HIGHWAYS DIVISION DESIGN BRANCH DRAFTING INSTRUCTIONS

This Drafting Instructions is to ensure that preparation of plans by the State Highways Division would be in conformance with the following Federal-Aid Policy Guides, 23 CFR 630B, Subchapter G, Subpart B and Non-Regulatory Supplement Attachment, "Plans, Specifications, and Estimates" and 23 CFR 630D, Subchapter G, Subpart D and Non-Regulatory Supplement Attachment, "Geodetic Markers" and Section 264-23, HRS. This Instruction guide is designed for all personnel that have responsibilities to draft, prepare, store and maintain construction plans and maps for the Highways Division.

The objectives are as follows:

- To ensure uniformity of drafting practice.
- To specify instructions for material requirements for plans.
- To ensure the completeness and clarity of plans for reproduction, addendum and change order revisions, as-built revisions, subsequent filing and archiving

Send comments and suggested improvements to the Design Branch Manager at:

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1 General Requirements for Plans

1.1 Purpose

The preparation of highway construction plans shall conform to the following Federal-Aid Policy Guides:

- 23 Code of Federal Regulations (CFR) 630B, Subchapter G, Subpart B and Non-Regulatory Supplement Attachment, "Plans Specifications, and Estimates"
- 23 CFR 630D, Subchapter G, Subpart D and Non-Regulatory Supplement Attachment, "Geodetic Markers"

In the Highways Division, the Drafting Technicians and the Highway Design Engineers shall utilize these guidelines to assist them in the development of easily readable and high quality half-size and full-size construction plan prints.

1.2 Plans designed by Design Branch Staff

The Project Manager shall be responsible for the development, coordination and assembly of plans for highway construction projects in accordance with these guidelines for the Design Branch. Plans shall be developed on the Computer-aided drafting (CAD) program MicroStation SS10 or the current version of AutoCAD.

The Drafting Technician Supervisor shall work with the Project Manager to develop the required base file and supporting design files for each highway construction project. Coordinate with the other support Sections of the branch when base files and design files are ready. Support Sections will copy required files to their home work station.

When highway construction project are completed and ready to be advertised, full-size Portable Document Format (PDF) files (vellums will only be done if absolutely needed) shall be made and filed with the Highway Design Section. The Drafting Unit shall be responsible for the storage of the vellums in a transit file system.

1.3 Plans designed by Consultants

Project Managers from the Technical Design Services Office shall ensure that design consultants follow these guidelines. Design consultants shall be responsible for the development, coordination and assembly of plans for highway construction projects in accordance with these guidelines except as amended by contract provisions.

The Drafting Technician Supervisor shall work with the Project Manager to develop the required base file and supporting design files for each highway construction project. The base file and supporting design files for consultant use shall be made available as required by contract provisions.

The consultant shall prepare all contract plans, including field survey, topographic and Rights-of-Way plans, on the CAD program MicroStation SS10 or the current version of AutoCAD. All drawing files shall comply with the Highways Division's Protocol for Line Weight, Color, Level, Size, Grid Reference, Standard Units, Fonts and Symbology for MicroStation produced contract plans or AutoCAD equivalent. The minimum lettering heights shall be 3/16" for uppercase and 1/8" for lowercase letters. See Chapter 5a, Table 5a.3, and Chapter 5b, Table 5b.3.

Upon completion of the Plans, Specifications, and Estimates (PS&E), in accordance with the contract provisions, the consultant shall submit to the Highways Division electronic CAD files on CD-ROM. One (1) set each of half-size and full-sized, semi-final and final plan prints on bond representative of the electronic files shall be submitted with electronic CAD files. After the Highways Division review and approval of the final plan prints, full-size PDF files will be produced by the consultant, endorsed by licensed professional engineer(s), and submitted to the Highways Division. Right-of-way maps and Land Court maps shall be plotted on good quality tracing cloth with opaque black ink.

Highway Design Section, shall file and store CAD files and vellum plans prepared by design consultants. The Drafting Unit shall be responsible for the storage of the vellums in a transit file system.

1.4 Plan Requirements

1.4.1 General

Plans are, instructions using drawings containing engineering data or details pertaining to geometric, drainage, structures, soils and pavements and other appurtenances. Plans should not encompass material that is properly a part of the specifications. The plan drawings shall be developed and completed in a standard contract plan design file conforming to CAD drafting practices.

Abbreviated Plans may be used, provided they give sufficient information to properly complete the project. This type of plan is particularly adaptable to special types of projects such as those for minor emergency relief, safety improvements, resurfacing, restoration, and rehabilitation and pavement marking. A typical set of abbreviated plans consists of only that information necessary to describe the type of work and its limits such as:

- General plan
- Cross section, if appropriate
- Estimate of quantities
- Tabulation of construction items, providing station, offset, and evaluation
- General notes
- Special details

1.4.2 Standard Plans

Standard Plans are used to reduce the number of drawings required to be supplied for each project and provide uniformity of design and construction where the details are the same from project to project for items such as guardrails, curbs, gutters, sidewalks, drainage structures, slope protection, concrete box girders, prestressed concrete piles, sign supports, light standards, fencing, and other appurtenances.

- Standard plans for the Highways Division is in a book form. The Standard Plan book is available to design consultants, engineers, construction contractors and the public.
- Standard plans that are used as part of the plan assembly shall be referenced in the project plans. The Standard Plans Summary design file will be used to annotate the applicable Standard Plan.
- When modifications to standard plans are necessary for a specific project, special details shall be prepared, properly describing the work, and included in the project plans.

1.4.3 Contract Plans

Contract Plans shall show the details that are necessary to construct a specific project, and should be tailored to provide all information necessary to accomplish the work in an orderly manner.

Title Sheet shall be composed using a title sheet design file that is appropriate to the island location of the project, it will include the following items:

- Project Title
- Index to Drawings
- Layout Plan
- Graphic scale for layout plan in hundred or thousand feet designation
- Gross length and net length of project in miles
- State of Hawaii map
- Island map with graphic scale in miles
- Design designation
- Department of Transportation, State of Hawaii director's signature block
- Mile Post limits for the project
- Highway Route Marker designation
- Federal Aid project designation title block
- Project manager identification line

See Figure 1.1 for an example of a Title Sheet design file.

Standard Plans Summary. The Standard Plans Summary Sheet indicates the Standard Plan's that apply to a Contract Plan set. It lists the most current Standard Plan with the revisions date that apply. A symbol is applied to each listing that applies to the Contract Plan set. A design file is available. See Figure 1.2 for an example of a Standard Plans Summary design file.

General Notes and Legend. The General Notes and Legend sheet has a list of notes and legends that shall apply to a Contract Plan set. Notes are revised and added to meet the requirements of the contract. The legend is revised to show additions or deletions to meet the requirements of the contract. A design file is available. See Figure 1.3 for an example of a General Notes and Legend design file.

Typical Sections. Typical cross sections shall be developed and completed in a standard contract plan design file. It shall be included in plans for all projects including those for bridges only, and those where abbreviated plans are to be used. See Figure 1.4 for an example of a Typical Section Sheet.

All functional elements should be shown to a convenient scale including:

- All different slopes of cut and fill.
- The width of the roadbed and median.
- The shape of the finished surface and shoulders.
- Curb and gutter if part of the design.

- All integral parts of the surfacing and shoulders including, as appropriate, sub base, base course, and surface course.
- Limiting locations where each typical cross section is to be used.
- Ultimate typical cross section for stage construction project.
- Thickness for each element of the surfacing system.
 - Where variations in surfacing or base thickness are proposed because of differing soil conditions or other reasons, such variations should be in tabular form, including station limits for each thickness.
 - In instances in subparagraph <u>a.</u> above, the typical section need show only those varying thicknesses that are to be employed.
- Relation between either proposed or ultimate status and a control survey line and profile grade line.
- Lateral location of profile grade line (grade point).

Roadway Plan and Profile. Roadway plan and profile design files shall be prepared at a scale to show the necessary details as governed by the topography to be shown and the complexity of the work. A standard Contract Plan Design File and a Plan and Profile Design File are available (Figure 1.5 and Figure 1.6).

Plans- Plans shall be drawn to a horizontal scale of 1 inch equals 40 feet, or 1 inch equals 20 feet. The general highway plan should include:

- The base line of the survey, which, if practicable, should also be the centerline of the proposed roadbed.
 - When the centerline and the base line are not coincident, their relationship should be indicated.
 - Divided highways, where independent base lines are used, may be treated as separate roadways indicating only the general relationship between the two.
 - Special areas such as interchanges and safety rest areas should be shown with separate survey control lines as necessary.
- The stationing shall read from left to right including Equations of Stationing.
- The horizontal position of the beginning and ending stations described by coordinates in the State Plan Coordinate System, datum adjusted on an area or project basis.
- Design data of curves.
- Right-of-way and access control lines, easements, and special use areas.
- North point.
- General soils, rock out crop, topography, streams, railroads, and other culture such as roads, streets, and airports on or near the right-of-way when these items influence the proposed construction.
- Location of borings, test pits, or other sites where subsurface investigations have been made.
- Incidental construction items such as erosion control provisions, guardrail, and retaining walls.
- Amount and volume of materials available at known sources.
- Existence of and disposition of all public utilities, buildings, and any other obstruction or encroachment within the right-of-way, or adjacent thereto if affecting the proposed construction.
 - If not part of the project, their disposition should be included in the project records.

- If part of the project, the plan should show the present and, if applicable, the proposed location including both horizontal and vertical positions and such additional details as may be needed to indicate the scope of work to be performed.
- On complex projects, a reference sheet is desirable to facilitate the use of the plans.

Profiles. The profile grade represents the trace of the vertical plane intersecting the top surface of the wearing course, base course, or other surface along the designated base line.

The existing ground line should represent the trace of a vertical plane intersecting the present traveled way or ground line along the designated base line.

Profiles shall be drawn to the same horizontal scale as the plan, but the vertical scale may be 5 to 10 times that of the horizontal scale. The profiles should show:

- Grade and existing ground lines.
 - When standard plan and profile design files are used, surface elevations may be omitted and grade elevations shown at changes of gradient only.
 - When plan sheets are used, grade and existing ground elevations should be shown.
- Datum line.
- Station ordinate lines.
- Percentage of gradient.
- Balance points, if necessary or desirable, together with excavation and fill quantities involved.
- Location and depth of subsurface borings or test pits (actual log or test results need not be shown, but a reference should be included indicating where this material may be viewed).
- Vertical and horizontal clearances under and over drainage, and utility lines within the right-ofway.
- Notation as to whether profile grade line represents the surface of pavement or sub grade, and culverts.

Bridges. Detail plans for bridges shall be developed and completed in a standard contract plan design file, it should include:

- A site plan.
- Location and log of each foundation sounding or boring indicating the results of the subsurface explorations.
- Profile of the crossing.
- Typical cross section.
- Sectional drawings, as needed, to detail the structure completely.
- Quantities of materials required.
- Reinforcing bar list and bar bending diagram.
- Design loadings, working stresses, class(es) of concrete, and grade(s) of steel.
- Drainage area and applicable runoff of hydraulic properties.

- Design and construction details, and all other details essential to completeness.
- Reference to applicable specifications.

Drainage Plan, Profile and Details. Drainage plan, profile and detail shall be developed and prepared in a standard contract plan design file. It shall show the necessary details to properly describe the required installation of a drainage system for a highway construction project.

Drainage Plans. The drainage plan shall be drawn to a horizontal scale of 1 inch equals 40 feet, or 1 inch equals 20 feet. The drainage plan should include the features of the roadway plan and drainage structures such as:

- Catch basins, concrete drop inlets.
- Grated drop inlets.
- Storm drain manholes.
- Inlet and outlet structures.
- Headwalls.
- Concrete lined ditches.
- Box culverts and pipe culverts (drainage structures 20 feet or less in length between abutments measured along the centerline of the roadway).
- The base line of the survey, which, if practicable, should also be the centerline of the proposed roadbed.
 - When the centerline and the base line are not coincident, their relationship should be indicated.
 - Divided highways, where independent base lines are used, may be treated as separate roadways indicating only the general relationship between the two.
 - Special areas such as interchanges and safety rest areas should be shown with separate survey control lines as necessary.
- The stationing shall read from left to right including Equations of Stationing.
- The horizontal position of the beginning and ending stations described by coordinates in the State Plan Coordinate System, datum adjusted on an area or project basis.
- Design data of curves.
- Right-of-way and access control lines, easements, and special use areas.
- North point.
- General soils, rock out crop, topography, streams, railroads, and other culture such as roads, streets, and airports on or near the right-of-way when these items influence the proposed construction.
- Incidental construction items such as erosion control provisions, guardrail, and retaining walls.
- On complex projects, a reference sheet is desirable to facilitate the use of the plans.

Drainage Profiles. The profile grade represents the trace of the vertical plane intersecting the top surface of the wearing course, base course, or other surface along the centerline of the culvert.

The existing ground line should represent the trace of a vertical plane intersecting the present traveled way or ground line along the centerline of the culvert.

Drainage profiles shall be drawn to the same horizontal scale as the plan, but the vertical scale may be 5 to 10 times that of the horizontal scale. The drainage profiles should show:

- Grade and existing ground lines.
- Datum line.
- Station ordinate lines.
- Percentage of slope for the culvert.
- Vertical and horizontal clearances under and over utility lines within the right-of-way.
- Notation as to whether profile grade line represents the surface of pavement or sub grade.

Drainage details shall be developed and completed in a contract plan design file. Details of structures shall be drawn to $\frac{3}{4}$ " = 1'-0" scale. Details of steel frame and grates shall be drawn to $\frac{1}{2}$ "=1'-0". Depending on the size of a drainage structure other scales maybe used to complete all views needed to describe the structure.

Traffic Control Plan (TCP). TCP shall be designed specifically for the project detailing the requirements for controlling traffic through the project, or referenced to standard plans, or a section of the Manual on Uniform Traffic Control Devices for Streets and Highways.

The plan should provide for appropriate treatment of all significant hazards likely to be encountered during the project, with the degree of detail depending on the project complexity and traffic interference with construction activity.

Special Details. Special details shall be prepared and included, as necessary, to properly describe the work. Special details shall be developed and completed in a standard contract plan design file.

Environmental Mitigation. Commitments for environmental mitigation features which are contained in the environmental documentation should be detailed as necessary and included in the project plans as special details and/or shown at the appropriate location in the plans.

Cross Sections. Cross sections should be taken at every 50 feet to determine accurately the character and extent of the proposed work. Cross sections should show:

- Profile of the ground line.
- Proposed cross section
- Station location.
- Grade line elevation.
- Areas.
- Minor drainage structures.

Contiguous Projects. A general plan or layout of contiguous construction projects that are to be constructed with either a different class of funds or by another agency should be included to show the location and effect of the work.

1.4.4 Right-of-Way Plans

Right-of-way plans should show:

- Right-of-way and access control lines.
- Width to be acquired.
- Proposed slope limits.
- Centerline and stationing with appropriate ties to intersecting property lines and changes in rightof-way widths.
- Any additional easement areas, either temporary or permanent, that are required to accommodate intersecting roads and streets, land service, access and temporary roads, drainage areas, material storage areas, slope widening, utilities, railroads, or any other special uses.
- All pertinent data affecting the cost of the right-of-way such as structures, land service or access roads, improvements, drain fields, and fences.
- All approved points of entry to or exit from the traffic lanes, even where the right-of-way lines and access control lines are coincident.
- Disposition of improvements within the proposed right-of-way.
- For each parcel to be acquired:
 - A parcel identification number.
 - The property ownership lines.
 - The name of the property owners.
 - The area in square feet or acres of the part to be taken and of each remainder of a partial taking.

The size, form, and arrangement of right-of-way plans should conform to the general requirements for highway plans and should contain sufficient dimensional and angular data to permit ready identification and correlation with the legal descriptions of all parcel easements and special use areas that are required by the associated highway project. Chapter 7 of this drafting instruction gives detailed instructions for the preparation of right-of-way maps to meet regulating agencies requirements and established mapping practices.







Figure 1.2 Standard Plan Summary



Figure 1.3 General Notes and Legend



Figure 1.4 Typical Section Sheet



Figure 1.5 Standard Contract Plan Sheet



Figure 1.6 Standard Contract Plan and Profile Sheet



Figure 1.7 Cross Section Contract Plan Sheet

2 Material Requirements for Plans

2.1 Materials

The CAD program MicroStation SS10 or the current version of AutoCAD shall be the platform upon which all preparation and development of construction plans are made.

Completed PS&E CAD files produced by consultants shall be submitted on CD-ROM (or may be downloaded thru their site).

Final plan prints shall be produced. Half-size and full-sized plan prints for semi-final and final review and approval shall be on bond paper.

Right-of-way maps and Land Court maps shall be produced on a quality tracing cloth with opaque black ink.

3 Drafting Practices

3.1 Drawing Standards

Basic standards must be adhered to in order to have half-size plans that are completely legible. The following requirements are set.

3.2 Scale

- The policy is to develop plan and profiles using 1" = 40' scale.
- Detailed Road Plan using 1'' = 20' scale.
- Abbreviated Road Plan using 1'' = 100' scale.

3.3 Symbols and Abbreviations

- Lists of abbreviations and symbols to be used are given in Attachment A and Attachment B.
- On occasions when the Consultant develops **abbreviations or symbols not contained in the guidelines, these should be defined and included in the legend noted on the plans.**

3.4 Title Block

The sheet title shall not exceed four (4) lines to include as follows:

- Line 1 shall indicate the type of drawing and double underlined.
- Line 2 shall show the highway name.
- Line 3 shall show the project description.
- Line 4 shall show the Project Number.

Dates and scale:

- Dates shall be shown on the bottom right corner of the title block indicating month and year. For example: JAN, 2000.
- Scale shall be shown on the bottom left corner of the title block. If more than one scale is being used, display the words "As Noted".

See Figure 3.1 for an example of a filled in Title Box.

3.5 Engineer's Seal on Consultant Designed Projects

Each sheet, except for the title sheet shall display the signed seal of the Engineer who is responsible for the work on the sheet. Preferably, the Engineer's seal should be placed directly above the title block and as close as possible to the right boarder line. See Figure 3.2 for an example.

3.6 Numbering of Contract Plan Sheets

The plan sheet number of the tracing shall be located at the lower right corner, within the boarder line and the print trim line. The last digit shall be located two (2) inches to the left of the vertical print trim line. Plan sheet numbers shall be located as close as possible to the border line to minimize possibility of the numbers being trimmed off on prints. See Figure 3.2 for Plan Sheet Number location.







Figure 3.2 Engineers Seal on Consultant Designed Projects

3.7 Orientation

All text shall be done to facilitate reading from the bottom or right hand edge of the sheet, with the dividing line 15 degrees past vertical to the left. Drawings shall be oriented with coordinate north generally towards the top or to the left of the sheet. It is specified in paragraph 1.4 that station line increase up station from the left side of the sheet to right. This would take precedence over north generally towards the top.

3.8 North Arrow

The north arrow shall be displayed in the upper right hand corner of plan sheets.

3.9 Identifying Symbols and Titles for Section Details

The sheet on which the section detail is drawn shall show in its section title the capital letter designation of the section in the upper half of the ellipse; the (sheet*) on which the section is taken in the lower left half; and the (sheet*) on which the detail section is drawn in the lower right half. If the section is taken on more than one sheet, the additional sheets shall be as shown in Figure 3.3 (sheet*) – This sheet number is the "SHEET NO. __*__OF _____SHEETS" (sub-set of sheets within the total plan sheets of the project) and not the "Plan Sheet Number", which is the consecutive sheet count for the entire set of plans.

3.9.1 Section Lines

Section lines indicating where a section is taken need not be continuous between their limits provided that their intent is clear. Use the following section line symbols shown in Figure 3.4.

3.9.2 Orientation

Whenever possible, sections shall be taken looking to the right or down and increasing stations on civil drawings. Whenever practical, sections that are drawn on the sheet on which they are identified should be drawn in the immediate vicinity of their identification symbol.

3.9.3 Designation

In all cases, sections shall be designated by capital letters. Whenever practical, sections shall be listed consecutively (A, B, C, etc.) from left to right from top to bottom on the sheet where they are drawn.

3.9.4 Similar Sections

When a section is taken such that it is similar to one already shown either on the same sheet or on a separate sheet, the new section need not be drawn but may be referred to in the existing section view by stating that the new section is similar (Figure 3.5).

The word "SIMILAR" should also be expanded to explain how it is similar (such as: "similar, but opposite hand" or "similar, except as noted"). In designating a similar section, always use a different letter (not the initial letter with an accent such as A and A'), and avoid the use of the word "SAME".



Figure 3.3 Section Title Symbol



Figure 3.4 Section Line Symbol



Figure 3.5 Similar Section Title Symbol

3.10 Identifying Symbols and Titles for Detail Drawings

3.10.1 Identifying Symbol

Details shall be designated by numerals in the upper half of the ellipse. Procedure of identification for the lower half of the ellipse shall be similar to that outlined in paragraph 3.9.

When the detail is drawn on the sheet on which it is identified, use the detail designation shown in Figure 3.6.

3.10.2 Orientation

Care shall be taken to ensure that the orientation of the detail drawing is identical to that of the plan, elevation, etc., where it is identified. Whenever practical, details which are drawn on the sheet on which they are identified should be drawn in the immediate vicinity of their identification symbols.

3.10.3 Designation

In all cases, details shall be designated by numerals. Whenever practical, details shall be listed consecutively (1, 2, 3, etc.) from left to right and from top to bottom on the sheet on which they are drawn.

3.11 Cross Sections

Arrange cross sections on a cross-section drawing so that cross sections commence from the bottom of the sheet and continue up. If two or more columns of cross sections are on one drawing sheet, commence from the bottom left corner and continue up.

3.12 Final Contract Tracings

All contract plan sheets shall conform in size, boarder lines, title and other boxes to a Standard Highways Division design file. All sheets shall have a print trim line $22^{"} \times 35^{"}$. Boarder line shall be $\frac{1}{2}^{"}$ from the top and bottom print trim line. The right boarder line shall be $\frac{1}{2}^{"}$ from the right print trim line and the left boarder line shall be 4 1/4" from the left print trim line. Plots are made on 36" size rolls of bond or vellum. See Figure 3.7 for dimensions of the contract plan sheet.







Figure 3.7 Dimensions for Highways Division Contract Plan Sheet
4 **Preparation of Addendum and Change Order Plans**

4.1 General

Whenever it is required to alter the original design file for an Addendum or Change Order, a copy of the design file shall be made for file. A subdirectory or folder labeled for Addendum or Change Order shall be created and the file copy shall be placed in the folder. In the lower right corner between the sheet margin and print trim line, post the following note: "COPY OF ORIGINAL TRACING" or "COPY OF TRACING PRIOR TO (ADDENDUM)/(C.O.) DATED ______" for design files that are revised more than once. For examples of file copy labeling see Figure 4.1.1.

4.2 Posting Revisions and Plan Sheet Numbers

Post revisions in the original design file. Prefix the original plan sheet number with "ADD." or "C.O.", whichever is appropriate. When revisions require that additional sheet or sheets be added to the plans, the sheet or sheets shall be inserted into the plan set consistent with the original plan compilation. If additional sheets are not related to any of the plan sheets, they shall be inserted at the end of the set. In either case, the plan sheet number for the addition should be the same as the sheet it follows and "S-1", "S-2", etc., added to the right of the sheet number. The plan sheet number shall also be prefixed with "ADD." or "C.O." whichever action necessitated this additional sheet (Figure 4.1.2).

4.3 Posting "SHEET NO.___OF___SHEETS"

The sheet number to use for the "SHEET NO.____OF___SHEETS" shall be the same as the sheet it follows and the letters A, B, etc., added to the number. Total sheet number shall remain the same (Figure 4.1.2). When posting "As-Built" data, all supplementary sheets added to the set shall be recorded on the "INDEX TO DRAWINGS" which is located on the title sheet.

A revision data block will be inserted to the left of the title block. Alternate location shall be directly over the title block. Post the date and brief description of the revision (Figure 4.2).

4.4 Plan Sheet Numbers with "A"

The letter "A", with the plan sheet numbers shall be utilized when any sheet is inserted for PS&E review submittal only and is not part of the contract plans. (e.g., Drainage Map).

4.5 Worded Amendments

All worded amendments to the plans by issuance of addenda shall be posted on the affected design files immediately after bid opening. All the requirements for preparing addendum plans shall be followed.



Figure 4.1.1 Labels for File Copy of Revised Design Files

Chapter 4



Figure 4.1.2 Labels for File Copy of Revised Design Files



Figure 4.2 Revisions and Plan Sheet Numbers

5a MicroStation Computer-Aided Drafting Protocols

5.1 Standard MicroStation Drawing Levels

The Computer-Aided Drafting and Design (CADD) permits the separation of data by levels. Similar types of data should be drawn on the same level. To make effective use of the CADD capabilities to create specific drawings and have standardization and uniformity, the CADD drawings created shall follow the level schemes described in the following paragraphs. CADD users shall use the customized menus to place elements and text in their files to eliminate and/or reduce key-in errors.

5.2 Geographical Type of Drawings

Geographical types of drawings are those where the elements are drawn to their on-ground locations (x and y coordinates for 2-dimensional files and x, y, and z coordinates for 3-dimensional files). Geographical drawings can be drawn with actual or assumed coordinate values.

Examples of Geographical types of drawings include topographical survey maps; roadway base maps; roadway, utility, drainage, landscaping, irrigation, traffic signal, highway lighting, pavement marking and signing plans; right-of-way maps; easement maps. Geographical maps and plans are created by using the base design file as a reference file. The CADD user shall follow the level scheme as shown in Table 5a.1 when creating Geographical type of drawings.

5.3 Geographical Highway Maps

The Geographical Highway Maps are those that are created by using the digital United States Geological Survey maps as the base file. The CADD user shall follow the level scheme as shown in Table 5a.2 when creating Geographical Highway Maps.

5.4 Non-Geographical Type of Drawings

Non-geographical types of drawings are those where elements are not drawn to any specific on-ground location. Examples include typical sections; cross sections; profiles; detail type of drawings. The CADD user shall follow the level scheme as shown in Table 5a.3 to Table 5a.6 depending on the type of non-geographical drawing.

5.5 Drafting for MicroStation Contract Plans

The text and symbology (weight, linestyle, and color) requirements for CADD Contract Plan Sheets have been standardized to provide uniform CADD Contract Plan Drawings throughout the Division. See Table 5a.3 to Table 5a.6 for the element symbology and text parameters.

5.6 Drafting for other types of MicroStation drawings

Architectural type of drawings are those where elements are drawn to describe buildings, and other structures for industrial purposes. The CADD user shall follow the level scheme as shown in Table 5a.7 depending on the type of architectural drawing.

Each office has developed their own CADD Drafting Standards for other type of drawings because of the many different types of drawings created. The Lead Operator will be responsible to document the CADD Drafting Standards used by his office for these types of drawings and give this information to the CADD Manager.

