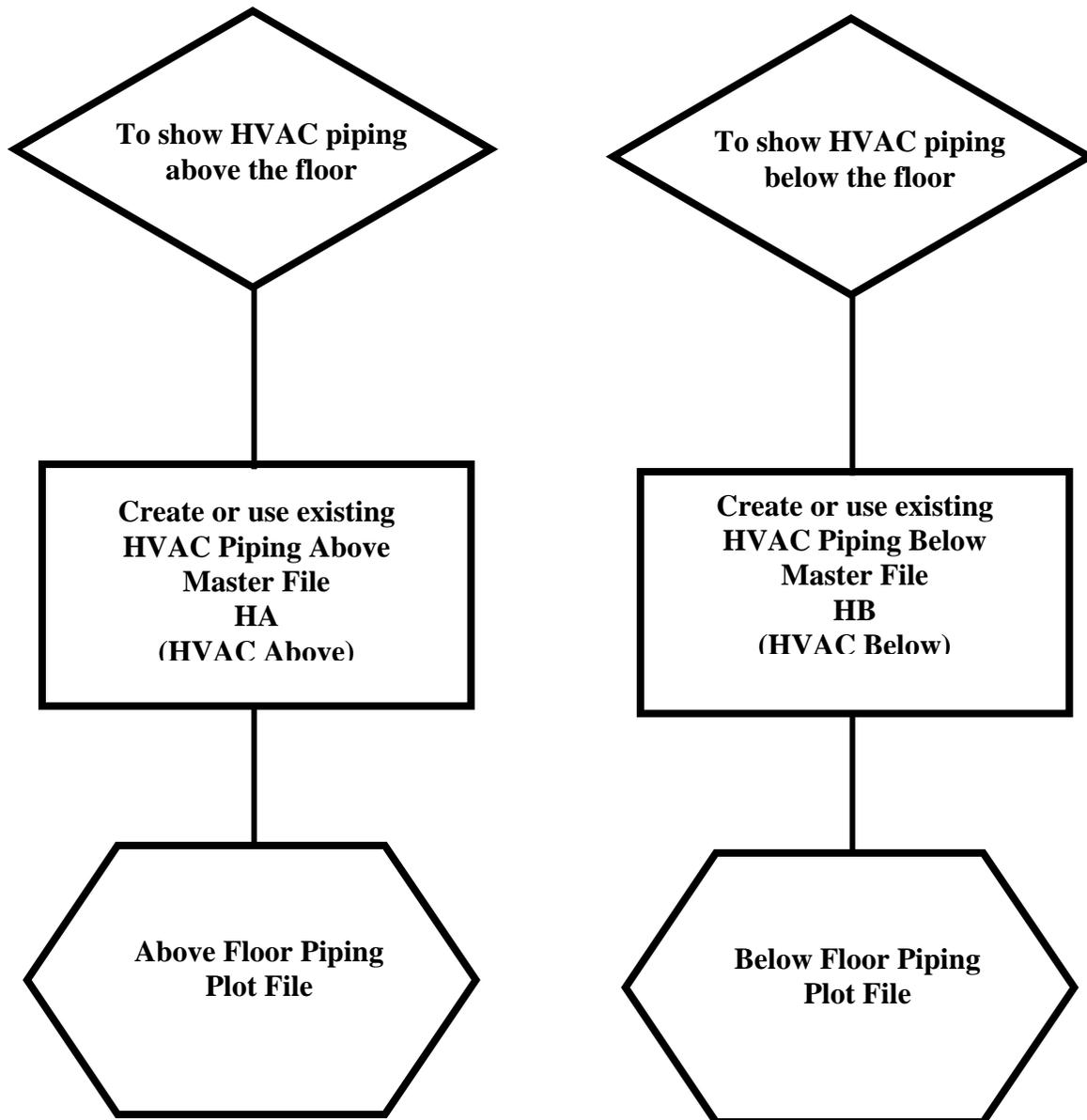


Figure 8-1. HVAC Ductwork Flowchart



**Figure 8-2. HVAC Piping Flowchart**

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
MECH_HVAC_ACEX	ACID EXHAUST (DUCTWORK, FITTINGS, & ASSOCIATED ELEMENTS)	18	0	3
MECH_HVAC_CFMTXT	C.F.M. TEXT FOR ALL DIFFUSERS	8	0	1
MECH_HVAC_CLNRM	CLEAN ROOM - RECIRCULATING AIR, HEPA FILTERS	64	0	2
MECH_HVAC_DETECT	DETECTORS	1	0	2
MECH_HVAC_DRLUV	DOOR LOUVERS	6	0	2
MECH_HVAC_DUCTSUP	DUCT SUPPORTERS	24	0	1
MECH_HVAC_EXDIFF	DIFFUSERS, GRILLES, REGISTERS	6	0	3
MECH_HVAC_EXDUCT	DUCTWORK, FITTINGS, DAMPERS, FILTERS, FLOW IND, TURNING VANES, SPLITTERS, EXTRACTORS	4	0	4
MECH_HVAC_EXRFSH	EXHAUST TO ROOF SHADING	0	0	0
MECH_HVAC_EXTXT	TEXT FOR DUCTWORK, DAMPERS, FILTERS, FITTINGS, ETC.	6	0	1
MECH_HVAC_HEXSYM	HEX SYMBOLS	0	0	0
MECH_HVAC_HUMID	HUMIDIFIER	7	0	2
MECH_HVAC_MECEQ	MECH. EQUIPMENT - FANS, FAN COIL,AIR HANDLING UNITS,PUMPS,ETC.	52	0	2
MECH_HVAC_MKTXT	TEXT FOR DUCTWORK, DAMPERS, FILTERS, FITTINGS, ETC.	4	0	1
MECH_HVAC_MUDIFF	DIFFUSERS	4	0	3
MECH_HVAC_MUDUCT	DUCTWORK, FITTINGS, DAMPERS, FILTERS, FLOW IND, TURNING VANES, SPLITTERS, EXTRACTORS	4	0	4
MECH_HVAC_RETDIFF	DIFFUSERS, GRILES, REGISTERS	13	0	3
MECH_HVAC_RETDUCT	DUCTWORK, FITTINGS, DAMPERS, FILTERS, FLOW IND, TURNING VANES, SPLITTERS, EXTRACTORS	13	0	4
MECH_HVAC_RETXT	TEXT FOR DUCTWORK, DAMPERS, FILTERS, FITTINGS, ETC.	13	0	1
MECH_HVAC_RTNAIR	RETURN AIR FLOW ARROWS	53	0	1
MECH_HVAC_SA	SUPPLY ARROWS	54	0	2
MECH_HVAC_SLVEX	SOLVENT EXHAUST (DUCTWORK, FITTINGS, & ASSOCIATED ELEMENTS)	19	0	3
MECH_HVAC_SMKREM	SMOKE REMOVAL	9	0	4
MECH_HVAC_SPECEX	SPECIAL EXHAUST,DIFFUSERS,GRILLS,RETURN,ETC.	7	0	4
MECH_HVAC_SPTXT	TEXT FOR DUCTWORK, DAMPERS, FILTERS, FITTINGS, ETC.	8	0	1
MECH_HVAC_SUPDIFF	DIFFUSERS, GRILLES, REGISTERS	54	0	3
MECH_HVAC_SUPDUCT	DUCTWORK,FILTERS,FITTINGS,FLOW IND,TURNING VANES,SPLTTERS,EXTRACTORS	8	0	4
MECH_HVAC_THERMCL	THERMOSTATE CONNECT LINE	2	4	2
MECH_HVAC_THERMPNELE	THERMOSTATS (PNEUMATIC AND ELECTRIC)	2	4	2
MECH_HVAC_VAVTERMBOX	VAV,TERM BOX	16	1	2
MECH_HVAC_MISC	elements in transition	0	0	0
MECH_HVAC_PIDSYMB	P&ID LEVEL FOR MECHANICAL FLOW SHEETS	0	0	0
MECH_HVAC_PNTCELL	LEVEL FOR ALL POINT CELLS THAT AREN'T ISOMETRIC	0	0	0

Name	Description	ByLevel Color	ByLevelS tyle	ByLevelW eight
MECH_PIPE_ACVNT	ACID VENT	21	0	2
MECH_PIPE_COND	CONDENSATE, GRAVITY	25	0	3
MECH_PIPE_HWR	HEATED WATER RETURN	9	0	3
MECH_PIPE_HWS	HEATED WATER SUPPLY	7	0	3
MECH_PIPE_RWL	RAIN WATER LEADER	32	0	4
MECH_PIPE_STDRN	STORM DRAIN	4	0	4
MECH_PIPE_VENT	VENT	11	2	2
MECH_PIPE_ACWST	ACID WASTE	16	0	4
MECH_PIPE_COILS	COILS	35	0	2
MECH_PIPE_CW	COLD WATER	2	0	3
MECH_PIPE_CWR	CHILLED WATER RETURN	11	0	3
MECH_PIPE_CWS	CHILLED WATER SUPPLY	10	0	3
MECH_PIPE_DRAIN	DRAIN	7	0	3
MECH_PIPE_FLDRN	FLOOR DRAIN	3	0	3
MECH_PIPE_FOG	FUEL OIL GAUGE LINE	20	0	2
MECH_PIPE_FOR	FUEL OIL RETURN	125	0	3
MECH_PIPE_FOS	FUEL OIL SUPPLY	7	0	3
MECH_PIPE_FOV	FUEL OIL TANK VENT	13	2	2
MECH_PIPE_HPS	HIGH-PRESSURE STEAM	3	0	3
MECH_PIPE_HW	HOT WATER	1	0	3
MECH_PIPE_HWC	HOT WATER CIRCULATING	5	0	3
MECH_PIPE_LABWST	LABORATORY WASTE	24	0	4
MECH_PIPE_LCWS	LOW TEMPERATURE CHILLED WATER SUPPLY	63	0	3
MECH_PIPE_LPS	LOW PRESSURE STEAM	2	0	3
MECH_PIPE_MPS	MEDIUM-PRESSURE STEAM	4	0	3
MECH_PIPE_NPW	NON-POTABLE WATER	21	0	3
MECH_PIPE_ORWL	OVERFLOW RAIN WATER LEADER	32	0	4
MECH_PIPE_PD	PRESSURE DRAIN	8	0	3
MECH_PIPE_PUMPCOND	PUMPED CONDENSATE	5	0	3

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
MECH_PIPE_RADW	RADIOACTIVE WASTE	18	0	4
MECH_PIPE_REFDISCH	REFRIGERANT DISCHARGE	12	0	3
MECH_PIPE_REFLIQ	REFRIGERANT LIQUID	12	0	3
MECH_PIPE_REFSUCT	REFRIGERANT SUCTION	12	0	3
MECH_PIPE_RFDRN	ROOF DRAIN	9	0	4
MECH_PIPE_SAS	SANITARY SEWER	3	0	4
MECH_PIPE_SOLWST	SOLVENT WASTE	24	0	4
MECH_PIPE_TWR	TOWER WATER RETURN	126	0	3
MECH_PIPE_TWS	TOWER WATER SUPPLY	16	0	3
MECH_PIPE_LCWR	LOW TEMPERATURE CHILLED WATER RETURN	62	0	3
MECH_PIPE_TEXT	TEXT FOR PIPE SIZES	0	0	1
MECH_PIPE_PIPESUP	PIPE SUPPORTERS	24	0	1
MECH_PIPE_MCWS	MEDIUM CHILLED WATER SUPPLY	61	0	3
MECH_PIPE_MCWR	MEDIUM CHILLED WATER RETURN	60	0	3

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
MECH_PROC_AMM	AMMONIA	29	0	2
MECH_PROC_ASH	ARSINE	25	0	2
MECH_PROC_B2H6	DIBORANE	79	0	2
MECH_PROC_BA	BREATHING AIR	10	0	2
MECH_PROC_BCI	BORON TRICHLORIDE	34	0	2
MECH_PROC_BRH	HYDROGEN BROMIDE	73	0	2
MECH_PROC_C2H	DIMETHYLCADMIUM	32	0	2
MECH_PROC_C2H2	ACETYLENE	22	0	2
MECH_PROC_CA	COMPRESSED AIR	6	0	2
MECH_PROC_CCI	CARBON TETRACHLORIDE	70	0	2
MECH_PROC_CCIF	DICHLORODIFLUOROMETHANE	23	0	2
MECH_PROC_CDA	CLEAN DRY AIR	6	0	2
MECH_PROC_CF	TETRAFLOUROMETHANE	8	0	2
MECH_PROC_CF4	CARBON TETRAFLOURIDE	77	0	2
MECH_PROC_CH32TE	DIMETHYLTELLURIUM	27	0	2
MECH_PROC_CH4	METHANE	18	0	2
MECH_PROC_CHCI	CHLOROFORM	124	0	2
MECH_PROC_CHF	HALOCARBON 23	9	0	2
MECH_PROC_CI2	CHLORINE	76	0	2
MECH_PROC_CISI	SILICON TETRACHLORIDE	40	0	2
MECH_PROC_CO2	CARBON DIOXIDE	39	0	2
MECH_PROC_DISI	DISILANE	5	0	2
MECH_PROC_DIWTR	DEIONIZED WATER (SUPPLY) (RETURN)	32	0	2
MECH_PROC_F2	FLUORINE	54	0	2
MECH_PROC_F2S	SULPHUR HEXAFLUORIDE	19	0	2
MECH_PROC_F3N	NITROGEN TRIFLOURIDE	111	0	2
MECH_PROC_F4SI	SILICON TETRAFLUORIDE	103	0	2
MECH_PROC_GBR	GAS BOTTLE RACK	0	0	2
MECH_PROC_H2S	HYDROGEN SELENIDE	48	0	2

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
MECH_PROC_H2SI	SILANE	28	0	2
MECH_PROC_H3P	PHOSPHINE	4	0	2
MECH_PROC_HCI	HYDROCHLORIC ACID	65	0	2
MECH_PROC_HE	HELIUM	12	0	2
MECH_PROC_HFAC	HYDROFLUORIC ACID	126	0	2
MECH_PROC_HKV	HOUSE KEEPING VACUUM	24	0	2
MECH_PROC_LIQAR	ARGON, LIQUID ARGON	60	0	2
MECH_PROC_LIQCO2	LIQUID CARBON DIOXIDE	39	0	2
MECH_PROC_LIQH2	HYDROGEN, LIQUID HYDROGEN	64	0	2
MECH_PROC_LPG	LIQUID PETROLEUM GAS	15	0	2
MECH_PROC_LQN2	LIQUID NITROGEN	112	0	2
MECH_PROC_MISCGAS	MISCELLANEOUS GASES NOT LISTED	104	0	2
MECH_PROC_N2	NITROGEN	100	0	2
MECH_PROC_N2O	NITROUS OXIDE	89	0	2
MECH_PROC_NG	NATURAL GAS	11	0	2
MECH_PROC_O2	OXYGEN, LIQUID OXYGEN	39	0	2
MECH_PROC_PCWR	PROCESS CHILLED WATER RETURN	124	0	2
MECH_PROC_PCWS	PROCESS CHILLED WATER SUPPLY	16	0	2
MECH_PROC_POR	PROCESS OIL RETURN	6	0	2
MECH_PROC_POS	PROCESS OIL SUPPLY	7	0	2
MECH_PROC_PRN2	PROCESS NITROGEN	110	0	2
MECH_PROC_PROCAR	ARGON, PROCESS ARGON	60	0	2
MECH_PROC_PURH2	HYDROGEN, PURIFIED HYDROGEN	64	0	2
MECH_PROC_ROW	REVERSE OSMOSIS WATER	64	0	2
MECH_PROC_SCW	SOFTENED COLD WATER	21	0	2
MECH_PROC_TEB	TRIETHYLBORATE	53	0	2
MECH_PROC_TEOS	TETRAETHYLORTHOSILICATE	53	0	2
MECH_PROC_VAC	VACUUM	16	0	2

