

## 2.4 Drawing Data Levels

### A. Standardization of a Level Convention for Design Information

The use and application of the leveling convention defined in this section should be uniformly observed for the following reasons:

#### 1. Work Transfer

To efficiently transfer work between functional units, CADD drawings must conform to a uniform leveling convention. If the same leveling convention is used, considerable time and effort is saved in obtaining only the desired information.

#### 2. Multi-Operators

It is not uncommon for more than one person to work on the same drawing file. For the drawing file to be effectively and efficiently used by all, each operator must conform to the same uniform leveling convention.

#### 3. Drawing Life

At Caltrans, drawings are active for several years or more. Base maps stored as MicroStation dgn files can be quickly used to start a new project or preliminary study. How the data is entered today (i.e., what levels are used for different data) must be readily apparent for a long period, often after the original operators are no longer available. Confusion is minimized with a uniform leveling convention.

#### 4. Expanding the Caltrans Leveling Convention

The leveling convention for a pre-version 8 (V8) MicroStation design file (63 levels) will remain the same in order to support the legacy plans that are maintained by Caltrans. This accommodates any pre-V8 files that may be submitted for future PS&E submittals.

The Caltrans DGNLIB was released in 2008 under Phase 2 (full V8) of the Caltrans implementation of MicroStation V8. It utilizes the first 1000 levels to transition the various departments within Caltrans (who had their own pre-V8 leveling convention) to one standard leveling convention for all of Caltrans. Full V8 still respects the level number in addition to the level name. Caltrans will implement expanded levels for full V8, where necessary, which will be more dependent on the specific name of the level. This will occur after Caltrans selects and implements new roadway software.

The Default Level (Level 0) is never to be used to place elements in a Caltrans MicroStation design file. In previous versions of MicroStation, Level 0 has been reserved for header information. Now with MicroStation V8, elements can be placed on Level 0 on purpose or by accident, but elements on Level 0 may not be handled or behave the same than if those elements were on a different level.

B. Highway/Landscape Leveling Convention

1. General Content of Highway/Landscape levels is as follows:

**Pre-V8**

<b>Level(s)</b>	<b>Content</b>
Level 1	Control Data
Levels 2-8, 11 & 12	Basic topographic map data
Levels 9 & 10	Sheet formats & Seal Information
Levels 13 – 28, 30	Alignments and Construction Details
Levels 31 - 33	Right of Way data
Levels 29, 34 - 59	Data for specific type of plan sheet
Level 60	Non-geographical drawing data
Levels 61 & 62	HQ & As-Built changes
Level 63	Engineer's Signature

Expanded levels to be used in roadway projects is as follows:

**Full V8**

<b>Level(s)</b>	<b>Content</b>
Levels 64 - 69	No_Plot
Level 70	Plot Shape for IPlot (does not plot)
Levels 71 - 74	Survey Information
Levels 75 - 100	Undefined (non-dropout)
Levels 128 - 137	Right of Way data
Levels 812 - 849	Utilities (line styles) (non-dropout)
Levels 871 - 890	Staging Dropout
Levels 891 - 895	Striping Dropout
Levels 896 - 900	Miscellaneous Dropout
Levels 966 - 999	Additional Staging (non-dropout)

Note 1: The Caltrans DGNLIB has various preset level filters. When selecting the Roadway filter, the above full V8 expanded levels will be displayed in Level Manager or Level Display.

Note 2: For projects that have a lot of stages for Stage Construction (or sequencing) levels 966 through 999 supplement the pre-V8 levels of 51 through 56 (for a total of 20 stages).

Work left in place (line work only, not labels, annotation or callouts) from a previous stage is to be dropped out for the next stage(s). Levels 871 through 890 (which will dropout information) were created to facilitate dropping out the completed line work from a previous stage.

For Example:

Level 871 for dropping out Stage 1  
 Level 872 for dropping out Stage 2  
 Level 879 for dropping out Stage 9  
 Level 880 for dropping out Stage 10  
 Level 881 for dropping out Stage 11  
 Level 890 for dropping out Stage 20

2. Summary of Highway/Landscape levels is as follows:

**Pre-V8**

<b>Level</b>	<b>Content</b>
1	Control (Includes Survey Monuments)
2	Existing Manmade Features
3	Existing Roadway Features
4	Existing Vegetation and Natural Features
5	Existing Utilities and Utility Facilities
6	Existing Hydrographic Features
7	Relief Features - Contours
8	Spot Elevations and Contour Annotations
9	Profile Grid
10	Border Sheets & Seal Information
11	Break Line, Terrain Features for 3D & Profile Grid
12	Coordinate Grid Ticks and Labels and Construction Staking Survey Control Data
13	Ramp, Over and Under Crossing Alignment Data
14	Ramp, Over and Under Crossing Annotation
15	Mainline Alignment Date
16	Mainline Alignment Annotation
17	Frontage Road Alignment Data
18	Frontage Road Alignment Annotation
19	Undefined
20	Pavement Edges
21	Curbs, Gutters, Dikes, Overside & Edge drains
22	Miscellaneous Construction Features
23	Layout Notes
24	Obliteration, AC Resurfacing & Cold Planing
25	Temporary Road Connections and Alignments, also for Railroad, Bike & Pedestrian Paths & Creek Alignments

<b>Level</b>	<b>Content</b>
26	Undefined
27	Undefined
28	Undefined
29	Existing Irrigation - Includes Annotation
30	Cut and Fill Data
31	Existing Right of Way Boundaries
32	New Right of Way, Fences & ESA's
33	Right of Way Text & Annotation
34	Temporary Water Pollution Control
35	Permanent Erosion Control
36	Drainage
37	Drainage Annotation
38	Sanitary Sewer
39	Sanitary Sewer Annotation
40	New Utilities - Includes Annotation
41	Contour Grading
42	Pavement Elevations
43	Pavement Markers and Striping
44	Pavement Markers and Striping Annotation
45	Signing
46	Construction Area Signing
47	Electrical
48	Electrical Annotation
49	Planting and Landscaping
50	New Irrigation - Includes Annotation
51	Stage 1 Construction and Temporary Traffic Facilities
52	Stage 1 Construction and Temporary Traffic Facilities Annotation
53	Stage 2 Construction and Temporary Traffic Facilities
54	Stage 2 Construction and Temporary Traffic Facilities Annotation
55	Stage 3 Construction and Temporary Traffic Facilities
56	Stage 3 Construction and Temporary Traffic Facilities Annotation
57	Undefined
58	Sound Walls & Retaining Walls
59	Sound Walls & Retaining Walls Annotation
60*	Non-geographical Drawing Data*
61	Headquarters Changes
62	As-Built Changes
63	Engineer's Signature