Level	Description	WT	LC	со
1 Baseline	Baseline element & symbol	4	0	4 (yellow)
1 Baseline DC	Baseline element & symbol (Cadastral Section)	2	0	4 (yellow)
1 Baseline detail	Baseline for contract plans: detail type drawings	5	0	0 (white)
1 Cl Hwy	Center line for highway per Contract plans: plan type drawings	4	0	0 (white)
1 Cl hwy detail Center line for highway per contract plans: detail type 5 drawings		5	0	0 (white)
1 Typ sec exist	Existing typical sections	2	2	2 (green)
1 Typ sec new	New typical sections	4	0	0 (white)
2 Alt Baseline	Alternate baseline element & symbol	4	0	12 (It. Mustard)
2 Alt Baseline DC	(Cadastral Section)	2	0	12 (It. Mustard)
3 Text Survey	Text for survey work	4	0	0 (white)
3 Text exist	Text for existing features Height=5/32" font=HDOT Standard	2	0	0 (white)
3 Text new	Text for new work	4	0	0 (white)
	Structural: height=5/32" font= HDOT Standard			
	Others: height 3/16: font=HDOT Standard			
3 Text subtitle	Sub-Title Text	6	0	0 (white)
	Height = ¼" font = HDOT Standard			
3 Symb and note	Miscellaneous symbols and notes	cell	0	cell
3 Text main title	Main title text	8	0	0 (white)
	Height = 5/16" font = HDOT Standard			
3 Text FA block	Text in Federal Aid block	3	0	0 (white)
	Height =5/32" font = HDOT Standard			
3 Text TB main title	Text for title block main title (line 1)	10	0	0 (white)
	Height = $1/4$ " font = HDOT Standard			
3 Text TB limits	Text for title block limits (line 2)	6	0	0 (white)
	Height =3/16" font = HDOT Standard			
3 Text TB proj info	Text for title block project name and number (lines 3, 4, & 5)	6	0	0 (white)
	Height =3/16" font = HDOT Standard			
3 Text TB scale	Text for title block scale and date	3	0	0 (white)
date	Height =5/32" font = HDOT Standard			. ,
3 Text TB sht no	Text for title block sheet number	6	0	0 (white)
	Height =5/32" font = HDOT Standard			
3 Text sht no	Text for plan sheet number	0	0	0 (white)
	Height =" font = HDOT Standard			
3D_Reference	n/a	0	0	0 (white)
4 Hwy struct exist	Existing highway structures	2	2	19 (aqua)
5 Hwy struct new	New highway structures	4	0	19 (aqua)
6 EOP n Shdr exist	Existing Edge of pavement and shoulders	2	2	2 (green)
7 EOP n Shdr new	New Edge of pavement and shoulders	4	0	0 (white)
8 Curb_gut exist	Existing curb & gutter	2	2	2 (green)
9 Curb_gut new	New curb & gutter	4	0	0 (white)
8 Sidewalk exist	Existing sidewalk	2	2	2 (green)
9 Sidewalk new	- New sidewalk	4	0	0 (white)
10 ICS TDP id	ICS. TDP point I.D. numbers	0	0	0 (white)

 Table 5a.1
 MicroStation Drawing Layers for Geographical Drawings

Level	Description	WТ	LC	СО
11 Misc sym n annot	Miscellaneous symbols & annotation	0	0	0 (white)
12 Cut_Fill slopes	Cut and Fill slopes	2	0	8 (tan)
13 Topo grnd shot	Topographic ground shots	2	2	8 (tan)
14 Misc struct exist	Miscellaneous existing structures	2	2	9 (med. Green)
14 Misc struct new	Miscellaneous new structures	4	0	9 (med. Green)
15 Pavt recon limit	Pavement reconstruction limits	4	0	0 (white)
15 Pavt recon hatch	Pavement reconstruction hatching	1	0	0 (white)
15 Cold plan limit	Cold planning limits	4	0	0 (white)
15 Cold plan Xhatch	Cold planning cross-hatching	1	0	0 (white)
16 Constr parcel	Construction Parcel	6	6	6 (orange)
17 Access Ctrl	Access Control	6	use cell	1 (blue)
18 DC text	Cadastral section text	0	0	0 (white)
19 Easements exist	Existing easements	4	5	2 (green)
19 Easements	Easements for contract plans: plan type drawings	7	5	2 (green)
20 Chord Radius DC	n/a	2	2	2 (green)
20 Lead line DC	n/a	2	2	2 (green)
20 Land crt_ exist	Original land court, property lines, and subdivisions	2	0	2 (green)
20 Land crt final	Final land court, property lines, subdivisions, and remnants	2	0	2 (green)
21 Grants exist	Original grants, land commission awards and royal patents	2	6	3 (red)
21 Grants final	Final grants, land commission awards and royal patents	2	6	3 (red)
20 Prop line	Property lines for contract plans: plan type drawings	4	6	2 (green)
22 ROW exist	Existing right-of-way (contract plans)	4	6	1 (blue)
22 ROW DC	Existing right-of-way (cadastral section)	4	6	1 (blue)
23 Traverse	Traverse	0	2	0 (white)
24 ROW new	New right-of-way (contract plans)	4	6	1 (blue)
24 ROW gen	ROW for contract plans: plan type drawings	5	6	1 (blue)
24 ROW detail	ROW for contract plans: detail type drawings	5	0	0 (white)
24 ROW new DC	New right-of-way (cadastral section)	12	0	1 (blue)
24 Easements new	New Easements (cadastral section)	12	0	1 (blue)
25 Triang exist surf	Triangles for existing surface	1	0	3 (red)
25 Triang new surf	Triangles for new surfaces	2	0	6 (orange)
25 Brdr exist surf	Border for existing surface	1	0	4 (yellow)
25 Brdr new surf	Border for new surface	2	0	16 (very It. blue)
30 Cont maj exist	Major contours for existing surface	2	5	4 (yellow)
30 Cont maj new	Major contours for new surface	2	5	12 (It. mustard)
31Cont min exist	Minor contours for existing surface	0	5	3 (red)
31 Cont min new	Minor contours for new surfaces	0	5	13 (lime)
35 Text util sym	Text for utility symbols	0	0	0 (white)
36 Water exist	Existing water utilities	2	4	16 (verv lt. blue)
36 Water new	New water utilities	4	4	16 (verv lt. blue)
37 Electric exist	Existing electrical utilities	2	4	24 (orange)
37 Electric new	New electrical utilities	4	4	24 (orange)
38 Telephone exist	Existing telephone utilities	2	4	22 (lt. mustard)
38 Telephone new	New telephone utilities	4	4	22 (It. mustard)

Level	Description	WT	LC	СО
38 Sig corp exist	Existing signal corp utilities	2	4	20 (flesh)
38 Sig corp new	New signal corp utilities	4	4	20 (flesh)
39 Sewer exist	Existing sewer utilities	2	4	1 (blue)
39 Sewer new	New sewer utilities	4	4	1 (blue)
40 Gas exist	Existing gas utilities	2	4	8 (tan)
40 Gas new	New gas utilities	4	4	8 (tan)
40 Cable exist	Existing cable utilities	2	4	26 (dark pink)
40 Cable new	New cable utilities	4	4	26 (dark pink)
40 Fiberop exist	New fiber optic utilities	2	4	14 (hot pink)
40 Fiberop new	New fiber optic utilities	4	4	14 (hot pink)
40 Msc util A exist	Existing miscellaneous utility	2	4	15 (lt. purple)
40 Msc util A new	Existing miscellaneous utility	4	4	15 (lt. purple)
40 Msc util B exist	Existing miscellaneous utility	2	4	15 (lt. purple)
40 Msc util B new	Existing miscellaneous utility	4	4	15 (lt. purple)
41 Drain exist	Existing drain	2	2	13 (lt. lime)
42 Drain new	New drain	4	0	13 (lt. lime)
43 Sprinkler exist	Existing sprinkler system	2	2	16 (very It. blue)
43 Sprinkler new	New sprinkler system	4	2	16 (very It. blue)
44 Landscape exist	Existing landscaping	2	2	10 (chartreuse)
44 Landscape new	New landscaping	4	2	10 (chartreuse)
45 Fence exist	Existing fence	2	7	7 (gray)
45 Fence new	New fence	2	7	7 (gray)
46 Boundary pts	Boundary points	2	0	0 (white)
48 Grid minor	Minor grid lines	0	0	0 (white)
49 Grid major	Major grid lines	0	0	0 (white)
49 Topo H2O	Topographic water shots (streams lakes, ocean, etc.)	2	2	16 (very lt. blue)
·				
50 Users	User discretion	0	0	0 (white)
51 Pt elev	Point elevations	0	0	0 (white)
52 St plan grd	Cadastral State Plane Grids	0	0	6 (orange)
53 Geode grd	Geodetic grids	0	0	3 (red)
54 Grdrail exist	Existing guardrail	2	3	25 (lt. pink)
54 Grdrail new	New guardrail	4	0	25 (lt. pink)
55 Pvt mark exist	Existing pavement marking	2	0	4 (yellow)
55 Pvt makr new	New pavement marking	4	0	4 (yellow)
56 Traf sign exist	Existing traffic signs	2	0	0 (white)
56 Traf sign new	New traffic signs	4	0	0 (white)
57 Traf signal exist	Existing traffic signal	2	2	20 (flesh)
57 Traf signal new	New traffic signal	4	0	20 (flesh)
58 Hwy light exist	Existing highway lighting	2	2	3 (red)
58 Hwy light new	New highway lighting	4	0	3 (red)
59 Traf control	Traffic control	4	0	6 (orange)
60 Border sht	Border sheet (cell)	4	0	0 (white)
61 As-built post	As-built postings	4	0	29 (hot pink)
62 Half size label	Half-size label (cell)	0	0	0 (white)
62 Half size ticks	Ticks for half-size plans	0	0	9 (med green)
Point info	Point description Northing and Easting	2	0	3 (red)
	r on a doorphon, northing and Lability	-	-	S (100)

Level	Description	WT	LC	СО
GPS	Global positioning system	2	3	3 (red)
Railroad	Railroad	2	2	10 (chartreuse)
Mass transit	Mass Transit	2	2	11 (lt. pink)
Xsect grnd exist	Existing ground on cross sections	3	2	2 (green)
Xsect grnd new	New grade on cross sections	5	0	0 (white)
Elev pln grnd exist	Existing ground on profile or elevation plans	3	2	2 (green)
Elev pln grnd new	New grade on profile or elevation plans	5	0	0 (white)
Conc exist	Concrete – existing	2	1	0 (white)
Conc exist hid	Concrete – hidden existing	2	2	0 (white)
Conc new	Concrete – new	4	0	2 (green)
Conc new hid	Concrete – hidden new	4	2	2 (green)
Metal exist	Metal – existing	2	1	45 (It. purple)
Metal exist hid	Metal – hidden existing	2	2	45 (It. purple)
Metal new	Metal – new	4	0	17 (dark pink)
Metal new hid	Metal – hidden new	4	2	17 (dark pink)
Wood exist	Wood – existing	2	1	12 (It. mustard)
Wood exist hid	Wood – hidden existing	2	2	12 (It. mustard)
Wood new	Wood – new	4	0	6 (orange)
Wood new hid	Wood – hidden new	4	2	6 (orange)
Grade exist	Grade – existing	2	3	13 (It. lime)
Grade exist hid	Grade – hidden existing	2	2	13 (lt. lime)
Grade new	Grade – new	4	0	2 (green)
Grade new hid	Grade – hidden new	4	5	2 (green)
Reinforc exist	Reinforcina – existina	3	3	28 (agua)
Reinforc exist hid	Reinforcing – hidden existing	3	5	8 (aqua)
Reinforc new	Reinforcing – new	8	0	0 (white)
Reinforc new hid	Reinforcing – hidden new	8	5	4 (vellow)
PM.IF exist	Premolded joint filler – existing	2	1	7 (grav)
PM.IF exist hid	Premolded joint filler – bidden existing	2	2	7 (gray) 7 (gray)
PM.IF new	Premolded joint filler – new	4	0	11 (It pink)
PM IF new hid	Premolded joint filler – hidden new	4	2	11 (lt. pink)
Plas blk exist	Plastic block – existing	2	1	10 (chartreuse)
Plas blk exist hid	Plastic block – hidden existing	2	2	10 (chartreuse)
Plas blk new	Plastic block – new	4	0	15 (lt. purple)
Plas blk new bid	Plastic block – hidden new	-т Д	2	15 (lt. purple)
Saw cut	Saw cut - new	- -	2	2 (areen)
Saw cut hid	Saw cut - hidden new	2	2	2 (green)
		2	2	2 (green)
	Limits of removal – hew	4	0	9 (med. Green)
Space	Void groap	4	2	9 (med. Green)
Space	Volu aleas	2	1	O(white)
Space nid		2	2	
		8	0	4 (yellow)
		ð F	2	4 (yellow)
	Concrete joints	5	U	∠ (green)
	Dimension and leader lines	2	U	U (white)
Dim text		4	U	0 (white)
Break line	Break line	2	0	0 (white)

Level	Description	WT	LC	СО
Cl det 3/8	Centerline for detail 3/8" dash	2	4	0 (white)
Cl det 1	Centerline for detail 1" dash	2	4	0 (white)
Cl det 5	Centerline for detail 5" dash	2	4	5 (flesh)
CI det	Center line for detail	2	0	0 (white)
Section line	Section line	6	0	0 (white)
Section line	Section line dor contract plans: detail dtype drawings	5	0	0 (white)
Weld	Weld symbol	4	0	0 (white)
Pattern exist	Existing fill patterns	0	0	14 (hot pink)
Pattern new	New fill patterns	2	0	17 (dark pink)
Cloud	Cloud for changes	8	0	0 (white)
Match line	Match line	6	0	0 (white)
Drain stl cvr new	New steel drain cover	4	0	47 (lt. blue)
Drain stl cvr exist	Existing steel drain cover	4	0	47 (lt. blue)
Drain fill matl new	New drainage fill material	0	0	0 (white)
Drain fill matl exist	Existing drainage fill material	0	0	0 (white)
Jnt comp	Joint Compound	5	0	14 (hot pink)
AC new	New structural AC work	4	0	3 (red)
AC exist	Existing structural AC work	2	0	3 (red)
PVC new	New structural PVC work	4	0	15 (lt. purple)
PVC exist	Existing PVC work	2	0	15 (lt. purple)
Photogrammetry	Point Clouds, Lidar, etc	0	0	0 (white)

NOTE:

* Element is cell.

Color is the same as Type of Easement (i.e., Drain easement is same color as drain).

Level	Description
1	Interstate Road System
	CO=3, WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided highway by centerline or barrier, CPK=75' (Total width 150')
	B. Divided highway by median, CPK=60' (Median width 30")
	(Total width 150' trees & landscaping)
	C. Ramps CPK=20' (Total width 40')
	D. Interchanges between incoming & outgoing viaducts, CPK=15'
2	Interstate Road System Center line
	CO=3, WT=1, LC=7, created with auto chain.
3	FAP Highways/Freeways & Expressway
	CO=25(Color display same as CO=11), WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided highway by centerline or barrier, CPK=75' (Total width 150')
	B. Divided highway by median, CPK=60' (Median width 30') (Total width 150' trees & landscaping)
4	FAP Highways/Freeway & Expressway Center line
	CO=25 (Color display same as CO=1), WT=1, LC=7, created with auto chain.
5	FAS Highways/Principal Arterial
	CO=26 (Color display same as CO=17), WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided highway by Center line or barrier, CPK=75' (Total width 150')
	B. Divided highway by median, CPK=60' (Median width 30') (Total width 150' trees & landscaping)
6	FAS Highways/Principal Arterial Center line
	CO=26 (Color display same as CO=17), WT=1, LC=7, created with auto chain.
7	FASC Highways/Minor Arterial
	CO=0, WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided Highway by Center line or Barrier CPK=75' (Total width 150')
	B. Divided Highway by Median, CPK=60' (Median width 30') (Total width 150' trees & landscaping)
8	FASC/Minor Arterial Center line
	CO=0, WT=1, LC=7, created with auto chain.
9	FAU Highways/Major Collector
	CO=19 (Color display same as CO=28), WT=1, LC=7, CPK=20' (Total width 40')
10	FAU Highways/Major Collector
	CO=19 (Color display same as CO=28), WT=1, LC=7, created with auto chain.
11	Minor Collector
	CO=15, WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided Highway by Center line or Barrier, CPK=75' (Total width 150')
	B. Divided Highway by Median, CPK=60' (Median width 30')
12	Minor Collector Center line
	CO=15, WT=1, LC=7, create with auto chain.
13	State Highway System Text
	TH=150', TW=150', LS=75', FT=29, WT=0, CO=3(Lv=1), 25(Lv=3), 26(Lv=5), 0(Lv=7), 19(Lv=9), 15(Lv=11)
14	County Road System
	CO=4, WT=0, LC=0, CPK=20' (Total width 40'), dirt road/primitive (LC=2)
15	Text County Road System
-	TH=100', TW=100', LS=50', FT=29, CO=4, WT=0
16	County Road System Center line
-	WT=0, LC=0, CO=4, Primitive (LC=2) created with auto chain.

 Table 5a.2
 MicroStation Drawing Levels for General Highway Mapping/Specs

Level	Description
17	Proposed State Highways
	CO=25, WT=1, CPK=30' (Total width 60'), LC=1
	A. Divided Highway by Center line or Barrier, CPK=75' (Total width 150')
	B. Divided Highway by Median, CPK=60' (Median width 30')
18	Text Proposed State Highways
	TH=150', TW=150', LS=75', FT=29, CO=25 (Color display same as CO=11), WT=0
19	Revised road updated (All new road elements) placed according to respective colors.
	CO=3, 25, 26, 0, 19, 15, 4
20	Shoreline
	CO=1, WT=1, LC=0
21	Text Shoreline
	CO=1, WT=0, FT=45
	Bays TH=250', TW=250', LS=300'
	Ocean TH=600', TW=600', LS=300'
22	Streams
	CO=1, WT=0, LC=0, (Intermittent streams CO=18, WT=0, LC=2)
	Flume bracket (As line terminator)30'@ 45 degrees
	Water tunnel bracket (As line terminator)30'@ 45 degrees
23	Text Streams
	TH=125', TW=125', LS=100', FT=45, CO=1, WT=0, char. Spacing=50' upper & lower case.
24	Lakes/Ponds (Shape)
	CO=1, WT=0, LC=0
25	Text Lakes
	TH=150', TW=150', LS=75', FT=45, CO=1, WT=0
26	Bridges/Overpass/Underpass using appropriate cells
27	Vacant
28	Vacant
29	Text Cities/Towns
	TH=200', TW=200', LS=100', FT=29, CO=0, WT=0
	Cities= Upper case, Towns=Lower case.
30	Text Cultural Features
	TH=125', TW=125', LS=50', FT=29, CO=0, WT=0
	Upper & Lower case.
31	Vacant
32	Partial adjusted & urbanized area boundary
	CO=10, WT=3, LC=5 (Adjusted), LC=6(Urbanized) CPK=100' from any other boundary or line.
33	Census Urban Boundary
	CO=10, WT=3, LC=4, CPK=100' from any other boundary or line.
34	Adjusted & Urbanized Area Boundary
05	CO=29 (Adjusted boundary), LC=6(Urbanized area boundary), CPK=100' from any other boundary or line.
35	Text Census Boundary
	TH=200', TW=200', LS=100', FT=29, CO=29 (Color display same as CO=14), WT=0.
36	District Boundary
07	CO=6 (Color display same as CO=24), W1=3, LC=3.
31	Lext District Boundary Line
	H=200, $H=200$, $H=200$, $H=200$, $H=29$, $CO=6$, $WI=0$, $Char. Spacing=50$, $District area (1H=250', 1W=750', LS=200', FT=29, CO=6, WT=0)$

Level	Description
38	Forest Boundary
	CO=2, WT=0, LC=0.
39	Text Forest Boundary
	TH=200', TW=250', LS=100', FT=29, CO=2, WT=0.
40	Forest Shape
	CO=6, WT=0, LC=0, AP=DOT3, PD-50', 50'.
41	Military Boundary
	CO=8, WT=0, LC=0.
42	Text Military Boundary
	TH=200', TW=250', LS=100', FT=29, CO=8, WT=0 or
	TH=100', TW=100', LS=50', FT=29, CO=8, WT=0.
43	Military Shape
	CO=6, WT=0, LC=0, AP=DOT2, PD=100', 100'.
44	Grid Ticks (Sheet Border/Frame)
	CO=0, WT=0, LC=0.
45	Coordinate Grid Text
	TH=150', TW=150', LS=75', FT=1, CO=0, WT=0
	Sheet Title
	TH=1000', TW=1000', LS=500', FT=43, CO=0, WT=0.
46	1:1000 Scale Grid
	CO=, WT=
47	1:2000 Scale Grid
	CO=, WT=
48	1:3000 Scale Grid
	CO=, WT=
49	Contours
	CO=23 (Color display same as CO=1) WT=0
50	User Level
	All elements user does not want plotted out complete path/file name lower right of plot sheet FT=0, CO=3, WT=1, TX=400' (2000 scale)
51	Control Points for digitizing
	CO=20, WT=10
52	Landing strip/airport & perimeter
	CO=27 (Color display same as CO=18), WT=0
53	Vacant
54	Railroad
	CO=20, WT=0
55	Urban map/functional classification map text
56	Vacant
57	Vacant
58	Vacant
59	Vacant
60	Border cell
61	Vacant
62	Vacant
63	Do not use

Description	Weight	Color	Level	Height	Font
Existing Features	2 *	0	3 **	3/16" ***	27
Planned Construction Features (New Work)	4	0	3 **	3/16" ***	27
Sub-Titles	6	0	3 **	1⁄4"	27
Main Titles	8	0	3 **	5/16"	27
F.A. Block	3	0	3 **	5/32"	27
Title Block					
Main Title (Line 1)	10	0	3 **	1⁄4"	27
Limits (Line 2)	6	0	3 **	3/16"	27
Project Name & No.	6	0	3 **	3/16"	27
Scale/Date	3	0	3 **	5/32"	27
Sheet No.	6	0	3 **	3/8"	27
Plan Sheet No.	0	0	3 **	3/8"	27

MicroStation Text Weights, Color, Level, Height and Font for Contract Plans Table 5a.3

NOTE:

Text weight for existing features may be same as new work. Levels 1 and 2 may also be used for Text **as determined by each Section.** HWY-DB and HWY-DH Text Height = 5/32". * **

Description	Weight	Linestyle	Color	Level
Existing Features	2 ***	2 *	****	****
Planned Construction Features (New work)	4	0	****	****
Existing Utilities	2	4 *	****	****
New Utilities	4	4 *	****	****
Contours				
Existing (Minor/Major)	0/2	5	****	****
New	4	0	****	****
Right of Way Line	5	6 *	****	****
Property Line	4	6 *	****	****
Easements	7	5	****	****
Baseline or Station Line of Highway	5	0	****	****
Centerline for Highway	5	0	****	****
Dimension Line	1	0	0	3
Break Line	1	0	0	3
Section Line **	6	0	0	3
Match Line **	6	0	0	3

Table 5a.4 MicroStation Line Weight, Linestyle, Color and Levels for Contract Plans Plan Type Drawings

NOTE:

* Linestyle Modified with Pentable. Element is a cell.

Existing Features for Structural Plans are Weight = 0.

**** The Symbology and Level for Plan Drawings will follow the Highways Division CADD Drawing Levels for Geographical Drawings.

Description	Weight	Linestyle	Color	Level
Existing Features	2	2 *	2	1
Planned Construction Features (New work)	4	0	0	2
Existing Utilities	2	4 *	2	1
New Utilities	4	4 *	0	2
Right of Way Line **	5	0	0	2
Baseline or Station Line of Highway **	5	0	0	2
Centerline for Highway **	5	0	0	2
Dimension and Leader Lines	1	0	0	3
Break Line	1	0	0	3
Centerline for Detail **	1	0	0	3
Section Line **	6	0	0	3
Cross Section Plans				
Existing Ground	3	2 *	2	1
New Grade	5	0	0	2
Profile and/or Elevation Plans				
Existing Ground	3	2 *	2	1
New Grade	5	0	0	2

Table 5a.5 MicroStation Line Weights, Linestyle, Color and Levels for Contract Plans Detail Type of Drawings

NOTE:

Linestyle Modified with Pentable. Element is a cell.

**

Description	Weight	Linestyle	Color	Level
Concrete				
Existing	0	0	30	40
Hidden	4	2	2	22
New	4	0	2	21
Metal				
Existing	0	3	17	40
Hidden	4	2	17	24
New	4	0	17	23
Wood				
Existing	0	0	12	40
Hidden	4	2	6	28
New	4	0	6	27
Grade				
Existing	0	3	13	40
Hidden	2	2	2	30
New	2	0	2	29
Reinforcing				
Existing	3	3	49	40
Hidden	8	5	4	26
New	8	0	4	25
Concrete Joints	5	0	14	33
Dimension and Leader Lines	1	0	0	3
Break Lines	1	0	0	3
Centerline for Detail				
3/8" Long Dash	1	4 *	51	3
1" Long Dash	1	4 *	0	3
5" Long Dash	1	4 *	50	3
Section Line **	6	0	0	3

MicroStation Line Weight, Linestyle, Color and Levels for Contract Plans Structural Type of Table 5a.6 Drawings

NOTE:

Linestyle Modified with Pentable. Element is a cell.

**

5.7 Highways Font Library

The Engineering CADD Office has developed a standard Highways Font Library. The CADD System Engineer will maintain and revise the Highway Font Library. The Lead Operator shall request to the CADD System Engineer for any revisions or additions to the Highways Font Library. The CADD System Engineer may assign the revisions to the Lead Operator if the font is unique to the Lead Operator's office. See Table 5a.8 for the CADD Fonts Library and Figure 5a.1 to Figure 5a.4 for the display of the Highways Font Library.

The Highways Font Library contains special characters, as the baseline, centerline, plus/minus etc. characters that uses certain keys to input. The keys that were used to input these special characters will be displayed on the CADD monitor however when the file is plotted the special characters will be plotted. See Figure 5a.5 for the Modified Character Keys display.

5.8 Highways Color Table

The Engineering CADD Office has developed a standard Highways Color Table. The CADD System Engineer will maintain and revise the Highways Color Table. The lead Operator shall request to the CADD System Engineer for any revisions or additions to the Highways Color Table. See Table 5a.9 for the Highways Division Color Table.

5.9 Highways Pen Tables

Pen Tables are used to selectively modify elements during the plotting process from how they were created in the design file. An example of the element weights is shown in Figure 5a.6. The Pen Table enables the user to change the symbology of the element in the hardcopy plot. Lines can be modified to plot to any user defined linestyle or weight, however the symbology as seen on the CADD monitor is not changed. An example of the Pen Table for the Highway Design Section is shown in Listing 5a.1 for the IPS plotting and Figure 5a.7 for the Linestyles printed display.

Pen Tables are also used to assign pens in a Pen Plotter to a set of CADD criteria. Each element is plotted by a pen based on the CADD criteria.

Pen tables are also used to modify element weights during the plotting process to match the size of the plotting medium. Various sizes of plotting mediums are used such as $8\frac{1}{2} \times 11^{\circ}$, $11^{\circ} \times 17^{\circ}$, and $36^{\circ} \times 22^{\circ}$. An example of the Pen Tables used by the Highway Design Section and the other sections of the Design Branch are shown in Listing 5a.2, Listing 5a.3, and Listing 5a.4 for plotting.

The Lead Operator may create customized Pen Tables for his office. They may modify the CADD files to meet the office criteria. All Pen Tables shall then be reviewed and approved by the CADD Office. The Lead Operator shall be responsible for maintaining his office's customized Pen Tables and shall inform the CADD Office of any revisions. An example of a customized Pen Table for the Bridge Design Section is shown in Listing 5a.5 for plotting and Figure 5a.8 for the Linestyles printed display.