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
GEN_SHT	SHEET EDGE	0	1	0
GEN_NORTH	NORTH ARROW	0	0	0
GEN_TBLK	TITLE BLOCK INFORMATION (GENERIC)	0	0	1
GEN_KEY	KEY PLAN	0	0	0
GEN_GRID	COLUMN GRIDS	2	4	0
GEN_GRDTAG	COLUMN GRID TAGS AND ASSOCIATED TEXT	2	0	1
GEN_ESD-LWT0-15	LINE WEIGHT = 0 (.15)	9	0	0
GEN_ESD-LWT1-25	LINE WEIGHT = 1 (.25)	0	0	1
GEN_ESD-LWT2-25	LINE WEIGHT = 2 (.25)	2	0	2
GEN_ESD-LWT3-35	LINE WEIGHT = 3 (.35)	4	0	3
GEN_ESD-LWT4-50	LINE WEIGHT = 4 (.50)	7	0	4
GEN_ESD-LWT5-70	LINE WEIGHT = 5 (.70)	1	0	5
GEN_ESD-LWT6-80	LINE WEIGHT = 6 (.80)	5	0	6
GEN_SYMB	REFERENCE SYMBOLS AND TEXT - SECTION, DETAIL, & ELEVATION CUTS	0	0	1
GEN_SYMBTXT	REFERENCE SYMBOLS AND TEXT - SECTION, DETAIL, & ELEVATION CUTS	0	0	1
GEN_TARGET	TARGETS	0	0	1
GEN_NOTING	KEYED NOTES, GENERAL NOTES, LEADER LINES, TERMINATORS	0	0	1
GEN_TITLE	DRAWING COMPONENT TITLES, SCALES, & ASSOCIATED GRAPHICS	0	0	1
GEN_TTLSC	DRAWING COMPONENT TITLES, SCALES, & ASSOCIATED GRAPHICS	0	0	1
GEN_TTLASC	DRAWING COMPONENT TITLES, SCALES, & ASSOCIATED GRAPHICS	0	0	1
GEN_LEGSC	LEGEND AND SCHEDULE GRAPHICS	0	0	3
GEN_LSTXT	LEGEND AND SCHEDULE TEXT	0	0	1
GEN_DIMENSIONS	DIMENSIONS AND ASSOCIATED LEADER LINES AND TERMINATORS	3	0	0
GEN_USRDEF1	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_USRDEF2	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_USRDEF3	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_USRDEF4	USER DEFINABLE - DOCUMENT PER PROJECT	0	0	0
GEN_CONSNTS1	CONSTRUCTION NOTES & BALLOONS - 1st REVISION	5	0	1
GEN_CONSBLN1	CONSTRUCTION NOTES & BALLOONS - 1st REVISION	5	0	6
GEN_CONSNTS2	CONSTRUCTION NOTES & BALLOONS - 2nd REVISION	37	0	1
GEN_CONSBLN2	CONSTRUCTION NOTES & BALLOONS - 2nd REVISION	37	0	6
GEN_BREAK	GENERAL BREAK LINE	7	0	0
GEN_KEYPLAN1	KEYPLAN CROSS HATCHING FOR SHEET FILES 1 or A	0	0	0
GEN_KEYPLAN2	KEYPLAN CROSS HATCHING FOR SHEET FILES 2 or B	0	0	0
GEN_KEYPLAN5	KEYPLAN CROSS HATCHING FOR SHEET FILES 5 or E	0	0	0
GEN_KEYPLAN4	KEYPLAN CROSS HATCHING FOR SHEET FILES 4 or D	0	0	0
GEN_KEYPLAN3	KEYPLAN CROSS HATCHING FOR SHEET FILES 3 or C	0	0	0
GEN_KEYPLAN6	KEYPLAN CROSS HATCHING FOR SHEET FILES 6 or F	0	0	0
GEN_KEYPLAN23	KEYPLAN CROSS HATCHING FOR SHEET FILES 23	0	0	0
GEN_KEYPLAN9	KEYPLAN CROSS HATCHING FOR SHEET FILES 9 or I	0	0	0
GEN_KEYPLAN8	KEYPLAN CROSS HATCHING FOR SHEET FILES 8 or H	0	0	0
GEN_KEYPLAN7	KEYPLAN CROSS HATCHING FOR SHEET FILES 7 or G	0	0	0
GEN_KEYPLAN15	KEYPLAN CROSS HATCHING FOR SHEET FILES 15 or O	0	0	0
GEN_KEYPLAN14	KEYPLAN CROSS HATCHING FOR SHEET FILES 14 or N	0	0	0
GEN_KEYPLAN13	KEYPLAN CROSS HATCHING FOR SHEET FILES 13 or M	0	0	0
GEN_KEYPLAN12	KEYPLAN CROSS HATCHING FOR SHEET FILES 12 or L	0	0	0
GEN_KEYPLAN11	KEYPLAN CROSS HATCHING FOR SHEET FILES 11 or K	0	0	0
GEN_KEYPLAN10	KEYPLAN CROSS HATCHING FOR SHEET FILES 10 or J	0	0	0
GEN_KEYPLAN17	KEYPLAN CROSS HATCHING FOR SHEET FILES 17 or Q	0	0	0
GEN_KEYPLAN18	KEYPLAN CROSS HATCHING FOR SHEET FILES 18	0	0	0
GEN_KEYPLAN19	KEYPLAN CROSS HATCHING FOR SHEET FILES 19	0	0	0
GEN_KEYPLAN20	KEYPLAN CROSS HATCHING FOR SHEET FILES 20	0	0	0
GEN_KEYPLAN21	KEYPLAN CROSS HATCHING FOR SHEET FILES 21	0	0	0
GEN_KEYPLAN16	KEYPLAN CROSS HATCHING FOR SHEET FILES 16 or P	0	0	0
GEN_KEYPLAN24	KEYPLAN CROSS HATCHING FOR SHEET FILES 24	0	0	0
GEN_KEYPLAN25	KEYPLAN CROSS HATCHING FOR SHEET FILES 25	0	0	0
GEN_KEYPLAN26	KEYPLAN CROSS HATCHING FOR SHEET FILES 26	0	0	0
GEN_KEYPLAN22	KEYPLAN CROSS HATCHING FOR SHEET FILES 22	0	0	0

## Chapter 9 - Electrical

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<b>9.3</b>	<b>Standard Cells.....</b>	<b>9-2</b>
<b>9.4</b>	<b>Panel Schedules.....</b>	<b>9-2</b>

## 9.1 Introduction

This section describes the CADD requirements for electrical systems.

## 9.2 Level Assignments

The level schemas shown in this chapter (see the tabbed Level Schemas section) are the standard element level definitions for electrical master files. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator, Amy Rhutasel, for approval before using user-defined levels. All user-defined levels must be identified using the File Specific Information cell located in `noting.cel`. Level schemas in this chapter are as follows:

<b>Level Schema</b>	<b>Page</b>
Lighting Plan	9-4
Power Plan	9-5
Receptacle Plan (Existing/Old Projects Only)	9-6
Underfloor Duct Plan (Existing/Old Projects Only)	9-7
Electrical Roof Plan	9-8
Radiation—Gas Detection Plan	9-9
Toxic Gas Monitoring System (MDA)	9-10
Hydrogen Gas Monitoring System	9-11
Intercom—EPPA Plan	9-12
Grounding Plan	9-13
Lightning Protection Plan	9-14

## 9.3 Standard Cells

The standard electrical cell library is `snlelec.cel`. If additional new cells are required for a particular project, create a project specific cell library and submit to the Project CADD Coordinator Amy Rhutasel, for review which will be submitted to the electrical standards committee prior to using new cells. Submit an Engineering Standards Request form (ESR) to incorporate the cells into the `snlelec.cel` library as required. Graphical representations of the cells in `snlelec.cel` are shown in the tabbed Electrical Cell Libraries section.

## 9.4 Panel Schedules

Panel Schedules are created in 'Excel; schedules for existing panels are organized by building and located in the AREA subfolders on the `srn.\london\panel`. Some existing panel schedules are in MicroStation format, and are located in Project Wise in the associated building directory.

Authorized A&E personnel may access and make modifications to existing panel schedules by using the community computer in the facilities Technical Library. Refer to <http://www.sandia.gov/engstds/forms.html> (panel Schedules), for blank forms for new panel schedules, and associated instructions.

In order for A&E personnel to utilize the community computer, both (1) an account on the Sandia domain, and (2) write access to the PANEL folder are required. To obtain PANEL folder access, contact any of the following:

John Rathbun 845-9000  
Kelley Garcia 844-9583  
Rebecca Lopez 845-9848

Preferred option: Copy the panel schedules into full-size drawings for construction projects requiring more than five panel schedules.

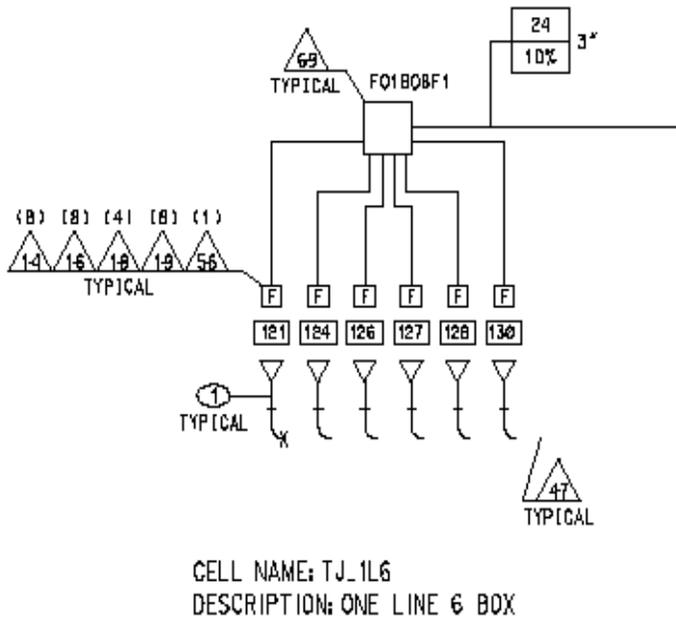
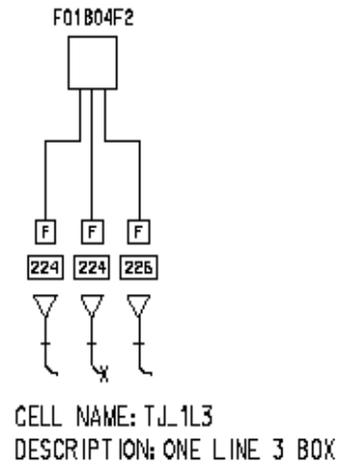
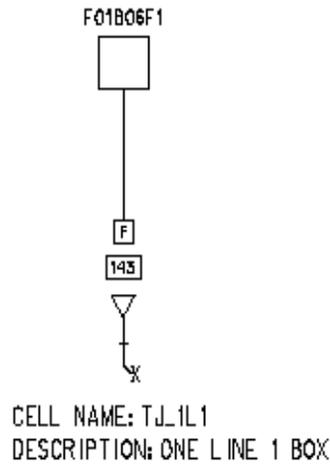
Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
ELEC_CLGMNT	FIRE ALARM CEILING MNTD (SMOKE DETECTOR, HORN, BELL, VISUAL/AUDIO, ETC.)	7	0	3
ELEC_CABINET_FIRE	FIRE ALARM TERMINAL CABINETS & DATA GATHERING PANELS	7	0	3
ELEC_CAMERA	CAMERA	75	0	3
ELEC_CKT	WIRE COUNTS, (CIRCUITING)	21	0	2
ELEC_CKT TXT	CIRCUIT NUMBER, TEXT ONLY	0	0	1
ELEC_CLG FIX	CEILING MOUNTED INTRUSION ALARM	87	0	3
ELEC_CLGCONTRL	CEILING MOUNTED ACCESS CONTROL	42	0	3
ELEC_CLGEXIT	EXIT LIGHTING FIXTURES (CEILING MOUNTED)	6	0	4
ELEC_CLGFLUOR	FLUORESCENT LIGHTING (CEILING MOUNTED)	6	0	5
ELEC_CLGINCAND	INCANDESCENT LIGHTING (CEILING MOUNTED)	6	0	4
ELEC_CLGINTERCOM	CEILING MOUNTED INTERCOM	43	0	3
ELEC_CLGJBOX	CEILING MOUNTED J-BOXES	21	0	3
ELEC_CLGPOWER	METERS, FAN HANGER OUTLETS, OUTLET BOXES / CEILING MNTD DUPLEX, 4PLEX & SPECIAL RECEPTACLES	53	0	3
ELEC_CLGRECEPT	CEILING MOUNTED DUPLEX, 4PLEX & SPECIAL RECEPTACLES	53	0	3
ELEC_CLGSP FIX	SPECIAL LIGHTING FIXTURES - HID, etc. (CEILING MOUNTED)	6	0	4
ELEC_COMM_BLACK	CB - COMMUNICATIONS BLACK and RED	2	0	2
ELEC_COMM_RED	CB - COMMUNICATIONS BLACK and RED	3	0	2
ELEC_COMPONENTS	RADIATION DETECTING COMPONENTS	41	0	3
ELEC_CONC COND	CIRCUIT LINES - CONCEALED CONDUIT	21	3	2
ELEC_CONDSYM		0	0	0
ELEC_CONTACTORS	LIGHTING CONTACTORS	6	0	3
ELEC_CONTROL	ACCESS CONTROL	42	0	3
ELEC_DUCT	UNDERFLOOR DUCT, TRENCH & CELLULAR DUCTS	53	0	3
ELEC_EM HATCH	EMERGENCY CROSS HATCH (WALL & CEILING MOUNTED), EMERGENCY LIGHT	50	0	1
ELEC_EQSYM	ELECTRICAL EQUIPMENT SYMBOL & CONDUIT SYMBOL	0	0	1
ELEC_EQUIP	LIGHTNING PROTECTION & EQUIPMENT	66	6	3
ELEC_EXP COND	CIRCUIT LINES - EXPOSED CONDUIT	21	0	2
ELEC_GAS COMP	GAS DETECTING COMPONENTS	41	0	3
ELEC_MOTOR	MOTORS	53	0	3
ELEC_MOTOR CTR	MOTOR CONTROLLERS, CONTACTORS & SAFETY SWITCHES	53	0	3
ELEC_NOTING_AC	NOTES, MISC. TEXT, LEADER LINES, TERMINATORS	0	0	1
ELEC_OUTLET	BLACK/RED OUTLET BOX (TELEPHONE, L.A.N., COPPER, PDS,FIBER OPTICS)	1	0	3
ELEC_PANEL_ACCESSCONTROL	ACCESS CONTROL PANELS	42	0	3
ELEC_PANEL_COMM_BP	COMMUNICATIONS BLACK PANELS	1	0	3
ELEC_PANEL_INTERCOM	INTERCOM PANEL	43	0	3
ELEC_PANEL_INTRUSION	INTRUSION ALARM PANEL	176	0	3
ELEC_PANEL_LIGHTING	LIGHTING PANEL, LIGHT SWITCHING CABINETS	6	0	3
ELEC_PANEL_MONITOR_EH2	PANELS, MONITORING CABINETS	53	0	2
ELEC_PANEL_MONITOR_EMD	PANELS, MONITORING CABINETS	53	0	2
ELEC_PANEL_POWER	POWER PANEL	53	0	3
ELEC_PANEL_TXT	PANEL TEXT	0	0	1
ELEC_POWER	P - POWER	53	0	2

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
ELEC_PSTRIP	PLUG-IN STRIPS	53	0	3
ELEC_ROOMNAMES	ROOM NAMES AND UNDERLINES	2	0	1
ELEC_SENSING PNTS	SENSING POINTS	53	0	1
ELEC_SP RECEPT	THERMAL OVERLOAD SWITCH, SPECIAL RECEPTACLES (OTHER THAN DUPLEX & 4 PLEX)	53	0	2
ELEC_SWITCHES	SWITCHES, LIGHT SWITCHING CABINETS	61	0	2
ELEC_THERMAL SW	THERMAL OVERLOAD SWITCH	61	0	2
ELEC_THERMS	THERMOSTATS	53	0	3
ELEC_UNDERGND COND_AC	CIRCUIT LINES - UNDERGROUND CONDUIT	21	4	2
ELEC_UNDERGND COND_EBR	CIRCUIT LINES - UNDERGROUND CONDUIT	21	4	2
ELEC_UNDERGND COND_EFA	CIRCUIT LINES - UNDERGROUND CONDUIT	21	4	2
ELEC_WIREWAYS	WIREWAYS, BUSDUCTS & CABLETRAYS	53	0	3
ELEC_WM_FIX	WALL MOUNTED INTRUSION ALARM	87	0	3
ELEC_WM_EXIT	EXIT LIGHT FIXTURE (WALL MOUNTED)	6	0	4
ELEC_WM_FLUOR	FLUORESCENT (WALL MOUNTED)	6	0	5
ELEC_WM_INCAND	INCANDESCENT LIGHTING (WALL MOUNTED)	6	0	4
ELEC_WM_INTERCOM	WALL MOUNTED INTERCOM	43	0	3
ELEC_WM_JBOX	WALL MOUNTED J-BOXES	21	0	3
ELEC_WM_RECEPT	WALL MOUNTED DUPLEX AND QUADRAPLEX RECEPTACLES	53	0	3
ELEC_WM_SP FIX	SPECIAL LIGHTING FIXTURES - HID etc. (WALL MOUNTED)	6	0	4
ELEC_WMSYM	FIRE ALARM WALL MNTD (SMOKE DETECTOR, HORN, BELL, VISUAL/AUDIO, ETC.)	7	0	3
ELEC_XFMR	TRANSFORMERS	53	0	3
ELEC_EXT COND	EXISTING CONDUIT	21	0	2
ELEC_PANEL_INTRUSTION	INTRUSION ALARM PANEL	87	0	3
ELEC_EXFIX	FIXTURES TO REMAIN	5	1	0
ELEC_EXREM	FIXTURES TO BE REMOVED	5	4	0
ELEC_RELAY	RELAY	53	0	3
ELEC_WMSW	SWITCHES	61	0	2
ELEC_KNKOUT	POWER KNOCK OUT	53	0	2
ELEC_PWRPOL	POWER POLE	53	0	2
ELEC_CLGTRK2	TRACK LIGHTING - 2 FIXTURES HEADS	6	0	4
ELEC_COUNT	COUNTERPOISE	66	6	3
ELEC_AIRTER	AIR TERMINAL	66	6	3
ELEC_GNDROD	GROUND ROD	66	6	3
ELEC_BNDEQP	BOND TO EQUIPMENT, OR BUILDING	66	6	3
ELEC_CABSPL	CABLE TO CABLE PARALLEL SPLICER	66	6	3
ELEC_LTNGND	GROUND	55	6	3
ELEC_WDIAG	WIRING DIAGRAMS	55	0	4
ELEC_OLDIAG		55	0	4
FA_WDIAG		55	0	4

x - DENOTES CELL ORIGINAL

# ONE LINE DIAGRAMS

## COMMUNICATION RED/BLACK DIAGRAMS



RC = SNLELEC.CEL

ADD 12/12/03

# Chapter 10 - Telecommunications

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<b>10.2 Level Assignments.....</b>	<b>10-2</b>

## 10.1 Introduction

This section describes the CADD requirements for telecommunications systems.