(\*) Key Map; Title Sheet; Profiles; Typical Cross Sections; Superelevation Diagrams, Construction Details and Quantity of Summaries should reside on Level 60 in a pre-V8 MicroStation design file. Using Level 60 for multiple purposes works because each type of sheet is a separate DGN file. In a full V8 MicroStation design file the various information may be separated, if desired, and placed on any of the undefined levels between 75 and 100 when working with only one model. Undefined levels may be used for information that has not been assigned to a specific level.

Undefined (miscellaneous) dropout levels have also been set aside for roadway projects. Those levels are 896 through 900.

When creating additional base maps (e.g., for Stage Construction) in a pre-V8 MicroStation design file, level 11 (which is a drop out level) can be used to move or copy the proposed line work from the previous stage to. This would facilitate showing already constructed design information as dropped out for a later stage within the constructing or sequencing of a project. In a full V8 MicroStation design file, levels have been set aside to facilitate the dropping out of the line work from previous stages when working with only one model. Those levels are 871 to 890.

Additional levels for Highway projects are as follows:

**Full V8**

<b>Level(s)</b>	<b>Content</b>
64 - 69	Information on these levels will not plot
70	Plot shape for lplot – will not plot
71-74	Additional Survey information for Roadway Design
75-100	Undefined Roadway levels when using one Model
128	Existing Easement line work
129	Existing Easement annotation
130	Existing R/W annotation
131	Existing R/W line work
132	New R/W line work
133	New R/W annotation
134	New Easement line work
135	New Easement annotation
136	Temporary Easement line work
137	Temporary Easement annotation
812-849	Utilities - each level is a unique Caltrans custom line style
871-890	For dropping out line work from previous stage
891-895	For dropping out design info on striping sheets
896-900	Miscellaneous dropout
966-999	For Stage Construction – stages 4 through 20

3. The following table identifies each level, it's associated color and the specific information belonging on each level for Highway/Landscape Construction projects.

LEVEL NO.	COLOR/ NAME & NUMBER	TITLE	DESCRIPTION/CONTENT
1	Violet/5	Control	All photo control data, and topographic map survey information. Also includes district-added control information.
2	Yellow/4	Existing Manmade Features	All existing man-made features not otherwise included in any other level, includes all buildings.
3	Yellow/4	Existing Roadway Features	Edges of existing surfaced areas accessible to vehicles, bicycles or pedestrians within the Existing Roadway limits. Examples of Roadway Features are traveled way, edge of pavement lane striping and dikes. The limits of the Existing Roadway are the outside edges of the existing surfaced shoulders, curbs or dikes. Roadway includes all public highways, streets, surfaced and unsurfaced roads, and railroads if the railroads are being improved as part of the project. Roadway does NOT include private roads such as driveways, ranch roads, parking lot streets and roads and streets within large commercial establishments. Railroads (not to be improved), private roads, guard railing, median barriers, right of way fences, existing sidewalks contiguous to the outside curbs are to be placed on Level 2.
4	Green/2	Existing Vegetation and Natural Features	All natural vegetation, existing highway plantings, orchards, vineyards, marshes, and miscellaneous natural features such as rock outcrops, slides, etc.
5	Orange/6 (Note 1)	Existing Utilities and Utility Features	All existing underground and aboveground utility-type facilities (including signals, power and telephone poles and transmission poles for utility, railroad, highway, street, and private improvements.) All existing drainage structures including culverts and headwalls, excluding substantial structures such as buildings. Also, includes district-added underground utilities.
6	Blue/1	Existing Hydro-graphic Features	All lakes, rivers, streams, natural channels, swamps, and standing water.
7	Brown/7	Relief Features Contour Lines Only	Contours (lines only) of the original terrain.
8	Brown/7	Spot Elevations and Contour Elevation Annotation	Spot elevations and contour elevation annotation.
9	Red/3	Profile Grid	Dropout grid for full profile and combination plan and profile standard sheets (red grid lines).
10	White/0	Border Sheets	Standard Border Sheets, Project Engineer's seal information, printed names of engineers, District-County-Route-Post Mile block, plan sheet name, match lines & north arrow (information associated with the border).

LEVEL NO.	COLOR/ NAME & NUMBER	TITLE	DESCRIPTION/CONTENT
11	White/0 & Green/2	Terrain features for dtm, profile grid and dropout level for base maps	Terrain features that define the ground surface for a 3D digital terrain model. Green grid lines for profile sheets. Can be used for dropping out information on non-dropout levels for possible additional base maps.
12	Violet/5	Coordinate Grid	Coordinate grid ticks and labels. Construction Staking Survey Control Data.
13	White/0	Ramp, Over & Under Crossing Alignment	Ramp, Over Crossing & Under Crossing alignment(s), includes station line and tick marks.
14	White/0	Ramp, Over & Under Crossing Annotation	Ramp, Over & Under Crossing annotation, includes Route designation, alignment bearing and station number.
15	White/0	Mainline Alignment	Mainline Alignment(s) for the main roadways, includes station line and tick marks.
16	White/0	Mainline Alignment Annotation	Mainline Alignment Annotation, includes Route designation, alignment bearing and station number.
17	White/0	Frontage Road Alignment	Frontage Road Alignment(s), includes station line and tick marks.
18	White/0	Frontage Road Alignment Annotation	Frontage Road Annotation, includes Route designation, alignment bearing and station number.
19	White/0	Undefined	
20	White/0	Pavement Edges	All lines necessary to depict the edges of pavement to be constructed, including traveled way, shoulders, road approaches and driveways.
21	White/0	Curbs, Gutters, Dikes and Drains	All drawing information required to depict curbs, gutters, dikes, overside & edge drains, includes annotation.
22	White/0	Miscellaneous Construction Features	All drawing information required to depict the construction shown on the layout plan, not specifically on other levels; e.g., new railings & barriers, crash cushions, sidewalks, bridge structures, miscellaneous paved areas.
23	White/0	Layout Notes	All notes, dimensions, and labeling required to describe the construction shown on the layout plan sheets, (except annotation specifically included on other levels) includes related lines and symbols such as leader lines, arrows, arrowheads, curve table, and legend.
24	Red/3	Obliteration and AC Resurfacing	All drawing information required to depict planing, grinding, obliterating and resurfacing of roadways.
25	Red/3	Temporary Road Connections and Alignments	All drawing information required to describe temporary road connections alignments, includes station line, tick marks and annotation. Also alignments for Railroad, Bike Paths, Creeks & Pedestrian Paths.
26	White/0	Undefined	
27	White/0	Undefined	
28	White/0	Undefined	
29	Brown/7	Existing Irrigation	All drawing information required to describe existing irrigation facilities, includes annotation.
30	Red/3	Cut & Fill Data	All drawing data required to describe the top of cut or toe of slope, includes annotation.