Description	Weight	Linestyle	Color	Level
General	_	-		
Dimension & Leader Lines	2	0	0	5
Section Line**	2			3
Site Plan				
Contours				
Existing (Minor/Major)	2	0	16	31
New	4	0	3	30
Drainage Line				
Existing	2	2	13	41
Hidden	2	1	13	42
New	4	2	13	42
Easements	4	5	1	24
Existing Features	2	2	22	1
Landscaping				
Existing	2		10	44
New	4		10	44
Planned Construction Features (New work)	4	0	0	2
Property Line	2	6	2	21
R/W Line	4	6	1	22
Structural				
Composition Material (Roofing)				
Existing	2	2	8	18
Hidden	2	1	8	18
New	4	0	8	19
Concrete				
Existing	2	2	14	4
Hidden	2	1	14	5
New	4	0	14	5
Concrete Masonry Unit				
Existing	2	2	14	6
Hidden	2	1	14	7
New	4	0	14	7
Glass				
Existing	2	2	0	8
Hidden	2	1	0	9
New	4	0	0	9
Metal				
Existing	2	2	7	10
Hidden	2	1	7	11
New	4	0	7	11
Reinforcing				
Existing	2	2	4	12
Hidden	2	1	4	13
New	4	0	4	13

Table 5a.7MicroStation Line Weight, Linestyle, Color, and Levels for Contract Plans Architectural Type
Drawings

Descript	ion	Weight	Linestyle	Color	Level
Wood					
	Existing	2	2	12	14
	Hidden	2	1	12	15
	New	4	0	12	15
Exterior	Elevation				
Composit	tion Material (Roofing)				
	Existing	2	2	8	18
	Hidden	2	1	8	18
	New	4	0	8	19
Concrete					
	Existing	2	2	14	4
	Hidden	2	1	14	5
	New	4	0	14	5
Concrete	Masonry Unit				
	Existing	2	2	14	6
	Hidden	2	1	14	7
	New	4	0	14	7
Glass					
	Existing	2	2	0	8
	Hidden	2	1	0	9
	New	4	0	0	9
Metal					
	Existing	2	2	7	10
	Hidden	2	1	7	11
	New	4	0	7	11
Wood					
	Existing	2	2	12	14
	Hidden	2	1	12	15
	New	4	0	12	15
Interior E	Elevation				
Concrete					
	Existing	2	2	14	4
	Hidden	2	1	14	5
	New	4	0	14	5
Concrete	Masonry Unit				
	Existing	2	2	14	6
	Hidden	2	1	14	7
	New	4	0	14	7
Fixtures (Water Closet, lavatory, shower)				
	Existing	2	4	16	36
	Hidden	2	4	16	36
	New	4	4	16	36
Floor Tile					
	Existing	2	2	13	16
	Hidden	2	1	13	17
	New	4	0	13	17

Description		Weight	Linestyle	Color	Level
Glass					
Exis	sting	2	2	0	8
Hide	den	2	1	0	9
Nev	N	4	0	0	9
Metal					
Exis	sting	2	2	7	10
Hide	den	2	1	7	11
Nev	N	4	0	7	11
Wood					
Exis	sting	2	2	12	14
Hide	den	2	1	12	15
Nev	Ν	4	0	12	15
Utilities					
Electrical					
Exis	sting	2	4	24	37
Hide	den	2	4	24	37
Nev	N	4	4	24	37
Fire Alarm Sys	stem				
Stand Pipes					
Exis	sting	2	2	16	43
Hide	den	2	2	16	43
Nev	Ν	4	2	16	43
Sprinkler Syst	tem				
Exis	sting	2	2	16	43
Hide	den	2	2	16	43
Nev	N	4	2	16	43
Fire Alarm (El	lectrical)				
Exis	sting	2	4	4	37
Hide	den	2	4	4	37
Nev	N	4	4	4	37
Gas					
Exis	sting	2	4	8	40
Hide	den	2	4	8	40
Nev	N	4	4	8	40
Heating					
Exis	sting	2	4	25	47
Hide	den	2	4	25	47
Nev	Ν	4	4	25	47
Lighting					
Exis	sting	2	4	21	48
Hide	den	2	4	21	48
Nev	N	4	4	21	48
Network Data	Communication System				
Exis	sting	2	4	15	49
Hide	den	2	4	15	49
Nev	N	4	4	15	49

Description	Weight	Linestyle	Color	Level
Sewer				
Existing	2	4	23	39
Hidden	2	4	23	39
New	4	4	23	39
Telephone				
Existing	2	4	22	38
Hidden	2	4	22	38
New	4	4	22	38
Ventilation				
Existing	2	2	7	35
Hidden	2	2	7	35
New	4	2	7	35
Water				
Existing	2	4	16	36
Hidden	2	4	16	36
New	4	4	16	36

Highways Division MicroStation Fonts Table 5a.8

Revision Date: 20-Mar-1995 All character fonts are stick fonts unless TYPE is **designated as BIT.** BIT fonts are low-resolution bit stream fonts (filled fonts).

Number	Туре	Name	Description
1		MOD_ WORKING	(modified) USTN WORKING
2		AS_ BUILT	(modified) FANCY FONT
5	BIT	SCRIPT	Ribbon 131
7		font007	INTERGRAPH_FONT_7
8		SCRIPT2	(modified) Lowercase script
23		MODFONT23	Superceded w/27, used on old drawings
24		MOD23WIDE	Superceded w/27, used on old drawings
25		MOD23NARW	Superceded w/27, used on old drawings
27		HDOT_STANDARD	(modified) ITALICS – HWY-D Standard
29	BIT	SWISS_722_L_L	(modified) HWY-D Leroy Std, Light
30	BIT	SWISS_722_L	(modified) HWY-D Leroy Std
31	BIT	SWISS_722_B_L	(modified) HWY-D Leroy Std, Bold
42		OUTLINE	(modified)
45	BIT	ALDINE 401_I_L	
90	SYMB	ICS_MODSURSYM	(modified) Cogo points
127		font127	fast font
Total Characte Total Symbol f	er Fonts: 15 fonts: 1		

Total Symbol fonts:



Figure 5a.1 Highways Font Library

23	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijkImnopqrstuvwxyz I234567890±~!@#\$%?&*()-= _+[]{}:''<>,./?
	1/2 1/4 3/4 1/8 3/8 5/8 7/8 1/16 3/16 5/16 7/16 9/16 11/16 13/16 15/16
24	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890±ø!@#\$%°&*()-= _+[]&&:'"\$,<>,./? ½ ¹ /4 ³ /4 ¹ /8 ³ /8 ⁵ /8 ⁷ /16 ³ /16 ⁵ /16 ⁷ /16 ⁹ /16 ¹¹ /16 ¹³ /16 ¹⁵ /16
25	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijkImnopqrstuvwxyz 1234567890±ø!@#\$%°\$*()-= _+[]&@:'''\$,<>,./? ½¼341/83/85/87/81/163/165/16 7/169/1611/1618/1615/16
27	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijkImnopqrstuvwxyz 1234567890±ø!@#\$%°¢*()-= _+EJ&&:'''\$,<>,./? ½¼341/83/85/87/81/163/165/16 7/169/16 ¹¹ /16 ¹³ /16 ¹⁵ /16
29	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890±~'!@#\$%°&*()-= _+[]₺₵:'''\$,<>,./? ******
	HIGHWAYS FONT LIBRARY
	Figure 592

Figure 5a.2 Highways Font Library



Figure 5a.3 Highways Font Library



Figure 5a.4 Highways Font Library



Figure 5a.5 Modified Character Keys

Number	Color	Red	Green	Blue
0	white	205	205	205
1	blue	20	150	255
2	green	0	255	0
3	red	255	0	0
4	yellow	255	255	0
5	flesh	235	185	185
6	orange	255	110	50
7	gray	150	150	150
8	tan	185	135	85
9	medium green	85	185	85
10	chartreuse	185	255	85
11	light pink	255	155	185
12	light mustard	255	200	100
13	light yellow	235	255	145
14 *	hot pink	255	35	185
15	light purple	175	175	255
16	very light blue	180	255	255
17	dark pink	205	50	150
18	very light pink	255	215	255
19	aqua	0	245	170
20	flesh	235	185	185
21	white	205	205	205
22	light mustard	255	200	100
23	blue	20	150	255
24	orange	255	110	50
25	light pink	255	155	185
26	dark pink	205	50	150
27	very light pink	255	215	255
28	aqua	0	245	170
29 *	hot pink	255	35	185
Highlight	bright white	255	255	255

Table 5a.9 **Highways Division Color Table**

For Contract Plan Drawings, DO NOT use colors 14 and 29. These colors will be reserved for posting as-built drawings. The following color pairs are the same colors:
 0 & 21 – white

1 & 23 - blue

5 & 20 - flesh

6 & 24 – orange 11 & 25 – light pink

14 & 29 – hot pink 17 & 26 – dark pink 18 & 27 – very light pink 19 & 28 – aqua





Listing 5a.1 Highway Design Section Linestyle Table

```
! "ddstyle.tbl" r05/11/94
1
  THIS TABLE IS LINESTYLE TABLE FOR IPS PLOTTING
1
  TO CHANGE THE EXIST. EP/CURB/GUTTER/SIDEWALK, UTILITIES AND R/W
1
! LINESTYLES FOR HWY-DD BASE PLANS.
  Revised 11/29/91
1
1
! LINESTYLES 0, 2, 3, 4, AND 6 HAS BEEN ALTERED
!IF (LNAME .NE. 'IRAS*') THEN
                                 !Use styles if not raster(Type 87/88)elements
IF (TYPE .NI. 7,17) THEN
                                  !Use styles if not text-nodes or text
 IF (STYLE .EQ. 0) THEN
   IF (COLOR .EQ. 33) THEN
     STYLE = (1.0, 0.09375)
                                  ! NEW CUT AND FILL
   ELSE
     STYLE = 0
                                   ! DEFAULT LINESTYLE LC=0
   ENDIF
 ELSE IF (STYLE .EQ. 1) THEN
   STYLE = (.03125, .03125)
                                   ! DEFAULT LINESTYLE LC=1
1
1
!
  LINESTYLE FOR EXISTING EP/CURB/GUTTER/SIDEWALK
1
  ELSE IF (STYLE .EQ. 2) THEN
   IF (COLOR .EQ. 2) THEN
     STYLE = (0.175, 0.075)
                                   ! EXIST. EP/CURB/GUTTER/SIDEWALK
   ELSE IF (COLOR .EQ. 19) THEN
     STYLE = (0.175, 0.075)
                                  ! BRIDGES
   ELSE
     STYLE = (.0625, .0625)
                                  ! DEFAULT LINESTYLE LC=2
   ENDIF
!
!
 ELSE IF (STYLE .EQ. 3) THEN
   IF (COLOR .EQ. 32) THEN
                                  ! SUPERELEVATION
     STYLE = (0.5, 0.09375)
   ELSE
     STYLE = (.125, .125)
                                  ! DEFAULT LINESTYLE LC=3
   ENDIF
!
1
  LINESTYLE FOR UTILITIES (WATER, SEWER, ELECTRIC, TELEPHONE, DRAIN, GAS AND MISC.)
1
  ELSE IF (STYLE .EQ. 4) THEN
   IF (COLOR .EQ. 16) THEN
     STYLE = (0.25, 0.10)
                                   ! WATER LINE LINESTYLE
   ELSE IF (COLOR .EQ. 23) THEN
     STYLE = (1.0, 0.15)
                                   ! SEWER LINE LINESTYLE
   ELSE IF (COLOR .EQ. 24) THEN
     STYLE = (1.0, 0.15)
                                   ! ELECTRIC LINE LINESTYLE
   ELSE IF (COLOR .EQ. 22) THEN
     STYLE = (1.0, 0.15)
                                   ! TELEPHONE LINE LINESTYLE
   ELSE IF (COLOR .EQ. 13) THEN
                                  ! DRAIN LINE LINESTYLE
     STYLE = (1.0, 0.15)
   ELSE IF (COLOR .EQ. 8) THEN
     STYLE = (1.0, 0.15)
                                 ! GAS LINE LINESTYLE
   ELSE IF (COLOR .EQ. 15) THEN
     STYLE = (1.0, 0.15)
                                   ! MISC. UTIL. LINE LINESTYLE
   ELSE
     STYLE = (.1, .0625, .03125, .0625) ! DEFAULT LINESTYLE LC=4
   ENDIF
!
!
 ELSE IF (STYLE .EQ. 5) THEN
   STYLE = (.375, .0625)
                                  ! DEFAULT LINESTYLE LC=5
I.
!
1
```

```
! LINESTYLE FOR R/W
1
 ELSE IF (STYLE .EQ. 6) THEN
    IF (COLOR .EQ. 1) THEN
   STYLE = (2.5, .1, .2, .1, .2, .1) ! RW LINE LINESTYLE
ELSE IF (COLOR .EQ. 6) THEN
     STYLE = (1, .125)
                                                      ! CONSTRUCTION PARCEL
    ELSE
     STYLE = (.125, .062, .03, .062, .03, .062) ! DEFAULT LINESTYLE LC=6
    ENDIF
!
!
 ELSE IF (STYLE .EQ. 7) THEN
   STYLE = (.125, .045, .062, .045) ! DEFAULT LINESTYLE LC=7
 ENDIF
ENDIF
!ENDIF
```

CO-33 olid otted .03125", .03125" xist. EP, curb, gutter, sidewalk and bridges .175", .075" CO-2, 19 edium dashed .0625", .0625" uperelevation .5", .09375" CO-32 .0625", .0625" ing dashed .125", .125" ater line .25", .10" CO-16 .25", .00" swer, electric, telephone, drain, gas, misc. utility line 1", .15" CO-23, 24, 22, 13, 8, 15 ash-dot .1", .0625", .03125", .0625" tert dashed .375", .0625" ingt dashed .375", .0625" ingt dashed .1", .125" CO-23, 24, 22, 13, 8, 15 .375", .0625" ingt dashed .375", .0625", .03125", .0625" ingt dashed .375", .0625" ingt dashed .375", .0625" ingt of way line .25", .1", .2", .1", .2", .1" CO-1 .1", .125" instruction Parcel .1", .125" CO-6 .125", .062", .03", .062", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .03", .052", .0	0	New cut and fill	1", .09375"
olid 03125", 03125" otted 03125", 03125" xist. EP, curb, gutter, sidewalk and bridges 175", 075" CO-2, 19 0625", 0625" edium dashed 0625", 0625" uperelevation 5", 09375" CO-32 09375" ing dashed 125", 125" ater line 25", 10" CO-16 25", 10" swer, electric, telephone, drain, gas, misc. utility line 1", 15" CO-23, 24, 22, 13, 8, 15 1", 0625", 03125", 0625" ash-dot 1", 0625", 03125", 0625" hort dashed 375", 0625" upstruction Parcel 1", 125" CO-6 125", 062", 03", 062", 03", 052", 03", .	0	CO-33	
otted 03125", 03125" xist. EP, curb, gutter, sidewalk and bridges 175", 075" CO-2, 19 0625", 0625" edium dashed 0625", 09375" c0-32 1000000000000000000000000000000000000	0	Solid	
widd will bridges J75", J075" CO-2, 19		Datted	03135" 03135"
xist. EP, curb, gutter, sidewalk and bridges J75", .075" CO-2, 19 .0625", .0625" edium dashed .0625", .0625" uperelevation .5", .09375" CO-32 .09375" ing dashed .125", .125" ater line .25", .10" CO-16 .0625", .03125", .0625" awer, electric, telephone, drain, gas, misc. utility line 1", .0525", .03125", .0625" hort dashed .375", .0625" ght of way line .25", .1", .2", .1", .2", .1" CO-1 .0625" unstruction Parcel 1", .125" CO-6 .125", .062", .03", .062", .03",	1	DUITED	.03125 , 103125
edium dashed .0625", .0625" uperelevation .5", .09375" CO-32 .09375" ong dashed .125", .125" ater line .25", .00" CO-16 .25", .00" ewer, electric, telephone, drain, gas, misc. utility line 1", .15" CO-23, 24, 22, 13, 8, 15 ash-dot	2	Exist. EP, curb, gutter, sidewalk and bridges	J75", .075"
uperelevation .5", .09375" CO-32 .125", .125" ater line .25", .10" CO-16	2	Medium dashed	.0625", .0625"
ang dashed 125", 125" ater line 25", 10" CO-16	3	Superelevation	.5", .09375"
ater line 25", J0" C0-16	3	Long dashed	J25", J25"
ewer, electric, telephone, drain, gas, misc. utility line 1", J5" C0+23, 24, 22, 13, 8, 15 ash-dot J", D625", D3125", D625" hort dashed .375", D625" 'ght of way line 2.5", J", 2", J", 2", J" C0+1	4	Water line	.25", 10"
ash-dot J", .0625", .03125", .0625" 'rort dashed .375", .0625" 'ght of way line 2.5", .J", .2", .J", .2", .J" CO-1	4	Sewer, electric, telephone, drain, gas, misc. utility line CO=23, 24, 22, 13, 8, 15	1", .15"
hort dashed .375", .0625" 'ght of way line 2.5", .1", .2", .1", .2", .1" CO-I	4	Dash-dot	J", .0625", .03125", .0625"
ight of way line 2.5", J", 2", J", 2", J" CO-I Instruction Parcel 1", J25" CO-6 Ish-dol-dot J25", .062", .03", .062", .03", .	5	Short dashed	.375", .0625"
onstruction Parcel	6	Right of way line	2.5", .1", .2", .1", .2", .1"
ash-dot-dot	6	Construction Parcel	1", J25"
	6	Dash-dot-dot	.125", .062", .03", .062", .03", .062"
ng dashed-short dashed J25", .045", .062", .045"	7	Long dashed-short dashed	125", .045", .062", .045"
	1		
LINESTYLES		LINESTYLES	
HWAY DESIGN SECTION – ddstyle.	H	IGHWAY DESIGN SECTIO	N – ddstyle.tb

Figure 5a.7 Linestyles Highway Design Section

Listing 5a.2 Highway Design Section 8 ¹/₂ × 11 Pen Table

```
!"dd811.tbl" r 05/11/94
1
! Design section pen table for plotting 8.5×11 plan
! sheets. Values cut to factor of 10.75/35.0=.30714
1
!IF (LNAME .NE.'IRAS*') THEN
IF (TYPE .NI. 7,17) THEN
 IF (STYLE .EQ. 0) THEN
   IF (COLOR .EQ. 33) THEN
      STYLE = (0.307143, 0.028795)
   ELSE
     STYLE = 0
   ENDIF
 ELSE IF (STYLE .EQ. 1) THEN
   STYLE = (0.00960, 0.00960)
  ELSE IF (STYLE .EQ. 2) THEN
   IF (COLOR .EQ. 2) THEN
     STYLE = (0.05375, 0.02304)
   ELSE IF (COLOR .EQ. 19) THEN
     STYLE = (0.05375, 0.023036)
   ELSE
     STYLE = (0.01920, 0.01920)
   ENDIF
  ELSE IF (STYLE .EQ. 3) THEN
    IF (COLOR .EQ. 32) THEN
     STYLE = (0.153571, 0.028795)
   ELSE
     STYLE = (0.03839, 0.03839)
   ENDIF
  ELSE IF (STYLE .EQ. 4) THEN
   IF (COLOR .EQ. 16) THEN
     STYLE = (0.07679, 0.03071)
   ELSE IF (COLOR .EQ. 23) THEN
     STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 24) THEN
     STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 22) THEN
     STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 13) THEN
     STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 8) THEN
     STYLE = (0.30714, 0.04607)
ELSE IF (COLOR .EQ. 15) THEN
     STYLE = (0.30714, 0.04607)
   ELSE
     STYLE = (0.03071, 0.01920, 0.00960, 0.01920)
   ENDIF
  ELSE IF (STYLE .EQ. 5) THEN
   STYLE = (0.11518, 0.01920)
  ELSE IF (STYLE .EQ. 6) THEN
   IF (COLOR .EQ. 1) THEN
     STYLE = (0.76786, 0.03071, 0.06143, 0.03071, 0.06143, 0.03071)
   ELSE IF (COLOR .EQ. 6) THEN
     STYLE = (.307143, .03839)
   ELSE
     STYLE = (0.03839, 0.01904, 0.00921, 0.01904, 0.00921, 0.01904)
   ENDIF
  ELSE IF (STYLE .EQ. 7) THEN
   STYLE = (0.03839, 0.01382, 0.01904, 0.01382)
 ENDIF
ENDIF
!
!Weights are approximate
1
IF (WEIGHT .LE. 2) THEN
 THICKNESS = .00250
ELSE IF (WEIGHT .LE. 5) THEN
 THICKNESS = .00500
ELSE IF (WEIGHT .LE. 8) THEN
```

THICKNESS = .00750ELSE IF (WEIGHT .LE. 12) THEN THICKNESS = .01000 ELSE IF (WEIGHT .LE. 15) THEN THICKNESS = .01250ELSE IF (WEIGHT .LE. 18) THEN THICKNESS = .01500 ELSE IF (WEIGHT .LE. 21) THEN THICKNESS = .01750 ELSE IF (WEIGHT .LE. 25) THEN THICKNESS = .02000 ELSE IF (WEIGHT .LE. 28) THEN THICKNESS = .02250 ELSE THICKNESS = .02500 ENDIF !ENDIF

Listing 5a.3 Highway Design Half Size Pen Table

```
!"halfdd.tbl" r 05/11/94
1
  Pentable for Half size plots.
1
  Half-size line styles not exactly half the width of the full-size plots
1
!IF (LNAME .NE. `IRAS*') THEN
                                   !Use table if not raster(Type 87/88)elements
IF (TYPE .NI. 7,17) THEN
                                    !Use styles if not text-nodes or text
 IF (STYLE .EO. 0) THEN
   IF (COLOR .EQ. 33) THEN
     STYLE = (0.5, 0.046875)
                                    ! NEW CUT AND FILL
   ELSE
     STYLE = 0
                                    ! DEFAULT LINESTYLE LC=0
   ENDIF
  ELSE IF (STYLE .EQ. 1) THEN
   STYLE = (.015625, .015625)
                                    ! DEFAULT LINESTYLE LC=1!
 ELSE IF (STYLE .EQ. 2) THEN
   IF (COLOR .EQ. 2) THEN
     STYLE = (0.0875, 0.0375)
                                    ! EXIST. EP/CURB/GUTTER/SIDEWALK
   ELSE IF (COLOR .EQ. 19) THEN
     STYLE = (0.0875, 0.0375)
                                    ! BRIDGES
   ELSE
     STYLE = (.03125, .03125)
                                    ! DEFAULT LINESTYLE LC=2
   ENDIF
  ELSE IF (STYLE .EQ. 3) THEN
   IF (COLOR .EQ. 32) THEN
     STYLE = (0.25, 0.046875)
                                    ! SUPERELEVATION
   ELSE
     STYLE = (.0625, .0625)
                                    ! DEFAULT LINESTYLE LC=3
   ENDIF
 ELSE IF (STYLE .EQ. 4) THEN
   IF (COLOR .EQ. 16) THEN
     STYLE = (0.125, 0.05)
                                   ! WATER LINE LINESTYLE
   ELSE IF (COLOR .EQ. 23) THEN
                                  ! SEWER LINE LINESTYLE
     STYLE = (.5, 0.075)
    ELSE IF (COLOR .EQ. 24) THEN
     STYLE = (.5, 0.075)
                                  ! ELECTRIC LINE LINESTYLE
   ELSE IF (COLOR .EQ. 22) THEN
     STYLE = (.5, 0.075)
                                  ! TELEPHONE LINE LINESTYLE
   ELSE IF (COLOR .EQ. 13) THEN
     STYLE = (.5, 0.075)
                                  ! DRAIN LINE LINESTYLE
   ELSE IF (COLOR .EQ. 8) THEN
     STYLE = (.5, 0.075)
                                 ! GAS LINE LINESTYLE
   ELSE IF (COLOR .EQ. 15) THEN
    STYLE = (.5, 0.075)
                                  ! MISC. UTIL. LINE LINESTYLE
   ELSE
     STYLE = (.05, .03125, .015625, .03125) ! DEFAULT LINESTYLE LC=4
   ENDIF
  ELSE IF (STYLE .EQ. 5) THEN
   STYLE = (.1875, .03125)
                                    ! DEFAULT LINESTYLE LC=5
  ELSE IF (STYLE .EQ. 6) THEN
   IF (COLOR .EQ. 1) THEN
     STYLE = (1.25, .05, .1, .05, .1, .05)
                                                   ! RW LINE LINESTYLE
   ELSE IF (COLOR .EQ. 6) THEN
     STYLE = (.5, .0625)
                                                 !CONSTRUCTION PARCEL
   ELSE
     STYLE = (.0625, .031, .015, .031, .015, .031) ! DEFAULT LINESTYLE LC=6
   ENDIF
 ELSE IF (STYLE .EQ. 7) THEN
   STYLE = (.0625, .0225, .031, .0225) ! DEFAULT LINESTYLE LC=7
 ENDIF
ENDIF
1
IF (WEIGHT .EQ. 0) THEN ! f/s wt=0 matched to wt=0 on laser for h/s
 THICKNESS = 0.0025
ELSE IF (WEIGHT .IN. 1,2) THEN !f/s wt=1,2 matched to wt=1 on laser for h/s
 THICKNESS = 0.0050
ELSE IF (WEIGHT .IN. 3,4) THEN If/s wt=3,4 matched to wt=2 on laser h/s
 THICKNESS = 0.0075
```
<pre>ELSE IF (WEIGHT .IN. 7,8) THEN !f/s wt=7,8 matched to wt=4 on laser h/s THICKNESS = 0.0125 ELSE IF (WEIGHT .IN. 9,10) THEN !f/s wt=9,10 matched to wt=5 on laser h/s THICKNESS = 0.0150 ELSE IF (WEIGHT .IN. 11,12) THEN !f/s wt=11,12 matched to wt=6 on laser h/s THICKNESS = 0.0175 ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
<pre>ELSE IF (WEIGHT .IN. 7,8) THEN !I/s wt=7,8 matched to wt=4 on laser h/s THICKNESS = 0.0125 ELSE IF (WEIGHT .IN. 9,10) THEN !f/s wt=9,10 matched to wt=5 on laser h/s THICKNESS = 0.0150 ELSE IF (WEIGHT .IN. 11,12) THEN !f/s wt=11,12 matched to wt=6 on laser h/s THICKNESS = 0.0175 ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
<pre>THICKNESS = 0.0125 ELSE IF (WEIGHT .IN. 9,10) THEN !f/s wt=9,10 matched to wt=5 on laser h/s THICKNESS = 0.0150 ELSE IF (WEIGHT .IN. 11,12) THEN !f/s wt=11,12 matched to wt=6 on laser h/s THICKNESS = 0.0175 ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
<pre>ELSE IF (WEIGHT .IN. 9,10) THEN !f/s wt=9,10 matched to wt=5 on laser h/s THICKNESS = 0.0150 ELSE IF (WEIGHT .IN. 11,12) THEN !f/s wt=11,12 matched to wt=6 on laser h/s THICKNESS = 0.0175 ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
THICKNESS = 0.0150 ELSE IF (WEIGHT .IN. 11,12) THEN !f/s wt=11,12 matched to wt=6 on laser h/s THICKNESS = 0.0175 ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250
<pre>ELSE IF (WEIGHT .IN. 11,12) THEN !f/s wt=11,12 matched to wt=6 on laser h/s THICKNESS = 0.0175 ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
THICKNESS = 0.0175 ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250
<pre>ELSE IF (WEIGHT .IN. 13,14) THEN !f/s wt=13,14 matched to wt=7 on laser h/s THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
<pre>THICKNESS = 0.0200 ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
<pre>ELSE IF (WEIGHT .IN. 15,16) THEN !f/s wt=15,16 matched to wt=8 on laser h/s THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250</pre>
THICKNESS = 0.0225 ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250
ELSE IF (WEIGHT .IN. 17,18) THEN !f/s wt=17,18 matched to wt=9 on laser h/s THICKNESS = 0.0250
THICKNESS = 0.0250
ELSE IF (WEIGHT .IN. 19,20) THEN !f/s wt=19,20 matched to wt=10 on laser h/s
THICKNESS = 0.0275
ELSE IF (WEIGHT .IN. 21,22) THEN $!f/s\ wt=21,22\ matched to\ wt=11\ on\ laser\ h/s$
THICKNESS = 0.0300
ELSE IF (WEIGHT .IN. 23,24) THEN $!f/s wt=23,24$ matched to wt=12 on laser h/s
THICKNESS = 0.0325
ELSE IF (WEIGHT .IN. 25,26) THEN !f/s wt=25,26 matched to wt=13 on laser h/s
THICKNESS = 0.0350
ELSE IF (WEIGHT .IN. 27,28) THEN !f/s wt=27,28 matched to wt=14 on laser h/s
THICKNESS = 0.0375
ELSE IF (WEIGHT .IN. 29,30) THEN !f/s wt=29,30 matched to wt=15 on laser h/s
THICKNESS = 0.0400
ELSE IF (WEIGHT .EQ. 31) THEN !f/s wt=31 matched to wt=16 on laser h/s
THICKNESS = 0.0425
ELSE
THICKNESS = 0.0025
ENDIF
! ENDIF