## 10.2 Level Assignments

The level schemas shown in this chapter are the standard element level definitions for telecommunications master files. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator Amy Rhutasel for approval before using user-defined levels. All user-defined levels must be identified using the File Specific Information cell located in `noting.cel`. Level schemas in this chapter are as follows:

<b>Level Schema</b>	<b>Page</b>
Telecommunications Black and Red Plan	10-3
Comm. – Controls and Monitors	10-4
Manholes – Comm.	10-5
Comm. – Alarms	10-6

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
COMM_ACCPR	COMM SYSTEMACCESS CONTROL COPPER	3	0	3
COMM_ACCPR_D	COMM SYSTEM ACCESS CONTROL COPPER DASHED	3	2	3
COMM_ACFBR	COMM SYSTEM ACCESS CONTROL FIBER	3	0	3
COMM_ACFBR_D	COMM FIBER SYSTEM ACCESS CONTROL DASHED	3	2	3
COMM_BLKCPBR	BLACK COPPER	104	0	3
COMM_BLKCPBR_D	BLACK COPPER DASHED	104	2	3
COMM_BLKCPRTXT	BLACK COPPER TEXT	1	0	1
COMM_BLKFBR	BLACK FIBER	65	0	3
COMM_BLKFBR_D	BLACK FIBER DASHED	65	2	3
COMM_BLKFBRTXT	BLACK FIBER TEXT	1	0	1
COMM_BLKRNGBR	BLACK RING FIBER	116	0	3
COMM_COAX	LAN COAX	1	0	3
COMM_COAX_D	LAN COAX DASHED	1	2	3
COMM_CPR	COMM SYSTEM COPPER	107	0	3
COMM_CPR_D	COMM SYSTEM COPPER DASHED	107	2	3
COMM_CPRTXT	COMM SYSTEM COPPER TEXT	1	0	1
COMM_FACPR	FIRE ALARM COPPER	2	0	2
COMM_FACPR_D	FIRE ALARM COPPER DASHED	2	2	2
COMM_FACPRTXT	FIRE ALARM COPPER TEXT	1	0	1
COMM_FAFBR	FIRE ALARM FIBER	2	0	3
COMM_FAFBR_D	FIRE ALARM FIBER DASHED	2	2	3
COMM_FBR	COMM FIBER	3	0	3
COMM_FBR_D	COMM FIBER DASHED	3	2	3
COMM_FBRTXT	COMM FIBER TEXT	1	0	1
COMM_IACOAX	COMM INTRUSION ALARM COAX	1	0	3
COMM_IACOAXTXT	COMM INTRUSION ALARM COAX TEXT	81	0	1
COMM_IACPR	COMM INTRUSION ALARM COPPER	6	0	3
COMM_IACPR_D	COMM INTRUSION ALARM COPPER DASHED	6	2	3
COMM_IACPRTXT	COMM INTRUSION ALARM COPPER TEXT	1	0	1
COMM_IAFBR	COMM INTRUSION ALARM FIBER	167	0	3
COMM_IAFBR_D	COMM INTRUSION ALARM FIBER DASHED	167	2	3
COMM_IAFBRTXT	COMM INTRUSION ALARM FIBER TEXT	1	0	1
COMM_LEAD	DOES NOT EXIST	0	0	0
COMM_MH	COMMUNICATION MANHOLES, ALL SIZES & DIMENSIONS	0	1	4
COMM_REDCPR	RED COPPER	139	0	3
COMM_REDCPR_D	RED COPPER DASHED	139	2	3

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
COMM_REDCPRTXT	RED COPPER TEXT	1	0	1
COMM_REDFBR	RED FIBER	119	0	3
COMM_REDFBR_D	RED FIBER DASHED	119	2	3
COMM_REDFBRTXT	RED FIBER TEXT	1	2	1
COMM_REDRNGFBR	RED RING FIBER	116	0	3
COMM_UNKCPR	UNKNOWN COPPER	7	2	3
CCT_CTRL_SYM	CONTROL DEVICE SYMBOLS, LEADER LINES, TERMINATORS	7	0	1
CCT_PNU SIG	PHEUMATIC SIGNAL	4	Pneumatic Signal	2
CCT_MISC	WAS Level 12, unknown	0	0	0
CCT_ELEC CTRL SIG	ELECTRICAL CONTROL SIGNAL	21	3	1
CCT_CTRL_DVS	CONTROL DEVICES	7	0	1
COMM_CMH_DTBK	COMM MANHOLE CONDUIT	0	0	2

## Chapter 11 - Security

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<b>11.2 Level Assignments.....</b>	<b>11-2</b>
<b>11.3 Intrusion Alarm and Access Control Systems.....</b>	<b>11-2</b>

## 11.1 Introduction

This section describes the CADD requirements for Intrusion Alarm and Access Control.

## 11.2 Level Assignments

The level schemas shown in this chapter are the standard element level definitions for security master files. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator, Amy Rhutasel, for approval before using user-defined levels. All user-defined levels must be identified using the File Specific Information cell located in `noting.cel`. Level schemas in this chapter are as follows:

<b>Level Schema</b>	<b>Page</b>
Access Control Plan	11-3
Intrusion Alarm Plan	11-3

## 11.3 Intrusion Alarm and Access Control Systems

Intrusion alarm plans follow the master file and plot file requirements explained in Chapter 2. The Facilities Management and Operation Center also has available standard Intrusion Alarm drawings. Refer to Section 2.9.14, Standard Drawings.

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
ELEC_PSTRIP	PLUG-IN STRIPS	53	0	3
ELEC_ROOMNAMES	ROOM NAMES AND UNDERLINES	2	0	1
ELEC_SENSING PNTS	SENSING POINTS	53	0	1
ELEC_SP RECEPT	THERMAL OVERLOAD SWITCH, SPECIAL RECEPTACLES (OTHER THAN DUPLEX & 4 PLEX)	53	0	2
ELEC_SWITCHES	SWITCHES, LIGHT SWITCHING CABINETS	61	0	2
ELEC_THERMAL SW	THERMAL OVERLOAD SWITCH	61	0	2
ELEC_THERMS	THERMOSTATS	53	0	3
ELEC_UNDERGND COND_AC	CIRCUIT LINES - UNDERGROUND CONDUIT	21	4	2
ELEC_UNDERGND COND_EBR	CIRCUIT LINES - UNDERGROUND CONDUIT	21	4	2
ELEC_UNDERGND COND_EFA	CIRCUIT LINES - UNDERGROUND CONDUIT	21	4	2
ELEC_WIREWAYS	WIREWAYS, BUSDUCTS & CABLETRAYS	53	0	3
ELEC_WM_FIX	WALL MOUNTED INTRUSION ALARM	87	0	3
ELEC_WM_EXIT	EXIT LIGHT FIXTURE (WALL MOUNTED)	6	0	4
ELEC_WM_FLUOR	FLUORESCENT (WALL MOUNTED)	6	0	5
ELEC_WM_INCAND	INCANDESCENT LIGHTING (WALL MOUNTED)	6	0	4
ELEC_WM_INTERCOM	WALL MOUNTED INTERCOM	43	0	3
ELEC_WM_JBOX	WALL MOUNTED J-BOXES	21	0	3
ELEC_WM_RECEPT	WALL MOUNTED DUPLEX AND QUADRAPLEX RECEPTACLES	53	0	3
ELEC_WM_SP FIX	SPECIAL LIGHTING FIXTURES - HID etc. (WALL MOUNTED)	6	0	4
ELEC_WMSYM	FIRE ALARM WALL MNTD (SMOKE DETECTOR, HORN, BELL, VISUAL/AUDIO, ETC.)	7	0	3
ELEC_XFMR	TRANSFORMERS	53	0	3
ELEC_EXT COND	EXISTING CONDUIT	21	0	2
ELEC_PANEL_INTRUSTION	INTRUSION ALARM PANEL	87	0	3
ELEC_EXFIX	FIXTURES TO REMAIN	5	1	0
ELEC_EXREM	FIXTURES TO BE REMOVED	5	4	0
ELEC_RELAY	RELAY	53	0	3
ELEC_WMSW	SWITCHES	61	0	2
ELEC_KNKOUT	POWER KNOCK OUT	53	0	2
ELEC_PWRPOL	POWER POLE	53	0	2
ELEC_CLGTRK2	TRACK LIGHTING - 2 FIXTURES HEADS	6	0	4
ELEC_COUNT	COUNTERPOISE	66	6	3
ELEC_AIRTER	AIR TERMINAL	66	6	3
ELEC_GNDROD	GROUND ROD	66	6	3
ELEC_BNDEQP	BOND TO EQUIPMENT, OR BUILDING	66	6	3
ELEC_CABSPL	CABLE TO CABLE PARALLEL SPLICER	66	6	3
ELEC_LTNGND	GROUND	55	6	3
ELEC_WDIAG	WIRING DIAGRAMS	55	0	4
ELEC_OLDIAG		55	0	4
FA_WDIAG		55	0	4

# Chapter 12 - Controls

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12.4 Control Master File.....	12-2
12.5 Control Labeling.....	12-2

## 12.1 Introduction

This chapter details standards and processes unique to HVAC Controls files.

## 12.2 Level Assignments

The level schemas shown in this chapter are the standard element level definitions for the controls system master file. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator for approval before using user-defined levels. All user-defined levels shall be identified using the File Specific Information (FSI) cell located in `noting.cel`. Level schemas in this chapter are as follows:

<b>Level Schema</b>	<b>Page</b>
Controls Plan	12-3

## 12.3 Standard Cells

The standard controls cell library is `snlcont.cel`. If additional new cells are required, create a personal project cell library and submit to the Project CADD Coordinator for approval before using new cells. Submit an Engineering Standards Request (ESR) to incorporate the cells into the `snlcont.cel` library. Graphical representations of the cells in `snlcont.cel` are shown in the tabbed Controls Cell Library section.

## 12.4 Control Master File

Control master files are created by referencing the appropriate mechanical and electrical system master files. The MicroStation V8 reference levels Symbology command (under the Reference, Settings, and Level menus) may be used to adjust line weights and colors on the referenced mechanical and electrical files in order to clearly identify equipment and control labels.

## 12.5 Control Labeling

The control cells contain data fields for text. An important requirement for all control files is the labeling.

Name	Description	ByLevel Color	ByLevel Style	ByLevel Weight
CCT_BLG EQ NON USR	BUILDING EQUIPMENT ONLY	0	0	0
CCT_CTRL_DVS	CONTROL DEVICES	7	0	1
CCT_CTRL_SYM	CONTROL DEVICE SYMBOLS, LEADER LINES, TERMINATORS	7	0	1
CCT_DLNK LAN INT SYSL	DATA LINK (LAN) COMM / INTERNAL SYSTEM LINE	3	Internal System	2
CCT_ELEC CTRL SIG	ELECTRICAL CONTROL SIGNAL	21	3	1
CCT_ELEC EQ CON SYM	ELECTRICAL EQUIPMENT SYMBOL & CONDUIT SYMBOL	0	0	1
CCT_ELEC PWR SIG	ELECTRICAL POWER SIGNAL	3	Data Link	2
CCT_FID_PNL	FID PANELS	21	0	3
CCT_HEX SYM	HEX SYMBOLS	0	1	0
CCT_JBOX_CLGMTD	J BOXES (CEILING MOUNTED)	21	0	3
CCT_JBOX_WLMTD	J BOXES (WALL MOUNTED)	21	0	3
CCT_PATTERN	PATTERNING WITH PEN TABLE-SEE SYSTEM MANAGER	0	0	0
CCT_PNL ID TXT	PANEL I.D. TEXT	0	0	1
CCT_PNU SIG	PHEUMATIC SIGNAL	4	Pneumat ic Signal	2
CCT_SHADING	SHADING	0	0	0

## Chapter 13 - Asbestos Management

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<b>13.5 Creating Plot Files.....</b>	<b>13-3</b>
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<b>13.7 Labels and Legends.....</b>	<b>13-3</b>
<b>13.8 Asbestos Codes and Descriptions List.....</b>	<b>13-4</b>

### 13.1 Introduction

This chapter details standards and processes unique to Asbestos CADD files. For more information, contact the asbestos team leader.

### 13.2 Level Assignments

The level schemas shown in this chapter are the standard element level definitions for each asbestos master file and plot files. User-definable levels are used where the level schemas do not accommodate the design needs of a particular project. Contact the Project CADD Coordinator for approval before using user-defined levels. All user-defined levels shall be identified within the CADD file using the File Specific Information (FSI) cell located in `noting.cel`.

### 13.3 Standard Cells

The standard asbestos cell library is `asbesto3.cel`. This cell library was created primarily for files using 1/8 inch = 1 foot 0 inches scale or smaller. If the scale is 1/4 inch = 1 foot 0 inches then an operator shall set active scale for cell placement to `AS=.5`

If additional new cells are required, create a personal project cell library and submit it to the Project CADD Coordinator for approval before using new cells. Submit an Engineering Standards Request (ESR) to incorporate the cells into the `asbesto3.cel` library. Graphical representations of the cells in `asbesto3.cel` are shown in the tabbed Asbestos Cell Libraries section.

When placing cells for Asbestos Material Samples, refer to the Asbestos Codes and Descriptions list (Section 13.8) to determine the type of mechanical insulation, surfacing material, or miscellaneous materials that were sampled. After the determining the type of sample, determine the result—sample was positive; negative; showed traces; or not tested. Refer to the tabbed Asbestos Cell Library section for descriptions and examples of cells.

The Facilities Asbestos Implementation Team (FAIT) Bulk Sample Report contains information about materials tested, task or service order number, sample number, year, material test results, and brief descriptions of the location of each sample. This information is used to select the proper cells.

### 13.4 Asbestos Files

Plot File	Zone Assignment Plan Drawing
Master (AP), then Plot file	Asbestos Survey Basement Plan
Master (AP), then Plot file	Asbestos Survey First Floor
Master (AP), then Plot file	Asbestos Survey Second Floor
Master (AP), then Plot file	Asbestos Survey Mezzanine
Master (AP), then Plot file	Asbestos Survey Any Additional Floors
Master (RO), then Plot file	Asbestos Roof Plan
Master (CT), then Plot file	Asbestos Ceiling Tile Plan by Floor (When Necessary)
Master (AT), then Plot file	Asbestos Attic Tile Plan (When Necessary)
Plot file	Abatement Drawing (When Necessary)

When circumstances warrant (for example, in small buildings), the Zone Assignment Plan Drawing and the Asbestos Survey-Floor Plan can be combined onto a single plot file.

If an Architectural CADD Roof Plan does not exist, a separate asbestos design file shall be generated and attached to the plot file. Use a single line for the Roof outline.

### 13.5 Creating Plot Files

Plot files for any Asbestos drawing follow the plot file standards in Chapter 2, with the exception of the border (D-plus) reference file. Place the referenced border file over the architectural floor plan. If master floor plan reference files require scaling down, then determine the scale factor and the x, y, z, scale about a point. Scale each reference floor plan with the same scale factor and x, y, z point. All master file manipulations shall be identified within the CADD file using the File Specific Information (FSI) cell in `noting.cel`. The FSI cell includes scale factor and recorded x, y, z scale point. Reduce the full-size master reference file to fit the border file as follows:

Scale	Master/Reference
1/8 =	.6 : 1
1/16 =	.25 : 1
3/16 =	.75 : 1
1/10 =	.4 : 1
1/30 =	.1333 : 1
1/20 =	.2 : 1

### 13.6 Updating Asbestos Abatement Files

FAIT will provide mark-ups indicating abatement tasks performed in buildings, such as removal of positive materials. This data is entered into asbestos CADD files to maintain accurate and current CADD drawings.