<b>LEVEL NO.</b>	<b>COLOR/ NAME &amp; NUMBER</b>	<b>TITLE</b>	<b>DESCRIPTION/CONTENT</b>
31	Orange/6	Existing Right of Way Boundaries	All drawing information required to describe property lines, township lines, section lines, existing Right of Way lines, existing easement lines.
32	Orange/6	New Right of Way Lines and Fences	All drawing information required to describe proposed Right of Way lines, easement lines, rights of entry, controlled access, fences and ESA boundaries and fences – (if too cluttered, then put on undefined level).
33	Orange/6	Right of Way Text	All Text and Annotation that describes new and existing Right of Way on levels 31 and 32.
34	Orange/6	Temporary Water Pollution Control	All drawing information required to describe Temporary Water Pollution Control, includes annotation.
35	Orange/6	Permanent Erosion Control	All drawing information required to describe Permanent Erosion Control, includes annotation.
36	Blue/1	Drainage	All drawing information required to describe drainage facilities to be constructed, including pipes, box culverts, headwalls, manholes, surfaced & unsurfaced ditches, ABM gutters and drains. Also includes irrigation facilities, except those included on Levels 29 or 50.
37	Blue/1	Drainage Annotation	All Annotation that describes drainage facilities.
38	Violet/5	Sanitary Sewer	All drawing information required to describe sanitary sewer facilities to be constructed, including manholes and sewer lines.
39	Violet/5	Sanitary Sewer Annotation	All Annotation that describes sanitary sewer facilities.
40	Yellow/4 (Note 1)	New Utilities	All drawing information required to describe utility relocation work above and below ground, includes annotation. (See Note 1 for chosen Caltrans colors associated with a particular utility).
41	Violet/5	Contour Grading	Proposed grading contours, slope lines, bench lines, includes annotation.
42	White/0	Pavement Elevations	Elevation of pavement, shoulders, curbs, and gutters.
43	Red/3	Pavement Markers and Striping	All drawing information required to describe pavement markers, striping and markings.
44	Red/3	Pavement Markers and Striping Annotation	All annotation that describes pavement markers, striping and markings.
45	Red/3	Signing	All drawing information required to describe sign installations, guide markers, etc., includes annotation.
46	Red/3	Construction Area Signing	All drawing information required to describe Construction Area signing, including tables, details and annotation.
47	White/0 (Note 2)	Electrical	All drawing information required to describe signal and lighting installations.
48	Yellow/4	Electrical Annotation	All annotation that describes signal and lighting installations.

LEVEL NO.	COLOR/ NAME & NUMBER	TITLE	DESCRIPTION/CONTENT
49	Green/2	Planting and Landscaping	All drawing information required to describe highway planting, landscaping, erosion control, etc., includes annotation.
50	Blue/1	New Irrigation	All drawing information required to describe new irrigation facilities for highway planting and landscaping (shown on Level 49), includes annotation. (The construction of other irrigation facilities is to be included on Level 36.)
51	Red/3	Stage 1 Construction and Temporary Traffic Facilities	All drawing information required to describe detours, sequences of construction, temporary barriers, temporary drainage requirements, etc. This level also accommodates Stage 4, Stage 7, etc., if necessary.
52	Red/3	Stage 1 Construction and Temporary Traffic Facilities Annotation	All annotation that describes detours and sequences of construction. This level also accommodates annotation for Stage 4, Stage 7, etc., if necessary.
53	Red/3	Stage 2 Construction and Temporary Traffic Facilities	All drawing information required to describe detours, sequences of construction, temporary barriers, temporary drainage requirements, etc. This level also accommodates Stage 5, Stage 8, etc., if necessary.
54	Red/3	Stage 2 Construction and Temporary Traffic Facilities Annotation	All annotation that describes detours and sequences of construction. This level also accommodates annotation for Stage 5, Stage 8, etc., if necessary.
55	Red/3	Stage 3 Construction and Temporary Traffic Facilities	All drawing information required to describe detours, sequences of construction, temporary barriers, temporary drainage requirements, etc. This level also accommodates Stage 6, Stage 9, etc., if necessary.
56	Red/3	Stage 3 Construction and Temporary Traffic Facilities Annotation	All annotation that describes detours and sequences of construction. This level also accommodates annotation for Stage 6, Stage 9, etc., if necessary.
57	White/0	Undefined	
58	White/0	Sound Wall and Retaining Wall	All drawing information required to depict the construction of Sound Walls and Retaining Walls, includes the plan and elevation views.
59	White/0	Sound Wall and Retaining Wall Annotation	All annotation that describes sound walls and retaining walls, includes curve table for layout lines of walls.
60	White/0	Non-geographical Drawing Data	All drawing information that is non-geographical, such as, details, sectional views, cross sections, profiles, quantities and strip maps. Plan sheets that typically place elements on this level include: Title sheet, Typical Cross Sections, Key Map, Profiles, Superelevation Diagrams, Construction Details and Summary of Quantities.