Listing 5a.4 Highway Design Section Weightzero Pen Table

```
! "weightzero.tbl" r08/11/99
1
  THIS TABLE IS LINESTYLE TABLE FOR IPS PLOTTING
1
  TO CHANGE THE EXIST. EP/CURB/GUTTER/SIDEWALK, UTILITIES AND R/W
1
! LINESTYLES FOR HWY-DD BASE PLANS.
! LINESTYLES 0, 2, 3, 4, AND 6 HAS BEEN ALTERED
IF (TYPE .NI. 7,17) THEN
                                  !Use styles if not text-nodes or text
  IF (STYLE .EQ. 0) THEN
   IF (COLOR .EQ. 33) THEN
     STYLE = (1.0, 0.09375)
                                   ! NEW CUT AND FILL
    ELSE
      STYLE = 0
                                   ! DEFAULT LINESTYLE LC=0
    ENDIF
  ELSE IF (STYLE .EQ. 1) THEN
    STYLE = (.03125, .03125)
                                  ! DEFAULT LINESTYLE LC=1
I.
1
  LINESTYLE FOR EXISTING EP/CURB/GUTTER/SIDEWALK
!
!
  ELSE IF (STYLE .EQ. 2) THEN
    IF (COLOR .EQ. 2) THEN
      STYLE = (0.175, 0.075)
                                   ! EXIST. EP/CURB/GUTTER/SIDEWALK
    ELSE IF (COLOR .EQ. 19) THEN
      STYLE = (0.175, 0.075)
                                   ! BRIDGES
    ELSE
      STYLE = (.0625, .0625)
                                  ! DEFAULT LINESTYLE LC=2
    ENDIF
1
!
  ELSE IF (STYLE .EQ. 3) THEN
    IF (COLOR .EQ. 32) THEN
     STYLE = (0.5, 0.09375)
                                  ! SUPERELEVATION
    ELSE
      STYLE = (.125, .125)
                                   ! DEFAULT LINESTYLE LC=3
    ENDIF
!
1
1
  LINESTYLE FOR UTILITIES (WATER, SEWER, ELECTRIC, TELEPHONE, DRAIN, GAS AND MISC.)
1
  ELSE IF (STYLE .EQ. 4) THEN
    IF (COLOR .EQ. 16) THEN
     STYLE = (0.25, 0.10)
                                   ! WATER LINE LINESTYLE
    ELSE IF (COLOR .EQ. 23) THEN
                                   ! SEWER LINE LINESTYLE
      STYLE = (1.0, 0.15)
    ELSE IF (COLOR .EQ. 24) THEN
     STYLE = (1.0, 0.15)
                                   ! ELECTRIC LINE LINESTYLE
    ELSE IF (COLOR .EQ. 22) THEN
      STYLE = (1.0, 0.15)
                                   ! TELEPHONE LINE LINESTYLE
   ELSE IF (COLOR .EQ. 13) THEN
      STYLE = (1.0, 0.15)
                                   ! DRAIN LINE LINESTYLE
    ELSE IF (COLOR .EQ. 8) THEN
      STYLE = (1.0, 0.15)
                                 ! GAS LINE LINESTYLE
    ELSE IF (COLOR .EQ. 15) THEN
      STYLE = (1.0, 0.15)
                                   ! MISC. UTIL. LINE LINESTYLE
    ELSE
      STYLE = (.1, .0625, .03125, .0625) ! DEFAULT LINESTYLE LC=4
    ENDIF
!
!
  ELSE IF (STYLE .EO. 5) THEN
    STYLE = (.375, .0625)
                                  ! DEFAULT LINESTYLE LC=5
I.
1
1
  LINESTYLE FOR R/W
1
```

```
!
 ELSE IF (STYLE .EQ. 6) THEN
    IF (COLOR .EQ. 1) THEN
   STYLE = (2.5, .1, .2, .1, .2, .1)
ELSE IF (COLOR .EQ. 6) THEN
                                            ! RW LINE LINESTYLE
      STYLE = (1, .125)
                                                       ! CONSTRUCTION PARCEL
    ELSE
      STYLE = (.125, .062, .03, .062, .03, .062) ! DEFAULT LINESTYLE LC=6
    ENDIF
!
!
 ELSE IF (STYLE .EQ. 7) THEN
   STYLE = (.125, .045, .062, .045) ! DEFAULT LINESTYLE LC=7
 ENDIF
ENDIF
1
!
                                                                                                 .IN.
IF
                                             (WEIGHT
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31) THEN
 THICKNESS = 0.0025
ENDIF
```

Listing 5a.5 Bridge Design Section Linestyle Table

```
! "dbstyle.tbl" r02/12/94
1
! Bridge section pen table for full size plotting to ProjectWise Interplot.
1
IF (TYPE .NI. 7,17) THEN
  IF (STYLE .EQ. 0) THEN
   STYLE = 0
  ELSE IF (STYLE .EQ. 1) THEN
  STYLE = (.03125, .03125)
ELSE IF (STYLE .EQ. 2) THEN
    STYLE = 2
  ELSE IF (STYLE .EQ. 3) THEN
    STYLE = (.125, .0625)
  ELSE IF (STYLE .EQ. 4) THEN
    IF (COLOR .EQ. 50) THEN
    STYLE = (5., .0625, .03125, .0625)
ELSE IF (COLOR .EQ. 51) THEN
      STYLE = (.375, .0625, .03125, .0625)
    ELSE
      STYLE = (1., .0625, .03125, .0625)
    ENDIF
  ELSE IF (STYLE .EQ. 5) THEN
    STYLE = (.375, .0625)
  ELSE IF (STYLE .EQ. 6) THEN
    STYLE = (4., .0625, .03125, .0625, .03125, .0625)
  ELSE
    STYLE = (4., .0625, .125, .0625)
  ENDIF
ENDIF
```



Figure 5a.8 Linestyles Bridge Design Section

5b AutoCAD Computer-Aided Drafting Protocols

5.1 Standard AutoCAD Drawing Layers

The CADD permits the separation of data by layers. Similar types of data should be drawn on the same layer. AutoCAD has 63 layers that data can be drawn on. To make effective use of the CADD capabilities to create specific drawings and have standardization and uniformity, the CADD drawings created shall follow the layer schemes described in the following paragraphs. CADD users shall use the menus to place objects and text in their files to eliminate and/or reduce key-in errors.

5.2 Geographical Type of Drawings

Geographical types of drawings are those where the elements are drawn to their on-ground locations (x and y coordinates for 2-dimensional files and x, y, and z coordinates for 3-dimensional files). Geographical drawings can be drawn with actual or assumed coordinate values.

Examples of Geographical types of drawings include topographical survey maps; roadway base maps; roadway, utility, drainage, landscaping, irrigation, traffic signal, highway lighting, pavement marking and signing plans; right-of-way maps; easement maps. Geographical maps and plans are created by using the base design file as a reference file. The CADD user shall follow the layer scheme as shown in Table 5b.1 when creating Geographical type of drawings.

5.3 Geographical Highway Maps

The Geographical Highway Maps are those that are created by using the digital United States Geological Survey maps as the base file. The CADD user shall follow the layer scheme as shown in Table 5b.2 when creating Geographical Highway Maps.

5.4 Non-Geographical Type of Drawings

Non-geographical types of drawings are those where elements are not drawn to any specific on-ground location. Examples include typical sections; cross sections; profiles; detail type of drawings. The CADD user shall follow the layer scheme as shown in Table 5b.3 to Table 5b.6 depending on the type of non-geographical drawing.

5.5 Drafting for AutoCAD Contract Plans

The text and symbology (weight, linetype, and color) requirements for CADD Contract Plan Sheets have been standardized to provide uniform CADD Contract Plan Drawings throughout the Division. See Table 5b.3 to Table 5b.6 for the object symbology and text parameters.

5.6 Drafting for Other Types of AutoCAD Drawings

Architectural type of drawings are those where elements are drawn to describe buildings, and other structures for industrial purposes. The CADD user shall follow the layer scheme as shown in Table 5b.7 depending on the type of architectural drawing.

Each office has developed their own CADD Drafting Standards for other type of drawings because of the many different types of drawings created. The Lead Operator will be responsible to document the CADD Drafting Standards used by the office for these types of drawings and give this information to the CADD Manager.

Layer	Description	LW (mm)	LT	со
1 Baseline	Baseline element & symbol	0.40	Continuous	2 (yellow)
1 Baseline DC	Baseline element & symbol (Cadastral Section)	0.25	Continuous	2 (yellow)
1 Baseline detail	Baseline for contract plans: detail type drawings	.050	Continuous	254 (white)
1 Cl Hwy	Center line for highway per Contract plans: plan type drawings	.040	Continuous	254 (white)
1 Cl hwy detail	Center line for highway per contract plans: detail type drawings	0.50	Continuous	254 (white)
1 Typ sec exist	Existing typical sections	0.25	2	3 (green)
1 Typ sec new	New typical sections	0.40	Continuous	254 (white)
2 Alt Baseline	Alternate baseline element & symbol	0.40	Continuous	41 (It. Mustard)
2 Alt Baseline DC	(Cadastral Section)	0.25	Continuous	41 (It. Mustard)
3 Text Survey	Text for survey work	0.40	Continuous	254 (white)
3 Text exist	Text for existing features Height=5/32" font=HDOT Standard	0.25	Continuous	254 (white)
3 Text new	Text for new work	0.40	Continuous	254 (white)
	Structural: height=5/32" font= HDOT Standard			
	Others: height 3/16: font=HDOT Standard			
3 Text subtitle	Sub-Title Text	0.60	Continuous	254 (white)
	Height = ¼" font = HDOT Standard			
3 Symb and note	Miscellaneous symbols and notes	Block	Continuous	Block
3 Text main title	Main title text	0.80	Continuous	254 (white)
	Height = 5/16" font = HDOT Standard			
3 Text FA block	Text in Federal Aid block	0.35	Continuous	254 (white)
	Height =5/32" font = HDOT Standard			
3 Text TB main title	Text for title block main title (line 1)	0.90	Continuous	254 (white)
	Height =1/4" font = HDOT Standard			
3 Text TB limits	Text for title block limits (line 2)	0.60	Continuous	254 (white)
	Height =3/16" font = HDOT Standard			
3 Text TB proj info	Text for title block project name and number (lines 3, 4, & 5)	0.60	Continuous	254 (white)
	Height =3/16" font = HDOT Standard			
3 Text TB scale date	Text for title block scale and date	0.35	Continuous	254 (white)
	Height =5/32" font = HDOT Standard			
3 Text TB sht no	Text for title block sheet number	0.60	Continuous	254 (white)
	Height =5/32" font = HDOT Standard			
3 Text sht no	Text for plan sheet number	0.09	Continuous	254 (white)
	Height =" font = HDOT Standard			
3D_Reference	n/a	0.00	Continuous	7 (bright white)
4 Hwy struct exist	Existing highway structures	0.25	2	120 (aqua)
5 Hwy struct new	New highway structures	0.40	Continuous	120 (aqua)
6 EOP n Shdr exist	Existing Edge of pavement and shoulders	0.25	2	3 (green)
7 EOP n Shdr new	New Edge of pavement and shoulders	0.40	Continuous	254 (white)
8 Curb_gut exist	Existing curb & gutter	0.25	2	3 (green)
9 Curb_gut new	New curb & gutter	0.40	Continuous	254 (white)
8 Sidewalk exist	Existing sidewalk	0.25	2	3 (green)
9 Sidewalk new	New sidewalk	0.40	Continuous	254 (white)
10 ICS_TDP id	ICS, TDP point I.D. numbers	0.00	Continuous	7 (bright white)

 Table 5b.1
 AutoCAD Drawing Layers for Geographical Drawings

Layer	Description	LW (mm)	LT	со
11 Misc sym n annot	Miscellaneous symbols & annotation	0.00	Continuous	7 (bright white)
12 Cut_Fill slopes	Cut and Fill slopes	0.25	Continuous	33 (tan)
13 Topo grnd shot	Topographic ground shots	0.25	2	33 (tan)
14 Misc struct exist	Miscellaneous existing structures	0.25	2	93 (med. Green)
14 Misc struct new	Miscellaneous new structures	0.40	Continuous	93 (med. Green)
15 Pavt recon limit	Pavement reconstruction limits	0.40	Continuous	254 (white)
15 Pavt recon hatch	Pavement reconstruction hatching	0.18	Continuous	254 (white)
15 Cold plan limit	Cold planning limits	0.40	Continuous	254 (white)
15 Cold plan Xhatch	Cold planning cross-hatching	0.18	Continuous	254 (white)
16 Constr parcel	Construction Parcel	0.60	6	20 (orange)
17 Access Ctrl	Access Control	0.60	use cell	142 (blue)
18 DC text	Cadastral section text	0.00	Continuous	7 (bright white)
19 Easements exist	Existing easements	0.40	5	3 (green)
19 Easements	Easements for contract plans: plan type drawings	0.70	5	3 (green)
20 Chord Radius DC	n/a	0.25	2	3 (green)
20 Lead line DC	n/a	0.25	2	3 (green)
20 Land crt exist	Original land court, property lines, and	0.25	Continuous	3 (green)
	subdivisions	0.20	Continuedo	e (green)
20 Land crt final	Final land court, property lines, subdivisions, and remnants	0.25	Continuous	3 (green)
21 Grants exist	Original grants, land commission awards and royal patents	0.09	6	1 (red)
21 Grants final	Final grants, land commission awards and royal patents	0.25	6	1 (red)
20 Prop line	Property lines for contract plans: plan type drawings	0.40	6	3 (green)
22 ROW exist	Existing right-of-way (contract plans)	0.40	6	142 (blue)
22 ROW DC	Existing right-of-way (cadastral section)	0.40	6	142 (blue)
23 Traverse	Traverse	0.09	2	254 (white)
24 ROW new	New right-of-way (contract plans)	0.40	6	142 (blue)
24 ROW gen	ROW for contract plans: plan type drawings	0.50	6	142 (blue)
24 ROW detail	ROW for contract plans: detail type drawings	0.50	Continuous	254 (white)
24 ROW new DC	New right-of-way (cadastral section)	1.06	Continuous	142 (blue)
24 Easements new	New Easements (cadastral section)	1.06	Continuous	142 (blue)
25 Triang exist surf	Triangles for existing surface	0.18	Continuous	1 (red)
25 Triang new surf	Triangles for new surfaces	0.25	Continuous	20 (orange)
25 Brdr exist surf	Border for existing surface	0.18	Continuous	2 (yellow)
25 Brdr new surf	Border for new surface	0.25	Continuous	131 (very lt. blue)
30 Cont mai exist	Maior contours for existing surface	0.25	5	2 (vellow)
30 Cont mai new	Major contours for new surface	0.25	5	41 (lt. mustard)
31Cont min exist	Minor contours for existing surface	0.09	5	1 (red)
31 Cont min new	Minor contours for new surfaces	0.09	5	61 (lime)
35 Text util svm	Text for utility symbols	0.00	Continuous	7 (bright white)
36 Water exist	Existing water utilities	0.25	4	131 (verv lt. blue)
36 Water new	New water utilities	0.40	4	131 (verv lt. blue)
37 Electric exist	Existing electrical utilities	0.25	4	20 (orange)
37 Electric new	New electrical utilities	0.40	4	20 (orange)
38 Telephone exist	Existing telephone utilities	0.25	4	41 (It, mustard)
38 Telephone new	New telephone utilities	0.40	4	41 (It. mustard)

Layer	Description	LW (mm)	LT	СО
38 Sig corp exist	Existing signal corp utilities	0.25	4	31 (flesh)
38 Sig corp new	New signal corp utilities	0.40	4	31 (flesh)
39 Sewer exist	Existing sewer utilities	0.25	4	142 (blue)
39 Sewer new	New sewer utilities	0.40	4	142 (blue)
40 Gas exist	Existing gas utilities	0.25	4	33 (tan)
40 Gas new	New gas utilities	0.40	4	33 (tan)
40 Cable exist	Existing cable utilities	0.25	4	222 (dark pink)
40 Cable new	New cable utilities	0.40	4	222 (dark pink)
40 Fiberop exist	New fiber optic utilities	0.25	4	220 (hot pink)
40 Fiberop new	New fiber optic utilities	0.40	4	220 (hot pink)
40 Msc util A exist	Existing miscellaneous utility	0.25	4	161 (lt. purple)
40 Msc util A new	Existing miscellaneous utility	0.40	4	161 (lt. purple)
40 Msc util B exist	Existing miscellaneous utility	0.25	4	161 (lt. purple)
40 Msc util B new	Existing miscellaneous utility	0.40	4	161 (lt. purple)
41 Drain exist	Existing drain	0.25	2	61 (lt. lime)
42 Drain new	New drain	0.40	Continuous	61 (lt. lime)
43 Sprinkler exist	Existing sprinkler system	0.25	2	131 (very It. blue)
43 Sprinkler new	New sprinkler system	0.40	2	131 (very It. blue)
44 Landscape exist	Existing landscaping	0.25	2	71 (chartreuse)
44 Landscape new	New landscaping	0.40	2	71 (chartreuse)
45 Fence exist	Existing fence	0.25	7	252 (gray)
45 Fence new	New fence	0.40	7	252 (gray)
46 Boundary pts	Boundary points	0.25	Continuous	254 (white)
48 Grid minor	Minor grid lines	0.00	Continuous	7 (bright white)
49 Grid major	Major grid lines	0.00	Continuous	7 (bright white)
49 Topo H2O	Topographic water shots (streams lakes, ocean, etc.)	0.25	2	131 (very lt. blue)
50 Users	User discretion	0.00	Continuous	7 (bright white)
51 Pt elev	Point elevations	0.00	Continuous	7 (bright white)
52 St plan grd	Cadastral State Plane Grids	0.09	Continuous	20 (orange)
53 Geode grd	Geodetic grids	0.09	Continuous	1 (red)
54 Grdrail exist	Existing guardrail	0.25	3	231 (lt. pink)
54 Grdrail new	New guardrail	0.40	Continuous	231 (lt. pink)
55 Pvt mark exist	Existing pavement marking	0.25	Continuous	2 (yellow)
55 Pvt makr new	New pavement marking	0.40	Continuous	2 (yellow)
56 Traf sign exist	Existing traffic signs	0.25	Continuous	254 (white)
56 Traf sign new	New traffic signs	0.40	Continuous	254 (white)
57 Traf signal exist	Existing traffic signal	0.25	2	31 (flesh)
57 Traf signal new	New traffic signal	0.40	Continuous	31 (flesh)
58 Hwy light exist	Existing highway lighting	0.25	2	1 (red)
58 Hwy light new	New highway lighting	0.40	Continuous	1 (red)
59 Traf control	Traffic control	0.40	Continuous	20 (orange)
60 Border sht	Border sheet (cell)	0.40	Continuous	7 (bright white)
61 As-built post	As-built postings	0.40	Continuous	220 (hot pink)
62 Half size label	Half-size label (cell)	0.00	Continuous	7 (bright white)
62 Half size ticks	Ticks for half-size plans	0.09	Continuous	93 (med. green)
Point info	Point description, Northing and Easting	0.25	Continuous	1 (red)
GPS	Global positioning system	0.25	3	1 (red)

Layer	Description	LW (mm)	LT	СО
Railroad	Railroad	0.25	2	71 (chartreuse)
Mass transit	Mass Transit	0.25	2	231 (lt. pink)
Xsect grnd exist	Existing ground on cross sections	0.35	2	3 (green)
Xsect grnd new	New grade on cross sections	0.50	Continuous	254 (white)
Elev pln grnd exist	Existing ground on profile or elevation plans	0.35	2	3 (green)
Elev pln grnd new	New grade on profile or elevation plans	0.50	Continuous	254 (white)
Conc exist	Concrete – existing	0.25	1	254 (white)
Conc exist hid	Concrete – hidden existing	0.25	2	254 (white)
Conc new	Concrete – new	0.40	Continuous	3 (green)
Conc new hid	Concrete – hidden new	0.40	2	3 (green)
Metal exist	Metal – existing	0.25	1	161 (lt. purple)
Metal exist hid	Metal – hidden existing	0.25	2	161 (lt. purple)
Metal new	Metal – new	0.40	Continuous	222 (dark pink)
Metal new hid	Metal – hidden new	0.40	2	222 (It. pink)
Wood exist	Wood – existing	0.25	1	41 (It. mustard)
Wood exist hid	Wood – hidden existing	0.25	2	41 (It. mustard)
Wood new	Wood – new	0.40	Continuous	20 (orange)
Wood new hid	Wood – hidden new	0.40	2	20 (orange)
Grade exist	Grade – existing	0.25	3	61 (It. lime)
Grade exist hid	Grade – hidden existing	0.25	2	61 (It. lime)
Grade new	Grade – new	0.40	Continuous	3 (green)
Grade new hid	Grade – hidden new	0.40	5	3 (green)
Reinforc exist	Reinforcing – existing	0.35	3	120 (aqua)
Reinforc exist hid	Reinforcing – hidden existing	0.35	5	120 (aqua)
Reinforc new	Reinforcing – new	0.80	Continuous	254 (white)
Reinforc new hid	Reinforcing – hidden new	0.80	5	2 (vellow)
PMJF exist	Premolded joint filler – existing	0.25	1	252 (gray)
PMJF exist hid	Premolded joint filler – hidden existing	0.25	2	252 (gray)
PMJF new	Premolded joint filler – new	0.40	Continuous	231 (It. pink)
PMJF new hid	Premolded joint filler – hidden new	0.40	2	231 (lt. pink)
Plas blk exist	Plastic block – existing	0.25	1	71 (chartreuse)
Plas blk exist hid	Plastic block – hidden existing	0.25	2	71 (chartreuse)
Plas blk new	Plastic block – new	0.40	Continuous	161 (lt. purple)
Plas blk new hid	Plastic block – hidden new	0.40	2	161 (lt. purple)
Saw cut	Saw cut – new	0.25	Continuous	3 (green)
Saw cut hid	Saw cut – hidden new	0.25	2	3 (green)
Lim rem	Limits of removal – new	0.40	Continuous	93 (med. Green)
Lim rem hid	Limits of removal – hidden new	0.40	2	93 (med. Green)
Space	Void areas	0.25	1	254 (white)
Space hid	Hidden void areas	0.25	2	254 (white)
Crack	Crack	0.80	Continuous	2 (yellow)
Crack hid	Hidden crack	0.80	2	2 (vellow)
Conc joint	Concrete joints	0.50	Continuous	3 (green)
, Dim lines	, Dimension and leader lines	0.25	Continuous	254 (white)
Dim text	Dimension text	0.40	Continuous	254 (white)
Break line	Break line	0.25	Continuous	254 (white)
CI det 3/8	Centerline for detail 3/8" dash	0.25	4	254 (white)

Layer	Description	LW (mm)	LT	СО
Cl det 1	Centerline for detail 1" dash	0.25	4	254 (white)
Cl det 5	Centerline for detail 5" dash	0.25	4	5 (flesh)
CI det	Center line for detail	0.25	Continuous	254 (white)
Section line	Section line	0.60	Continuous	254 (white)
Section line	Section line dor contract plans: detail dtype drawings	0.50	Continuous	254 (white)
Weld	Weld symbol	0.40	Continuous	254 (white)
Pattern exist	Existing fill patterns	0.09	Continuous	220 (hot pink)
Pattern new	New fill patterns	0.25	Continuous	222 (dark pink)
Cloud	Cloud for changes	0.80	Continuous	254 (white)
Match line	Match line	0.60	Continuous	254 (white)
Drain stl cvr new	New steel drain cover	0.40	Continuous	140 (lt. blue)
Drain stl cvr exist	Existing steel drain cover	0.40	Continuous	140 (lt. blue)
Drain fill matl new	New drainage fill material	0.00	Continuous	7 (bright white)
Drain fill matl exist	Existing drainage fill material	0.00	Continuous	7 (bright white)
Jnt comp	Joint Compound	0.50	Continuous	220 (hot pink)
AC new	New structural AC work	0.40	Continuous	1 (red)
AC exist	Existing structural AC work	0.25	Continuous	1 (red)
PVC new	New structural PVC work	0.40	Continuous	161 (lt. purple)
PVC exist	Existing PVC work	0.25	Continuous	161 (It. purple)
Photogrammetry	Point Clouds, Lidar, etc	0.00	Continuous	7 (bright white)

NOTE:

Object is block. Color is the same as Type of Easement (i.e., Drain easement is same color as drain). **

Table 5b.2	AutoCAD Drawing	Layers for General	Highway	Mapping/Specs
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Layer	Description
1	Interstate Road System
	CO=3, WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided highway by centerline or barrier, CPK=75' (Total width 150')
	B. Divided highway by median, CPK=60' (Median width 30")
	(Total width 150' trees & landscaping)
	C. Ramps CPK=20' (Total width 40')
	D. Interchanges between incoming & outgoing viaducts, CPK=15'
2	Interstate Road System Center line
	CO=3, WT=1, LC=7, created with auto chain.
3	FAP Highways/Freeways & Expressway
	CO=25(Color display same as CO=11), WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided highway by centerline or barrier, CPK=75' (Total width 150')
	B. Divided highway by median, CPK=60' (Median width 30') (Total width 150' trees & landscaping)
4	FAP Highways/Freeway & Expressway Center line
	CO=25 (Color display same as CO=1), WT=1, LC=7, created with auto chain.
5	FAS Highways/Principal Arterial
	CO=26 (Color display same as CO=17), WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided highway by Center line or barrier, CPK=75' (Total width 150')
	B. Divided highway by median, CPK=60' (Median width 30') (Total width 150' trees & landscaping)
6	FAS Highways/Principal Arterial Center line
	CO=26 (Color display same as CO=17), WT=1, LC=7, created with auto chain.
7	FASC Highways/Minor Arterial
	CO=0, WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided Highway by Center line or Barrier CPK=75' (Total width 150')
	B. Divided Highway by Median, CPK=60' (Median width 30') (Total width 150' trees & landscaping)
8	FASC/Minor Arterial Center line
	CO=0, WT=1, LC=7, created with auto chain.
9	FAU Highways/Major Collector
	CO=19 (Color display same as CO=28), WT=1, LC=7, CPK=20' (Total width 40')
10	FAU Highways/Major Collector
	CO=19 (Color display same as CO=28), WT=1, LC=7, created with auto chain.
11	Minor Collector
	CO=15, WT=1, LC=7, CPK=30' (Total width 60')
	A. Divided Highway by Center line or Barrier, CPK=75' (Total width 150')
	B. Divided Highway by Median, CPK=60' (Median width 30')
12	Minor Collector Center line
	CO=15, WT=1, LC=7, create with auto chain.
13	State Highway System Text
	TH=150', TW=150', LS=75', FT=29, WT=0, CO=3(Lv=1), 25(Lv=3), 26(Lv=5), 0(Lv=7), 19(Lv=9), 15(Lv=11)
14	County Road System
	CO=4, WT=0, LC=0, CPK=20' (Total width 40'), dirt road/primitive (LC=2)
15	Text County Road System
	TH=100', TW=100', LS=50', FT=29, CO=4, WT=0
16	County Road System Center line
	WT=0, LC=0, CO=4, Primitive (LC=2) created with auto chain.