Except for HFF symbols and text, graphic elements or data shall not be deleted from asbestos master files. Elements that are abated are reassigned to an abatement level (see level schemas). When HFFs are removed, change the number in the HFF symbol. After all HFFs have been abated, remove the symbol from the drawings.

When Asbestos Abatement plot files become too cluttered with information, create a new file for clarity.

### 13.7 Labels and Legends

Several legends and labels are used in asbestos files, as follows:

- Title block  
Revision block extends along right side of title block. See Figure 13-1.
- Typical material references  
This cell is shown in asbestos Survey Master Files. See Figure 13-2.

- **Inventory of samples**  
Follow the sequence of the Bulk Sample Inventory printout. See Figure 13-3 for a close-up example and Figure 13-6 for the location on the plot file provided by FAIT.
- **Inventory of background air samples**  
Follow the sequence of the Air Sample Inventory printout. See Figure 13-4 for a close-up example and Figure 13-6 for the location on the plot file provided by FAIT.
- **Asbestos legend**  
This cell is shown on each Asbestos Survey plot files. See Figure 13-5 for a close-up example and Figure 13-6 for the location on the plot file.
- **Abatement revision indicator.**  
This symbology is used for each revision balloon indicator on abatement plot files. See Figure 13-7 for a close-up example.
- **Patterning indicators**  
See Figure 13-8 for an example of patterning used in creating asbestos plot files.

### 13.8 Asbestos Codes and Descriptions List

Symbols placed on survey locations are separated into three categories:

- Mechanical Insulation
- Surfacing Material
- Miscellaneous Material

#### Mechanical Insulation

<u>Code</u>	<u>Description</u>	<u>Code</u>	<u>Description</u>
ACDI	Air Cell Duct Insulation	HG/NA	Hard Fittings/Non-Asbestos Pipe
AIR	Air Cell Pipe Insulation	HFA	Hard Fittings on Air Cell
AIR/H	Air Cell/Hard Fitting	HFF	Hard Fittings on Fiberglass
AIR/J	Air Cell/Jacket	HFFELT	Hard Fittings on Felt Wrap
API	Asbestos Pipe Insulation	HFM	Hard Fittings on Mag Pipe
API/HF	Asbestos Pipe Insulation/Hard Fittings	HFPERM	Hard Fittings on Permalite
ASML/H	Asphaltic Emulsion/Hard Fittings	HFPW	Hard Fittings on Paper Wrap
ASMUL	Asphaltic Emulsion	WRTAPE	Heat Resistant Tape
BLOCK	Mag Block Insulation	INS	Insulating Cement
DIC	Duct Insulation Cement	INS/FG	Insulating Cement/Fiberglass
DUCT/B	Duct Board	LAG/FG	Felt Lagging on Fiberglass
FAB	Heavy Woven Fabric	LAG/NA	Lagging Non-Asbestos Material
FELT	Felt Wrap Pipe Insulation	LAG/PW	Lagging on Paper Wrap Pipe
FELT/H	Felt Wrap Pipe/Hard Fitting	MAG	MAG Pipe Insulation
FELT/I	Felt Lagging Insulation	MAG/H	MAG Pipe/Hard Fittings
PAPER	Paper Felt	TAPE	Duct Felt Tape
PRM	Permalite Pipe Insulation	TRANS	Transite Tape
PRM/H	Permalite/Hard Fitting	WIRE	Asbestos Insulated Wiring

PW Paper Wrap  
PW/H Paper Wrap/Hard Fitting

DUCT/LAG Duct Lagging  
WH/FIB INS White Fibrous Insulation

### Surfacing Materials

<u>Code</u>	<u>Description</u>
PLSTER	Wall and Ceiling Plaster
PORD	Poured Flooring
SC-FP	Sprayed Cementitious Fireproofing
SF-FP	Sprayed Fibrous Fireproofing
T-TEX	Troweled Textured Material
TARP	Asphalt Impregnated Paper

<u>Code</u>	<u>Description</u>
TO-FP	Troweled on Fireproofing
TEX	Textured Ceiling Material
VENR	Veneer Plaster
MUD/TAPE	Mud & Tape (joint compound for sheetrock)
PAINT	Paint
PA-TEX	Paint/textured coating

### Miscellaneous Material

<u>Code</u>	<u>Description</u>
BLANK	Variable unclassified material
BLOWN	Blown-in Insulation
BRAKE	Brake & Clutch Pads
BUR	Built-up Roofing
CAB	Cement Asbestos Board
CAS	Cement Asbestos Siding
CERGRT	Ceramic Tile/Grout
CG/CT	Concealed Grid Ceiling Tile
COMP	Composition Shingles
CONC	Concrete
COVBAS	Covebase
DEB	Material Debris
DUST	Settled Dust
FIREDR	Fire Door
GASKET	Gasket
GCT	Glued-on Ceiling Tile
CT	Glued-on Tile
GWT	Glued-on Wall Tile
GYP	Gypsum Wallboard
HOTPAD	Hotpad
LABTOP	Lab Countertop

<u>Code</u>	<u>Description</u>
LCT	Lay-in Ceiling Tile
MASTIC	Mastic
MIC	Mechanical Isolation Cloth
MLBD	Millboard
PUTTY	Putty Wrap
RFFELT	Roofing Felt
SHINGL	Cementitious Roof Shingles
SHT	Sheet Floor Covering
SOIL	Contaminated Soil
VAT	Vinyl Floor Covering
FOAM	Foam
CON/DUST	Concrete Dust
TRANS/SID	Transite Siding
TAR	Tar
TARP	Asphalt Impregnated Paper
TRANS/SHINGL	Transite Shingle
TRANS/PIPE	Transite Pipe
WALL	Wallboard
WD	Wood



TYPICAL MATERIAL REFERENCES

FLOOR MATERIAL REFERENCES:

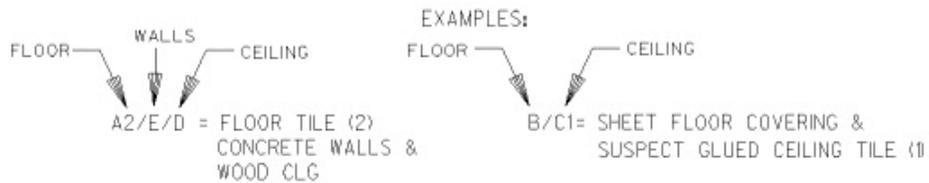
- A FLOOR TILE
- B SHEET FLOOR COVERING
- C CARPET
- D WOOD
- E CONCRETE
- F CERAMIC TILE
- G TERRAZO

WALL MATERIAL REFERENCES: (if used)

- A GYPSUM AND/OR PLASTER
- B BRICK
- C GLUED WALL TILE
- D WOOD
- E CONCRETE/CONCRETE BLOCK
- F CERAMIC TILE

CEILING MATERIAL REFERENCES:

- A GYPSUM AND/OR PLASTER
- B SUSPECT LAY-IN CEILING TILE
- C SUSPECT GLUED CEILING TILE
- D WOOD
- E CONCRETE
- F SUSPECT CONCEALED GRID CEILING TILE
- G TEXTURED CEILING MATERIAL
- H FIRTEX
- X NON-SUSPECT LAY-IN CEILING TILE
- Y NON-SUSPECT CONCEALED GRID CEILING TILE
- Z NON-SUSPECT GLUED CEILING TILE



NOTE: WHEN TWO OR MORE DIFFERENT TYPES OF A GIVEN MATERIAL ARE NOTED A SUFFIX IS USED TO DIFFERENTIATE BETWEEN THEM e.g. (1),(2), ETC.

Figure 13-2. Material References Example

INVENTORY OF SAMPLES				INVENTORY OF SAMPLES			
DRAWING REFERENCE	SAMPLE CODE	LAB RESULT	MATERIAL SAMPLED	DRAWING REFERENCE	SAMPLE CODE	LAB RESULT	MATERIAL SAMPLED
301	301-301	(-)	LCT(2)	289	200-289	(-)	MASTIC(1)
302	301-302	(-)	LCT(2)	<del>290</del>	<del>200-290</del>	<del>(+)</del>	<del>HFF(1)</del>
303	301-303	(-)	LCT(2)	<del>291</del>	<del>200-291</del>	<del>(+)</del>	<del>HFF(1)</del>
304	301-304	(-)	LCT(1)	<del>292</del>	<del>200-292</del>	<del>(TRACE)</del>	<del>HFF(2)</del>
305	301-305	(-)	LCT(1)	<del>293</del>	<del>200-293</del>	<del>(-)</del>	<del>HFF(3)</del>
306	301-306	(-)	LCT(1)	<del>294</del>	<del>200-294</del>	<del>(+)</del>	<del>HFF(5)</del>
307	301-307	(+)	VAT(1)	295	200-295	(-)	VAT(5)
308	301-308	(+)	VAT(1)	T295	200-T295	(-)	VAT(5)TEM
309	301-309	(TRACE)	VAT(1)	296	200-296	(-)	VAT(5)
310	301-310	(-)	COVBAS(2)	T296	200-T296	(-)	VAT(5)TEM
311	301-311	(-)	GYP(1)	297	200-297	(-)	LCT(1)
301A	302-301	(-)	LCT(2)	298	200-298	(-)	LCT(2)
302A	302-302	(-)	LCT(1)	299	200-299	(-)	GASKET(1)
303A	302-303	(-)	GYP(1)	300	200-300	(-)	GASKET(1)
501	550-501	(-)	GYP(2)	301	200-301	(-)	GASKET(1)
502	550-502	(-)	GYP(2)	001F	CNT113-001	(+)	GYP(4)
503	550-503	(-)	GYP(2)	002F	CNT113-002	(+)	GYP(4)
504	550-504	(-)	GYP(2)	003F	CNT113-003	(+)	GYP(4)
001C	301-001	(-)	GYP(1)	001	CNT258-001	(-)	GYP(5)
002C	301-002	(-)	GYP(1)	002	CNT258-002	(-)	GYP(5)
003C	301-003	(-)	GYP(1)	003	CNT258-003	(-)	GYP(5)
601	601-601	(-)	GYP(1)	004	CNT258-004	(-)	LAG/FG(1)
602	601-602	(-)	GYP(1)	005	CNT258-005	(-)	LAG/FG(1)
603	601-603	(-)	GYP(1)	006	CNT258-006	(-)	LAG/FG(1)
604	601-604	(-)	GYP(1)	007	CNT258-007	(-)	FAB(2)
605	601-605	(-)	GYP(1)	008	CNT258-008	(-)	FAB(2)
606	601-606	(-)	GYP(1)	009	CNT258-009	(-)	FAB(2)
<del>275</del>	<del>200-275</del>	<del>(+)</del>	<del>HFF(3)</del>	010	CNT258-010	(-)	LCT(6)
<del>2750</del>	<del>200-2750</del>	<del>(+)</del>	<del>HFF(3)</del>	011	CNT258-011	(-)	LCT(6)
<del>276</del>	<del>200-276</del>	<del>(-)</del>	<del>HFF(3)</del>	012	CNT258-012	(-)	LCT(6)
277	200-277	(-)	VAT(5)	013	CNT258-013	(-)	MASTIC(3)
278	200-278	(-)	VAT(5)	014	CNT258-014	(-)	MASTIC(3)
279	200-279	(-)	COVBAS(2)	015	CNT258-015	(-)	MASTIC(3)
280	200-280	(-)	COVBAS(2)	016	CNT258-016	(-)	VAT(6)
281	200-281	(-)	COVBAS(2)	017	CNT258-017	(-)	VAT(6)
282	200-282	(-)	VAT(5)	018	CNT258-018	(-)	VAT(6)
283	200-283	(-)	PW(1)	025	CNT258-025	(-)	GYP(3)
284	200-284	(-)	PW(1)	026	CNT258-026	(-)	GYP(3)
285	200-285	(-)	PW(1)				
<del>286</del>	<del>200-286</del>	<del>(-)</del>	<del>COVBAS(3)</del>				
287	200-287	(-)	VAT(5)				
288	200-288	(+)	VAT(1)				
288B	200-288B	(+)	MAS/VT(1)				

← LINE INDICATES ABATEMENT

Figure 13-3. Bulk Sample Inventory Example

## INVENTORY OF BACKGROUND AIR SAMPLES



DRAWING REFERENCE	SAMPLE ANALYSIS	CONCENTRATION	
		<u>S/MM<sub>2</sub></u>	<u>F/CC</u>
001	PCM		<0.001
002	PCM		0.003
003	PCM		0.001
004	TEM	NSD	
005	PCM		<0.001

## BACKGROUND AIR SAMPLES NOTES

1. BDL = BELOW DETECTION LIMITS
2. NSD = NO STRUCTURES DETECTED
3. ALL SAMPLES WERE ANALYZED BY PCM,  
UNLESS OTHERWISE NOTED.

**Figure 13-4. Air Sample Inventory Example**

LEGEND

	DRAWING REFERENCE TO BULK SAMPLE FIELD CODE. SEE INVENTORY OF SAMPLES
	MATERIAL SYMBOL
	ENDING POINT OF SPECIFIED BUILDING MATERIAL
	VERTICAL PIPE RUN
	PARTITION WALLS
	ACM PIPE RUN
	ATTIC ACCESS HATCH UNLESS NOTED OTHERWISE
	DRAIN SPACE ACCESS UNLESS NOTED OTHERWISE
	CIRCLED NUMBERS INDICATE THE NUMBER AND LOCATION OF HARD FITTINGS ON FIBERGLASS
B/C	FLOOR/CEILING MATERIAL REFERENCE (SEE TYPICAL MATERIAL REFERENCES)
B/A/C	FLOOR/WALL/CEILING MATERIAL REFERENCE (SEE TYPICAL MATERIAL REFERENCES)
	ROOM NUMBER (WHEN KNOWN)
	BACKGROUND AIR SAMPLE LOCATION

ABBREVIATIONS

±	APPROXIMATE
AC	AIR CELL
BUR	BUILT-UP ROOFING
CAB	CEMENT ASBESTOS BOARD
CGCT	CONCEALED GRID CEILING TILE
CLG	CEILING
CONC	CONCRETE
COVBAS	COVEBASE/MASTIC
CT	CERAMIC TILE
DEB	MATERIAL DEBRIS
DI	DUCT INSULATION
FD	FIRE DOOR
FG	FIBERGLASS
FLR	FLOOR
FT	FLOOR TILE
FW	FELT WRAP
GCT	GLUED CEILING TILE
GWT	GLUED WALL TILE
GYP	GYPSON BOARD
HFF	HARD FITTING ON FIBERGLASS, OBSERVED BUT NOT NECESSARILY SAMPLED.
INS	INSULATION
LAG/NA	LAGGING NON-ASBESTOS MATERIAL
LCT	LAY-IN CEILING TILE
MAG	MAGNESIUM SILICATE (ASBESTOS CONTAINING)
NA	NO ACCESS
NAD	NO ASBESTOS DETECTED
NS	NON-SUSPECT
NT	BULK SAMPLE TAKEN, BUT NOT TESTED
PI	PIPE INSULATION
PL	PLASTER
PNT	PAINT
PW	PAPER WRAP PIPE INSULATION
SF	SQUARE FEET
SHT	SHEET FLOOR COVERING
TEX	TEXTURED MATERIAL
T-TEX	TROWELED TEXTURED MATERIAL
VAT	VINYL FLOOR TILE
+	POSITIVE, SAMPLE CONTAINS ASBESTOS
-	NEGATIVE, NO ASBESTOS DETECTED

TYPICAL MATERIAL REFERENCES

FLOOR MATERIAL REFERENCES:		WALL MATERIAL REFERENCES: (If Used)	
A	FLOOR TILE	A	GYPSON AND/OR PLASTER
B	SHEET FLOOR COVERING	B	BRICK
C	CARPET	C	GLUED WALL TILE
D	WOOD	D	WOOD
E	CONCRETE	E	CONCRETE/CONCRETE BLOCK
F	CERAMIC TILE	F	CERAMIC TILE
G	TERRAZO	FG	FIBERGLASS UNDER VINYL
H	RAISED COMPUTER FLOORING	J	METAL
-	NOT DOCUMENTED	-	NOT DOCUMENTED
CEILING MATERIAL REFERENCES:		EXAMPLES:	
A	GYPSON AND/OR PLASTER	FLOOR/WALL/CEILING	
B	SUSPECT LAY-IN CEILING TILE	C A1A1 / A4M21 / B11 E	
C	SUSPECT GLUED CEILING TILE	D A1A1 / A4M21 / B11 E	
D	WOOD	E	
E	CONCRETE	F	
F	SUSPECT CONCEALED GRID CEILING TILE	CARPET OVER FLOOR TILE/4) OVER CONCRETE	
FG	FIBERGLASS UNDER VINYL	GYPSUM WALLS	
G	TEXTURED CEILING MATERIAL	SUSPECT LAY-IN CEILING TILE BELOW GYPSUM CEILING	
H	FIBREX		
J	METAL		
X	NON-SUSPECT LAY-IN CEILING TILE		
Y	NON-SUSPECT CONCEALED GRID CEILING TILE		
Z	NON-SUSPECT GLUED CEILING TILE		
-	NOT DOCUMENTED		

SYMBOLS

NOT TESTED	NEGATIVE -	POSITIVE +	TRACE AMOUNT	
				MECHANICAL INSULATION
				SURFACING MATERIAL
				MISCELLANEOUS MATERIAL

NOTES

1. THESE DRAWINGS ARE DIAGRAMMATIC. THEY ARE FOR GENERAL INFORMATION AND SAMPLE LOCATION.
2. ACCESSIBLE SPACES WERE SURVEYED FOR SUSPECT ASBESTOS MATERIALS. WHEN OBSERVED THE MATERIALS WERE NOTED ON THE DRAWINGS. NON FRIABLE MATERIALS SUCH AS FLOOR TILE, PLASTER & ETC, MAY BE PRESENT.