LEVEL NO.	COLOR/ NAME & NUMBER	TITLE	DESCRIPTION/CONTENT
61	Yellow/4	Headquarter Changes	All final plan revisions performed by HQ Office Engineer after PS&E Submittal and before Advertising and Award.
62	Red/3	As-Built Changes	Changes made during construction that need to be shown on the signed original plans. Revisions are depicted by lining out the original information (do not obscure) and placing the new information.
63	White/0 & Red/3 (Note 3)	Engineer's Signature	Project Engineer's signature. Identification stamps for electronic As-Awarded plans and electronic As-Built plans.

### C. Exceptions or flexibility from the Caltrans Standard Leveling Convention

The Caltrans Standard Leveling Convention for pre-V8 MicroStation files should not be changed. However, there are times when an exception (or some flexibility) may expedite the handling of a project to achieve the desired intent. Utilizing the undefined levels will handle most of the situations not defined by the standard leveling convention. When using undefined levels, communicate to others what was done in order to eliminate the loss of efficiency and productivity.

Example: For pre-V8 MicroStation design files existing utilities belong on level 5, color orange/6. Level 5 is a dropout level, which changes the weight of the lines representing the utilities to a zero weight and changes the solid line to a dotted line. In the past, some Contractors and Resident Engineers could not clearly see the utility line depicted on the Contract Plans, thus creating confusion and a possible source of conflict.

One way to handle the situation is to move the utility information to an undefined level (which does not dropout). Thus the lines representing the utilities will be more visible on the Contract Plans. If the existing utilities are placed on a non-dropout level, 2 features/attributes have been added to help distinguish existing from proposed. The symbology for existing utilities will have a lowercase letter while proposed utilities will have an uppercase letter. Existing utilities will be shown as a thinner line while proposed utilities will be shown as a thicker line. The difference in width is the important point in distinguishing between existing and proposed. The suggested difference in line weight (wt) is **wt = 1** for existing and **wt = 3** for proposed. On a crowded or cluttered plan sheet, another suggestion would be to use line weight **wt = 0** for existing and **wt = 2** for proposed.

In a full V8 MicroStation design file, Levels 812 through 849 has been set aside for all utilities (existing and new) shown in a Caltrans project. The only information on each of these levels is a specific Caltrans custom line style (see Appendix A9 of this manual for the specific line style assigned to each level). The existing utilities are not dropped out, so the symbology that distinguishes the existing from new utilities (as stated in the previous paragraph) is very important to adhere to.

Note 1: Colors have been assigned to various utilities for 2 reasons:

1. To easily distinguish between the various utilities when viewing the design files in the monitor.
2. To assist in the future ability to plot utility verification maps in color. The color yellow is not used because it is difficult to see when plotted.

*(See cell “AAUTIL” in the Caltrans English Cell Library for the assigned colors. Caltrans custom line styles depicting utilities have been defaulted to these assigned colors).*

Note 2: Traffic Electrical has only 1 level (level 47) to place design information. To assist the CADD operator in distinguishing between the various electrical components, cells have been created in various colors, grouped by type of electrical components or symbols. The color scheme is listed below.

White =	Notes and Symbols
Yellow =	Lighting
Green =	Signals
Red =	Conduit and Riser
Violet =	Other Electrical Components

Note 3: Level 63 is now reserved for the Engineer's Signature. The color white/0 is for the Engineer's signature. The color red/3 is for the “As-Awarded” cell (asawrd) created to be used “in lieu” of the Engineer's Signature when the design file (dgn) is set to the Resident Engineer to assist with potential CCOs during the construction phase of the project.

D. Structures Design Leveling Convention

1. General Content of Structures Design Levels is as follows:

**Pre-V8**

<b>Level(s)</b>	<b>Content</b>
Level 1	Control Data
Levels 2 - 8	Pen table drop out code to be used for elements of existing features
Levels 10	Sheet Formats & Seal Information
Level 12	Dimensions
Levels 13, 16 - 19	Bar Reinforcement
Levels 14 & 15	Notes
Levels 20 - 25	Elements made of structural steel
Levels 30 - 35	Elements made of wood
Levels 36 & 37	Contours
Levels 40 - 50	Elements made of concrete
Level 51	Elements made of concrete masonry
Levels 52 & 53	Bridge Data
Levels 54 – 58	Topo, Original Ground & Survey Control
Level 59	Hydrology Data
Level 60	UBC Code
Level 61	Headquarter Changes
Level 62	As-Built Changes
Level 63	Engineer's Signature

Reassigned and expanded levels to be used in Structures Design projects are as follows:

**Full V8**

<b>Level(s)</b>	<b>Content</b>
Level 201	Control Data
Levels 202 - 208	Pen table drop out code to be used for elements of existing features
Levels 210	Sheet Formats & Seal Information
Level 212	Dimensions
Levels 213, 216 - 219	Bar Reinforcement
Levels 214 & 215	Notes
Levels 220 - 225	Elements made of structural steel
Levels 230 - 235	Elements made of wood
Levels 236 & 237	Contours

Level(s)	Content
Levels 240 - 250	Elements made of concrete
Level 251	Elements made of concrete masonry
Levels 252 & 253	Bridge Data
Levels 254 – 258	Topo, Original Ground & Survey Control
Level 259	Hydrology Data
Level 260	UBC Code
Level 261	Headquarter Changes
Level 262	As-Built Changes
Level 263	Engineer's Signature
Levels 264 - 269	No Plot
Level 270	Plot Shape for lplot (does not plot)
Levels 271 - 300	Undefined

Note 1: There were a few levels that were named “### Not Assigned” in the Caltrans DGMLIB that actually were assigned (defined) per the Standards Chart in the Structures seed files. Those levels are as follows:

- Levels 246 though 250 are for Concrete
- Level 253 is for Bridge
- Level 254 is for Topo Data
- Level 255 is for Topo
- Level 256 is for Topo Data for Coutours
- Level 258 is for Survey Control Data
- Level 259 is for Hydrology Data
- Level 260 is for UBC Code

Use the “### Not Assigned” levels as they are defined above or in the Structures seed files, even though the actual name of the level does not reflect the purpose of the level.