Layer	Description
17	Proposed State Highways
	CO=25, WT=1, CPK=30' (Total width 60'), LC=1
	A. Divided Highway by Center line or Barrier, CPK=75' (Total width 150')
	B. Divided Highway by Median, CPK=60' (Median width 30')
18	Text Proposed State Highways
	TH=150', TW=150', LS=75', FT=29, CO=25 (Color display same as CO=11), WT=0
19	Revised road updated (All new road elements) placed according to respective colors.
	CO=3, 25, 26, 0, 19, 15, 4
20	Shoreline
	CO=1, WT=1, LC=0
21	Text Shoreline
	CO=1, WT=0, FT=45
	Bays TH=250', TW=250', LS=300'
	Ocean TH=600', TW=600', LS=300'
22	Streams
	CO=1, WT=0, LC=0, (Intermittent streams CO=18, WT=0, LC=2)
	Flume bracket (As line terminator)30'@ 45 degrees
	Water tunnel bracket (As line terminator)30'@ 45 degrees
23	Text Streams
	TH=125', TW=125', LS=100', FT=45, CO=1, WT=0, char. Spacing=50' upper & lower case.
24	Lakes/Ponds (Shape)
	CO=1, WT=0, LC=0
25	Text Lakes
	TH=150', TW=150', LS=75', FT=45, CO=1, WT=0
26	Bridges/Overpass/Underpass using appropriate cells
27	Vacant
28	Vacant
29	Text Cities/Towns
	TH=200', TW=200', LS=100', FT=29, CO=0, WT=0
	Cities= Upper case, Towns=Lower case.
30	Text Cultural Features
	TH=125', TW=125', LS=50', FT=29, CO=0, WT=0
	Upper & Lower case.
31	Vacant
32	Partial adjusted & urbanized area boundary
	CO=10, WT=3, LC=5 (Adjusted), LC=6(Urbanized) CPK=100' from any other boundary or line.
33	Census Urban Boundary
	CO=10, WT=3, LC=4, CPK=100' from any other boundary or line.
34	Adjusted & Urbanized Area Boundary
	CO=29 (Adjusted boundary), LC=6(Urbanized area boundary), CPK=100' from any other boundary or line.
35	Text Census Boundary
	TH=200', TW=200', LS=100', FT=29, CO=29 (Color display same as CO=14), WT=0.
36	District Boundary
	CO=6 (Color display same as CO=24), WT=3, LC=3.
37	Text District Boundary Line
	TH=200', TW=200', LS=150', FT=29, CO=6, WT=0, Char. Spacing=50', District area (TH=250', TW=750', LS=200', FT=29, CO=6, WT=0)

Layer	Description
38	Forest Boundary
	CO=2, WT=0, LC=0.
39	Text Forest Boundary
	TH=200', TW=250', LS=100', FT=29, CO=2, WT=0.
40	Forest Shape
	CO=6, WT=0, LC=0, AP=DOT3, PD-50', 50'.
41	Military Boundary
	CO=8, WT=0, LC=0.
42	Text Military Boundary
	TH=200', TW=250', LS=100', FT=29, CO=8, WT=0 or
	TH=100', TW=100', LS=50', FT=29, CO=8, WT=0.
43	Military Shape
	CO=6, WT=0, LC=0, AP=DOT2, PD=100', 100'.
44	Grid Ticks (Sheet Border/Frame)
	CO=0, WT=0, LC=0.
45	Coordinate Grid Text
	TH=150', TW=150', LS=75', FT=1, CO=0, WT=0
	Sheet Title
	TH=1000', TW=1000', LS=500', FT=43, CO=0, WT=0.
46	1:1000 Scale Grid
	CO=, WT=
47	1:2000 Scale Grid
	CO=, WT=
48	1:3000 Scale Grid
	CO=, WT=
49	Contours
	CO=23 (Color display same as CO=1) WT=0
50	User Level
	All elements user does not want plotted out complete path/file name lower right of plot sheet FT=0, CO=3, WT=1, TX=400' (2000 scale)
51	Control Points for digitizing
	CO=20, WT=10
52	Landing strip/airport & perimeter
	CO=27 (Color display same as CO=18), WT=0
53	Vacant
54	Railroad
	CO=20, WT=0
55	Urban map/functional classification map text
56	Vacant
57	Vacant
58	Vacant
59	Vacant
60	Border cell
61	Vacant
62	Vacant
63	Do not use

Description	Lineweight (mm)	Color	Layer	Height	Font
Existing Features	0.25 *	254	3 **	3/16" ***	HDOT_STANDARD
Planned Construction					
Features (New Work)	0.40	254	3 **	3/16" ***	HDOT_STANDARD
Sub-Titles	0.60	254	3 **	1/4"	HDOT_STANDARD
Main Titles	0.80	254	3 **	5/16"	HDOT_STANDARD
F.A. Block	0.35	254	3 **	5/32"	HDOT_STANDARD
Title Block					
Main Title (Line 1)	0.90	254	3 **	1/4"	HDOT_STANDARD
Limits (Line 2)	0.60	254	3 **	3/16"	HDOT_STANDARD
Project Name & No.	0.60	254	3 **	3/16"	HDOT_STANDARD
Scale/Date	0.35	254	3 **	5/32"	HDOT_STANDARD
Sheet No.	0.60	254	3 **	3/8"	HDOT_STANDARD
Plan Sheet No.	0.09	254	3 **	3/8"	HDOT_STANDARD

AutoCAD Text Weights, Color, Layer, Height and Font for Contract Plans Table 5b.3

NOTE:

*

Text weight for existing **features may be same as new work.** Layers 1 and 2 may also be used for Text as determined by each Section. HWY-DB and HWY-DH Text Height = 5/32". **

Description	Lineweight (mm)	Linetype	Color	Layer
Existing Features	0.25 ***	2 *	****	****
Planned Construction Features (New work)	0.40	Continuous	****	****
Existing Utilities	0.25	4 *	****	****
New Utilities	0.40	4 *	****	****
Contours				
Existing (Minor/Major)	0.09/0.25	5	****	****
New	0.40	Continuous	****	****
Right of Way Line	0.50	6 *	****	****
Property Line	0.40	6 *	****	****
Easements	0.70	5	****	****
Baseline or Station Line of Highway	0.50	Continuous	****	****
Centerline for Highway	0.50	Continuous	****	****
Dimension Line	0.18	Continuous	254	3
Break Line	0.18	Continuous	254	3
Section Line **	0.60	Continuous	254	3
Match Line **	0.60	Continuous	254	3

AutoCAD Line Weight, Linetype, Color and Layers for Contract Plans Plan Type Drawings Table 5b.4

NOTE:

Line**type Modified with** CTB. Object **is a block.** *

Existing Features for Structural Plans are Weight = 0.09. The Symbology and Layer for Plan Drawings will follow the Highways Division CADD Drawing Levels for Geographical **** Drawings.

Description	Lineweight (mm)	Linestyle	Color	Layer
Existing Features	0.40	continuous*	2	1 baseline
Planned Construction Features (New work)	0.40	Continuous	41	2 alt baseline
Existing Utilities	0.40	continuous*	2	1 basline
New Utilities	0.40	continuous*	41	2 alt baseline
Right of Way Line **	0.60	Continuous	254	3 symb and note
Baseline or Station Line of Highway **	0.40	Continuous	41	2 alt baseline
Centerline for Highway **	0.60	Continuous	254	3 symb and note
Dimension and Leader Lines	0.09	Continuous	254	3 text new
Break Line	0.09	Continuous	254	3 symb and note
Centerline for Detail **	0.09	Continuous	254	3 symb and note
Section Line **	0.60	Continuous	254	3 symb and note
Cross Section Plans				
Existing Ground	0.25	2 *	3	1 typ sec exist
New Grade	0.40	Continuous	254	2 typ sec new
Profile and/or Elevation Plans				
Existing Ground	0.25	2 *	3	1 typ sec exist
New Grade	0.40	Continuous	254	2 typ sec new

AutoCAD Line Weights, Linetype, Color and Layer for Contract Plans Detail Type of Table 5b.5 Drawings

NOTE:

Linetype Modified with CTB. Object is a block.

**

Descripti	on	Lineweight (mm)	Linetype	Color	Layer
Concrete					
	Existing	0.25	1	254	conc exist
	Hidden	0.25	2	254	conc exist hid
	New	0.40	Continuous	3	Conc new
	Hidden	0.40	2	3	Conc new hid
Metal					
	Existing	0.25	1	161	metal exist
	Hidden	0.25	2	161	metal exist hid
	New	0.40	Continuous	222	metal new
	Hidden	0.40	2	222	Metal new hid
Wood					
	Existing	0.25	1	41	wood exist
	Hidden	0.25	2	41	wood exist hid
	New	0.40	Continuous	20	wood new
	Hidden	0.40	2	20	Wood new hid
Grade					
	Existing	0.25	3	61	grade exist
	Hidden	0.25	2	61	grade exist hid
	New	0.40	Continuous	3	grade new
	Hidden	0.40	5	3	Grade new hid
Reinforcir	ng				
	Existing	0.35	3	120	reinforce exist
	Hidden	0.35	5	120	reinforc exist hid
	New	0.80	continuous	254	reinforc new
	Hidden	0.80	5	2	Reinforc new hid
Concrete	Joints	0.50	continuous	3	conc joint
Dimensio	n and Leader Lines	0.25	continuous	254	dim lines
Break Lin	es	0.25	continuous	254	break line
Centerline	e for Detail				
	3/8" Long Dash	0.25	4 *	254	cl det 3/8
	1" Long Dash	0.25	4 *	254	cl det 1
	5" Long Dash	0.25	4 *	5	cl det 5
Section Li	ine **	0.60	continuous	254	section line

Table 5b.6 AutoCAD Line Weight, Linetype, Color and Layers for Contract Plans Structural Type of Drawings

NOTE:

Linetype Modified with CTB. Object is a block.

**

5.7 Highways Font Library

The Engineering CADD Office has developed a standard Highways Font Library folder. The CADD System Engineer will maintain and revise the Highway Font Library folder. The Lead Operator shall request to the CADD System Engineer for any revisions or additions to the Highways Font Library folder. The CADD System Engineer may assign the revisions to the Lead Operator if the font is unique to the Lead Operator's office. All .shx and .TTF files that are located in the Highways Font Library need to be copied to the users local drive located here: c:\users*user name*\AppData\Roaming\Autodesk\C3D 2016\enu\Support.

See Table 5b.8 for the CADD Fonts Library and Figure 5b.1 to Figure 5b.7 for the display of the Highways Font Library.

The Highways Font Library contains special characters, as the baseline, centerline, plus/minus etc. characters that uses certain keys to input. The keys that were used to input these special characters will be displayed on the CADD monitor however when the file is plotted the special characters will be plotted. See Figure 5b.8 for the Modified Character Keys display.

5.8 Highways Color Table

The Engineering CADD Office has developed a standard Highways Color Table. The Engineering CADD office will maintain and revise the Highways Color Table. The Lead Operator shall request to the Engineering CADD Office for any revisions or additions to the Highways Color Table. The Engineering CADD Office will copy the color table to all workstations during software upgrades. See Table 5b.9 for the Highways Color Table.

5.9 Highways CTB

CTB files are used to selectively modify objects during the plotting process from how they were created in the design file. An example of the objects weights is shown in Figure 5b.9. The CTB file enables the user to change the symbology (linestyle or weight) of the object in the hardcopy plot. Lines can be modified to plot to any user defined linestyle or weight, however the symbology as seen on the CADD monitor is not changed. An example of the CTB for the Highway Design Section is shown in Figure 5b.10 to Figure 5b.19 for the Linestyles printed display.

CTB files are also used to modify object weights during the plotting process to match the size of the plotting medium. Various sizes of plotting mediums are used such as $8\frac{1}{2} \times 11^{\circ}$, $11^{\circ} \times 17^{\circ}$, and $36^{\circ} \times 22^{\circ}$. An example of the CTB file used by the Highway Design Section and the other sections of the Design Branch are shown in Listing 5b.1 and Listing 5b.2.

The Lead Operator may create customized CTB files for the office. They may modify the CADD files to meet the office criteria. All CTB files shall then be reviewed and approved by the CADD Office. The Lead Operator shall be responsible for maintaining the office's customized CTB files and shall inform the CADD Office of any revisions. An example of a customized CTB file for the Bridge Design Section is shown in Figure 5b.20 for the Linetype printed display.

Description	LW (mm)	Linetype	Color	Layer
General				
Dimension & Leader Lines	0.25	continuous	254	dim lines
Section Line	2			3
Site Plan				
Contours				
Existing (Minor/Major)	2	0	16	31
New	4	0	3	30
Drainage Line				
Existing	2	2	13	41
Hidden	2	1	13	42
New	4	2	13	42
Easements	4	5	1	24
Existing Features	2	2	22	1
Landscaping				
Existing	2		10	44
New	4		10	44
Planned Construction Features (New work)	4	0	0	2
Property Line	2	6	2	21
R/W Line	4	6	1	22
Structural				
Composition Material (Roofing)				
Existing	2	2	8	18
Hidden	2	1	8	18
New	4	0	8	19
Concrete				
Existing	2	2	14	4
Hidden	2	1	14	5
New	4	0	14	5
Concrete Masonry Unit				
Existing	2	2	14	6
Hidden	2	1	14	7
New	4	0	14	7
Glass				
Existing	2	2	0	8
Hidden	2	1	0	9
New	4	0	0	9
Metal				
Existing	2	2	7	10
Hidden	2	1	7	11
New	4	0	7	11
Reinforcing				
Existing	2	2	4	12
Hidden	2	1	4	13
New	4	0	4	13

Table 5b.7 AutoCAD Line Weight, Linetype, Color, and Layers for Contract Plans Architectural Type Drawings

Descripti	on	LW (mm)	Linetype	Color	Layer
Wood					
	Existing	2	2	12	14
	Hidden	2	1	12	15
	New	4	0	12	15
Exterior E	Elevation				
Compositi	ion Material (Roofing)				
	Existing	2	2	8	18
	Hidden	2	1	8	18
	New	4	0	8	19
Concrete					
	Existing	2	2	14	4
	Hidden	2	1	14	5
	New	4	0	14	5
Concrete	Masonry Unit				
	Existing	2	2	14	6
	Hidden	2	1	14	7
	New	4	0	14	7
Glass					
	Existing	2	2	0	8
	Hidden	2	1	0	9
	New	4	0	0	9
Metal					
	Existing	2	2	7	10
	Hidden	2	1	7	11
	New	4	0	7	11
Wood					
	Existing	2	2	12	14
	Hidden	2	1	12	15
	New	4	0	12	15
Interior E	levation				
Concrete					
	Existing	2	2	14	4
	Hidden	2	1	14	5
	New	4	0	14	5
Concrete	Masonry Unit				
	Existing	2	2	14	6
	Hidden	2	1	14	7
	New	4	0	14	7
Fixtures (Water Closet, lavatory, shower)				
	Existing	2	4	16	36
	Hidden	2	4	16	36
	New	4	4	16	36
Floor Tile					
	Existing	2	2	13	16
	Hidden	2	1	13	17
	New	4	0	13	17

Descripti	on	LW (mm)	Linetype	Color	Layer
Glass					
	Existing	2	2	0	8
	Hidden	2	1	0	9
	New	4	0	0	9
Metal					
	Existing	2	2	7	10
	Hidden	2	1	7	11
	New	4	0	7	11
Wood					
	Existing	2	2	12	14
	Hidden	2	1	12	15
	New	4	0	12	15
Utilities					
Electrical					
	Existing	2	4	24	37
	Hidden	2	4	24	37
	New	4	4	24	37
Fire Alarr	n System				
Stand Pip	es				
	Existing	2	2	16	43
	Hidden	2	2	16	43
	New	4	2	16	43
Sprinkler	System				
	Existing	2	2	16	43
	Hidden	2	2	16	43
	New	4	2	16	43
Fire Alarm	n (Electrical)				
	Existing	2	4	4	37
	Hidden	2	4	4	37
	New	4	4	4	37
Gas					
	Existing	2	4	8	40
	Hidden	2	4	8	40
	New	4	4	8	40
Heating					
	Existing	2	4	25	47
	Hidden	2	4	25	47
	New	4	4	25	47
Lighting					
	Existing	2	4	21	48
	Hidden	2	4	21	48
	New	4	4	21	48
Network E	Data Communication System				
	Existing	2	4	15	49
	Hidden	2	4	15	49
	New	4	4	15	49

Description	LW (mm)	Linetype	Color	Layer
Sewer				
Existing	2	4	23	39
Hidden	2	4	23	39
New	4	4	23	39
Telephone				
Existing	2	4	22	38
Hidden	2	4	22	38
New	4	4	22	38
Ventilation				
Existing	2	2	7	35
Hidden	2	2	7	35
New	4	2	7	35
Water				
Existing	2	4	16	36
Hidden	2	4	16	36
New	4	4	16	36

Highways Division AutoCAD Fonts Table 5b.8

Revision Date: June-2020 All character fonts are .shx or .TTF

Font Name	Туре	Description
Font000	SHX	
MOD_ WORKING	SHX	(modified) USTN WORKING
AS_ BUILT	SHX	(modified) FANCY FONT
USTN ENGNRG	SHX	
SHADOW	SHX	
SCRIPT	SHX	
DOTTED	SHX	
font007	SHX	INTERGRAPH_FONT_7
SCRIPT2	SHX	(modified) Lowercase script
Font026	SHX	
HDOT_STANDARD	SHX	(modified) ITALICS – HWY-D Standard
Cadastral_RW_LC	SHX	
SWIS 721 Lt BT	TTF	
SWIS 721 BT	TTF	
SWIS 721 Blk BT	TTF	
INERNAT.CEL	SHX	
SWIS 721 Lt BT	TTF	Italic
SWIS 721 BT	TTF	Italic
SWIS 721 Blk BT	TTF	Italic
Font041	SHX	
OUTLINE	SHX	(modified)
Times New Roman	TTF	
Times New Roman	TTF	Bold
Book Antiqua	TTF	
Book Antiqua	TTF	Bold
Century Gothic	TTF	
Century Gothic	TTF	Bold
Font050	SHX	
SWISS_721_BO_L	SHX	
ICS_MODSURSYM	SHX	
CHAR_FAST_FONT	SHX	
Total Fonts: 31		

Total Fonts:

USTN_ENGNRG.shx	ABCDEF GHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890'~!@#\$%'&*()-= _+[]]]::'"***>,./? ½ ¼ ¾ ½ ½ % % % % % % % %
	1234567890'~!@#\$%*&*()-= _+[]]}::'''\:<>/? ½ ¼ ¾ ½ ⅔ % % № № № № № ೫6 %6 %6 %6 %6 % % %3
AS_BUILT.shx	ABCDEFGHIJKLMNOPQRSTUVWXYZ
MOD_WORKING shx	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijkimnopqrstuvwxyz 1234567890±ø!e+\$%%&*() _+EJ电化口'''笔:<>),/? % % % % % % % % % % % % %
	72 74 74 78 78 78 78 78 76 716 716 716 148 148 148 1348 1548 764 364 ABCDEEGHUKI MNOPORSTUVWXY3

Figure 5b.1 Highways Font Library

CODIOT	ADVENTED HALF AMALEN AND THE A MILLER
SCHIPT.SIX	Liffelinger
	229954 7890 · 7 39 15+*()_*
DOTTED.shx	ADCDEPOHIJKI MICE OFSTATUTELTZ
	nixxiofghi i kimmpqrsiurexyz
	AC1406/ (00/

font007 shx	ABCORNGHLTCL HINOPOBSTUVWXYZ
1011007.011	ماسا ماليك المراجع الم
	1224167090*1*9**&*C-*

SCRIPT2.shx	abcdelghijkimnopqrotuvuxyz
	1234567890±ø/##22 & #1}=
	_+[3#¢\$.<>./?
	1/2 1/4 \$4 1/0 \$6 \$6 1/0 1/18 \$18 \$18
	1/16 9/16 1/16 1/16 1/2 1/3 9/3
font026.shx	ABXAE90THI*KAMNOTEP2TTOQXYZ
	αβχδαθγηκ *κλμωσπέροπτυφωχιγς

	* * * * * * * * * *

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	Page 2 of

Figure 5b.2 Highways Font Library

HDOT_STANDARD.shx	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890±"!@#\$%"&#()-= _+[]]{:::'"\: ?</th
	1/2 1/4 1/4 1/4 1/4 1/6 1/8 1/6 1/6 1/16 1/6 1/6 1/16 1/16 1/16 1/3 1/3
CADASTRAL_RW_LC.shx	ABCDEFGHIJKLMNOPQRSTUVWXYZ abodefghIjkimnopqrstuvwxyz 1994557800+#(###%f=r)-
	+E JBC=""5.<>? 1/2 1/4 3/4 1/9 3/8 3/8 1/8 1/8 3/8 3/8 1/8 3/8 1/8 13/8 13/8 1/3 3/3
Swis721 Lt BT.ttf	ABCDEFGHIJKLMNOPQRSTUWXYZ abcdefghijklmnopqrstuwxyz
	1∠3436/890±~!@#\$%*&*()-= _+[]{};:*\ <>,./? *********

Swis721 BT ttf	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890±~!@#\$%°&*()-=
	_+[]{};:"\]<>,./?
Swis 721 Blk BT.ttf	ABCDEFGHIJKLMNOPQRSTUVWXY abcdefghijklmnopqrstuvwxyz 1234567890±~!@#\$%°&*()-= _+[]{};:"\]<>,./?

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	June 2021

Figure 5b.3 Highways Font Library



Figure 5b.4 Highways Font Library

HIGHWA	AYS FONT LIBRARY	

Book Antiqua.ttf (Bold)	ABCDEFGHIJKLMNOPQRSTU abcdefghijklmnopqrstuvwxyz 1234567890`~!@#\$%^&*()_= _+[]{];:'''\ <,/?	WXIZ

Boon / Indua.m	abcdefghijklmnopqrstuowxyz 1234567890`~!@#\$%^&*()= +∏{]::"\\ ?</td <td></td>	
Book Antiqua ttf	ABCDEFGHIJKLMNOPQRSTUW	VXYZ

(Bold)	1234567890`~!@#\$%^&*()-= _+[]{};;'''\ ~,/?	
Times New Roman.ttf	abcdefghijklinnopqrstuvwxyz	WAYZ
-	ABODEECHI PT LOODODOT	1111112

	_+[]{};:"'\\\\\?,/?	
	abcdefghijklmnopqrstuvwxyz 1234567890~~!@#\$%^&*O-=	
Times New Roman.ttf	ABCDEFGHIJKLMNOPQRSTUV	WXYZ
	* * * * * * * * * * * *	
	1234567600**1**0 **4 *()-* *******; *****(9/ ?	6
OUTLINE SIX	abedofahijkimnosqretuvwz	872

Figure 5b.5 Highways Font Library

Century Gothic.ttf	ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890`~!@#\$%^&"()-= _+[]{;:"`\]<,./?
Century Gothic.ttf (Bold)	ABCDEFGHIJKLMNOPQRSTUVWXYZ
	abcdefghijklmnopqrstuvwxyz 1234567890`~!@#\$%^&*()-= _+[]{}:'''\]<>,./?

font050.shx	ABCOEFGHIJKLMNOPDRSTUVWXYZ
	HBLUEFGHIJKLMNUPUHSTUVWXYZ 1234567890\~l@#\$%*&+()-= _+[]{};;*'\;<>,./?
	* * * * * * * * * * *
SWISS_721_BO_L.shx	ABCOEFGHLIKI, MNOPORSTLIVWXYZ
	1224557880`~!@#\$%^L*(+[]{}::^\<>./?
	X X X X Y X X X ***
ICS MODSURSYM.shx	©©\$C#I₽₽₽¥€,♂℃&©e\$C#ID#C-C#ID&&O
	‍‍‍َ©©^ * コ/≀ - ≬ * 世⊕ ~~ %©%⊙ -O ∞ ⊡△△○ 1234567890△~!@#\$%Ҳ&*()= /+⊕□};:""団 <>,./?

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	June 2021

Figure 5b.6 Highways Font Library



Figure 5b.7 Highways Font Library



Figure 5b.8 Modified Character Keys

255 255 0 255 255	0 255 255 255	0 0 0
255 0 255 255	255 255 255	0 0
0 255 255	255 255	0
255 255	255	-
255	200	255
200	127	127
155	63	0
204	127	102
255	127	0
255	191	127
204	153	102
255	223	127
255	255	127
204	207	0
223	255	127
191	255	127
102	207	102
0	255	191
0	255	191
127	255	255
0	191	255
0	153	204
127	159	255
127	102	204
255	127	255
255	0	191
255	127	223
204	0	153
255	127	191
132	132	132
214	214	214
	255 255 204 255 204 255 255 204 225 204 223 191 102 0 0 0 127 0 0 0 127 127 255 255 255 255 255 204 255 255 204 255 132 214	255 255 255 127 155 63 204 127 255 127 255 127 255 191 204 153 255 223 255 255 204 207 223 255 191 255 102 207 0 255 102 207 0 255 102 207 0 255 127 255 0 191 0 153 127 159 127 102 255 127 255 0 255 127 204 0 255 127 204 0 255 127 132 132 214 214

Table 5b.9 **Highways Color Table**

For Contract Plan Drawings, DO NOT use color 220. This color will be reserved for posting as-built drawings.