Figure 13-5. Asbestos Legend Example

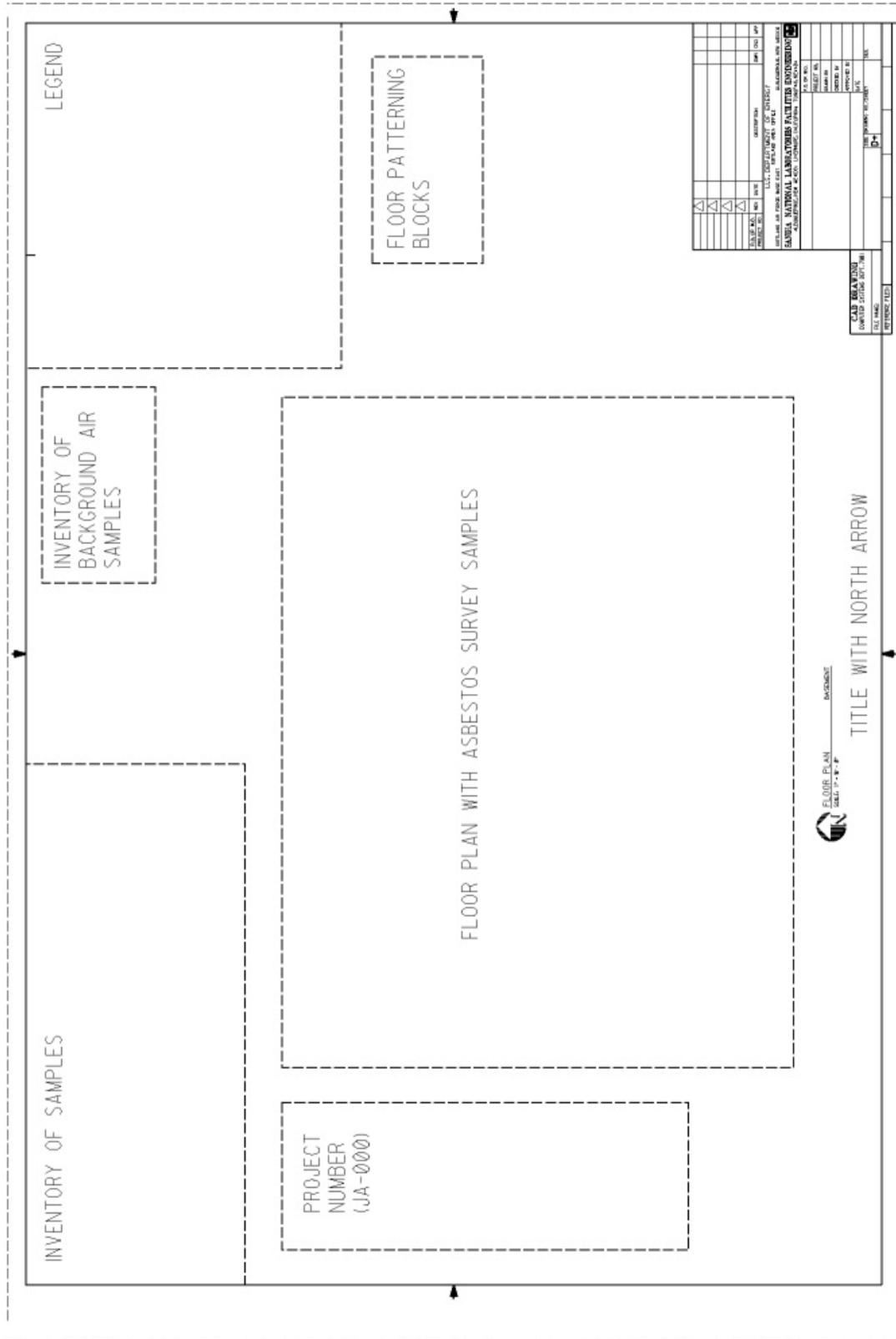


Figure 13-6. Symbol Location Diagram



**Figure 13-7. Abatement Drawing Revision Indicator**

	<p>INDICATES VAT (VINYL FLOOR COVERING)            ASSUMED OR TESTED POSITIVE            AREA PATTERN = DOT      SPACING = 1:2, 1:2            PATTERN ANGLE = 0      PATTERN SCALE = 1            WEIGHT = 2      COLOR = 1      LEVEL = 12</p>
	<p>INDICATES SHT (SHEET FLOOR COVERING)            ASSUMED OR TESTED POSITIVE            AREA PATTERN = DOT      SPACING = :7, :7            PATTERN ANGLE = 0      PATTERN SCALE = .50            WEIGHT = 1      COLOR = 47      LEVEL = 13</p>
	<p>INDICATES LCT (LAY-IN CEILING TILE)            ASSUMED OR TESTED POSITIVE            AREA PATTERN = HATCH      SPACING = 1            PATTERN ANGLE = 45      PATTERN SCALE = 1            WEIGHT = 1      COLOR = 115      LEVEL = 13</p>
	<p>INDICATES GCT (GLUED-IN CEILING TILE)            ASSUMED OR TESTED POSITIVE            AREA PATTERN = HATCH      PATTEN DELTA = 1            PATTERN ANGLE = -45      PATTERN SCALE = 1            WEIGHT = 1      COLOR = 73      LEVEL = 15</p>
	<p>INDICATES DEBRIS            ASSUMED OR TESTED POSITIVE            AREA PATTERN = HATCH      SPACING = :6, :6            PATTERN ANGLE = 45      PATTERN SCALE = 1            WEIGHT = 1      COLOR = 25      LEVEL = 16</p>

**Figure 13-8. Patterning Indicators**

LV	ASSIGNED ELEMENT DESCRIPTIONS	CO	WT	LC	REMARKS
1	USER DEFINABLE - DOCUMENT PER PROJECT				
2	NORTH ARROW				PLACED PER CELL
3	TITLE BLOCK INFORMATION	0	1	0	PLACED PER CELL - USE DATA FIELDS
4	KEY PLAN				
5	WALL/PARTITION DISCREPANCIES	13	1	0	
6					
7					
8					
9					
10	COLUMN GRIDS	2	0	4	
11	COLUMN GRID TAGS AND ASSOCIATED TEXT	2	1	0	
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40	REFERENCE SYMBOLS AND TEXT - SECTION, DETAIL, & ELEVATION CUTS	3	3	0	
41	TARGETS	0	1	0	
42					
43					
44					
45					
46	ZONE PLAN LINE INFORMATION & ZONE TEXT	3, 15	15, 1	2	Dictated by cell / STD TEXT FOR NOTES
47	DRAWING COMPONENT TITLES, SCALES, & ASSOCIATED GRAPHICS	0, 0, 3	3, 1, 3	0	SEE NOTE
48	LEGEND AND SCHEDULE GRAPHICS				
49	LEGEND AND SCHEDULE TEXT	0	3, 1	0	
50	DIMENSIONS AND ASSOCIATED LEADER LINES AND TERMINATORS	3	1, 0	0	
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					

**ASBESTOS ZONE ASSIGNMENT PLOT PLAN**

ASBESTOS  
PLOT FILE LEVEL SYMBOLOLOGY:

BLANK SPACES = USER DEFINABLE - DOCUMENT PER PROJECT

Color Table = ASBE.TBL

NOTE:

TITLES: CO=0,WT=3; SCALES: CO=0,WT=1; GRAPHICS: CO=3,WT=3

AP

LV	ASSIGNED ELEMENT DESCRIPTIONS	CO	WT	LC	REMARKS
1					
2	NORTH ARROW 7 GRAPHIC SCALE				DICTATED BY CELL
3	AIR SAMPLING LOCATION	13	1	-	DICTATED BY CELL TEXT
4	USER DEFINABLE - DOCUMENT IF USED				
5	WALL/PARTITION DISCREPANCIES	13	1	0	
6	TASK BOUNDARY INDICATION	19	7	0	
7	FLOOR/WALL/CEILING (ROOM) MATERIALS	32	1	0	TEXT SIZES: DEPENDENT ON SCALE OF DRAWING
8	SURVEY SAMPLE LOCATIONS SYMBOLS AND TEXT	21	1	0	SYMBOL DICTATED BY CELL. TEXT IS SCALE DEPENDENT
9	MISC. ACBM-CAB, CAB FUME HOOD	31	2	0	TEXT DEPENDENT ON SCALE OF DRAWING
10	MISC. ACBM-METAL PANEL, TRANSITE, ETC.	103	1	0	SPACING: 2' ANGLE 45, 135
11	(+) VAT/MASTIC CROSS HATCH	6	1	0	PATTERN SCHEME DICTATED BY CELL
12	(+) VINYL FLOOR COVERING (VAT)	1	2	-	PATTERN SCHEME
13	(+) SHEET FLOOR COVERING (SHT)	47	1	-	PATTERN SCHEME DICTATED BY CELL
14	(+) LAY-IN CEILINGTILE (LCT)	115	1	0	PATTERN SCHEME
15	(+) GLUED-ON CEILING TILE (GCT))	73	1	0	PATTERN SCHEME
16	(+) MATERIAL DEBRIS	25	1	0	
17	(+)GYPSUM WALLBOARD (GYP)	60	4,1	0	LINE WEIGHT, TEXT
18	ATTIC ACCESS & CRAWL SPACE ACCESS	16	-	-	DICTATED BY CELL
19	MISC. EQUIPMENT: TANKS, AIR HANDLERS, OVENS, LABTOPS	4,111	2	0	
20		-	-	-	
21	(+) "PLUMBING" PIPE RUNS, TEXT (ACM)	*	*	0	SEE NOTE *
22	(+) "HVAC" DUCTWORK (ACM)	36	1	0	
23	(+) "HVAC" PIPE RUNS, TEXT (ACM)	*	*	0	SEE NOTE *
24	ABATED SAMPLES (SYMBOLS & TEXT)	-	-	-	SAME AS LEVEL 8
25	(+) GASES (ACM) PIPING	*	*	0	SEE NOTE *
26	(+) SPECIALTY GASES (ACM) PIPING	*	*	0	SEE NOTE *
27	(+) PROCESS LIQUIDS (ACM) PIPING	*	*	0	SEE NOTE *
28	(+) FIRE PROTECTION (ACM) PIPING	-	-	-	SEE NOTE *
29	ABATED VINYL FLOOR COVERING (VAT)	-	-	-	SAME AS LEVEL 12
30	ABATED SHEET FLOOR COVERING (SHT)	-	-	-	SAME AS LEVEL 13
31	ABATED LAY-IN CEILING (LCT)	-	-	-	SAME AS LEVEL 14
32	ABATED GLUED-ON CEILING TILE (GCT)	-	-	-	SAME AS LEVEL 15
33	ABATED MATERIAL DEBRIS	-	-	-	SAME AS LEVEL 16
34	ABATED GYPSUM WALLBOARD (GYP)	-	-	-	SAME AS LEVEL 17
35	CEILING TILE PLAN (LCT) ASSIGNMENT	125	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
36	CEILING TILE PLAN (LCT) ASSIGNMENT	3	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
37	CEILING TILE PLAN (LCT) ASSIGNMENT	94	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
38	CEILING TILE PLAN (LCT) ASSIGNMENT	79	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
39	CEILING TILE PLAN (LCT) ASSIGNMENT	111	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
40	CEILING TILE PLAN (LCT) ASSIGNMENT	64	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
41	CEILING TILE PLAN (LCT) ASSIGNMENT	122	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
42	CEILING TILE PLAN (LCT) ASSIGNMENT	21	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
43	ABATED PIPE RUNS & SYMBOLS (PLUMBING)	-	-	-	SAME AS LEVEL 21
44	ABATED PIPE RUNS & SYMBOLS (HVAC)	-	-	-	SAME AS LEVEL 23
45	ROOM NUMBERS	-	-	-	DICTATED BY CELL
46					
47					
48					
49	ABATED DUCTWORK (HVAC)	-	-	-	SAME AS LEVEL 22
50	CEILING TILE PLAN (GCT) ASSIGNMENT	1	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
51	CEILING TILE PLAN (GCT) ASSIGNMENT	5	1	0	USER DEFINABLE SYMBOLOGY - DOCUMENT
52	CEILING TILE PLAN (GCT) ASSIGNMENT	10	1	-	USER DEFINABLE SYMBOLOGY - DOCUMENT
53	CEILING TILE PLAN (GCT) ASSIGNMENT	13	1	-	USER DEFINABLE SYMBOLOGY - DOCUMENT
54	CEILING TILE PLAN (GCT) ASSIGNMENT	31	1	-	USER DEFINABLE SYMBOLOGY - DOCUMENT
55					
56					
57					
58	ABATED PIPING - GASES AND SPECIALTY LIQUIDS	-	-	-	SAME AS LEVELS 25 & 26
59	ABATED PIPING - PROCESS LIQUIDS & FIRE PROTECTION	-	-	-	SAME AS LEVELS 25 & 26
60					
61					
62					
63					

ASBESTOS SURVEY, ROOF & TILE MASTER FILES

ASBESTOS MASTER FILE LEVEL SYMBOLOGY:

BLANK SPACES = USER DEFINABLE - DOCUMENT IF USED

Color Table = ASBE.TBL

\* NOTE: REFER TO:

COLOR AND WEIGHT TABLE FOR ADDITIONAL PIPE RUN INFORMATION

AP

LV	ABBREV.	ASSIGNED ELEMENT DESCRIPTIONS	CO	WT	LC	REMARKS
21		<b>PLUMBING ELEMENT DESCRIPTIONS</b>				
	HWC	HOT WATER CIRCULATING	5	3	0	
	D	DRAIN, GRAVITY	7	3	0	
	PD	PRESSURE DRAIN	8	3	0	
	NPW	NON-POTABLE WATER	57	3	0	
	V	VENT	11	2	0	
	RWL	RAIN WATER LEADER	32	4	0	
	HW	HOT WATER	1	3	0	
	CW	COLD WATER	2	3	0	
	S	SANITARY SEWER	3	4	0	
	SD	STORM SEWER	4	4	0	
	RD	ROOF DRAIN	64	4	0	
	LW	SOLVENT DRAIN	24	4	0	
	AV	ACID VENT	64	2	0	
	AW	ACID WASTE	16	4	0	
	LW	LABORATORY WASTE	24	4	0	
23		<b>HVAC PIPING ELEMENT DESCRIPTIONS</b>				
	HPS	HIGH-PRESSURE STEAM	126	3	0	
	MPS	MEDIUM PRESSURE STEAM	4	3	0	
	PC	PUMPED CONDENSATE	5	3	0	
	FOS	FUEL OIL SUPPLY	7	3	0	
	FOR	FUEL OIL RETURN	125	3	0	
	FOV	FUEL OIL VENT	13	2	2	
	FOG	FUEL OIL GAUGE LINE	57	2	0	
	TWS	TOWER WATER SUPPLY	16	3	0	
	TWR	TOWER WATER RETURN	126	3	0	
	HWS	HEATED WATER SUPPLY	8	3	0	
	HWR	HEATED WATER RETURN	65	3	0	
	CWS	CHILLED WATER SUPPLY	10	3	0	
	CWR	CHILLED WATER RETURN	64	3	0	
	RS	REFRIGERANT SUCTION	12	3	0	
	RD	REFRIGERANT DISCHARGE	12	3	0	
	RL	REFRIGERANT LIQUID	12	3	0	
	LCWS	LOW TEMPERATURE CHILLED WATER SUPPLY	63	3	0	
	LPS	LOW PRESSURE STEAM	1	2	0	
	C	CONDENSATE, GRAVITY	25	2	0	
25		<b>GASES ELEMENT DESCRIPTIONS</b>				
	H2	HYDROGEN	3	2	0	
	G	NATURAL GAS	11	2	0	
	LH2	LIQUID HYDROGEN	5	2	0	
	Ar	ARGON	7	2	0	
	LAr	LIQUID ARGON	13	2	0	
	L02	LIQUID OXYGEN	21	2	0	
	LC02	LIQUID CARBON DIOXIDE	39	2	0	
	CA	COMPRESSED AIR	6	2	0	
	N2	NITROGEN	2	2	0	
	VAC	VACUUM	16	2	0	
	LPG	LIQUID PETROLEUM GAS	15	2	0	
	CDA	CLEAN DRY AIR	57	2	0	
	HCV	HOUSE CLEAN VACUUM	1	2	0	
	LN	LIQUID NITROGEN	4	2	0	
	C02	CARBON DIOXIDE	9	2	0	
	BA	BREATHING AIR	10	2	0	
	He	HELIUM	12	2	0	
	PAr	PROCESS ARGON	17	2	0	
	CH4	METHANE	18	2	0	
	C2 H2	ACETYLENE	64	2	0	