Note 2: The “Undefined” levels 271 though 300 were created as place markers so they would not be available for MicroStation to randomly place information on a level slot number within the range of the Caltrans defined levels. Caltrans Structures Design does not use the undefined levels at this time. Anyone, Caltrans or Consultants, desiring to use the Structures Design undefined levels should first contact the editor of this manual and explain the reason so that need might be accommodated in the future by all users.

## 2. Summary of Structures Levels is as follows:

**Pre-V8 and Full V8**

<b>Levels</b>	<b>Content</b>
1 or 201	Control (Includes Center Line, Station Line)
2 or 202	Existing Features for structural steel elements
3 or 203	Existing Features for wood elements
4 or 204	Existing Features for concrete elements
5 or 205	Existing Features for concrete masonry elements
6 or 206	Existing Features
7 or 207	Existing Features
8 or 208	Existing Features
9 or 209	Reserved for District use
10 or 210	Sheet Formats & Seal Information
11 or 211	Undefined
12 or 212	Dimensioning (Includes dimension lines, witness lines, dimension text, arrow heads & reinforcement leaders)
13 or 213	Bar Reinforcement
14 or 214	Detailing Information (Includes text, detail notes & titles)
15 or 215	Design Notes
16 or 216	Bar Reinforcement
17 or 217	Bar Reinforcement
18 or 218	Bar Reinforcement
19 or 219	Bar Reinforcement
20 or 220	Structural Steel
21 or 221	Structural Steel
22 or 222	Structural Steel
23 or 223	Structural Steel
24 or 224	Structural Steel
25 or 225	Structural Steel
26 or 226	Undefined
27 or 227	Undefined
28 or 228	Undefined
29 or 229	Undefined
30 or 230	Wood
31 or 231	Wood
32 or 232	Wood
33 or 233	Wood
34 or 234	Wood

<b>Levels</b>	<b>Content</b>
35 or 235	Wood
36 or 236	Minor Contours
37 or 237	Major Contours
38 or 238	Undefined
39 or 239	Undefined
40 or 240	Concrete
41 or 241	Concrete
42 or 242	Concrete
43 or 243	Concrete
44 or 244	Concrete
45 or 245	Concrete
46 or 246	Concrete
47 or 247	Concrete
48 or 248	Concrete
49 or 249	Concrete
50 or 250	Concrete
51 or 251	Concrete (Masonry)
52 or 252	Bridge Data
53 or 253	Bridge
54 or 254	Topo Data
55 or 255	Topo
56 or 256	Topo Data for Contours
57 or 257	Original Ground, batch plotting points
58 or 258	Survey Control Data
59 or 259	Hydrology Data
60 or 260	UBC Code
61 or 261	Headquarter Changes
62 or 262	As-Built Changes
63 or 263	Engineer's Signature

Summary of additional Levels for Structures Design is as follows:

**Full V8**

<b>Level(s)</b>	<b>Content</b>
264 – 269	No_Plot
270	Plot Shape for lplot (does not plot)
271 - 300	Undefined

3. The following table identifies each level, its associated color and the specific information belonging on each level for a Structures Design project.

### **Pre-V8 and Full V8**

The Level Number is shown twice, once for pre-V8 and a second time for full V8. The color numbers remain the same as it was for pre-V8 whether using level numbers for pre-V8 or full V8.

<b>LEVEL NO.</b>	<b>COLOR NAME AND NUMBER</b>	<b>TITLE</b>	<b>DESCRIPTION/CONTENT</b>
1/201	Blue/1	Control	Control information (e.g. center line, station line)
2/202	Purple/2	Existing	Drop out, existing structural steel elements
3/203	Green/3	Existing	Drop out, existing wood elements
4/204	Orange/4	Existing	Drop out, existing concrete elements
5/205	Light Slate Blue/5	Existing	Drop out, existing concrete masonry elements
6/206	Med Spring Green/6	Existing	Drop out, existing features
7/207	Pink/7	Existing	Drop out, existing features
8/208	Cyan/8	Existing	Drop out, existing features
9/209	Undefined		Drop out, reserved for District Use
10/210	White/10	Sheet Formats	Standard Sheet with border, trim lines, registration seal, signature blocks, District-County-Kilometer Post, etc.
11/211	Undefined		
12/212	Green/12	Dimensioning	Dimension lines, witness lines, dimension text, arrow heads & reinforcement leaders
13/213	Red/13	Bar Reinforcement	Bar Reinforcement Symbols (excluding reinforcing text)
14/214	Yellow/14	Detailing Information	Text, detail notes and titles
15/215	Thistle/15	Design Notes	Design Notes
16/216	Hot Pink/16	Bar Reinforcement	Bar Reinforcement Symbols
17/217	Cyan/17	Bar Reinforcement	Bar Reinforcement Symbols
18/218	Honeydew/18	Bar Reinforcement	Bar Reinforcement Symbols
19/219	Light Blue/19	Bar Reinforcement	Bar Reinforcement Symbols