LAYER	DESCRIPTION	<u>LW</u> (mm)	<u>LT</u>	COLOR
 1 Baseline	Baseline element & symbol	0.40	Continuous	2 (yellow)
 1 Baseline DC	Baseline element & symbol (Cadastral Section)	0.25	Continuous	2 (yellow)
 1 Baseline detail	Baseline for contract plans: detail type drawings	0.50	Continuous	254 (white)
 1 Cl Hwy	Center line for highway per Contract plans: plan type drawings	0.40	Continuous	254 (white)
 1 Cl hwy detail	Center line for highway per contract plans: detail type drawings	0.50	Continuous	254 (white)
 1 Typ sec exist	Existing typical sections	0.25	2	3 (green)
 1 Typ see new	New typical sections	0.40	Continuous	254 (white)
 2 Alt Baseline	Alternate baseline element & symbol	0.40	Continuous	41 (lt. mustard)
 2 Alt Baseline DC	(Cadastral section)	0.25	Continuous	41 (lt. mustard)
 3 Text survey	Text for survey work	0.40	Continuous	254 (white)
 3 Text exist	Text for existing features Height = 5/32" font = HDOT Standard	0.25	Continuous	254 (white)
 3 Text new	Text for new work structural: height = 5/32" font=27 others: height 3/16" font = HDOT Standard	0.40	Continuous	254 (white)
 3 Text subtitle	Sub-Title Text Height = ¼" font = HDOT Standard	0.60	Continuous	254 (white)
 3 Symb and note	Miscellaneous symbols and notes	Block	Continuous	Block

Figure 5b.10 Linetypes Highway Design Section
LAVER DESCRIPTION		<u>LW</u> (mm)	<u>LT</u>	COLOR
 3 Text main title	Main title text Height = 5/16" font = HDOT Standard	0.80	Continuous	254 (white)
 3 Text FA block	Text in Federal Aid block Height =5/32" font = HDOT Standard	0.35	Continuous	254 (white)
 3 Text TB main title	Text for title block main title (line 1) Height =1/4" font = HDOT Standard	0.90	Continuous	254 (white)
 3 Text TB limits	Text for title block limits (line 2) Height =3/16" font = HDOT Standard	0.60	Continuous	254 (white)
 3 Text TB proj info	Text for title block project name and number (lines 3, 4, & 5) Height =3/16" font = HDOT Standard	0.60	Continuous	254 (white)
 3 Text TB scale date	Text for title block scale and date Height =5/32" font = HDOT Standard	0.35	Continuous	254 (white)
 3 Text TB sht no	Text for title block sheet number Height =5/32" font = HDOT Standard	0.60	Continuous	254 (white)
 3 Text sht no	Text for plan sheet number Height =" font = HDOT Standard	0.09	Continuous	254 (white)
 4 Hwy struct exist	Existing highway structures	0.25	2	120 (aqua)
 5 Hwy struct new	New highway structures	0.40	Continuous	120 (aqua)
 6 EOP n Shdr exist	Existing Edge of pavement and shoulders	0.25	2	3 (green)

Figure 5b.11 Linetypes Highway Design Section

I	LAYER	DESCRIPTION	<u>LW</u> (mm)	<u>LT</u>	COLOR
	7 EOP n Shdr new	New Edge of pavement and shoulders	0.40	Continuous	254 (white)
	8 Curb_gut exist	Existing curb & gutter	0.25	2	3 (green)
	9 Curb_gut new	New curb & gutter	0.40	Continuous	254 (white)
	8 Sidewalk exist	Existing sidewalk	0.25	2	3 (green)
	9 Sidewalk new	New sidewalk	0.40	Continuous	254 (white)
	10 ICS_TDP id	ICS, TDP point I.D. numbers	0.00	Continuous	7 (bright white)
	11 Misc sym n annot	Miscellaneous symbols & annotation	0.00	Continuous	7 (bright white)
	12 Cut_Fill slopes	Cut and Fill slopes	0.25	Continuous	33 (tan)
	13 Topo grnd shot	Topographic ground shots	0.25	2	33 (tan)
	14 Misc struct exist	Miscellaneous existing structures	0.25	2	93 (med. green)
	14 Misc struct new	Miscellaneous new structures	0.40	Continuous	93 (med. green)
	15 Pavt recon limit	Pavement reconstruction limits	0.40	Continuous	254 (white)
	15 Pavt recon hatch	Pavement reconstruction hatching	0.18	Continuous	254 (white)
	15 Cold plan limit	Cold planning limits	0.40	Continuous	254 (white)
	15 Cold plan Xhatch	Cold planning cross-hatching	0.18	Continuous	254 (white)
· · — · · — · · — · · — · · — · · — · · — · ·	16 Constr parcel	Construction Parcel	0.60	б	20 (orange)
······	17 Access Ctrl	Access Control	0.60	use cell	142 (blue)
	18 DC text	Cadastral section text	0.00	Continuous	7 (bright white)
	19 Easements exist	Existing easements	0.40	5	7 (bright white)

Figure 5b.12 Linetypes Highway Design Section

	LAYER	DESCRIPTION	<u>LW</u> (mm)	LT	COLOR
	19 Easements	Easements for contract plans: plan type drawings	0.70	5	3 (green)
	20 Land crt_ exist	Original land court, property lines, and subdivisions	0.09	Continuous	3 (green)
	20 Land crt final	Final land court, property lines, subdivisions, and remnants	0.25	Continuous	3 (green)
	21 Grants exist	Original grants, land commission awards and royal patents	0.09	б	1 (red)
	21 Grants final	Final grants, land commission awards and royal patents	0.25	6	1 (red)
	20 Prop line	Property lines for contract plans: plan type drawings	0.40	б	3 (green)
· · _ · · _ · · _ · · _ · · _ · · _ ·	22 ROW exist	Existing right-of-way (contract plans)	0.40	б	142 (blue)
	22 ROW DC	Existing right-of-way (cadastral section)	0.40	б	142 (blue)
	23 Traverse	Traverse	0.09	2	254 (white)
	24 ROW new	New right-of-way (contract plans)	0.40	б	142 (blue)
	24 ROW gen	ROW for contract plans: plan type drawings	0.50	б	142 (blue)
	24 ROW detail	ROW for contract plans: detail type drawings	0.50	Continuous	254 (white)
	24 ROW new DC	New right-of-way (cadastral section)	1.06	Continuous	142 (bluc)
	24 Easements new	New Easements (cadastral section)	1.06	Continuous	142 (blue)
	25 Triang exist surf	Triangles for existing surface	0.18	Continuous	1 (red)
	25 Triang new surf	Triangles for new surfaces	0.25	Continuous	20 (orange)

Figure 5b.13 Linetypes Highway Design Section

LAYER	DESCRIPTION	<u>LW</u> (mm)	LT	COLOR
25 Brdr exist surf	Border for existing surface	0.18	Continuous	2 (yellow)
25 Brdr new surf	Border for new surface	0.25	Continuous	131 (very lt. blue)
- 30 Cont maj exist	Major contours for existing surface	0.25	5	2 (yellow)
- 30 Cont maj new	Major contours for new surface	0.25	5	41 (lt. mustard)
31Cont min exist	Minor contours for existing surface	0.09	5	1 (red)
31 Cont min new	Minor contours for new surfaces	0.09	5	61 (lime)
35 Text util sym	Text for utility symbols	0.00		7 (bright white)
- 36 Water exist	Existing water utilities	0.25	4	131 (very lt. blue)
- 36 Water new	New water utilities	0.40	4	131 (very lt. blue)
37 Electric exist	Existing electrical utilities	0.25	4	20 (orange)
- 37 Electric new	New electrical utilities	0.40	4	20 (orange)
- 38 Telephone exist	Existing telephone utilities	0.25	4	41 (lt. mustard)
- 38 Telephone new	New telephone utilities	0.40	4	41 (lt. mustard)
- 38 Sig corp exist	Existing signal corp utilities	0.25	4	31 (flesh)
- 38 Sig corp new	New signal corp utilities	0.40	4	31 (flesh)
- 39 Sewer exist	Existing sewer utilities	0.25	4	142 (blue)
- 39 Sewer new	New sewer utilities	0.40	4	142 (blue)
40 Gas exist	Existing gas utilities	0.25	4	33 (tan)
- 40 Gas new	New gas utilities	0.40	4	33 (tan)
40 Cable exist	Existing cable utilities	0.25	4	222 (dark pink)
- 40 Cable new	New cable utilities	0.40	4	222 (dark pink)

Figure 5b.14 Linetypes Highway Design Section

	LAYER	DESCRIPTION	<u>LW</u> (mm)	<u>LT</u>	COLOR
	40 Fiberop exist	New fiber optic utilities	0.25	4	220 (hot pink)
	40 Fiberop new	New fiber optic utilities	0.40	4	220 (hot pink)
$-\cdots,-\cdots,-\cdots,-\cdots,-\cdots,-\cdots,\cdots,\cdots,\cdots,\cdots$	40 Msc util A exist	Existing miscellaneous utility	0.25	4	161 (lt purple)
_ · _ · _ · _ · _ · _ · _ · _ · _ · _ ·	40 Msc util A new	Existing miscellaneous utility	0.40	4	161 (lt purple)
ب ، کہ کہ کہ خدہ کہ کہ کہ ایک ہے والے وگ	40 Msc util B exist	Existing miscellaneous utility	0.25	4	161 (ll purple)
· · · · · · · · · · · · · · · · · · ·	40 Msc util B new	Existing miscellaneous utility	0.40	4	161 (It purple)
	41 Drain exist	Existing drain	0.25	2	61 (lt. lime)
·	42 Drain new	New drain	0.40	Continuous	61 (lt. lime)
	43 Sprinkler exist	Existing sprinkler system	0.25	2	131 (very lt. blue)
	43 Sprinkler new	New sprinkler system	0.40	2	131 (very it. blue)
	44 Landscape exist	Existing landscaping	0.25	2	71 (chartreuse)
	44 Landscape new	New landscaping	0.40	2	71 (chartreuse)
	45 Fence exist	Existing fence	0.25	7	252 (gray)
	45 Fence new	New fence	0.40	7	252 (gray)
	46 Boundary pts	Boundary points	0.25	Continuous	254 (white)
	48 Grid minor	Minor grid lines	0.00	Continuous	7 (bright white)
	49 Grid major	Major grid lines	0.00	Continuous	7 (bright white)
	49 Topo H20	Topographic water shots (streams lakes, ocean, etc.)	0.25	2	131 (very lt. blue)
	50 Users	User discretion	0.00	Continuous	7 (bright white)
	51 Pt elev	Point elevations	0.00	Continuous	7 (bright white)
	52 St plan grd	Cadastral State Plane Grids	0.09	Continuous	20 (orange)
	53 Geode grd	Geodetic grids	0.09	Continuous	1 (red)

Figure 5b.15 Linetypes Highway Design Section

LA	YER	DESCRIPTION	<u>LW</u> (mm)	<u>LT</u>	COLOR
54	Grdrail exist	Existing guardrail	0.25	3	231 (lt. pink)
	Grdrail new	New guardrail	0.40	Continuous	231 (lt. pink)
55	Pvt mark exist	Existing pavement marking	0.25	Continuous	2 (yellow)
55	Pvt makr new	New pavement marking	0.40	Continuous	2 (yellow)
56	Traf sign exist	Existing traffic signs	0.25	Continuous	254 (white)
56	Traf sign new	New traffic signs	0.40	Continuous	254 (white)
57	Traf signal exist	Existing traffic signal	0.25	2	31 (flesh)
57	Traf signal new	New traffic signal	0.40	Continuous	31 (flesh)
58	Hwy light exist	Existing highway lighting	0.25	2	1 (red)
	Hwy light new	New highway lighting	0.40	Continuous	1 (red)
59	Traf control	Traffic control	0.40	Continuous	20 (orange)
60	Border sht	Border sheet (cell)	0.40	Continuous	7 (bright white)
61	As-built post	As-built postings	0.40	Continuous	220 (hot pink)
62	Half size label	Half-size label (cell)	0.00	Continuous	7 (bright white)
62	Half size ticks	Ticks for half-size plans	0.09	Continuous	93 (med green)
Po	int info	Point description, Northing and Easting	0.25	Continuous	1 (red)
GP	s	Global positioning system	0.25	3	1 (red)
Ra	ilroad	Railroad	0.25	2	71 (chartreuse)
Ma	ass transit	Mass Transit	0.25	2	231 (lt. pink)
Xs	ect grnd exist	Existing ground on cross sections	0.35	2	3 (green)
Xs	ect grnd new	New grade on cross sections	0.50	Continuous	254 (white)

Figure 5b.16 Linetypes Highway Design Section

	LAYER	DESCRIPTION	<u>LW</u> (mm)	<u>LT</u>	COLOR
	Elev pln grnd exist	Existing ground on profile or elevation plans	0.35	2	3 (green)
	Elev pln gmd new	New grade on profile or elevation plans	0.50	Continuous	254 (white)
	Conc exist	Concrete - existing	0.25	1	254 (white)
	Conc exist hid	Concrete – hidden existing	0.25	2	254 (white)
	Conc new	Concrete – new	0.40	Continuous	3 (green)
	Conc new hid	Concrete – hidden new	0.40	2	3 (green)
	Metal exist	Metal – existing	0.25	1	161 (lt. purple)
	Metal exist hid	Metal – hidden existing	0.25	2	161 (lt. purple)
	Metal new	Metal – new	0.40	Continuous	222 (dark pink)
	Metal new hid	Metal – hidden new	0.40	2	222 (lt. pink)
	Wood exist	Wood – existing	0.25	1	41 (lt. mustard)
	Wood exist hid	Wood – hidden existing	0.25	2	41 (lt. mustard)
	Wood new	Wood – new	0.40	Continuous	20 (orange)
	Wood new hid	Wood – hidden new	0.40	2	20 (orange)
	Grade exist	Grade – existing	0.25	3	61 (lt. lime)
	Grade exist hid	Grade – hidden existing	0.25	2	61 (lt. lime)
	Grade new	Grade – new	0.40	Continuous	3 (green)
	Grade new hid	Grade – hidden new	0.40	5	3 (green)
	Reinforc exist	Reinforcing - existing	0.35	3	120 (aqua)
	Reinforc exist hid	Reinforcing - hidden existing	0.35	5	120 (aqua)
r	Reinforc new	Reinforcing - new	0.80	Continuous	254 (white)

Figure 5b.17 Linetypes Highway Design Section

	LAYER	DESCRIPTION	<u>LW</u> (mm)	LT	COLOR
	Reinforc new hid	Reinforcing - hidden new	0.80	5	2 (yellow)
	PMJF exist	Premolded joint filler – existing	0.25	1	252 (gray)
	PMJF exist hid	Premolded joint filler – hidden existing	0.25	2	252 (gray)
·	PMJF new	Premolded joint filler – new	0.40	Continuous	231 (lt. pink)
	PMJF new hid	Premolded joint filler – hidden new	0.40	2	231 (lt. pink)
	Plas blk exist	Plastic block – existing	0.25	1	71 (chartreuse)
	Plas blk exist hid	Plastic block – hidden existing	0.25	2	71 (chartreuse)
·	Plas blk new	Plastic block - new	0.40	Continuous	161 (lt. purple)
	Plas blk new hid	Plastic block – hidden new	0.40	2	161 (lt. purple)
	Saw cut	Saw cut – new	0.25	Continuous	3 (green)
	Saw cut hid	Saw cut – hidden new	0.25	2	3 (green)
	Lim rem	Limits of removal – new	0.40	Continuous	93 (med. green)
	Lim rem hid	Limits of removal – hidden new	0.40	2	93 (med. green)
	Space	Void areas	0.25	1	254 (white)
	Space hid	Hidden void areas	0.25	2	254 (white)
	Crack	Crack	0.80	Continuous	2 (yellow)
	Crack hid	Hidden crack	0.80	2	2 (yellow)
	Conc joint	Concrete joints	0.50	Continuous	3 (green)
	Dim lines	Dimension and leader lines	0.25	Continuous	254 (white)
	Dim text	Dimension text	0.40	Continuous	254 (white)
	Break line	Break line	0.25	Continuous	254 (white)

Figure 5b.18 Linetypes Highway Design Section

	LAYER.	DESCRIPTION	<u>LW</u> (mm)	<u>LT</u>	COLOR
	C1 det 3/8	Centerline for detail 3/8" dash	0.25	4	254 (white)
_ · _ · _ · _ · _ · _ · _ · _ · _ · _ ·	Cl det 1	Centerline for detail 1" dash	0.25	4	254 (white)
	C1 det 5	Centerline for detail 5" dash	0.25	4	5 (flesh)
-	C1 det	Center line for detail	0.25	Continuous	254 (white)
	Section line	Section line	0.60	Continuous	254 (white)
	Section line	Section line dor contract plans: detail dtype drawings	0.50	Continuous	254 (white)
	Weld	Weld symbol	0.40	Continuous	254 (white)
	Pattern exist	Existing fill patterns	0.09	Continuous	220 (hot pink)
	Pattern new	New fill patterns	0.25	Continuous	222 (dark pink)
	Cloud	Cloud for changes	0.80	Continuous	254 (white)
	Match line	Match line	0.60	Continuous	254 (white)
	Drain stl cvr new	New steel drain cover	0.40	Continuous	140 (lt. blue)
	Drain stl cvr exist	Existing steel drain cover	0.40	Continuous	140 (lt. blue)
	Drain fill matl new	New drainage fill material	0.00	Continuous	7 (bright white)
	Drain fill matl exist	Existing drainage fill material	0.00	Continuous	7 (bright white)
	Jnt comp	Joint Compound	0.50	Continuous	220 (hot pink)
507 	AC new	New structural AC work	0.40	Continuous	1 (red)
	AC exist	Existing structural AC work	0.25	Continuous	1 (red)
	PVC new	New structural PVC work	0.40	Continuous	161 (lt. purple)
	PVC exist	Existing PVC work	0.25	Continuous	161 (lt. purple)
	Photogrammetry	Point Clouds, Lidar, etc	0.00	Continuous	7 (bright white)

Figure 5b.19 Linetypes Highway Design Section

Listing 5b.1 Highway Design Section 8 ¹/₂ × 11 Pen Table

```
!"dd811.tbl" r 05/11/94
1
! Design section pen table for plotting 8.5×11 plan
! sheets. Values cut to factor of 10.75/35.0=.30714
Т
!IF (LNAME .NE.'IRAS*') THEN
IF (TYPE .NI. 7,17) THEN
 IF (STYLE .EQ. 0) THEN
   IF (COLOR .EQ. 33) THEN
      STYLE = (0.307143, 0.028795)
   ELSE
     STYLE = 0
   ENDIF
 ELSE IF (STYLE .EQ. 1) THEN
   STYLE = (0.00960, 0.00960)
  ELSE IF (STYLE .EQ. 2) THEN
   IF (COLOR .EQ. 2) THEN
     STYLE = (0.05375, 0.02304)
   ELSE IF (COLOR .EQ. 19) THEN
     STYLE = (0.05375, 0.023036)
   ELSE
     STYLE = (0.01920, 0.01920)
   ENDIF
  ELSE IF (STYLE .EQ. 3) THEN
    IF (COLOR .EQ. 32) THEN
     STYLE = (0.153571, 0.028795)
   ELSE
     STYLE = (0.03839, 0.03839)
   ENDIF
  ELSE IF (STYLE .EQ. 4) THEN
   IF (COLOR .EQ. 16) THEN
     STYLE = (0.07679, 0.03071)
   ELSE IF (COLOR .EQ. 23) THEN
     STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 24) THEN
     STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 22) THEN
     STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 13) THEN
      STYLE = (0.30714, 0.04607)
   ELSE IF (COLOR .EQ. 8) THEN
     STYLE = (0.30714, 0.04607)
ELSE IF (COLOR .EQ. 15) THEN
     STYLE = (0.30714, 0.04607)
   ELSE
     STYLE = (0.03071, 0.01920, 0.00960, 0.01920)
   ENDIF
  ELSE IF (STYLE .EQ. 5) THEN
   STYLE = (0.11518, 0.01920)
  ELSE IF (STYLE .EQ. 6) THEN
   IF (COLOR .EQ. 1) THEN
     STYLE = (0.76786, 0.03071, 0.06143, 0.03071, 0.06143, 0.03071)
   ELSE IF (COLOR .EQ. 6) THEN
     STYLE = (.307143, .03839)
   ELSE
     STYLE = (0.03839, 0.01904, 0.00921, 0.01904, 0.00921, 0.01904)
   ENDIF
  ELSE IF (STYLE .EQ. 7) THEN
   STYLE = (0.03839, 0.01382, 0.01904, 0.01382)
 ENDIF
ENDIF
!
!Weights are approximate
1
IF (WEIGHT .LE. 2) THEN
 THICKNESS = .00250
ELSE IF (WEIGHT .LE. 5) THEN
 THICKNESS = .00500
ELSE IF (WEIGHT .LE. 8) THEN
```

THICKNESS = .00750ELSE IF (WEIGHT .LE. 12) THEN THICKNESS = .01000 ELSE IF (WEIGHT .LE. 15) THEN THICKNESS = .01250ELSE IF (WEIGHT .LE. 18) THEN THICKNESS = .01500 ELSE IF (WEIGHT .LE. 21) THEN THICKNESS = .01750 ELSE IF (WEIGHT .LE. 25) THEN THICKNESS = .02000 ELSE IF (WEIGHT .LE. 28) THEN THICKNESS = .02250 ELSE THICKNESS = .02500 ENDIF !ENDIF

Listing 5b.2 Highway Design Half Size Pen Table

```
!"halfdd.tbl" r 05/11/94
1
  Pentable for Half size plots.
!
  Half-size line styles not exactly half the width of the full-size plots
1
!IF (LNAME .NE. 'IRAS*') THEN
                                   !Use table if not raster(Type 87/88)elements
IF (TYPE .NI. 7,17) THEN
                                    !Use styles if not text-nodes or text
 IF (STYLE .EO. 0) THEN
   IF (COLOR .EQ. 33) THEN
     STYLE = (0.5, 0.046875)
                                    ! NEW CUT AND FILL
   ELSE
     STYLE = 0
                                     ! DEFAULT LINESTYLE LC=0
   ENDIF
  ELSE IF (STYLE .EQ. 1) THEN
   STYLE = (.015625, .015625)
                                    ! DEFAULT LINESTYLE LC=1!
 ELSE IF (STYLE .EQ. 2) THEN
   IF (COLOR .EQ. 2) THEN
     STYLE = (0.0875, 0.0375)
                                    ! EXIST. EP/CURB/GUTTER/SIDEWALK
   ELSE IF (COLOR .EQ. 19) THEN
     STYLE = (0.0875, 0.0375)
                                    ! BRIDGES
   ELSE
     STYLE = (.03125, .03125)
                                    ! DEFAULT LINESTYLE LC=2
   ENDIF
  ELSE IF (STYLE .EQ. 3) THEN
   IF (COLOR .EQ. 32) THEN
     STYLE = (0.25, 0.046875)
                                    ! SUPERELEVATION
   ELSE
     STYLE = (.0625, .0625)
                                    ! DEFAULT LINESTYLE LC=3
   ENDIF
 ELSE IF (STYLE .EQ. 4) THEN
   IF (COLOR .EQ. 16) THEN
     STYLE = (0.125, 0.05)
                                   ! WATER LINE LINESTYLE
   ELSE IF (COLOR .EQ. 23) THEN
                                  ! SEWER LINE LINESTYLE
     STYLE = (.5, 0.075)
    ELSE IF (COLOR .EQ. 24) THEN
     STYLE = (.5, 0.075)
                                  ! ELECTRIC LINE LINESTYLE
   ELSE IF (COLOR .EQ. 22) THEN
                                  ! TELEPHONE LINE LINESTYLE
     STYLE = (.5, 0.075)
   ELSE IF (COLOR .EQ. 13) THEN
     STYLE = (.5, 0.075)
                                  ! DRAIN LINE LINESTYLE
   ELSE IF (COLOR .EQ. 8) THEN
     STYLE = (.5, 0.075)
                                 ! GAS LINE LINESTYLE
   ELSE IF (COLOR .EQ. 15) THEN
    STYLE = (.5, 0.075)
                                  ! MISC. UTIL. LINE LINESTYLE
   ELSE
     STYLE = (.05, .03125, .015625, .03125) ! DEFAULT LINESTYLE LC=4
   ENDIF
  ELSE IF (STYLE .EQ. 5) THEN
   STYLE = (.1875, .03125)
                                    ! DEFAULT LINESTYLE LC=5
  ELSE IF (STYLE .EQ. 6) THEN
   IF (COLOR .EQ. 1) THEN
     STYLE = (1.25, .05, .1, .05, .1, .05)
                                                   ! RW LINE LINESTYLE
   ELSE IF (COLOR .EQ. 6) THEN
     STYLE = (.5, .0625)
                                                 !CONSTRUCTION PARCEL
   ELSE
     STYLE = (.0625, .031, .015, .031, .015, .031) ! DEFAULT LINESTYLE LC=6
   ENDIF
 ELSE IF (STYLE .EQ. 7) THEN
   STYLE = (.0625, .0225, .031, .0225) ! DEFAULT LINESTYLE LC=7
 ENDIF
ENDIF
1
IF (WEIGHT .EQ. 0) THEN ! f/s wt=0 matched to wt=0 on laser for h/s
 THICKNESS = 0.0025
ELSE IF (WEIGHT .IN. 1,2) THEN !f/s wt=1,2 matched to wt=1 on laser for h/s
 THICKNESS = 0.0050
ELSE IF (WEIGHT .IN. 3,4) THEN If/s wt=3,4 matched to wt=2 on laser h/s
 THICKNESS = 0.0075
```

ELSE IF (WEIGHT .IN. 5 THICKNESS = 0.0100	5,6) THEN	!f/s wt=5,6 ma	tched to wt	=3 on lase	r h/s
ELSE IF (WEIGHT .IN. 7	7,8) THEN	!f/s wt=7,8 ma	tched to wt	=4 on lase	r h/s
ELSE IF (WEIGHT .IN. 9	,10) THEN !:	f/s wt=9,10 ma	tched to wt	=5 on lase	r h/s
THICKNESS = 0.0150 ELSE IF (WEIGHT .IN. 1	1,12) THEN	!f/s wt=11,12	matched to	wt=6 on la	ser h/s
THICKNESS = 0.0175					
ELSE IF (WEIGHT .IN. 1	3,14) THEN	!f/s wt=13,14	matched to w	wt=7 on la	ser h/s
THICKNESS = 0.0200					
ELSE IF (WEIGHT .IN. 1	5,16) THEN	!f/s wt=15,16	matched to	wt=8 on l	aser h/s
THICKNESS = 0.0225					
ELSE IF (WEIGHT .IN. 1	7,18) THEN	!f/s wt=17,18	matched to w	wt=9 on la	ser h/s
THICKNESS = 0.0250					
ELSE IF (WEIGHT .IN. 1	9,20) THEN	!t/s wt=19,20	matched to	wt=10 on 1	aser h/s
THICKNESS = 0.0275					
ELSE IF (WEIGHT .IN. 2	21,22) THEN	!i/s wt=21,22	matched to w	wt=11 on 1	aser h/s
THICKNESS = 0.0300					
ELSE IF (WEIGHT .IN. 2	23,24) THEN	!1/s wt=23,24	matched to w	wt=12 on 1	aser h/s
THICKNESS = 0.0325					
ELSE IF (WEIGHT .IN. 2	25,26) THEN	!f/s wt=25,26	matched to w	wt=13 on 1	aser h/s
THICKNESS = 0.0350					
ELSE IF (WEIGHT .IN. 2	27,28) THEN	!1/s wt=27,28	matched to	wt=14 on 1	aser h/s
THICKNESS = 0.0375					, ,
ELSE IF (WEIGHT .IN. 2 THICKNESS = 0 0400	29,30) THEN	!t/s wt=29,30	matched to w	wt=15 on 1	aser h/s
ELSE IF (WEIGHT .EO. 3	31) THEN !f/s	s wt=31 matche	d to wt=16	on laser h	/s
THICKNESS = 0.0425					, -
ELSE					
THICKNESS = 0.0025					
ENDIF					
!ENDIF					



Figure 5b.20 Linestyles Bridge Design Section

6 **Procedures for Developing CADD Drawings**

6.1 Base Plan Drawings:

6.1.1 Creating Base Plans from "As-Built" Drawings

The Project Manager researches the as-built plans for project limits. The Project Engineer will inform the Drafting Technician of the project limits. Thereafter, the Drafting Technician will obtain a copy of the Route Master baseline alignment with the existing data from the as-built plans. CADD Office (HWY-EE) will store the original master baseline alignment of all State Highway Routes.