**ASBESTOS SURVEY COLOR & WEIGHT TABLE**

ASBESTOS  
COLOR & WEIGHT SYMBOLOLOGY:

AP

LV	ABBREV.	ASSIGNED ELEMENT DESCRIPTIONS	CO	WT	LC	REMARKS
26		<b>SPECIALTY GASES ELEMENT DESCRIPTIONS</b>				
	ASH3	ARSINE	3	2	0	
	PH3	PHOSPHINE	4	2	0	
	Si2H6	DISILINE	5	2	0	
	R12	DICHLORODIFLUOROMETHANE	7	2	0	
	H2SE	HYDROGEN SELENIDE	57	2	0	
	DMT	DIMETHYLTELLURIUM	11	2	0	
	HC1	HYDROGEN CHLORIDE	14	2	0	
	SiH4	SILANE	21	2	0	
	NH3	AMMONIA	16	2	0	
	2	OXYGEN	39	2	0	
	R14	TETRAFLUOROMETHANE	8	2	0	
	DMC	DIMETHYLCADMIUM	32	2	0	
	CL2	CHLORIDE	76	2	0	
	PH2	PURIFIED HYDROGEN	64	2	0	
	F	FLUORIDE	54	2	0	
	PN2	PURIFIED HYDROGEN	1	2	0	
	SFG	SULPHUR HEXAFLUORIDE	19	2	0	
27		<b>PROCESS LIQUIDS ELEMENT DESCRIPTIONS</b>				
	DCW	DEMINERALIZED COLD WATER	1	2	0	
	SCW	SOFTENED COLD WATER	21	2	0	
	DI	DEIONIZED WATER	32	2	0	
	PCWR	PROCESS COLD WATER RETURN	124	2	0	
	HF	HYDROFLUORIC ACID	126	2	0	
	PCWS	PROCESS COLD WATER SUPPLY	16	2	0	
	RO	REVERSE OSMOSIS WATER	64	2	0	
	POR	PROCESS OIL RETURN	6	2	0	
	POS	PROCESS OIL SUPPLY	7	2	0	
28		<b>FIRE PROTECTION ELEMENT DESCRIPTIONS</b>				
	F	FIRE MAIN	3	2	0	
	F	INDIRECT MAIN	3	2	0	
	AFFF	FOAM	4	3	0	
	D	DRAIN	5	4	0	

**ASBESTOS SURVEY COLOR & WEIGHT TABLE**

ASBESTOS  
COLOR & WEIGHT SYMBOLOLOGY:

LV	ASSIGNED ELEMENT DESCRIPTIONS	CO	WT	LC	REMARKS
1					
2	NORTH ARROW				PLACED PER CELL
3	TITLE BLOCK INFORMATION (GENERIC)	0	1	0	PLACED PER CELL - USE DATA FIELDS
4	KEY PLAN				
5					
6					
7					
8					
9					
10					
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31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46	ABATEMENT NOTES, LEADER LINES, TERMINATORS & MISC TEXT	0	1	0	
47	ABATEMENT LINE IN SAMPLE INVENTORY LIST	3	0	0	
48	ASBESTOS LEGEND	15			DICTATED BY CELL
49	LEGEND AND SCHEDULE TEXT	0	3,1	0	
50					
51					
52					
53					
54					
55	CONSTRUCTION NOTES & BALLOONS	5	1,6	0	
56					
57					
58					
59					
60					
61					
62					
63					

**ASBESTOS SURVEY, ROOF & TILES PLOT PLANS**

ASBESTOS  
PLOT FILE LEVEL SYMBOLOLOGY:

BLANK SPACE = USER DEFINABLE - DOCUMENT PER PROJECT

Color Table = ASBE.TBL

LV	ASSIGNED ELEMENT DESCRIPTIONS	CO	WT	LC	REMARKS
1					
2	NORTH ARROW				PLACED PER CELL
3	TITLE BLOCK INFORMATION (GENERIC)	0	1	0	PLACED PER CELL - USE DATA FIELDS
4	KEY PLAN				
5					
6					
7					
8					
9					
10					
11					
12					
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14					
15					
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31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46	ABATEMENT NOTES, LEADER LINES, TERMINATORS & MISC TEXT	0	1	0	
47	SAMPLE INVENTORY LIST	15			DICTATED BY CELL
48	LEGEND AND SCHEDULE GRAPHICS				
49	LEGEND AND SCHEDULE TEXT	0	3,1	0	
50					
51					
52					
53					
54					
55	CONSTRUCTION NOTES & BALLOONS	5	1,6	0	
56					
57					
58					
59					
60					
61					
62					
63					

**ASBESTOS ABATEMENT PLOT PLAN**

ASBESTOS  
PLOT FILE LEVEL SYMBOLOLOGY:

BLANK SPACE = USER DEFINABLE - DOCUMENT PER PROJECT

Color Table = ASBE.TBL

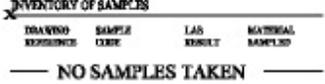
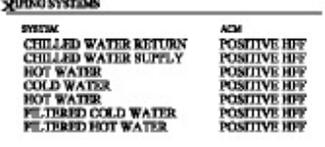
x - DENOTES CELL ORIGIN.

<h1>ASBESTOS</h1>																																		
CELL	CELL NAME	DESCRIPTION	LV	CO	WT	LC																												
<p><b>LEGEND:</b></p> <p>--- HORIZONTAL ASBESTOS PIPE FITTING</p> <p>o VERTICAL ASBESTOS PIPE FITTING</p> <p>① NUMBER &amp; LOCATION OF BOARD FITTINGS ON FIBERGLASS</p> <p><b>NOTES:</b></p> <p>1. CONTRACTOR TO VERIFY ALL QUANTITIES BEFORE. LOCATIONS, DIMENSIONS, AND QUANTITIES INDICATED ARE REPRESENTATIVE AND MAY REQUIRE FIELD VERIFICATION.</p> <p>2. SEE SPECIFICATIONS FOR BOARD RED SCOTCH AND RED ALUMINUM TAPE.</p>	ABATNO	ABATEMENT NOTE	1 5	0 10	0 0	0 2																												
	AIR	BACKGROUND AIR SAMPLE	3	36 53	1 2	0																												
	ATAC	ATTIC ACCESS PANEL	18	16	1	0																												
<p><b>SYMBOLS</b></p> <p>--- HORIZONTAL ASBESTOS PIPE FITTING</p> <p>o VERTICAL ASBESTOS PIPE FITTING</p> <p>① NUMBER &amp; LOCATION OF BOARD FITTINGS ON FIBERGLASS</p>	BBCOT2	BBCOT21	1	0	0	0																												
<p><b>INVENTORY OF BACKGROUND AIR SAMPLES</b></p> <table border="1"> <thead> <tr> <th>TRACK NO.</th> <th>SAMPLE REFERENCE</th> <th>ANALYSE</th> <th>CONCENTRATION</th> </tr> <tr> <th></th> <th></th> <th></th> <th>PC/M</th> </tr> </thead> <tbody> <tr> <td>001</td> <td>PCM</td> <td></td> <td>0.001</td> </tr> <tr> <td>002</td> <td>TEM</td> <td>NED</td> <td></td> </tr> <tr> <td>003</td> <td>PCM</td> <td></td> <td>0.001</td> </tr> <tr> <td>004</td> <td>PCM</td> <td></td> <td>0.002</td> </tr> <tr> <td>005</td> <td>TRK</td> <td>2 OTHERS/100 FIELDS</td> <td></td> </tr> </tbody> </table> <p><b>BACKGROUND AIR SAMPLE NOTES</b></p> <p>1. BDL - BELOW DETECTION LIMITS</p> <p>2. NED - NO STRUCTURES DETECTED</p> <p>3. ALL SAMPLES WERE ANALYZED BY PCM, UNLESS OTHERWISE NOTED.</p>	TRACK NO.	SAMPLE REFERENCE	ANALYSE	CONCENTRATION				PC/M	001	PCM		0.001	002	TEM	NED		003	PCM		0.001	004	PCM		0.002	005	TRK	2 OTHERS/100 FIELDS		BKGAI R	BKG AI R I NVENTORY LI ST	47	36	1	0
TRACK NO.	SAMPLE REFERENCE	ANALYSE	CONCENTRATION																															
			PC/M																															
001	PCM		0.001																															
002	TEM	NED																																
003	PCM		0.001																															
004	PCM		0.002																															
005	TRK	2 OTHERS/100 FIELDS																																
	CRWL	CRAWL SPACE ACCESS	18	16	1	0																												
	DOT	DOT PATTERN	PNT	PNT	PNT	PNT																												
<p><b>FLOW PLAN</b></p> <p>--- DIRECTION</p>	EARRO	EAST DI RECTI ON ARROW	1 2	1 4 13	0 1 2	0																												
<p><b>LEGEND</b></p> <p>--- HORIZONTAL ASBESTOS PIPE FITTING</p> <p>o VERTICAL ASBESTOS PIPE FITTING</p> <p>① NUMBER &amp; LOCATION OF BOARD FITTINGS</p>	HFFLEG	LEGEND FOR HFF	48	21 36	1	0																												
	HFFNU	HFF NUMBERS	8	21	1	0																												
	HFFTE	HFF TEENS	8	21	1	0																												
	HFF1	JUST ONE HFF	8	21	1	0																												

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ASBESTOS						
CELL	CELL NAME	DESCRIPTION	LV	CO	WT	LC
 <p>AS-24 REMOVE DAMAGED 12" X 12" VINYL FLOOR TILES TILES TO EXPOSE SUBFLOOR REMOVE: 4.00 YARDS 4.00 YARDS</p>  <p>AS-25 REMOVE 40 SF OF DAMAGED 12" X 12" FLOOR TILES TO EXPOSE SUBFLOOR REMOVE: 4.00 YARDS</p>  <p>AS-26 REMOVE 1 SF OF DAMAGED SECTION OF REMOVE: 1.00 YARD</p>  <p>AS-27 REMOVE 14 SF OF DAMAGED VINYL FLOOR REMOVE: 1.40 YARDS 1.40 YARDS 1.40 YARDS</p>	JA	ABATEMENT CALLOUTS	55	0 7	1 2	0
	LBRACK	LBRACKET	3	4	0	0
	MATQUA	MATERIAL QUANTITY	3	0 4	0 1	0
	NAD	NO SAMPLES TAKEN	46	3	2 3	0 2
	NARRO	NORTH ARROW	1 2	1 4 13	0 1 2	0
	NEG1	NEGATIVE MECHANICAL	8	21	1	0
	NEG2	NEGATIVE SURFACING	8	21	1	0
	NEG3	NEGATIVE MISCELLANEOUS	8	21	1	0
	NOSAMP	NO SAMPLES	1 2	1 4 13	0 1 2	0
	NTES1	NOT TESTED MECHANICAL	8	21	1	0
	NTES2	NOT TESTED SURFACING	8	21	1	0
	NTES3	NOT TESTED MISCELLANEOUS	8	21	1	0
	PI SYS	PIPING SYSTEM NOTES	46	36	1	0

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x - DENOTES CELL ORIGIN.

<h1>ASBESTOS</h1>						
CELL	CELL NAME	DESCRIPTION	LV	CO	WT	LC
<p>x <span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> INDICATES VAT THAT IS ASSUMED OR TESTED POSITIVE.</p> <p><span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> INDICATES RHT THAT IS ASSUMED OR TESTED POSITIVE.</p> <p><span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> INDICATES LCT THAT IS ASSUMED OR TESTED POSITIVE.</p> <p><span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> INDICATES OCT THAT IS ASSUMED OR TESTED POSITIVE.</p> <p><span style="border: 1px solid black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span> INDICATES DEBRIS THAT IS ASSUMED OR TESTED POSITIVE.</p>	PATBLK	PATTERN BLOCK	46	36	1	0
	LEG	LEGEND	3 28	36	1 2	0 1 2

**x**

**LEGEND**

007 DRAWING REFERENCE TO BULK SAMPLE FIELD CODE, SEE INVENTORY OF SAMPLES

MATERIAL SYMBOL

ENDING POINT OF SPECIFIED BUILDING MATERIAL

VERTICAL PIPE RUN

PARTITION WALLS

ACM PIPE RUN

ATIC ACCESS HATCH UNLESS NOTED OTHERWISE

CRAWL SPACE ACCESS UNLESS NOTED OTHERWISE

CIRCLED NUMBERS INDICATE JOB NUMBER AND LOCATION OF HARD FITTINGS ON FIBERGLASS

BC FLOOR/CILING MATERIAL REFERENCE (SEE TYPICAL MATERIAL REFERENCES)

BC/WC FLOOR/WALL/CEILING MATERIAL REFERENCE (SEE TYPICAL MATERIAL REFERENCES)

105 ROOM NUMBER (WHEN KNOWN)

BACKGROUND AIR SAMPLE LOCATION

**ABBREVIATIONS**

+	APPROXIMATE
AC	AIR CELL
BR	BUILT-UP ROOFING
CAB	CERAMIC ASBESTOS BOARD
CBCT	CERAMIC (GRID) CEILING TILE
CEG	CEILING
CONC	CONCRETE
COV/MS	COVER/MASTIC
CT	CERAMIC TILE
DEB	MATERIAL DEBRIS
DI	DUCT INSULATION
FD	FIRE DOOR
FG	FIBERGLASS
FLR	FLOOR
FT	FLOOR TILE
FW	FELT WRAP
OCT	GLAZED CEILING TILE
OWT	GLAZED WALL TILE
OYF	GYPSUM BOARD
EFF	HARD FITTING ON FIBERGLASS, OBSERVED BUT NOT NECESSARILY SAMPLED.
INS	INSULATION
LAG/NA	LAGGED NON-ASBESTOS MATERIAL
LCT	LAY-IN CEILING TILE
MAG	MAGNESIUM SILICATE (ASBESTOS CONTAINING)
NA	NO ACCESS
NAD	NO ASBESTOS DETECTED
NS	NON-SUSPECT
NT	BULK SAMPLE TAKEN, BUT NOT TESTED
PI	PIPE INSULATION
PL	PLASTER
PNT	PAINT
PW	FIBER WRAP PIPE INSULATION
SF	SQUARE FEET
SFC	SHEET FLOOR COVERING
TEX	TEXTURED MATERIAL
T-TEX	TROWELED TEXTURED MATERIAL
VAT	VINYL FLOOR TILE
+	POSITIVE, SAMPLE CONTAINS ASBESTOS
-	NEGATIVE, NO ASBESTOS DETECTED

**TYPICAL MATERIAL REFERENCES**

<b>FLOOR MATERIAL REFERENCES:</b>	<b>WALL MATERIAL REFERENCES: (2 min)</b>
A FLOOR TILE	A GYPSUM AND/OR PLASTER
B SHEET FLOOR COVERING	B BRICK
C CARPET	C GLAZED WALL TILE
D WOOD	D WOOD
E CONCRETE	E CONCRETE/CONCRETE BLOCK
F CERAMIC TILE	F CERAMIC TILE
G TERRAZO	FO FIBERGLASS UNDER VINYL
H RAISED COMPUTER FLOORING	J METAL
- NOT DOCUMENTED	- NOT DOCUMENTED

**CEILING MATERIAL REFERENCES:**

A GYPSUM AND/OR PLASTER	EXAMPLE:
B SUSPECT LAY-IN CEILING TILE	FLOOR/WALL/CEILING
C SUSPECT GLAZED CEILING TILE	C
D WOOD	NS (A) (O) (S) (B) (A)
E CONCRETE	S
F SUSPECT CONCRETE GRID CEILING TILE	CARPET OVER FLOOR TILE(S) OVER CONCRETE
FO FIBERGLASS UNDER VINYL	GYPSUM WALLS
G TROWELED CEILING MATERIAL	SUSPECT LAY-IN CEILING TILE BELOW GYPSUM CEILING
H FIBERGLASS	
J METAL	
X NON-SUSPECT LAY-IN CEILING TILE	
Y NON-SUSPECT CONCRETE GRID CEILING TILE	
Z NON-SUSPECT GLAZED CEILING TILE	
- NOT DOCUMENTED	

**SYMBOLS**

NOT TESTED	NEGATIVE -	POSITIVE +	TRACE AMOUNT	
				MECHANICAL INSULATION
				SURFACING MATERIAL
				MISCELLANEOUS MATERIAL

**NOTES**

- THESE DRAWINGS ARE DIAGRAMMATIC. THEY ARE FOR GENERAL INFORMATION AND SAMPLE LOCATION.
- ACCESSIBLE SPACES WERE SURVEYED FOR SUSPECT ASBESTOS MATERIALS. WHEN OBSERVED THE MATERIALS WERE NOTED ON THIS DRAWING. NON FRAGILE MATERIALS SUCH AS FLOOR TILE, PLASTER & ETC. MAY BE PRESENT.