<b>LEVEL NO.</b>	<b>COLOR NAME AND NUMBER</b>	<b>TITLE</b>	<b>DESCRIPTION/CONTENT</b>
20/220	Aquamarine/20	Structural Steel	Structural Steel (plates, beams & misc. steel)
21/221	Cornflower Blue/21	Structural Steel	Structural Steel (plates, beams & misc. steel)
22/222	Orange/22	Structural Steel	Structural Steel (plates, beams & misc. steel)
23/223	Yellow/23	Structural Steel	Structural Steel (plates, beams & misc. steel)
24/224	Tan/24	Structural Steel	Structural Steel (plates, beams & misc. steel)
25/225	Light Gray/25	Structural Steel	Structural Steel (plates, beams & misc. steel)
26/226	Undefined		
27/227	Undefined		
28/228	Undefined		
29/229	Undefined		
30/230	Burleywood/30	Wood	Wood
31/231	Peru/31	Wood	Wood
32/232	Saddle Brown/32	Wood	Wood
33/233	Brown/33	Wood	Wood
34/234	Dark Goldenrod/34	Wood	Wood
35/235	Chocolate/35	Wood	Wood
36/236	Coral/36	Contours	Minor Contours
37/237	Magenta/37	Contours	Major Contours
38/238	Undefined		
39/239	Undefined		
40/240	White/40	Concrete	Concrete
41/241	Steel Blue/41	Concrete	Concrete
42/242	Cadet Blue/42	Concrete	Concrete
43/243	Med Violet Red/43	Concrete	Concrete
44/244	Lt. Pink/44	Concrete	Concrete
45/245	Dark Orange/45	Concrete	Concrete
46/246	Azure/46	Concrete	Concrete
47/247	Pale Green/47	Concrete	Concrete
48/248	Dark Sea Green/48	Concrete	Concrete
49/249	Khaki/49	Concrete	Concrete
50/250	Light Coral/50	Concrete	Concrete
51/251	Deep Sky Blue/51	Concrete Masonry	Concrete (Masonry)
52/252	Salmon/52	Bridge	Bridge Data
53/253	Dark Khaki/53	Bridge	Bridge
54/254	Peach Puff/54	Topo	Topo Data
55/255	Med Sea Green/55	Topo	Topo
56/256	Firebrick/56	Topo	Topo Data for Contours
57/257	Dodger Blue/57	Original Ground	Original Ground, Batch Plotting Points (circles)
58/258	Dark Orange/58	Survey Control	Survey Control Data
59/259	Pale Turquoise/59	Hydrology	Hydrology Data
60/260	White/60	UBC Code	UBC code information or level map.
61/261	Yellow/61	Headquarters Changes	Final plan revisions performed by ESC- OE Drafting Services prior to reproduction.
62/262	Red/62	As-Built Changes	Changes made during construction. Revisions are shown by lining out the original information and then placing the as-built information.
63/263	White/63 (Red for Cells)	Engineer's Signature	Project Engineer's signature.

E. Right of Way (R/W) Mapping Products Leveling Convention

The R/W Mapping leveling conventions are to be used for R/W Mapping Products only. These are not intended for Final Design contract plans. If R/W boundaries & annotation are delivered to Design in a pre-V8 MicroStation design file, the contract plans leveling convention for pre-V8 MicroStation design files must be adhered to (e.g., Existing R/W, Easement, and Property Boundaries reside on Level 31; New R/W and Easement Boundaries reside on Level 32; and the Text & Annotation describing data on Levels 31 & 32 reside on Level 33).

If R/W boundaries & annotation are delivered to Design in a full V8 MicroStation design file, the leveling convention for full V8 MicroStation design files must be adhered to (e.g., Levels 128 through 137).

1. General Content of R/W Mapping Levels is as follows:

**Pre-V8**

Level(s)	Content
Level 1	Control Data
Levels 2 - 8	Basic topographic map data
Levels 9 - 11	Sheet formats
Levels 13 – 18	Alignments
Levels 19 - 27	Parcel Coloring
Levels 28 – 37, 43 – 46 *	R/W Data
Levels 38 – 42 *	Landnet Data
Levels 47 – 49 *	Point data
Levels 50 – 52 *	Project Surveyor Data
Levels 53 & 54 *	Clipping & Plotting Boundaries
Levels 12, 55 – 63 **	Undefined

\* Flexibility from the R/W Mapping Leveling Convention. (See Note 1)

\*\* Undefined levels may be used for information that has not been assigned to a specific level. (See Note 2)

Reassigned and expanded levels to be used in R/W Mapping Products are as follows:

**Full V8**

Level(s)	Content
Levels 101 - 108	Unassigned, still using pre-V8 levels (1 through 8) for control and topographic map data
Levels 109 - 111	Sheet formats
Level 112 **	Undefined

<b>Level(s)</b>	<b>Content</b>
Levels 113 – 118	Unassigned, still using pre-V8 levels (13 through 18) for alignments
Levels 119 - 127	Parcel Coloring
Levels 128 – 137 *	R/W Data
Levels 138 – 142 *	Landnet Data
Levels 143 – 146 *	R/W Data
Levels 147 – 149 *	Point data
Levels 150 – 152 *	Project Surveyor Data
Levels 153 & 154 *	Clipping & Plotting Boundaries
Levels 155 – 163 **	Undefined
Levels 164 – 169	No_Plot
Level 170	Plot Shape for Iplot (does not plot)
Levels 171 – 200 **	Undefined

2. Summary of R/W Mapping Levels is as follows:

### **Pre-V8 and Full V8**

<b>Level(s)</b>	<b>Content</b>
1	Photogrammetric Mapping Control
2	Existing Man-Made Features
3	Existing Roadway Features
4	Existing Vegetation and Natural Features
5	Existing Utilities and Utility Facilities
6	Existing Hydrographic Features
7	Relief Features - Contours
8	Spot Elevations and Contour Annotations
9 & 109	Appraisal Map Sheet Information
10 & 110	General Sheet Formats
11 & 111	Record Map Sheet Information
12 & 112	Undefined **
13	Ramp, Over and Under Crossing Alignment Data
14	Ramp, Over and Under Crossing Annotation
15	Mainline Alignment Data
16	Mainline Alignment Annotation
17	Frontage Road Alignment Data
18	Frontage Road Alignment Annotation
19 & 119	Parcel Coloring
20 & 120	Parcel Coloring
21 & 121	Parcel Coloring
22 & 122	Parcel Coloring
23 & 123	Parcel Coloring
24 & 124	Parcel Coloring