The Project Engineer is responsible to give a copy of the base plan file to the support sections as soon as possible so they can begin their design and create their CADD Contract Plans. The base plan need not be fully completed when given to the support sections, however, the Project Engineer should inform the support sections of any changes to the base plan file and give them a copy of the revised base plan file. The base plan file is used as a Reference file when creating the Contract Plan sheets.

6.1.2 Creating Base Plans from Topographic Survey

When a topographic survey is taken, it can be used to develop the base plan. If an automated topographic survey with the total station is done, the base plan will be created automatically with the MGE/ETI and Inroads/Insurv software. This file will be used as the base plan and converted to a 2-D file and the above procedures followed.

If the survey was done manually, then the topographic points and features will have to be input by a Command File (See the 'Procedural Manual For Creating An Alignment and/or Topo Data Using the Inroads/Insurv Program') into the Inroads/Insurv software to create the base plan file. This file will be then used as the base plan and converted to a 2-D file and the above procedures followed.

6.2 Contract Plan Sheet Drawings

6.2.1 General

Each Contract Plan Sheet shall be drawn in a separate CADD file. The CADD Contract Plan Sheet files shall be named in accordance with 'Section 5.02 – Naming Convention For CADD Files' and shall be documented in accordance with 'Section 5.04 – File Documentation' of the CADD Procedures Manual. The level and symbology of all elements and text shall be in accordance with Chapter 5a, MicroStation Computer-Aided Drafting Protocols, and Chapter 5b, AutoCAD Computer-Aided Drafting Protocols.

The CADD user shall be responsible for creating the CADD drawings and keeping track of all CADD Contract Plan Sheet files. The CADD user shall create a project sub-directory in his login directory to store all the project files. The sub-directory shall be named the first four (4) characters in the 'Working Filename'. All files shall stay in the CADD user's directory until bids are opened.

6.2.2 Storing of CADD Drawings After The Contract is Awarded

After Bids are opened and the contract is awarded, the Project Manager shall compile the 'CADD Filenames For Project Plans' forms from all the respective offices that did CADD work for the project. The listing shall include all project CADD files that need to be retained. The CADD Office will temporarily archive these files until time of Contract Change Orders or As-Built postings. Prior to the CADD Office moving the CADD files from the user's directory to the temporary archive, the following **SHALL** be done by the CADD user:

- Documentation of CADD files
- For Contract Plan Sheet files, the following views shall be saved:
 - View named 'plot', which is the exact copy of the original hard copy plot and set up for a full size plot. The view 'plot' should be saved in View 1.
 - View named 'hplot', which is the exact copy of the original hard copy plot and set up for an actual half size plot with the half size decal placed in the plan sheet. The view 'hplot' should be saved in View 5.

NOTE: Only Views 1 and 5 should be active, with View 1 on the right screen and View 5 on the left screen.

- If a corrupted file is encountered, contact the CADD Office (HWY-EE).
- With the 'plot' view in View 1 and the 'hplot' or 'ahplot' view in View 5, select the <u>File Design</u> command.
- Select the <u>Compress</u> command to compress the file.

NOTE: It is the user's responsibility as to the accuracy and contents of the CADD file.

The CADD Office will copy all the Project files from the User's directory to a holding place on the network. After the files are copied, the CADD Office will inform the user so these files can be deleted from the User's directory. The files will be write protected so no one can change these files.

The files will be in the following directories:

```
bidop1
bidop2
.
bidopn
```

The project subdirectory will be the assigned 4 digits for the CADD working filename. For projects that do not have an assigned 4 digit, the CADD Office will create a unique name for the subdirectory.

All workstations in the Department of Transportation (DOT) Network will be able to access the above directories and can view and plot these files. These Files will be write protected so no modifications can be made to them.

6.2.3 Recalling CADD Drawings for Contract Change Orders

The Project Manager shall contact the CADD System Engineer if a CADD File is needed for Contract Change Orders. The CADD System Engineer will give the Project Manager the information so he can copy the necessary CADD Files to the users directory. After the Change Order is completed, the Project Manager shall contact the CADD System Engineer and send the file to the designated directory.

6.3 Posting As-Built CADD Contract Plan Sheet Files.

6.3.1 General

The Highway Design Section (HWY-DD) will be responsible for coordinating the posting of CADD As-Built. Each Section and/or Branch that created the CADD drawing will be responsible to post their revisions, unless there are only minor revisions, at which time HWY-DD will do posting of all revisions.

The Project Manager shall contact the CADD Office and request to have the Project CADD Files moved to a working login called 'hwywrk'. The 'hwywrk' directory is accessible to all workstations in the DOT Network. A Project subdirectory will be created under 'hwywrk' and all the Project CADD Files will be copied to that directory from the 'bidopn' directory.

All CADD As-Built Postings shall conform to the following:

- AS-BUILT CELL LIBRARY: For posting As-Built, the 'asbuilt.cel' shall be used.
- **LEVEL:** Level 61 will be used for posting As-Built changes.
- COLOR: Color 29 will be used for all text, numerals and elements.
- **WEIGHT:** Weight 4 will be used.
- **FONT:** Font 2 will be used for text and numerals.

Note: Modify the Text Width because Font 2 is wider than the fonts used for creating the drawings.

- DELETIONS: A double solid line will be used for deleting text and numerals. A squiggly line will be used for other type of deletions.
- LEGEND: An 'As-Built Legend' will be placed on each CADD Plan Sheet that had revisions to the drawing. For plan sheets that had changes made, a new vellum print shall be made to replace the original vellum contract plan sheet. If no changes were made to the plan sheet, a vellum print need not be made.
- **TITLE SHEET AS-BUILT NOTES:** The As-Built Note and Signature of the Resident Engineer will be **placed on the Title Sheet. This part will be done manually.**

6.3.2 Contract Plan Sheets with Reference Files Attached

All CADD Contract Plan Sheets that have reference files attached shall have all elements on the reference files copied to the CADD Contract Plan Sheet file. This is required so that all the information on the Contract Plan Sheet is on one CADD file. Also, all elements outside the border, except for the documentation shall be deleted.

The following procedures should be used when copying the reference file to the active file and deleting elements outside the border:

• Set <u>lv=63</u> and turn off all levels.

Note: If there are elements on the active file within the Fence limits, these elements together with the reference file elements will be copied when activating the Fence Copy command and you will have duplicate elements.

- Check the References. Check if the 'Locate' is on for all reference files to be copied. If the locate is off, toggle it to on.
- Place a Fence around the limits of the reference file to be copied and select the <u>Fence Contents</u> <u>Clip</u> command to enable the Clip Lock.
- Select the <u>Fence Copy</u> Command and 'Define Origin' with a <D> anywhere in the view. Key in '<u>dl=0,0</u>' (This will copy the Reference File elements to the same location in the Active File).
- Select the <u>Reference File Display Off</u> command and key in <u>all</u> to turn off the display of all Reference Files.
- Turn on all levels of the active file. Check the file to see if the Reference File elements copied over to the Active File.
- Check to see if there are any elements outside the border sheet and delete those elements.
- Delete all elements on level 50, except the documentation.
- Check to see if the views 'plot' and 'hplot' have been saved ('aplot' should also be saved for files with 22" × 36" border). If not, save those views with 'plot' in View 1 and 'hplot' in View 5.
- Make a full size plot and check the print if all elements of the reference file were copied over and the print is the same as the Contract Plan Sheet.
- If everything is OK, detach all Reference Files.
- Put the 'plot' view in View 1 and the 'hplot' or 'ahplot' view in View 5, select the <u>File Design</u> command.
- Select the <u>Compress</u> command to compress the file.

6.3.3 Contract Plan Sheets with No Reference Files Attached

All CADD Contract Plan Sheets that have no reference files attached shall have all objects outside the border, except for the documentation, deleted from the file. Follow the above procedures.

6.4 Archiving As-Built CADD Contract Plan Sheet Files

6.4.1 General

Prior to archiving, all CADD files shall be checked by the users in accordance with paragraph 6.3 Posting As-Built CADD Contract Plan Sheet Files to assure that all elements and text conform to the CADD standards, have the correct symbology and are on the correct levels.

The Project Manager shall be responsible to inform the CADD Office when the CADD As-Built have been posted and are ready to be archived.

The CADD Office will copy all the Project files from the 'hwywrk' login to the archival directory. After the files are copied, the CADD Office will delete the files from the 'hwywrk' login. The files in the archival logins will be write protected so no one can modify these files.

The files will be in the following directory:

```
arch1
arch2
.
.
archn
```

Each directory will have Island subdirectories and Project subdirectories under them, where all the files for that project will reside.

All workstations in the DOT Network will be able to access the above directories and can view and plot these files. These Files will be write protected so no modifications can be made to them.

The CADD Office will keep a record of all the above logins, the subdirectories and the project files and cross references of the CADD filename to the Contract Plan Sheet Numbers.

7 Cadastral Engineering Mapping Guidelines

7.1 Purpose

The Mapping Unit of the Cadastral Engineering Section is responsible for the preparation of the right-ofway maps. The right-of-way maps shall be prepared in a professional manner to the highest applicable standard of cadastral engineering. It shall be appropriately executed to promote clarity and uniformity and shall be prepared to adequately fulfill the following intentions, purposes and uses:

- **Recording instrument** for showing accurately and clearly the right-of-way requirements in detail.
- Federal Highway Administration (FHWA) for approval of final right-of-way requirements of federal aid highways projects.
- Cadastral for reference of survey and mapping data.
- Abstract for land title examination of search.
- **Design** for final right-of-way data and additional topographic information.
- **Appraisal** for aid in establishing the fair market value of land to be acquired including any damage to remainder lands.
- Acquisition for negotiating with property owners.
- **Condemnation** for exhibits in court actions.
- **Construction** for locating and staking out points, boundaries and physical features.

7.2 Preparation of Title Sheet

Title sheets for standard full-sized right-of-way shall be prepared for all projects. Title sheets shall be designed as sheet 1 of the right-of- way maps (Figure 7.1).

Size and Form. Title sheet shall conform to the size and the general format of the right-of-way map.

Title.

- Title shall include: State of Hawaii, Department of Transportation, Highways Division, Honolulu, Hawaii, right-of-way maps of project title, project number, district and island.
- Both seals of the State of Hawaii and the Department of Transportation shall be shown near the top of the title.

Legend. List of conventions and symbols for the right-of-way maps shall be placed on the upper left corner of the sheet (Figure 7.2).

Island Map. The island map shall be positioned at the upper right corner of the sheet along with the scale and North arrow. The location of the project in relations to sketch shall be indicated and labeled.



Figure 7.1 Right-of-Way Map Title Sheet

	LEGEND
	Proposed Right-of-Way
	Centerline or Baseline
<u></u>	Limit-of-Slope Line
<u></u> .	Control-of-Access Line (Special conditions are noted on Map
	Original BoundaryDistrict, Grant, L.C. Aw. Ld. Ct. Appl.,etc.
	Property LinesFile plans, Subdivisions, Existing R/W.
	Easement Lines
	Wire fence
-1-1-1-	Other fence
-9	Guard rail
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Stone wall
	Tile wall
Current	Hedge
مين نسيين ميند	Edge of cultivated area
XXX	Palm trees
$\odot \odot \odot$	Trees
	Stream
	Building
	Bridge, culvert
Â	Triangulation station
The the the	Natural slope
لبصة أسم أصلك	Cut slope
+++++++++++++++++++++++++++++++++++++++	Railroad
	Sand
=====:	Existing roadway
0	Street monument
đ	Fire hydrant
W	Water main
75	Contour lines
	Concrete
o	Boundary pipe, boundary monument, telephone pole, electric pole, power pole, sewer manhole, telephone manhole, water manhole, water valve as noted.
alle ally when	Marsh, swamp
	Highwater mark
(36)	Right of way parcel designation

# RIGHT-OF-WAY MAP LEGEND

### Figure 7.2 Right-of-Way Map Legend

**Project Alignment.** The map showing the project alignment and the surrounding area shall be properly positioned on the sheet. The point of the beginning and end of the project shall be indicated. The North arrow and the scale of the maps shall be shown.

**Signature Block.** A block for the signatures and date of both Cadastral Engineer and Design Branch Head for Highways Administrator of the Department of Transportation shall be positioned on the lower right corner of the sheet.*

### Miscellaneous Data.

- The assigned pigeon hole (PH) for the project shall be noted in the margin of the lower right corner of the sheet.
- Sheet 1 of __ Sheets of the right-of-way maps shall be noted.

### 7.3 Standards and Requirements – Size of Map (Figure 7.3)

- The map shall be plotted on 4 mil double matte inkjet mylar for inkjet plotter or 4 mil double matte mylar for pen plotter, having an overall width from top to bottom of 22 inches and an overall length of 36 inches.
- Border lines shall be so placed on all sheets as to provide a binding margin two (2) inches wide on the left edge and a margin of one-half inch on each of the remaining three edges.

**Scale.** Scale for the right-of-way map shall be appropriate to the project. Scales of 40, 50, 100 and 200 are most often used.

### Title Block.

- The title block shall be positioned on the lower right hand corner of the map.
- Information to be included in the block: State of Hawaii, Department of Transportation, Highways Division, Right-of-Way Map, name of project, project number, location of project, date, graphic scale, space for signatures of Cadastral Engineer and Design Branch Head for Highways Administrator (Figure 7.4).
  - Space and signature of Cadastral Engineer shall be omitted for plans prepared by consultants.

### **Revision Block.**

- The revision block shall be positioned to the left of and near the title block.
- In the revisions, initials or signature and date for Highways Administrator or his assigns.

Notes. The note shall be positioned at the lower left corner of the sheet and shall include the following data:

- Origin of azimuths
- Coordinates referred to (Figure 7.5)

**Reference Block.** The reference block shall be positioned in the binding margin on the lower left of the sheet and shall include the following data (Figure 7.6):

- Project Engineer
- Field Chief
- Computer
- Plotter
- Drafting Technician
- Rack Number
- Data Folder
- Field Books
- Calc. Folder
- Work Sheet Number
- Certificate Folder
- Description Folder

### Other References.

- Tax Map Key shall be placed in the margin of the lower left corner of the map.
- PH number shall be placed in the margin of the lower right corner of the map.
- Size of the map  $(22'' \times 36'' = 5.5$  square feet) shall be noted in the margin below the title block.

### Layout and Orientation of Tracings.

- The right-of-way maps shall be orientated to show the baseline stationing from left to right.
- North arrow shall point toward the top edge of the map wherever possible. The more important map data shall be appropriately emphasized for ready identification.
- All elements of the map shall be arranged and positioned within the standard size format to form a visually pleasing and balanced map.

**Right-of-Way** (Strip) Map. Standard size map divided into two or more strips shall be used, when appropriate, to show portions of the highway whose alignment is relatively straight with few mapping details.

**North Arrow.** A simple conventional north arrow shall be placed in an appropriate position preferably near the upper right corner of the map (Figure 7.7).

**Grids.** One-and-one half inch (1-1/2") grids shall be placed 10" apart and a line one inch (1") in length indicating the coordinates shall be placed at each border.

**Conventions and Symbols.** Accepted conventions and symbols shall be used for the right-of-way maps (Figure 7.2).



Figure 7.3 Right-of-Way Map Plan Sheet

	STATE OF HAWAII	0.05.00.000
DEPARTMEN	T OF TRANS	SPORTATION
RIGHT	OF WAY	MAP
HONOLULU, HAWAII		
APPROVED:	APPROVED:	
CADASTRAL ENGINEER	FOR: ADMINISTR	ATOR HIGHWAYS DIVISIO

## TITLE MAP



### SAMPLE

### RIGHT-OF-WAY MAP TITLE BLOCK DESCRIPTION

FIGURE 7.4

### Figure 7.4 Right-of-Way Map Title Block Description

Cadastral Engineering Mapping Guidelines

NOTE: Origin of Azimuths: Coordinates referred to: _______ Denotes access permitted _______ Denotes no vehicle access permitted _______ Denotes no access permitted _______ Denotes limited access as noted on plan

# RIGHT-OF-WAY MAP SHEET NOTES

PROJ. ENGINEER	DATA FLDR.	
FIELD CHIEF	FIELD BOOKS	
COMPUTER	CALC. FLDR.	
PLOTTER	W.S. NO.	
DRAFTSMAN	CERT. FLDR.	
CK'D BY	DESC. FLDR.	

### REFERENCE BLOCK

PROJ. ENGINEER G.G.	DATA FLDR. 839, 839-A
FIELD CHIEF G.G.	FIELD BOOKS 406, 406-A
COMPUTER	CALC. FLDR. 572, 572-A, 572-B
PLOTTER T.H.	W.S. NO.
DRAFTSMAN H.F., A.L., J.W.	CERT. FLDR.
CK'D BY G.G.	DESC. FLDR. 536

SAMPLE

## RIGHT-OF-WAY MAP REFERENCE BLOCK DESCRIPTION

FIGURE 7.6

Figure 7.5 Right-of-Way Map Sheet Notes

Γ

PROJ. ENGINEER FIELD CHIEF COMPUTER PLOTTER DRAFTSMAN CK/D BY	DATA FLDR FIELD BOOKS QALC, FLDR W.S. NO CERT, FLDR DESC, FLDR
REFE	RENCE BLOCK
PROJ. ENGINEER G.G.	DATA FLDR. 839, 839-A
COMPUTERT.H.	CALC. FLDR. 572, 572-A, 572-B
PLOTTERT.H.	W.S. NO
DRAFTSMAN H.F. A.L. J.W.	DESC FLDR 536
CKU BY G.G.	DEDGITEDIT. 550
	SAMPLE
CKU BY5.5_	SAMPLE
UKU BY	SAMPLE
	SAMPLE
RIGHT	SAMPLE -OF-WAY MAP
RIGHT	SAMPLE -OF-WAY MAP
REFERENCE	SAMPLE -OF-WAY MAP BLOCK DESCRIPTION
REFERENCE	SAMPLE -OF-WAY MAP BLOCK DESCRIPTION

Figure 7.6 Right-of-Way Map Reference Block Description

True North

# RIGHT-OF-WAY MAP NORTH ARROW

FIGURE 7.7

Figure 7.7 Right-of-Way Map North Arrow

### **Insets or Enlargements.**

- Insets shall be used when a portion of the drawing is either excessively congested, not clear, confusing, ambiguous or difficult to interpret.
- Insets shall be placed in an available space that is as close as possible to that portion of the drawing to be enlarged.
- Scales for the insets shall be appropriate for a clear presentation of data.
- Portion of the drawing to be enlarged shall be marked with a border of heavy dash lines (rectangular or circular) and appropriately labeled: "See Inset", "See Inset A", etc.
- Border of inset
  - Heavy dashed line shall be used when the north arrow of the enlargement and the map is the same.
  - Heavy Solid line shall be used when the north arrow of the enlargement and the map is not in the same alignment.
- Not to Scale Insets
  - Not to scale insets shall be used to show long slivers, congested or complicated areas, minute features and where it is more practical and comprehensible to use a scaled enlargement.
  - The inset shall have a minimum of distortion.

**Overlapping of Multiple Sheets.** Sufficient overlap shall be provided to orient one map with the next but not excessive to unnecessarily duplicate portions of drawings.

### Numbering of Sheets.

- Right-of-way tracings shall be numbered consecutively.
- Each sheets shall be noted Sheet ____ of ____ Sheets with appropriate figures inserted in the blank spaces.
- Any additional or supplemental sheet shall be designated Supplemental Sheet, followed by the number of the sheet it is supplementing with an alphabet (e.g., "SUPPLEMENTARY SHEET 2-A"). The total number of sheets shall be changed accordingly.

### Lettering.

- The requirements for lettering shall be legibility.
- Lettering of the inclined type shall have a slant to the right (font = 28). This type of lettering is used basically for all general text.
- General text when plotted measures 1/10".
- Vertical lettering shall be used for titles and wherever appropriate.
- Different weights and sizes of lettering shall be used to distinguish the various features of the map such as metes and bounds, land titles and districts.
- Lettering shall be sufficiently legible when reduced to half size.

- Lettering Layout
  - Lettering shall be parallel as possible with the bottom of the map.
  - Lettering for districts and land titles shall be appropriately positioned within the applicable boundaries and outside of Highway Right-of-Way.
  - Lettering at right angles to the bottom of the map shall be read from the bottom to the top.
  - Lettering that is diagonal to the bottom of the map shall be read from left to right.

### Dimensioning.

- Methods of dimensioning the right-of-way maps shall follow established mapping practices to produce effective maps that are clear, orderly, easily read and interpreted.
- A small circle is placed and cleared of intersecting lines at corners and where the azimuth changes when describing a parcel or lot.
- Dimensioning shall be arranged to be read from the bottom or from the right side of the map. Reading from the bottom is preferred.
- Right-of-way lines shall have the priority when dimensioning.
- Azimuths and distances aligned along the boundaries shall be printed generally to the center of the line being described. An arrow indicating direction of the azimuth shall be positioned between the azimuth and the distance of the right of the azimuth (Figure 7.8).
- Lettering size for the dimensions shall be appropriate to the scale of the map, the configuration of the parcels, and the amount of details in the given vicinity. Size of dimensions shall be sufficiently legible when reduced to half size.

### Parcels.

- All parcels along and within the highway right-of-way to be acquired shall be numbered consecutively, beginning at the left of the first sheet. The parcel numbers shall be circled and placed in or near the parcel to be taken together with the area. The area shall be in square feet and/or acre.
- When only a portion of a piece of land is required for the highway project, the Right-of-Way Branch will inform the Cadastral Section whether or not a remainder is to be classified as uneconomic. The uneconomic remainders shall be designated with an "A" and "B" coincident with the parcel number of the land, i.e., uneconomic remainder adjacent to Parcel 8 shall be designed as Parcel 8-A together with the area.

**Remainders (Parcel).** Remainders that are not classified as uneconomic remainders shall show metes and bounds if available and space permits. These remainders shall be labeled "Remainder of Parcel _____" together with the area.

**Remnants** (**Road**). Portions of land within the existing highway that becomes surplus to the right-of-way requirements and is to be sold transferred, shall be labeled REMNANT and designated with a number preceded by the letter "R". Example: Remnant R-3. When space is limited, the abbreviation REMN. shall be used.



### Figure 7.8 Dimensioning Cadastral Maps

#### Cadastral Engineering Mapping Guidelines

### **Construction Parcel.**

- Construction parcels must be included in the right-of-way map submittal to FHWA. Each parcel will be labeled CONSTRUCTION PARCEL and designated with a number preceded by the letter "C". Example: CONSTRUCTION.
- PARCEL-3. Construction parcels detract from the clarity of the regular tracings, so additional sheets will be made specifically for showing the construction parcels.
- The additional sheets may be sepia prints of the regular tracings but will be numbered consecutively and carry a label "CONSTRUCTION PARCELS" and the standard approval blank.

**Property Lines.** All established and recorded property lines pertinent to the project shall be shown unless they are so far removed from the highway project as to be of no significance.

### Name of Owners.

- Immediate adjacent property on both sides of the right-of-way should be identified by the name of the owner.
- Name of owners shall be shown within the parcels whenever possible. If not possible, the names will be shown as near to the appropriate properties as possible.

**Land Titles.** Land titles shall be shown and arranged on the map to indicate its extent or limit (R.P., L.P., Grant, etc.).

### **District Title.**

- District titles shall be shown and arranged on the map in heavy shadowed lettering to indicate its location.
- Boundary lines between districts shall be appropriately labeled.

### Centerline or Baseline of Right-of-Way.

- The highway centerline or baseline shall be clearly drawn and dimensioned to show its azimuths and distances and curve data including the central angle, radius, tangent length, curve length and chord length.
- Stationing shall be indicated at the beginning and the end of the project with intermediate stationing marked at every 100 feet, and numbered at every five stations or 500 feet, and at every point of tangency (PT) and point of curvature (PC). Stationing shall be appropriately indicated at jogs along the right-of-way.
- Coordinates and references to triangulation stations shall be indicated at the beginning and the end of the project, at P.I.s and appropriate points.
- Sufficient dimensions of the right-of-way widths at PC or PT, and at jogs necessitated by design requirements shall be shown.

**Right-of-Way Line.** The right-of-way line shall be shown by a solid heavy line to clearly indicate the right-of-way boundaries.

Access Control Line. The access control line shall be indicated by the various access control symbols.

### **Control of Access Boundary Designation.**

- Identification by alphabet or number. Length of the boundary shall be shown.
- Boundary length along curves shall be measured by the length of curve.

### Easements.

- Easements shall be consecutively designated either numerically or alphabetically. To differentiate easements in congested areas, an alphabet designating use of easement may precede the easement number.
- Easements to be acquired shall be described by metes and bounds along the centerline or the exterior of the easement. Easement number and purposes shall be designated together with the area. Dash lines shall outline the boundaries of the various easements.

### **Physical Features.**

- Physical characteristics of the land to be acquired shall be noted on the map, including roads and streets, fencing, streams and rivers, structures of all kinds, telephone and power lines, crops, etc., which have bearings on the engineering or economic aspects of land acquisition in the construction of the highway itself or in the ascertainment of the value of the property to be acquired and the resultant damages to the remainder of the parcel. Physical features are considered on a right-of-way map, therefore, should be shown as grey.
- In identifying the physical attributes, the standard symbols, and conventions shall be used. Symbols shall be drawn and labeled for clear identification. Direction of the flow of streams shall be indicated by an arrow that is appropriately placed.
- Government Horizontal and Vertical Survey Control Marks along the project shall be noted on the map to insure their proper identification and location for surveying, engineering, construction and survey mark preservation.

### Limit of Slope.

- The proposed limit of slope shall be shown on the right-of-way plans except when it is adequately depicted on the construction plans or other documents available to the appraiser of partial takings.
- Limits of slope may be shown on a duplicate vellum tracing of the right-of-way plan.

### Non-Standard Size Right-of-Way Maps.

- Non-standard size right-of-way maps shall be made when the size of the project does not require a full size right-of-way tracing.
- The two acceptable map sizes shall be 8-1/2" ×11" and 11" ×18" (Figure 7.9).
- The requirements and general format shall be the same as the standard size right-of-way map.



### Figure 7.9 Non-Standard Right-of-Way Map
## Checking and Reviewing Right-of-Way Maps.

- Right-of-way maps shall be checked by the project engineer with calculations, certificates of search and data for completeness and accuracy.
- Right-of-way maps shall be checked by the mapping supervisor for proper application and execution of mapping techniques, conformity to symbols and conventions and consistency within the project.