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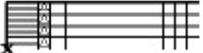
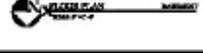
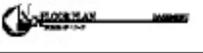
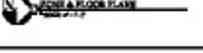
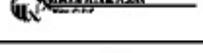
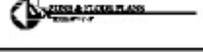
x - DENOTES CELL ORIGIN.

ASBESTOS								
CELL	CELL NAME	DESCRIPTION	LV	CO	WT	LC		
	LIST	SAMPLE INVENTORY LIST	47	36	1	0		
INVENTORY OF SAMPLES								
DRAWING REFERENCE	SAMPLE CODE	LAB RESULT	MATERIAL SAMPLED	DRAWING REFERENCE	SAMPLE CODE	LAB RESULT	MATERIAL SAMPLED	
301	301-301	(-)	LCT(2)	289	200-289	(-)	MASTIC(1)	
302	301-302	(-)	LCT(2)	<del>290</del>	<del>200-290</del>	(+)	HFF(1)	
303	301-303	(-)	LCT(2)	<del>291</del>	<del>200-291</del>	(+)	HFF(1)	
304	301-304	(-)	LCT(1)	<del>292</del>	<del>200-292</del>	(TRACE)	HFF(2)	
305	301-305	(-)	LCT(1)	<del>293</del>	<del>200-293</del>	(-)	HFF(3)	
306	301-306	(-)	LCT(1)	<del>294</del>	<del>200-294</del>	(+)	HFF(5)	
307	301-307	(+)	VAT(1)	295	200-295	(-)	VAT(5)	
308	301-308	(+)	VAT(1)	T295	200-T295	(-)	VAT(5)TEM	
309	301-309	(TRACE)	VAT(1)	296	200-296	(-)	VAT(5)	
31 0	301-31 0	(-)	COVBAS(2)	T296	200-T296	(-)	VAT(5)TEM	
31 1	301-31 1	(-)	GYP(1)	297	200-297	(-)	LCT(1)	
301A	302-301	(-)	LCT(2)	298	200-298	(-)	LCT(2)	
302A	302-302	(-)	LCT(1)	299	200-299	(-)	GASKET(1)	
303A	302-303	(-)	GYP(1)	300	200-300	(-)	GASKET(1)	
501	550-501	(-)	GYP(2)	301	200-301	(-)	GASKET(1)	
502	550-502	(-)	GYP(2)	001 F	CN71 1 3-001	(+)	GYP(4)	
503	550-503	(-)	GYP(2)	002F	CN71 1 3-002	(+)	GYP(4)	
504	550-504	(-)	GYP(2)	003F	CN71 1 3-003	(+)	GYP(4)	
001 C	301-001	(-)	GYP(1)	001	CN7258-001	(-)	GYP(5)	
002C	301-002	(-)	GYP(1)	002	CN7258-002	(-)	GYP(5)	
003C	301-003	(-)	GYP(1)	003	CN7258-003	(-)	GYP(5)	
601	601-601	(-)	GYP(1)	004	CN7258-004	(-)	LAG/FG(1)	
602	601-602	(-)	GYP(1)	005	CN7258-005	(-)	LAG/FG(1)	
603	601-603	(-)	GYP(1)	006	CN7258-006	(-)	LAG/FG(1)	
604	601-604	(-)	GYP(1)	007	CN7258-007	(-)	FAB(2)	
605	601-605	(-)	GYP(1)	008	CN7258-008	(-)	FAB(2)	
606	601-606	(-)	GYP(1)	009	CN7258-009	(-)	FAB(2)	
<del>275</del>	<del>200-275</del>	<del>(+)</del>	<del>HFF(3)</del>	01 0	CN7258-01 0	(-)	LCT(6)	
<del>275Q</del>	<del>200-275Q</del>	<del>(-)</del>	<del>HFF(3)</del>	01 1	CN7258-01 1	(-)	LCT(6)	
<del>276</del>	<del>200-276</del>	<del>(-)</del>	<del>HFF(3)</del>	01 2	CN7258-01 2	(-)	LCT(6)	
277	200-277	(-)	VAT(5)	01 3	CN7258-01 3	(-)	MASTI C(3)	
278	200-278	(-)	VAT(5)	01 4	CN7258-01 4	(-)	MASTI C(3)	
279	200-279	(-)	COVBAS(2)	01 5	CN7258-01 5	(-)	MASTI C(3)	
280	200-280	(-)	COVBAS(2)	01 6	CN7258-01 6	(-)	VAT(6)	
281	200-281	(-)	COVBAS(2)	01 7	CN7258-01 7	(-)	VAT(6)	
282	200-282	(-)	VAT(5)	01 8	CN7258-01 8	(-)	VAT(6)	
283	200-283	(-)	PW(1)	025	CN7258-025	(-)	GYP(3)	
284	200-284	(-)	PW(1)	026	CN7258-026	(-)	GYP(3)	
285	200-285	(-)	PW(1)					
<del>286</del>	<del>200-286</del>	<del>(-)</del>	<del>COVBAS(3)</del>					
287	200-287	(-)	VAT(5)					
288	200-288	(+)	VAT(1)					
288B	200-288B	(+)	MAS/VT(1)					
	POS1	POSITION VE MECHANICAL			8	21	1	0
	POS2	POSITION VE SURFACING			8	21	1	0
	POS3	POSITION VE MISCELLANEOUS			8	21	1	0
	QRMNO	ROOM NUMBER			45	2	0 1	0

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ASBESTOS						
CELL	CELL NAME	DESCRIPTION	LV	CO	WT	LC
	RD	ROOF DRAIN	21	64	1	0
	REV	REVISION BLOCK ADDS	3	05	1	0
	SAMPRS	SAMPRLT	46	3	0	0
	SARRO	SOUTH DIRECTION ARROW	12	14	01	0
	SBRACK	SBRACKET	3	4	0	0
	SPNOTE	SPEC NOTE	3	4	012	0
	TRA1	TRACE MECHANICAL	8	21	1	0
	TRA2	TRACE SURFACING	8	21	1	0
	TRA3	TRACE AMOUNT MISCELLANEOUS	8	21	1	0
	POS3	POSITIVE MISCELLANEOUS	8	21	1	0
	WARRO	WEST DIRECTION ARROW	12	1413	012	0
	ZEARR	ZONE EAST ARROW	12	1413	012	0
	ZNARR	ZONE NORTH ARROW	12	14	01	0
	ZPARR	ZONE ARROW HEAD	46	3	1	0
	ZNARR	ZONE NORTH ARROW	12	1413	012	0
ZONE 101	ZTXT	ZONE PLAN TEXT	46	3	1	0
	ZWARR	ZONE WEST ARROW	12	1413	012	0

RC = ASBESTO3.CEL

REVISED 9/01

x - DENOTES CELL ORIGIN.

<h1>ASBESTOS</h1>						
CELL	CELL NAME	DESCRIPTION	LV	CO	WT	LC
	ROMLEG	ROOM LEGEND	1	0 1 2	0	0
<b>TYPICAL MATERIAL REFERENCES</b>						
* _____						
<b>FLOOR MATERIAL REFERENCES:</b>			<b>WALL MATERIAL REFERENCES: (if used)</b>			
A FLOOR TILE			A GYPSUM AND/OR PLASTER			
B SHEET FLOOR COVERING			B BRICK			
C CARPET			C GLUED WALL TILE			
D WOOD			D WOOD			
E CONCRETE			E CONCRETE/CONCRETE BLOCK			
F CERAMIC TILE			F CERAMIC TILE			
G TERRAZO						
<b>CEILING MATERIAL REFERENCES:</b>						
A GYPSUM AND/OR PLASTER						
B SUSPECT LAY-IN CEILING TILE						
C SUSPECT GLUED CEILING TILE						
D WOOD						
E CONCRETE						
F SUSPECT CONCEALED GRID CEILING TILE						
G TEXTURED CEILING MATERIAL						
H FIRTEX						
X NON-SUSPECT LAY-IN CEILING TILE						
Y NON-SUSPECT CONCEALED GRID CEILING TILE						
Z NON-SUSPECT GLUED CEILING TILE						
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><b>EXAMPLES:</b></p> <p>FLOOR      WALLS      CEILING</p> <p>↓      ↓      ↓</p> <p>A2/E/D = FLOOR TILE (2) CONCRETE WALLS &amp; WOOD CLG</p> </div> <div style="text-align: center;"> <p>FLOOR      CEILING</p> <p>↓      ↓</p> <p>B/C1 = SHEET FLOOR COVERING &amp; SUSPECT GLUED CEILING TILE (1)</p> </div> </div> <p>NOTE: WHEN TWO OR MORE DIFFERENT TYPES OF A GIVEN MATERIAL ARE NOTED A SUFFIX IS USED TO DIFFERENTIATE BETWEEN THEM eg. (1),(2). ETC.</p>						
	SANDIT SANDI3	SANDIT B1 AND SANDIT B3	1 2 40	1 4 13	0 1 2	0
<div style="border: 1px solid black; width: 100%; height: 100%; position: relative;"> <div style="position: absolute; left: -20px; top: 50%; transform: translateY(-50%); font-size: 10px;">                 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40             </div> </div>						

RC = ASBESTO3.CEL

REVISED 9/01

## Chapter 14 - Appendices

### List of Attachments

<b>Attachment</b>	<b>Page</b>
<b>A. Drawing Request Form .....</b>	<b>A-1</b>
<b>B. New Filename Request Form.....</b>	<b>B-1</b>
<b>C. Quality Assurance Process .....</b>	<b>C-1</b>
<b>D. Panel Schedules .....</b>	<b>D-1</b>
<b>E. Spatial Data Request Form .....</b>	<b>E-1</b>
<b>F. CADD Operators Mentorship Process.....</b>	<b>F-1</b>
<b>G. Master Plot Sheets for Reproduction .....</b>	<b>G-1</b>

## A. Drawing Request Form

A/E firms in need of Sandia/NM Facilities Drawings should use the Sandia/NM Facilities Drawing Request Form. The turnaround time will vary depending on the quantity of drawings requested.

ADD NEW FORM HERE



**Sandia National Laboratories**

Operated for the U.S. Department of Energy by Sandia Corporation

Date: \_\_\_\_\_

### Drawing Request and/or Project Turn-in Transmittal Form

**Instruction:** This transmittal form is to accompany any drawing request or electronic file format project turn-in.

**A/E:** Transmittal form is used when requesting and/or submitting electronic CADD files. Do not submit without a valid project and task number. All disks, transmittal and electronic files will be turned in to the CADD Point of Contact and final As-Built will include drawing redlines. Copy given to SNL Project Manager.

**SNL Project Manager:** Verify that this form is complete. Do not submit without a valid project and task number. Select the required CADD Quality Control options listed below, then submit form to the CAD Point of Contact with a projected Return or Submitted date.

**SNL On-Site CADD Point of Contact:** For file request, check out files to A/E and email or notify A/E when files are ready for pick-up. For project turn in, complete QA and check files in to SNL server. Notify Project Manager when all files have been returned to SNL server. Retain a copy of Transmittal Letter for project records.

<b>A/E Information</b>		<b>SNL Information</b>	
Name:		SNL Point of Contact: Jan Couto	
Company:		Phone: 844-0556	e-mail: jcouto@sandia.gov
Phone:	e-mail:		
<b>Project Information</b>			
Project Title:		Service Order Number:	
SNL Project Manager:		Building Number or Location:	

Media Type:     Prints: 11x17     Disks     CD     e-mail     Other

**Project Leader please select one of the following check-in options:**

- Title I – CADD QA review of the CADD files and half-size prints will be checked for compliance with the SNL CADD standards. All Master files and Master-out files will be reviewed, both printed copy and electronic format. Spot checks of plot files will be conducted as well as a review of drawing numbers and title block information. Files will be checked only within the construction boundaries of the project. Errors will be documented on the CADD QA form or Title review form. The completed CADD QA forms will be returned to the originator and the originator is expected to correct all errors in an expedient manner.**
- Title II – Same as Title I with the addition of drafting check, which will be conducted from printed half-size sets of project drawings. Files will be checked only within the construction boundaries of the project. Errors will be documented on the CADD QA form and on the half-size set of project drawings. The CADD QA and the project drawings will be returned to the SNL Project Leader. Project Leader will pass this information on to the originator. Originator is expected to correct all errors and omissions in an expedient manner.**
- 100% Project Design - Turn-in Electronic files and half-size printed sets will be turned into SNL Project Leader. A quick view (loading) of the CADD files to verify readability, file names and title block information will be conducted. Files will be checked in to the SNL CADD server. (An optional CADD QA may be performed at this time). Files that are mislabeled or are corrupt will be listed on this form and will be returned to Project Leader for request of new files from originator.**
- Final As-Built - Electronic files and redline sets will be turned into SNL On-Site CADD Point of Contact and/or Project Construction Assistant. Copy to the Project Manager. Files will be checked in to the SNL CADD server and a final QA will be done. Final As-Built will be rolled into the master files.**

Title I: Return Date

Title II: Return Date

100% Project Design: Return Date

Final As-Built: Date Submitted

Check Out from SNL	Check In to SNL	File Number	Title or Description	Return Modified	Return Not Modified	Check Out Received	Redlines Received	Comments
--------------------	-----------------	-------------	----------------------	-----------------	---------------------	--------------------	-------------------	----------

<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**B. New Filename Request Form**

A/E firms should use the New File request form when reserving new file numbers. The following information must be provided or new numbers will not be issued.

Discipline  
Sub Discipline  
Building Number  
Floor Number  
Title  
Project Description/Name  
Project Leader/Manager  
Project and Task Number  
Company Name  
Company Engineer/CADD Technician



**Sandia National Laboratories**

Operated for the U.S. Department of Energy by  
Sandia Corporation

Date: \_\_\_\_\_

## New Drawing File Request Form

### A/E / Sandia/NM Information

Name:	Company:
Phone:	E-mail:

### Project Information

Project Title:	Project and Task Number:
Sandia/NM Project Leader/Manager:	Project Description/Name:

### Drawing Information

Drawing Title:	Discipline:
Sub-Discipline:	Building Number or Location:
Floor Number:	

## **C. Quality Assurance Process**

### **14.1 Purpose**

The purpose of this process is to check the quality, consistency, and compliance with the Facilities CADD standards of drawings being submitted to Sandia National Laboratories Facilities Engineering.

### **14.2 Scope**

This process is applicable to all CADD files generated or used by the Facilities Management and Operation Center and its contracted architectural/engineering (A/E) firms. Informal reviews are encouraged during the project to prevent major discrepancies.

### **14.3 Project CADD Coordinator**

The Project CADD Coordinator is responsible for

- Coordinating all CADD QA processes
- Assigning CADD QA Checkers
- Performing QA checks
- Soliciting feedback on QA process from participants
- Reviewing QA comments with CADD operator (A/E &/or SNL)
- Giving feedback to the Space and Site Services centers.

### **14.4 CADD QA Checker**

CADD QA Checkers in the process are responsible for

- Undergoing training and understanding the CADD QA process
- Performing QA checks
- Reviewing QA comments with CADD operator (A/E &/or SNL)
- Providing feedback on the CADD QA process for continuous improvement.

**Note:** See the CADD QA Checklist and Project CADD Coordinator description of duties

Drawings must be checked before they are accepted or checked in to the Document Management System as record drawings. CADD drawings are checked at the following project stages:

- Title I (Preliminary Design)
- Title II (Construction Documents)
- Final/As-Built

For large projects a percentage of the project files are checked at Title I and Title II. All files are checked at final design. Title I CADD QA comments must be incorporated for Title II turn-in, Title II CADD QA comments must be completed and turned in for a final review within two (2) weeks from the date of the Title II CADD QA review meeting.

The Project CADD Coordinator obtains one set of prints and one copy of the electronic CADD files from the project manager or A/E. **There will be “NO” Duplication of electronic CADD files across A/E Disciplines.** (Standard, Demolition and Removal drawing files are not turned in for CADD QA). Problems or discrepancies are noted on the QA form, and on a set of check prints as required. Every checked master drawing file has a QA form.

The Project CADD Coordinator uses the CADD Standards Manual as the guideline for quality and conformance.

The Project CADD Coordinator reviews the QA form with the CADD QA Checker(s). CADD operators make all appropriate corrections, note corrections made, and return the QA form to the Project CADD Manager.