<b>Level(s)</b>	<b>Content</b>
25 & 125	Parcel Coloring
26 & 126	Parcel Coloring
27 & 127	Parcel Coloring
28 & 128	Existing Easement Boundaries *
29 & 129	Existing Easement Annotation *
30 & 130	Existing R/W Annotation *
31 & 131	Existing R/W Boundaries *
32 & 132	New R/W Boundaries *
33 & 133	New R/W Annotation *
34 & 134	New Easement Boundaries *
35 & 135	New Easement Annotation *
36 & 136	Temporary Easement Boundaries *
37 & 137	Temporary Easement Annotation *
38 & 138	Minor Landnet Boundaries *
39 & 139	Minor Landnet Annotation *
40 & 140	Major Landnet Boundaries *
41 & 141	Major Landnet Annotation *
42 & 142	Political & Municipal Boundaries *
43 & 143	JUA/CCUA/Freeway Lease Boundaries & Annotation *
44 & 144	Relinquishment *
45 & 145	Directors Deed *
46 & 146	Vacation/Abandonment *
47 & 147	Landnet Point Data *
48 & 148	R/W Point Data *
49 & 149	Landnet & R/W Plotted Point Data *
50 & 150	Retracement Data *
51 & 151	Retracement Annotation *
52 & 152	Retracement Comments *
53 & 153	Clip Boundaries *
54 & 154	Plot Boundaries *
55 & 155	Undefined **
56 & 156	Undefined **
57 & 157	Undefined **
58 & 158	Undefined **
59 & 159	Undefined **
60 & 160	Undefined **
61 & 161	Undefined **
62 & 162	Undefined **
63 & 163	Undefined **

\* Flexibility from the R/W Mapping Leveling Convention. (See Note 1)

\*\* Undefined levels may be used for information that has not been assigned to a specific level. (See Note 2)

Expanded levels to be used in R/W Mapping Products are as follows:

**Full V8**

<b>Level(s)</b>	<b>Content</b>
164 - 169	No_Plot
170	Plot Shape for lplot (does not plot)
171 – 200 **	Undefined

3. The following table identifies each level, the associated level name, and the specific information belonging on each level for R/W Mapping projects for both pre-V8 and full V8 projects. Levels with only one number are for both pre-V8 and full V8 projects and the levels **were not** reassigned. Level names are exactly as identified in MicroStation for pre-V8 (including the level number). Level names for full V8 will now reflect the new level number instead of the pre-V8 level number (see Appendix A9). Note: level naming has a character length restriction.

### **Pre-V8 and Full V8**

<b>LEVEL NO.</b>	<b>LEVEL NAME</b>	<b>TITLE</b>	<b>DESCRIPTION/CONTENT</b>
1	1 Control	Control	All photo control data, and topographic map survey information. Also includes district-added control information.
2	2 Exist Man Made	Existing Man-Made Features	All existing man-made features not otherwise included in any other level, includes all buildings.
3	3 Exist Roadway	Existing Roadway Features	Edges of existing surfaced areas accessible to vehicles, bicycles or pedestrians within the Existing Roadway limits. See section 2.4_B_3 (page 2.4-4) for a complete description of this level.
4	4 Exist Veg_Nat	Existing Vegetation and Natural Features	All natural vegetation, existing highway plantings, orchards, vineyards, marshes, and miscellaneous natural features such as rock outcrops, slides, etc.
5	5 Exist Utilitie	Existing Utilities and Utility Features	All existing underground and aboveground utility-type facilities (including signals, power and telephone poles and transmission poles for utility, railroad, highway, street, and private improvements.) All existing drainage structures including culverts and headwalls, excluding substantial structures such as buildings. Also, includes district-added underground utilities.
6	6 Exist Hydro	Existing Hydro-graphic Features	All lakes, rivers, streams, natural channels, swamps, and standing water.
7	7 Contours	Relief Features Contour Lines Only	Contours (lines only) of the original terrain.
8	8 Spot Elev	Spot Elevations and Contour Elevation Annotation	Spot elevations and contour elevation annotation.
9/109	9 Appraisal Map	Appraisal Map	Data specific to Appraisal Map sheets.
10/110	10 Sheet Format	Sheet Format	Standard Border Sheets, (22" x 34" when plotted) with trim lines, District-County-Route-Post Mile block, plan sheet name, vestee block, geometry tables, North arrow, details, match lines & joining sheet data. (Information associated with the border).
11/111	11 Record Map	Record Map	Data specific to Record Map sheets.

LEVEL NO.	LEVEL NAME	TITLE	DESCRIPTION/CONTENT
12/112	12 Undefined	Undefined	** (See Note 2)
13	13 Ramp Align	Ramp, Over & Under Crossing Alignment	Ramp, Over Crossing & Under Crossing Alignment(s), includes station line and tick marks.
14	14 Ramp Anno	Ramp, Over & Under Crossing Annotation	Ramp, Over & Under Crossing Annotation, includes Route designation, alignment bearing and station number.
15	15 Main Align	Mainline Alignment	Mainline Alignment(s) for the main roadways, includes station line and tick marks.
16	16 Main Anno	Mainline Alignment Annotation	Mainline Alignment Annotation, includes Route designation, alignment bearing and station number.
17	17 Front Align	Frontage Road Alignment	Frontage Road Alignment(s), includes station line and tick marks.
18	18 Front Anno	Frontage Road Alignment Annotation	Frontage Road Annotation, includes Route designation, alignment bearing and station number.
19/119	19 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
20/120	20 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
21/121	21 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
22/122	22 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
23/123	23 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
24/124	24 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
25/125	25 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)