**Field Check.** Delineation of all property improvements on right-of-way maps shall be checked in the field by the project engineer for omissions or errors.

**Right-of-Way Maps Prepared by Consultants.** The following notation with a stamped seal of the licensed land surveyor shall be placed to the left of the revision block: "This work was prepared by me or under my supervision."

### Approval of Right-of-Way Maps.

- Upon completion of the right-of-way map of any highway project, the Cadastral Engineering Section Head shall check and approve all tracing prior to submitting to Design Branch Head for approval and signature.
- All approved tracings shall be filed with the Cadastral Engineering Section.

# 7.4 Preparation of Land Court Maps

Land court maps shall be prepared in accordance with the "Rules of the Land Court" adopted and promulgated by the Supreme Court of the State of Hawaii effective December 15, 1989.

### Rules of procedure.

- Maps shall be plotted on 4 mil double matte mylar.
- Maps shall be of the following sizes in inches:
  - 10×15, 15×21, 21×32, 30×36, 36×36, or 36" wide to 72" in length.
- Maps shall be drawn in the following scales: 10, 20, 30, 40, 50, 60 feet to the inch, or any power of ten times the mentioned scales.
- Letters I and O shall <u>not</u> be used to designate lots and when letters are combined with number, I and O shall be skipped.
- A hyphen or dash shall not be used between degrees, minutes or seconds or between courses and distances.
- Two white copies shall be filed with the map.
- Maps shall be in two parts:
  - On the left side the drawing of the plat of the land with true North pointing towards the top edge.
  - On the right side near the top of the map the title of the court, the number and title of the cause and reference to the locality in which the land is situated which shall include the number of the award and name of awardee, or the number of the patent or grant, or other class of original title, and the name of the patentee or grantee, the *ili*, and *ahupuaa*, district and island, and any local name in common use together with a brief general description of the land sufficient to identify the same.

- All writings shall have a space not less than 2/10 of an inch between the written lines.
- The scale to which the plat is drawn shall be noted.
- Sufficient space shall be reserved for signatures, certificates, orders of the court, and other writings.
- As non-contiguous land may be registered under one application, more than one map may be filed under the same number of the several parcels of land may be shown in separate parcels in the same map.
- Inset maps delineating in more detail or on a different scale particular features of the land sought to be registered may be inserted and shown in panels on the map. All insets must include directional north arrow with a solid border.
- One or more supplementary maps may be filed with the original map or at any time prior to the issuance of the decree and shall be indicated by letters of the alphabet, as "Supplemental Map A", Supplemental Map B", etc. When two or more maps are filed, each map shall carry in the lower right-hand corner the notation "Sheet _____ of _____ sheets", with the appropriate figures inserted in the blank spaces.
- Unless otherwise ordered by the court, the description and map shall be referred for check as to form and mathematical correctness to the state land surveyor who shall then make a report of his findings by written return.

# 7.5 Cadastral Drafting Methods

Land Court tracings shall be prepared by using data from the latest applicable recorded map. Drafting methods previously established shall be used as precedent to be consistent within a Land Court Application.

**Selection of Map Size.** The most appropriate map size shall be selected according to the size of the plat of land to be drawn, the date and the title.

**Preparation of 4 Mil Double Matte Mylar.** The tracing cloth or mylar surface shall be adequately prepared with pounce to accept ink type used by design jet printer or comparable.

**Layout of Map.** All parts of the map shall be arranged and appropriately positioned within the standard format.

**Techniques, Conventions and Symbols.** Accepted cadastral mapping techniques and appropriate convention and symbols shall be used to draw up the plat of the land.

Lettering. The style of lettering shall be of the inclined type having a slant to the right.

**Title of Map.** The title of the cause shall be written in a form that is as consistent as possible with the majority of maps filed for the similar action.

**Map Data.** All necessary data shall be included to adequately fulfill the purpose of the tracing and all unnecessary data shall be excluded that tend to complicate, confuse and not contribute to the purpose of the tracing.

**Reference to Right-of-Way Map.** Reference data related to the Highway right-of-way map shall be shown in the center of the lower border of the tracing.

**Seal and Signature of Surveyor.** All finished land court tracings shall be reviewed, stamped with seal and signed by a Registered Professional Land Surveyor possessing a Land Court Certificate. Professional registration number and Land Court registration number shall be noted under the signature.

### **Record of Tracings.**

- On completion of tracing, pertinent data shall be entered into the Land Court index book and tracing appropriately filed.
- When tracing is removed for Land Court filing, the name of the person requesting it and the date shall be noted in the Land Court index book.

# 7.6 Mapping procedures for Land Court Maps

**Original Land Court Registration.** Whenever an unregistered or registered land needs to be filed as an original application in the Land Court, the "Rules of Procedure" adopted by the Land Court shall be adhered to.

## Subdivision of Lots.

- Subdivision of lots shall be made in accordance with the "Rules of Procedure" adopted by the Land Court.
- The title portion of the map shall state "SUBDIVISION OF LOT ____ AS SHOWN ON MAP _____
  INTO LOTS _____".
- The number used for designating a lot shall be the next consecutive number or letter after the last recorded lot number of letter used in the same Land Court Application. Lot number shall be printed in pencil when not filing immediately. A new number shall be given to a lot after the combination of numbers and letters exceeds six (6).
- The area of a lot taken for the highway shall be described in square feet and/or acre. The area of the remainder lot shall be described in the same manner as the original lot.

Consolidation and Resubdivision of Lots. The title portion of the map shall state:

"CONSOLIDATION OF LOTS _____ AS SHOWN ON MAPS _____ AND RESUBDIVISION OF SAID CONSOLIDATION INTO LOTS _____.

### **Designation of Easements.**

- A number, letter or combination not already used in the subject Land Court Application shall be given to the easement for identification purposes. The title portion of the map shall state: "DESIGNATION OF EASEMENT _____ OVER AND ACROSS LOT _____".
- Area of easement shall be noted at the lower left corner of the map.

**Cancellation of Easement.** Cancellation of an entire designated easement shall be by petition. No tracing is necessary. A print of the filed map indicating cancellation of the easement shall be submitted with the petition.

**Deleting of Portion of Easements.** Portion of easements may be cancelled by petition without a Land Court map but with a sketch map showing:

- Portion of the easement to be deleted.
- Metes and bounds, an area of deletion; if given an original designation map number.
- Easement number, Lot number and original designation ma number.

The petition shall specify the Lot number, Map number, and Transfer Certificate of Title number covering the lots affected by the deletion, as well as the data listed in Item 3 above.

**Relocating Portion of Easement.** General procedure – Delete the portion of the original easement from the Land Court map and designate the relocated portion as a new easement.

### Access Restriction.

- The title portion of the map shall state: "DESIGNATION OF RESTRICTION OF ACCESS RIGHTS AFFECTING LOT _____".
- The appropriate access control symbol shall be used. The legend for the symbols shall be noted at the lower left corner of the map.

Access Restriction Changes. The general procedure is to DELETE all restriction of access along the existing right-of-way shown on the designating map then to DESIGNATE the new restriction of access on the subdivision map and specify the restrictions by Document and in Petition.

**Describing the Plat of the Land.** All easements, roadways, etc., intersection of the property with the R/W lines at a curve shall be described and shown by exterior metes and bounds within the lot. Radial azimuths should also be shown where curves are involved.

Adjacent Lots and Easements. Lots and easements adjacent to the subject of the map shall be labeled together with the appropriate map number.

**New Road Lines.** New road lines extending beyond the limits of the lots being subdivided will not be shown.

### **Report of Original Land Court Application.**

- Whenever any unregistered land is filed in the Land Court for registration purposes, a check is made for any highway interest based on any mathematical calculations and other survey data.
- An abstract of titles and the Examiner's report filed in the Land Court, provide some aid in making necessary research.
- Field survey notes made by the survey office in checking the land to be registered are located at the Department of Accounting and General Services, State Survey Office. The Survey Office files are for examination and general use.
- A written report shall be made on the findings on the parcel, as far as highway interest are concerned, and a copy of the map with proper notations made for transmittal to the proper officials for action. A copy of the report shall be retained and filed in the Cadastral Engineering office file.

15 44

# DCSTYLE.TBL

|c=0|

lc=1 (5., .0625, .03125, .0625)

lc = 2 (.0625, .0625)

lc = 2 co = 50 (.015625, .03125)

lc = 2 co = 51 (.015625, .015625)

lc = 2 co = 52 (.0078125, .015625)

lc=2 co=53 (.0078125, .0078125)

lc=3 co=49 (.0078125, .015625, .0078125, .015625, .0078125, .015625, .0078125, .015625, .0078125, .015625, .0078125)

 $lc = 3 \quad (.125, .0625)$   $lc = 4 \quad (1., .0625, .03125, .0625)$   $lc = 5 \quad (.375, .0625)$   $lc = 6 \quad (2., .0625, .03125, .0625, .03125, .0625)$   $lc = 7 \quad (4., .0625, .03125, .0625, .03125, .0625)$ 

4--

```
dcstyle.tbl
    !r04/14/03
! "dcstyle.tbl" r08/11/99
                     Cadastral section pen table for full size plotting to IPLOT and IPS.
!

IF (TYPE .IN. 87-88) THEN

PRIORITY = 65

ELSE IF (TYPE .EQ. 90) THEN

IF (LEVEL .EQ. 2) THEN

PRIORITY = 0

ELSE

PRIORITY = 65

ENDTE

      Set priorities for plotting COT, CIT and Vector Data

      Priority:
      Type:
      Plot Order:

      0
      90 (I/RAS C)
      1st

      65
      87-88 (I/RAS B)
      2nd

      100
      Area fill
      Not last

      200
      Vector
      Last

               ENDIF
 ELSE
IF (AREA_FILL == TRUE) THEN
PRIORITY=100
             ELSE
PRIORITY = 200
               ENDIF
    ENDIF
         F (TYPE .NI. 7,17) THEN
IF (STYLE .EQ. 0) THEN
STYLE = 0
ELSE IF (STYLE .EQ. 1) THEN
STYLE = (5.. 0625. 03125, .0625)
ELSE IF (COLOR .EQ. 50) THEN
STYLE = (.015625, .03125)
ELSE IF (COLOR .EQ. 51) THEN
STYLE = (.015625, .015625)
ELSE IF (COLOR .EQ. 52) THEN
STYLE = (.0078125, .0078125)
ELSE IF (COLOR .EQ. 53) THEN
STYLE = (.0625, .0625)
    IF
             ELSE

STYLE = (.0625, .0625)

ENDIF

ELSE IF (STYLE .EQ. 3) THEN

IF (COLOR .EQ. 49) THEN

STYLE = (.0078125,.015625,.0078125,.015625,.0078125,.015625,.0078125,.015625,.0078125,.015625,.0078125,.015625,.0078125,.015625,.0078125,.015625,.0078125,.015625,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.0078125,.007825,.007825,.007825,.007825,.007825,.007825
          STYLE = (.0078125,.015625,.0076123,.015625,.007

ELSE

STYLE = (.125, .0625)

ENDIF

ELSE IF (STYLE .EQ. 4) THEN

STYLE = (1., .0625, .03125, .0625)

ELSE IF (STYLE .EQ. 5) THEN

STYLE = (.375, .0625)

ELSE IF (STYLE .EQ. 6) THEN

STYLE = (2., .0625, .03125, .0625, .03125, .0625)

ELSE
             SIVLE = (2., .0625, .03125, .0625, .03125, .0625)
ELSE
STYLE = (4., .0625, .03125, .0625, .03125, .0625)
ENDIF
ENDIF
```

## Cadastral text height example.

NOI	НЕІGHT	WIDTH		COLOR	LEVEL	LINE	LINE WEIGHT	SCALE (Height and Width is what each scale shows) ex: 10 scale (H2.50 x W2.50)						
DESCRIPT			FONT					10	20	30	40	50	100	200
DISTRICT	see	scale	4 (Shadow)	Green	18 DC Text	0	2	2.50	5.00	7.50	10.00	12.50	15.00	17.50
MAIN STREET	see	scale	33	Green	18 DC Text	0	2	2.19	4.38	6.57	8.76	10.95	13.14	15.33
SIDE STREET	see	scale	33	Green	18 DC Text	0	2	1.25	2.50	3.75	5.00	6.25	7.50	8.75
LAND COURT/ FILE PLAN	see	scale	33	Green	18 DC Text	0	2	1.50	3.00	4.50	6.00	7.50	9.00	10.50
DETAILS	see	scale	28	Brown	13	0	0	0.71	1.41	2.12	2.82	3.53	4.23	4.94
CONSTRUCTION PARCEL	see	scale	33	Green	18 DC Text	0	2	1.63	3.26	4.89	6.52	8.15	9.78	11.41
PARCEL	see	scale	33	Green	18 DC Text	0	2	1.75	3.50	5.25	7.00	8.75	10.50	12.25
LOT/OWNER	see	scale	33	Green	18 DC Text	0	2	1.50	3.00	4.50	6.00	7.50	9.00	10.50
GENERAL TEXT - Azimuth and Distance	see	scale	28	Green	18 DC Text	0	2	0.94	1.88	2.82	3.76	4.70	5.64	6.58
GENERAL TEXT - Existing Easement	see	scale	28	Green	18 DC Text	0	2	0.94	1.88	2.82	3.76	4.70	5.64	6.58
NEW EASEMENT	see	scale	33	Green	18 DC Text	0	2	1.50	3.00	4.50	6.00	7.50	9.00	10.50
GENERAL TEXT - Chord	see	scale	28	Green	18 DC Text	0	2	0.94	1.88	2.82	3.76	4.70	5.64	6.58
GENERAL TEXT - Radial	see	scale	28	Green	18 DC Text	0	2	0.94	1.88	2.82	3.76	4.70	5.64	6.58

# 8 Hydraulic Design Section Drafting Guidelines

## 8.1 Purpose

The Drafting unit of the Hydraulic Design Section is responsible for the preparation of contract plans. The contract plans shall show the necessary details to properly describe the required installation of a drainage system for a highway construction project. Contract Plans are prepared to meet the following requirements:

- Drainage Plans in support of a highway construction contract to improve and maintain a State Highway Route.
- Drainage Improvement Projects, a construction contract to improve safety and reduce flooding at a specific location or at various locations on a State Highway Route.

# 8.2 Drainage Plans

The drainage plan shall be drawn to a horizontal scale of 1 inch equals 40 feet, or 1 inch equals 20 feet. The base plan is a 2D design file copied from the Highway Design Section "Base plan" directories. It shall carry a project assigned CADD file name with a "d" in the fifth position. A copy of the base plan is made and renamed with the CADD file name using "h" in the fifth position. This "h" base plan will serve as the drainage system base plan. The "d" base plan shows all of the highway design improvements and existing roadway conditions. The "h" base plan will show all of the drainage design system improvements. The "d" and "h" files will be attached as reference files to each design file showing the "Drainage Plan" of the roadway.

A standard contract plan design file shall be used to create the "Drainage Plan." Design files will be created with a segment of roadway in each design file. The stationing shall read from left to right including Equations of Stationing. The segment of roadway will not be stacked in a design file. Identify all of the drainage structures to be constructed with Station numbers, off sets, and type of structure. The Station Number and type of structure will identify the construction notes, and estimated quantities, for each of the drainage structures shown. The drainage plan should include the features of the roadway plan and drainage structures such as:

- Catch basins, concrete drop inlets.
- Grated drop inlets.
- Storm drain manholes.
- Inlet and outlet structures.
- Headwalls.
- Concrete lined ditches.
- Box culverts and pipe culverts (drainage structures 20 feet or less in length between abutments measured along the centerline of the roadway).
- The base line of the survey, which, if practicable, should also be the centerline of the proposed roadbed.
  - When the centerline and the base line are not coincident, their relationship should be indicated.
  - Divided highways, where independent base lines are used, may be treated as separate roadways indicating only the general relationship between the two.

- Special areas such as interchanges and safety rest areas should be shown with separate survey control lines as necessary.
- The stationing shall read from left to right including Equations of Stationing.
- The horizontal position of the beginning and ending stations described by coordinates in the State Plan Coordinate System, datum adjusted on an area or project basis.
- Design data of curves.
- Right-of-way and access control lines, easements, and special use areas.
- North point.
- General soils, rock out crop, topography, streams, railroads, and other culture such as roads, streets, and airports on or near the right-of-way when these items influence the proposed construction.
- Incidental construction items such as erosion control provisions, guardrail, and retaining walls.
- On complex projects, a reference sheet is desirable to facilitate the use of the plans.

## 8.3 Drainage Profiles

The profile grade represents the trace of the vertical plane intersecting the top surface of the wearing course, base course, or other surface along the centerline of the culvert.

Drainage profiles shall be drawn to the same horizontal scale as the plan, but the vertical scale may be 5 to 10 times that of the horizontal scale. The drainage profiles should show:

- Grade and existing ground lines.
- Datum lines for elevations.
- Percentage of slope for the culverts.
- Type and length of culverts in liner feet.
- Station identification and type of drainage structures.
- Inverts of drainage structures.
- Vertical and horizontal clearances under and over of utility lines within the right-of-way.

# 8.4 Drainage Details

Details shall be developed and completed in a contract plan design file. Details of structures shall be drawn to  $\frac{3}{4}=1'-0''$  scale. Details of steel frame and grates shall be drawn to  $\frac{1}{2}=1'-0''$ . Depending on the size of a drainage structure other scales may be used to complete all views needed to describe the structure.

# Attachment A Glossary

Base Material	Paper or film material coated with diazo or photosensitive emulsion which are used in reproductions of original drawings.
CADD	Computer Aided Drafting and Design.
Contrast	The difference in opaqueness between light and dark areas of a print.
Contact Print	A print which is the same scale as the original made by exposing the sensitized print base material in direct contact with the original or duplicate. Light passing through the drawn images of an original are blocked out, thus preventing exposure of the sensitized material directly behind the images.
Density	The relative extent of opaqueness.
Diazo Process	A method of contact printing in which positive prints are produced with black or blue lines on white background.
Dimensional Stability	The relative ability of a material to resist change in size due to such factors as temperature and humidity among others.
Duplicate	A transparent or translucent drawing reproduced from an original.
Eradicator	A chemical solution used to eliminate drawn or reproduced images in an original or print.
Film Base	A base material which has the desirable characteristics of being dimensionally stable, highly transparent, tearing strength, age and heat resistant, non-soluble and waterproof. This material is available with photographic emulsion or diazo dyes on matte surface.
Front Reading	A film base or sepia paper drawing in which the emulsion is on the same side as the side on which the image is observed.
Ghosting	An image which remains after eradication or erasing resulting from ink or pencil lead penetrating the fibers of the tracing material.
Graphite Lead	Pencil lead used for paper drawings which yields dark lines but may smudge if too soft.
Ink Drawing	A drawing produced by ink lines which have uniform density, uniform width of lines and sharpness resulting in a drawing with excellent reproducible features.
Leroy Lettering Equipment	A type of mechanical lettering equipment.
Matte Finish	A surface which is lusterless, rough and dull which allows for easy bonding or adhesion of ink or pencil lead.
Mechanical Lettering	A method of printing letters and numbers using a template and scribe. The advantage of using mechanical lettering is that more than one drafter can letter on a sheet without any distinct difference. However, its use can be time consuming.
Mylar	A type of film base reproducible.
Non-Print Lead	Lead which produces visible images not reproduced in the diazo process.
Opacity	Degree of imperviousness to light.
Original	A drawing or tracing from which duplicates or prints are to be made.
Plastic Lead	Lead used on mylar drawings which is not of graphite/clay mixture but a plastic formula that bonds to film.
Print	An opaque plan sheet made from a reproducible.
Rapidograph Pen	A drafting instrument which directly drafts ink onto film by gliding over the coated surface.
Reproducible	A plan sheet which allows for the copying of prints or duplicates.
Reverse Reading	A film base or sepia paper drawing in which the emulsion is on the back side of the sheet from which the image is observed. This allows for revisions without disturbing the emulsion.
Sepia	A paper reproducible which has a brown (Sepia Tone) image.
Topography	Representation on a plan of the existing physical features in an area.
Translucent Drawing	A drawing which allows light to pass through and can be easily seen through.
Vellum	Translucent paper used for pencil work and CADD prints.

# Attachment B

# Abbreviations

A.C., ac	Asphalt Concrete	Conc.	Concrete
Abn.	Abandon	Cond.	Conduit
Abut.	Abutment	Conn.	Connection
ACB	Asphalt Concrete Base	Const.	Construction
Adj.	Adjacent	Const. Jt.	Construction Joint
ADT	Average Daily Traffic	Constr.	Construction
Agg	Aggregate	Cont.	Continuous
Ah.	Ahead	Contr.	Control or Contraction
Alt.	Alternate	Coord.	Coordinate
Alum.	Aluminum	Corresp.	Corresponding
Approx.	Approximate	CRM	Cement Rubble Masonry
Arch.	Architectural	Culv.	Culvert
АТВ	Asphalt Treated Base	D, dia	Diameter
Avg.	Ave	D.I.	Drop Inlet
Az.	Azimuth	Dbl.	Double
B.F.	Board Feet	Det.	Detail
Bal.	Balance	Diag.	Diagonal
Bc	bottom curb	Dim.	Dimension
Bd. Ft.	Board Feet	Dist.	Distance
Beq.	Begin	DOT	Department of Transportation
Bet.	Between	Drwy	driveway
Bit.	Bituminous	Dwg.	Drawing
Bk.	Back	E	East
BL	Baseline	E.F.	Each Face
Bldg.	Building	E.P.	Edge of Pavement
Blk.	Block	E.S.	Edge of Shoulder
вм	Bench Mark	E.W.	Each Way
Bm, bm	Beam	Ea.	Each
Bot.	Bottom	Easmt.	Easement
BP	Bearing Pile	Ebox	electrical box
Br.	Bridge	El. elev.	Elevation
Bra.	Bearing	Elec.	Electrical
Bss	Bot. Slab Strip-(Reinf, Type)	Emb.	Embankment
BVC	Beginning of Vertical Curve	Engr.	Engineer
Bw	bottom of wall	Ea.	Equal
C.C.	Center to center	Est.	Estimate: estimated
C.F., Cu. Ft.	Cubic Feet	EVC	End of Vertical Curve
C.I.	Cast Iron	Exc.	Excavation
C.Y., Cu. Yd.	Cubic Yard	Exist.	Existing
CAD	computer-aided drafting	Exp.	Expansion
CADD	computer aided drafting and design	Ext.	Exterior
Cant.	Cantiliver	F	Fixed
СВ	Catch Basin	F&C	Frame and Cover
CC	Compound Curve	F&G	Frame and Grate
CF	Cubic Feet	E.F.	Front Face
CFR	Code of Federal Regulations	F-1	Spread footing-(Type)
CIP	Cast in place	FA	Force Account
Ckt.	Circuit	Edr.	Feeder
CL	Centerline	FH	Fire Hydrant
CI.	Class	FHWA	Federal Highway Administration
Cl., clr	Clear	Fig.	Figure
Coco	coconut tree	Fin Gr	Finish Grade
Col	Column	FI	Floor
Comn Pfg	Composition roofing		Feet foot
South tria.	Composition rooming	1	

Ftg.	Footing	O/H	Overhead
Fut.	Future	o/s	Offset
Fwy.	Freeway	OB	Outbound
G-1	Girder-(number)	OD	Outside Diameter
Ga.	Gauge, gage	Opn'g.	Opening
Galv	Galvanized	Р.В.	Pullbox
Gen.	General	P.C.	Point of Curvature
Gir	Girder	P.C.C.	Point of Compound Curvature
Grnd	Ground	PGIV	Prestressed Girder-(type)
CPP	Grouted Rubble Paving	DI	point of intersection of tangents
GSP	Galvanized Steel Pine		Point of Intersection of Vertical Curve
U U		P.1.V.C.	Point of Intersection of Venical Curve
П b bt		P.U.C.	
n., n		P.1.	
н.э.	High Strength	P/L Dami	Property Line
HG	Mercury Vapor Lamp	Part.	Partial
Horiz.	Horizontal	Pavt.	pavement
HPS	High Pressure Sodium	PC	point of curvature
Ht., h	Height	PCF	Pounds per Cubic Foot
Hwy	Highway	PDF	Portable Document Format
HWY-DD	Highway Design Section	Perf.	Perforated
IB	Inbound	PF-18	Pile Footing-(type)
ID	Inside Diameter	PH	pigeon hole
In.	Inch	Proj.	Project
Inc.	Include	PS&E	plans, specifications, and estimates
Int.	Interior	PSF	Pounds per Square Foot
Inv.	Invert	PSI	Pounds per Square Inch
Irr.	Irrigation	РТ	point of tangency
Jt.	Joint	Pt.	Point
к	Kip, Kips	PVC	Polyvinyl Chloride
KF	Kip Foot	Pvmt.	Pavement
KIF	Kins per Linear Foot	R	Radius
KSF	Kins per Square Foot	R.F.	Rear face
KSI	Kips per Square Inch	R/W	right of way
1	Length	PAL	Rigid Aluminum Conduit
L. Lin Et	Lineal Et	PC	Reinforced concrete
L.I ., LIII. I L. I S		PCP	Reinforced Concrete Pipe
	Bound Boundo		Read
		Ru. Def	Roau
	Linear Foot	Ref.	Reference
Lg	Long	Reinf	Reinforced
Lin.	Linear	Reinf.	Reinforcing
Longit.	Longitudinal	Rel.	Relocate
LS	Lump Sum	Req'd	Required
Lt.	Left	Ret.	Retaining
Ltg.	Lighting	RGS	Rigid Galvanized Steel
Ltg. Std.	Lighting Standard	RN	Reference North
M.L.	Match Line	Rt.	Right
Max.	Maximum	S	South
Mech.	Mechanical	S.E.	Super elevation
МН	Manhole	Salv.	Salvage
Min.	Minimum	SDMH	Storm drain manhole
Misc.	miscellaneous	Sect.	Section
Mlbox	Mailbox	SF	Square Feet
MSL	Mean Sea Level	Sht.	Sheet
N	North	SL	Station Line
NIC	Not In Contract	SMH	Sewer Manhole
No #	number	Spc.	Spacing
NTS	Not to Scale	Spcs	Spaces
0.0	On center	Spec. Spece	Specification
0.0.		-p, op	ep comoundin

Sta.	Station	TSS	Top Slab Strip-(Reinf. Type)
Std.	Standard	Tw	Top of wall
Stirr.	Stirrup	Ud.	Underdrain
Str.	Straight	Ug.	Underground
Strig.	Stringer	V	Valve
Struct.	Structure	Var.	Variable, Varies
SY	Sq. Yd.	VC	Vertical Curve
Sym.	Symmetrical	Vert.	Vertical
т	Tons	W	West
Tan.	Tangent	W.P.	Working Point
Tbox	Telephone box	W.W.	Wing Wall
тс	Top of curb	W.W.F.	Welded Wire Fabric
ТСР	traffic control plan	Wbox	Water box
Temp.	Temporary	Wc ramp	Wheelchair ramp
Thk.	Thick	Wm	Water meter
Tmh	Telephone manhole	Wv	Water valve
Transv.	Transverse	Wvmh	Water valve manhole
Trbox	Traffic box	X-walk	Crosswalk
Trsig	Traffic signal		