**Facilities CADD - Quality Assurance Summary - Master Files**

<b>Project Title:</b>		
<b>Drawing #:</b>	<b>Drawing Title:</b>	
<b>Building # :</b>	<b>Project # :</b>	
<b>Reviewed by:</b>	<b>Phone # :</b>	<b>Date:</b>

File Discipline:

Review Type:

Title I     
  Title II     
  Final/As-Built

Return Form to:	Phone # :
-----------------	-----------

Qualifier Number	Qualifier Item	Check	<b><u>Reviewer's Summary Comments</u></b> <b><u>Check mark - indicates correct &amp; approved</u></b> <b><u>O - indicates corrections required</u></b> <b><u>Initial Completed Corrections</u></b>	Item Corrected
<b><u>General</u></b>				
1a	Naming Convention			
1b	Fit All			
1c	Logical Name			
1d	No Extra Reference			
1e	Active Scale			
1f	Z - Depth			
1g	Depth Lock			
1h	North Arrow			
1i	Matchline (Arch)			
1j	Drawing Title			
1k	Copy Right Cell			
1l	Working Units			
1m	Cells			
1n	Dimensioning Attributes			
<b><u>Text Parameters</u></b>				
2a	Text Font			
2b	Text Color			
2c	Text Weight			
2d	Text Size			
2e	Text Level			





## Sandia National Laboratories

### Line Item Qualifiers CADD Quality Assurance From Master Files

#### 1) **General:**

- a) Naming Convention – File name must be consistent with SNL naming convention per SNL CADD standards.
- b) Fit All – Plan view is to be “Fit All” view #1
- c) Logical Name – Reference file attachments must be given logical name consistent with SNL CADD standards (system codes) **(Recommended)**
- d) No Extra Reference Files – Master file must not contain inapplicable or extraneous reference files (Design & Raster)
- e) Active Scale – Must be at One to One for all plans; sections and details to be scaled accordingly for clarity and denoted accurately under piece mark
- f) Z-Depth – Drawing must be set at a Z-Depth of “0”, with no elements rising or descending into z-axis
- g) Depth Lock – Depth Lock must be “ON”.
- h) North Arrow – Must be active element within master and plot file, and must be orientated correctly respective to floor plan orientation (utilizing cell)
- i) Matchline – Must be placed as active elements in the **Architectural Master Floor Plan**, with correct symbology assigned per SNL CADD standards;
- j) Drawing Title – “Master Drawing Files” and “Key Plans” Must have Drawing Title placed as active element in drawing file. (Cell = Title)
- k) Copy Right Cell – COPYR - Must be active element in all Master Drawing Files, placed under drawing title
- l) Working Units - MU/SU/PU units set to follow SNL CADD standards.
- m) Cells – To be placed consistent with SNL CADD standards, utilizing SNL Cell Libraries (Utilization of workspace palettes assures correct symbology) Any new cells created by A/E’s should be placed on system defined levels with A/E’s initials included (example: SNL-GEN\_NORTH, SNL represents A/E initials).
- n) Dimensioning Attributes – To be set per SNL CADD standards .

#### 2) **Text Parameters:**

- a) Text Font – To be consistent with SNL CADD standards
- b) Text Color - To be consistent with SNL CADD standards
- c) Text Weight - To be consistent with SNL CADD standards
- d) Text Size - To be consistent with SNL CADD standards
- e) Text Level - To be consistent with SNL CADD standards

#### 3) **Miscellaneous List:**

- a) Element Placement – To be consistent with SNL CADD Standards
- b) Level Schema – To be consistent with SNL Level Schemas per SNL CADD standards. New or user defined levels must be placed in drawing file w/ level specific form, they must also be identified with A/E’s initials (example: SNL-GEN\_NORTH, SNL represents A/E initials). Please notify Mark C. of any new levels.

- c) Reference File Boundary Clipping – All reference files must be boundary clipped so that no unnecessary information is displayed
- d) Reference File Full Path – “Not Saved”, full path of reference files should not be saved.
- e) Color Table – Correct Color Table attached (Arch – Default, Struct – Default, Elect – elec.ctb, & Mech – plumb.ctb or hvac.ctb)
- f) v7-v8/Design History On – If file is v7 it must be converted to v8, Design History must be “ON”.

**4) Comments:**

- a) Project CADD Coordinator and/or CADD QA Checker to note those general issues to be addressed and/or corrected upon submittal back to responsible A/E Firm
- b) For further definitions & explanation please refer the CADD Standards Manual



**Facilities CADD - Quality Assurance Summary – Civil/Site Files**

<b>Project Title:</b>		
<b>Building # :</b>	<b>Project # :</b>	
<b>Reviewed by:</b>	<b>Phone # :</b>	<b>Date:</b>

File Discipline: Civil/Site

Review Type:

Title I     
  Title II     
  Final/As-Built

Return Form to:	Phone # :
-----------------	-----------

<b>Qualifier Number</b>	<p><b><u>Note to CADD Operator</u></b> – Refer to Line Item Qualifiers (civil/site files) for definition of line items (1a, 2b, 3d, etc.). This Summary is compiled from a random check of (civil/site) files, Check <u>all</u> (civil/site) files for these required corrections. Initial Completed Corrections.</p> <p><b><u>Note to Reviewer</u></b> - The discrepancy must be based on a standard, omission or error per the SNL - CADD Standards Manual. Otherwise it will be treated as a recommendation.</p>			<b>Item Corrected</b>
	<b>Qualifier Item</b>	<b>Check</b>	<p align="center"><b><u>Reviewer’s Summary Comments</u></b>  <b><u>Check mark - indicates correct &amp; approved</u></b>  <b><u>O - indicates corrections required</u></b>  <b><u>Initial Completed Corrections</u></b></p>	
<b><u>General</u></b>				
1a	Naming Convention			
1b	Fit All			
1c	Active Scale			
1d	Z - Depth			
1e	Depth Lock			
1f	North Arrow			
1g	Drawing Title			
1h	Copy Right Cell			
1i	Working Units			
1j	Border			
1k	Section / Detail			
1l	Graphic Scale			
1m	Color Table			
<b><u>Text Parameters</u></b>				
2a	Text Font			
2b	Text Color			
2c	Text Weight			
2d	Text Size			
2e	Text Level			





## Sandia National Laboratories

### Line Item Qualifiers CADD Quality Assurance Form Civil/Site Files

#### 1) General:

- a) Naming Convention – File name must be consistent with SNL naming convention per SNL CADD standards
- b) Fit All – Plan view is to be “Fit All” view #1
- c) Active Scale – Must be at One to One for all plans; sections and details to be scaled accordingly for clarity and denoted accurately under piece mark
- d) Z-Depth – Drawing must be set at a Z-Depth of “0”, with no elements rising or descending into z-axis for construction plot files & ESD files
- e) Depth Lock – Depth Lock must be “ON”.
- f) North Arrow – Must be active element within drawing file, and must be orientated correctly respective to plan orientation (utilizing civil/site cell)
- g) Drawing Title – Graphic area drawing title & title block drawing title must be consistent (Cell = TITLE)
- h) Copy Right Cell – COPYR – Element of Border File
- i) Working Units - MU/SU/PU units set to follow SNL CADD standards.
- j) Border – To be placed about defined (boundary clipped) area of plot file utilizing SNL CADD standard “bdutl.dgn” or “bdpp.dgn files; shall be boundary clipped with applicable border visible only
- k) Section/Detail– Must be placed as active elements in the plot file (Sections/Elevations = Letter, Details = Number)
- l) Graphic Scale – Graphic scale must be placed active in drawing file
- m) Color Table – GISP.ctb must be used

#### 2) Text Parameters:

- Text Font – To be consistent with SNL CADD standards
- Text Color - To be consistent with SNL CADD standards
- Text Weight - To be consistent with SNL CADD standards
- Text Size - To be consistent with SNL CADD standards
- Text Level - To be consistent with SNL CADD standards

#### 3) Miscellaneous List:

- a) Element Placement – To be consistent with SNL CADD Standards
- b) Level Schema – To be consistent with SNL Level Schemas per SNL CADD standards
- c) Ground Coordinates – Used – Applies to Title 1 & Title 2 drawing files (Contact SNL for clarification)
- d) Grid Coordinates – Used – Applies to Final/As-Built drawing files (Contact SNL for clarification)

**4) Comments:**

- a) Project CADD Coordinator and/or CADD QA Checker to note those general issues to be addressed and/or corrected upon submittal back to responsible A/E Firm
- b) For further definitions & explanation please refer to Chapters 3, 3B, 3C & 4 of the CADD Standards Manual

## D. Panel Schedules

New panel schedules are created using Excel software on the Sandia/NM Facilities Server. Some panel schedules may still be in MicroStation, located under the building directories; others are hard copies located in the Sandia/NM Facilities Technical Library.

Excel panel schedules may be updated by anyone having an authorized panel schedule password account; contact the Sandia/NM Facilities electrical process owner for authorization.

### Creating Panel Schedules at Sandia/NM

Instruction for accessing the Facilities panel schedules:

1. Open File Manager window.
2. Map network drive (example: drive P:) to panel schedule server <\\london\panel.UPDATE???>
3. Change to mapped drive (example: drive P:).
4. Double click on the Panel folder.
5. Double click on the blank panel template.
6. Under Microsoft tools select “File”; “Save As” place in correct snl area file folder, then correct building file folder; name file using the panel name. Example: The schedule for panel A is A.xls.

### Modifying Panel Schedules at Sandia/NM

Excel version 5.0 or newer must be loaded on the computer.

Instruction for accessing the Facilities panel schedules:

1. Open File manager window.
2. Map network drive (example: drive P:) to panel schedule server <\\london\panel.Update??>
3. Change to mapped drive (example: drive P:).
4. Double click on the Panel folder.
5. Double click on the technical area desired.
6. Double click on the building number.
7. Double click on the panel schedule desired. (This opens the selected panel schedule.).

### Panel Schedule Custom Palette

Before you can use the custom palette, you must first load it from the Sandia/NM server.

Instructions for loading it are located in [\\london\panel\panel\\_inst.doc](\\london\panel\panel_inst.doc).Update?? If you need help, contact the Facilities desktop support team.

The custom palette menu automatically pops up in the toolbar once it has been loaded. This palette menu enables you to place standard electrical symbols in the panel schedule using the right mouse button.

To place a symbol from the custom palette menu:

1. Highlight the Excel cell on the panel schedule where you want the symbol placed.
2. Select the symbol from the custom palette menu with the right mouse button.

To delete a symbol from a selected panel schedule:

1. Select the symbol on the schedule with the right mouse button. (Handles appear around the symbol.)
2. Hit the “delete” key on the keyboard.

### **Revisions to the panel schedule**

After changes have been made to the schedule, the revision block shall be updated. The revision is listed by alphabetical order. After all five cell blocks are filled; replace the *oldest* revision with the update. Put the revision letter in the column beside the item that was changed.

### **Existing Panel Schedules on CADD**

New panel schedules are created only in the Excel application written by the Facilities Management and Operations Center. CADD master files that contain electrical panel schedules are named according to the following convention:

nnnnefps.dgn

where

nnnn is the building number (padded with leading zeros)  
 e denotes electrical discipline  
 f is the building floor designator (1, 2, 3, ..., a, b, p, z)  
 ps denotes panel schedule  
 .dgn is the default extension for drawing files

Modifications to existing CADD panel schedules are done as follows (**you must contact the Sandia/NM Facilities System Engineer point of contact first**):

1. Locate the existing master file panel schedule and the associated plot files from the CADD file server
2. If only minor modifications are necessary, make the change using MicroStation V8.
3. If the panel schedule requires many changes, transfer all panel information to the Excel panel schedule application.
  - a. Boldly “X” out the schedule in the existing master file panel schedule.
  - b. Using large text, note that the schedule has been transferred to Excel.
  - c. When all schedules in the plot file have been transferred to Excel, contact the drawing database manager to delete the project plot file. Contact the Facilities Technical Support Systems Department to delete the file from the file server permanently.

- d. When all schedules in the master panel file have been transferred, notify the Facilities Technical Support Systems Department to delete the file from the file server permanently.

**E. Spatial Data Request Form**

A/E firms in need of Sandia/NM Facilities Utility/FGIS Site Data should use the Sandia/NM Facilities Spatial Data Request Form. The turnaround time will vary depending on the quantity of data requested.

**SPATIAL DATA REQUEST**  
**Civil, Exterior Utilities, Exterior Power, and Telecommunications**

**Section 1**

Engineers Fill out Section 1

Requester: \_\_\_\_\_ Today's Date: \_\_\_\_\_

A/E Company: \_\_\_\_\_

Activity Code & Charge #: \_\_\_\_\_ (AW) Project #: \_\_\_\_\_ (TW) Construction #: \_\_\_\_\_

CADD support \_\_\_\_\_ Estimated Design \_\_\_\_\_  
Total Est. Hours: \_\_\_\_\_ Start Date: \_\_\_\_\_ Completion Date: \_\_\_\_\_

**Type**

As-Build \_\_\_\_\_ Project \_\_\_\_\_ Plotting \_\_\_\_\_ Survey \_\_\_\_\_  
Files to A/E \_\_\_\_\_ Files from A/E \_\_\_\_\_ A/E CADD interface \_\_\_\_\_  
Other \_\_\_\_\_

**Media**

Electronic \_\_\_\_\_ Field \_\_\_\_\_  
Manual \_\_\_\_\_ Other \_\_\_\_\_

Instructions: \_\_\_\_\_

**Utility Systems Required:**

Planimetric (Roads & Bldgs.) \_\_\_\_\_ Water Distribution System \_\_\_\_\_ Steam Distribution System \_\_\_\_\_  
Gases Distribution System \_\_\_\_\_ Sanitary Sewer System \_\_\_\_\_ Storm Sewer System \_\_\_\_\_  
Power Distribution System \_\_\_\_\_ Telecommunication System \_\_\_\_\_ Perimeter Lighting System \_\_\_\_\_  
Control Monuments \_\_\_\_\_ Thermal Water (Chilled & Hot Water) \_\_\_\_\_

All of the Above \_\_\_\_\_  
Contour and Elevation \_\_\_\_\_ Other (please describe) \_\_\_\_\_

**Addition Tracking Information:**

Project Leader: \_\_\_\_\_ Inspector Arch: \_\_\_\_\_

Inspector Mech. \_\_\_\_\_ Inspector Elec: \_\_\_\_\_

Construction Start Date: \_\_\_\_\_

*Note: Drafting Priority is lost if Requester fails to meet Negotiated Start Date or three day review time*

**Section 2**

FGIS Personnel fill out Section 2

Project Assigned to: \_\_\_\_\_ Log-in Date: \_\_\_\_\_

List of on-Going Projects within site plan area: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Section 3**

Assigned CADD person fill out Section 3

Date Red-lines received: \_\_\_\_\_

Drafting Start date: \_\_\_\_\_

Date returned to Eng.: \_\_\_\_\_

Misc. Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **F. On-Site CADD Technician Mentorship Process**

### **Purpose**

The purpose of the CADD mentorship program is to familiarize new CADD technicians with the CADD system, manuals, and references, and to introduce key personnel.

### **Objectives**

The objectives of the CADD mentorship program are to maximize the efficiency of the new CADD technicians and provide orientation of Facilities-specific processes and requirements.

The CADD mentorship program is recommended to all on-site and off-site CADD technicians.

### **Owner – CADD Coordinator**

Conduct an annual review of this process including feedback from mentors, participants, and managers.

Spot-check for verification of compliance.

### **Coordinator responsibilities**

Assign a key CADD technician to act as a mentor for each new CADD technician.

Schedule time for both the mentor and the new CADD technician to accomplish this mentorship training.

### **Mentor Responsibilities**

Provide training to the new CADD technician to maximize efficiency.

Provide a network of resources for the CADD technician to get answers to future questions.

See the following CADD Mentorship Checklist

### **New CADD Technician**

Read and understand the Facilities CADD Standards Manual.

Ask for help whenever the need arises.

### **Schedule**

The mentorship process requires about 24 hours per person over a period of six weeks.

***Facilities CADD Standards Mentorship Training Checklist***

Mentor assigned: \_\_\_\_\_ Start date: \_\_\_\_\_

**Computer orientation and applications**

_____	Computer passwords	_____	Sandia domain passwd
_____	Login process	_____	Plotting/Plotter room
_____	Workstation and network orientation	_____	Graphic Document
_____	File check out process	_____	Database

**Manuals and Books**

\_\_\_\_\_ CADD Standards Manual

**Introductions**

\_\_\_\_\_ Facilities Management and Operations Center Departments  
 \_\_\_\_\_ Department CADD Operators  
 \_\_\_\_\_ CADD standards Department

**Informational Resources**

_____	FGIS Department	_____	Facilities Technical Library
_____	Plotter Room	_____	ProjectWise

**Facilities System Standards**

_____	master file/plot file/cut file	_____	working units
_____	Sandia/NM menus	_____	cells
_____	drawing scale	_____	file management
_____	level hierarchies	_____	standard drawings
_____	user commands & MDLs	_____	quality assurance checks
_____	3D capabilities	_____	Facilities File Naming Stds.

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CADD Operator \_\_\_\_\_ End Date \_\_\_\_\_

**G. Master Plot Sheets for Reproduction**

All CDs delivered to Sandia/NM Facilities shall be given to the Sandia/NM Facilities CADD Coordinator. Plotting of drawings on CDs delivered will be done on site by the Sandia/NM Facilities Engineering CADD staff to ensure a high-quality Master set that can be distributed to vendors for reproduction.