LEVEL NO.	LEVEL NAME	TITLE	DESCRIPTION/CONTENT
26/126	26 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
27/127	27 Parcel Color	Parcel Coloring	Parcel Coloring line work and fill for Fee, Easement, and Remainder areas. Specific colors associated with parcel coloring (See Note 3) Optional reference file usage (See Note 4)
28/128 *	28 Exist Ease L	Existing Easement Boundaries	Existing Easement line work including easements, public roadway alignments, public utilities, and other title encumbrances.
29/129 *	29 Exist Ease A	Existing Easement Annotation	All Annotation that describes Existing Easements.
30/130 *	30 Exist RW A	Existing R/W Annotation	All Annotation that describes Existing & previously existing Rights of Way.
31/131 *	31 Exist RW L	Existing R/W Boundaries	Existing & previously existing R/W line work.
32/132 *	32 New RW L	New R/W Boundaries	New R/W line work.
33/133 *	33 New RW A	New R/W Annotation	All Annotation that describes New Rights of Way.
34/134 *	34 New Ease L	New Easement Boundaries	New Easement line work – excluding temporary easements.
35/135 *	35 New Ease A	New Easement Annotation	All Annotation that describes New Easement Annotation.
36/136 *	36 Temp Ease L	Temporary Easement Boundaries	New Temporary Easements Line work – Construction, Drainage, General, & Slope.
37/137 *	37 Temp Ease A	Temporary Easement Annotation	All Annotation that describes New Temporary Easements.
38/138 *	38 Minor Land L	Minor Landnet Boundaries	Minor Landnet Line work – Parcel ownership, Lots, Subsection Lines (1/16 & below), USPLS Gov't Lots.
39/139 *	39 Minor Land A	Minor Landnet Annotation	All Annotation that describes Minor Landnet.
40/140 *	40 Major Land L	Major Landnet Boundaries	Major Landnet Line work – Township & Range Lines, Ranchos, Section & ¼ Section Lines, USPLS Gov't Tracts, Subdivision Boundaries.
41/141 *	41 Major Land A	Major Landnet Annotation	All Annotation that describes Major Landnet.
42/142 *	42 PBndy FedPart	Political & Municipal Boundaries	All drawing information required to describe Political Boundaries, City & County limits, Municipal boundaries, Federal Boundaries, and Federal Participation, includes annotation.
43/143 *	43 JUA_CCUA	JUA/CCUA & Freeway Lease Areas	All drawing information required to describe JUA & CCUA, Freeway Lease Area, and Supplemental Reference Areas, includes annotation.

LEVEL NO.	LEVEL NAME	TITLE	DESCRIPTION/CONTENT
44/144 *	44 Relinquishmt	Relinquishment	All drawing information required to identify areas of Relinquishment, includes annotation.
45/145 *	45 DirectorsDeed	Directors Deed	All drawing information required to identify areas in Directors Deeds, includes annotation.
46/146 *	46 Vac_Abandon	Vacation / Abandonment	All drawing information required to identify areas of Vacation/Abandonment, includes annotation.
47/147 *	47 LandnetPts-NP	Landnet Point Data	Non-plotted Point data – Landnet Point data that will not be shown on R/W maps including name, description, coordinates, leaders, and cells.
48/148 *	48 RW Pts - NP	R/W Point Data	Non-plotted Point data – R/W Point data that will not be shown on R/W maps including name, description, coordinates, leaders, and cells.
49/149 *	49 Points-Plot	Plotted Point Data	Plotted Point data - Landnet & R/W Point data to be displayed on R/W maps including name, description, coordinates, leaders, and cells.
50/150 *	50 Retracement L	Retracement Data	Project Surveyors Retracement Line work.
51/151 *	51 Retracement A	Retracement Annotation	Project Surveyors Retracement Annotation.
52/152 *	52 Retracement C	Retracement Comments	Project Surveyors Retracement Comments.
53/153 *	53 Clip Boundary	Clip Boundaries	Reference file clip boundaries and clip masks.
54/154 *	54 Plot Boundary	Plot Boundaries	Boundary along sheet border used for fenceless IPLOT.
55/155	55 Undefined	Undefined	** (See Note 2)
56/156	56 Undefined	Undefined	** (See Note 2)
57/157	57 Undefined	Undefined	** (See Note 2)
58/158	58 Undefined	Undefined	** (See Note 2)
59/159	59 Undefined	Undefined	** (See Note 2)
60/160	60 Undefined	Undefined	** (See Note 2)
61/161	61 Undefined	Undefined	** (See Note 2)
62/162	62 Undefined	Undefined	** (See Note 2)
63/163	63 Undefined	Undefined	** (See Note 2)

\* Flexibility from the R/W Mapping Leveling Convention. (See Note 1)

\*\* Undefined levels may be used for information that has not been assigned to a specific level. (See Note 2)

#### 4. Exceptions or flexibility from the R/W Mapping Leveling Convention

Note 1: The R/W Mapping Standard Leveling Conventions were developed to provide users with a means of grouping similar data types while also separating line work from text. Many of the levels were assigned as a convenience for those users who desire to work across more levels. Not all of the data needs to be separated on all of the defined levels. However, some of the R/W Mapping Standard Leveling Conventions should not be deviated from.

The following table identifies those R/W Mapping Level Conventions that **must** be adhered to in both pre-V8 and full V8 MicroStation design files:

Level 1	Control Data as described in Sections E 2 & 3
Levels 2 - 8	Basic topographic map data as described in Sections E 2 & 3
Levels 9–11/109-111	Sheet formats as described in Sections E 2 & 3
Levels 13 – 18	Alignments as described in Sections E 2 & 3
Levels 19–27/119-127	Parcel Coloring as described in Sections E 2 & 3
Level 31 or 131	Existing R/W, Easement, and Property Line Boundaries
Level 32 or 132	New R/W and Easement Boundaries
Level 33 or 133	All Text & Annotation describing data on Levels 31 & 32 or Levels 131 & 132
Level 38 or 138	All Landnet Boundaries
Level 39 or 139	Text & Annotation describing all Landnet
Level 47 or 147	All non-plotted Point Data
Level 49 or 149	All plotted Point Data

Note 2: There are times when an exception (or some flexibility) may expedite the handling of a project to achieve the desired intent. Utilizing the undefined levels will handle most of the situations not defined by the standard leveling convention. When using undefined levels, communicate to others what was done in order to eliminate the loss of efficiency and productivity.

Note 3: Specific colors in the Caltrans color table (ctcolor.tbl), 224, 226 – 231 & 233 - 239, have been designed and **must** be used for the parcel coloring. These colors were chosen because the Easement & Remainder colored lines are clearly visible while the filled Fee areas do not obscure the overlying topography and data. These colors should also provide enough variation to allow colorblind users of the maps to be able to distinguish between adjoining parcels.

Note 4: The user may work with a separate referenced pre-V8 DGN file for the parcel coloring. If this is the case, every level (1 – 63) may be used in this “Parcel Coloring” DGN file and the coloring for each parcel can reside on a separate level.

In a full version 8 (V8) MicroStation design file, if the coloring for each parcel is to reside on a separate level within one DGN file (model), then one option is for the parcel coloring to be placed on one of the new “Undefined” levels (171 through 200).