

Appendix D

Design Aids

TABLE OF CONTENTS

APPENDIX D	3
D.1 Design Aids	3
D.1.1 Introduction	3
D.2 Clip Bound Procedure	4
D.2.1 Steps for using Clip Bound	4
D.3 Stippling and Cross-Hatching	5
D.3.1 Steps for Patterning	5
D.3.2 Pattern Angle, Scale, Spacing, Row and Column Spacing	8
D.3.2.1 Imperial Patterning	8
D.3.2.2 Metric Patterning	11
D.3.2.3 Example of settings for Pavement Stippling	14
D.3.2.4 Example of settings for Pavement Hatching	15
D.4 Standard Levels (Metric & Imperial Projects)	16
D.4.1 Layering Scheme Policy	16
D.4.2 Levels and Content	16
D.4.2.1 Standard Levels for Design Projects with Surveys Completed after July 1, 1995	16
D.4.2.2 Standard Levels for Design Projects with Surveys Completed before July 1, 1995	19
D.4.2.3 Standard Levels for Hydraulics Projects with Surveys Completed after July 1, 1995	21
D.4.2.4 Standard Levels for Erosion & Sediment Control Design Completed after January 1, 2000	23
D.4.3 Profile Sheet Level Structure	26
D.5 Standard Text Sizes (Metric & Imperial Projects)	27
D.5.1 Imperial Text	27
D.5.2 Metric Text	28
D.5.3 Profile Sheet Text Sizes	28
D.5.4 Using the Place Note Command	30
D.5.5 Dimension Styles	33
D.6 Standard Line Weights (Metric & Imperial Projects)	36
D.6.1 Profile Sheet Line Weights and Thicknesses	36
D.6.2 Line Weights and Thicknesses	36
D.7 Standard Line Styles (Metric & Imperial Projects)	38
D.7.1 Default Line Styles	38
D.7.2 Standard Custom Line Styles for Proposed Plans	39
D.8 Standard Cell Libraries	42
D.8.1 Design Symbols Cell Libraries	42
D.8.2 Drainage Cell Library	47

D.9	Creating Cross Section Plot File for Electronic Submission	52
	D.9.1 GEOPAK Cross Sections	52
D.10	VDOT Standard Data	55
	D.10.1 MicroStation Seed Files	55
	D.10.2 MicroStation Cell Libraries	55
	D.10.3 MicroStation Pen Tables	59
	D.10.4 MicroStation Font Libraries	61
	D.10.5 Workspace Files	61
	D.10.6 GEOPAK Configuration Files	61
	D.10.7 VDOT Insertable Sheets - (as requested)	63
D.11	Generating and Submitting PDF Files *	64
	D.11.1 Database Fields	64
	D.11.1.1 General Information	64
	D.11.1.2 Keywords	65
	D.11.1.3 Format Keyword	65
	D.11.2 Generate PDF File	66

Appendix D

D.1 Design Aids

D.1.1 Introduction

Appendix D consists of standards for design drafting and instructions for various programs used in the design process. **Bold** type denotes user key-ins and *italics* denote menu item selections.

D.2 *Clip Bound Procedure*

D.2.1 Steps for using Clip Bound

- Call up appropriate plan sheet file that you plan to work in.
- Attach all necessary reference files, giving them logical names as you attach each to allow for easier manipulation at later dates. Please see [Falcon Instructions](#) for proper method of referencing design files.
- Set active level to 51.
- **LV=51**
(The purpose of working in level 51 is to ensure that if the reference file is detached, deleted, or lost in some manner, the area needed will be retained in the design file for re-clipping.)
- Place a *SmartLine* around the area to be clip bound.
- It will be necessary to move and/or copy text that your shape cuts through. To do this open the survey and/or alignment file which has the text to be moved and reference the sheet file into it. After referencing the sheet file (which shows the boundary of the clip) *move* or *copy* text as necessary. After completing this procedure for all files, make the sheet file active again with all others as reference files to verify that all text has been moved or copied as necessary.
- Place a *Fence Shape* outlining the *SmartLine* or *Shape* placed on Level 51. *Snap* to each point to ensure an exact copy of the area delineated by the line string.
- Make sure Reference File Locate and Snap options are set on (See Reference File Manipulations Section of Command Menu). Select *Clip Bound* from the menu and identify reference file(s) to be clipped (key-in **ALL**). If only one reference file is to be clipped, then place a *data point* on an element of the individual reference file.
- Turn off level 51 (Set another level active first.)
- **OF=51**
- Plot sheet from the same view that was clip-bound. Turn on display of all clip bound files; turn off display of all other files.
- To see the complete reference file, call up reference file with a different logical name. Turn off display of clip-bound files.

EXAMPLE: Display can be turned on or off by using the logical name only.
OF=SUR1, ALI1, DR

D.3 Stippling and Cross-Hatching

D.3.1 Steps for Patterning

Since the method of drafting plans has shifted from manual methods to CADD, we have tried to eliminate stippling and cross-hatching as much as possible. However, it is still a requirement that proposed pavement areas be defined by stippling, and that existing pavement areas to be demolished should be defined by hatching. Areas of existing pavement which are to be milled (resurfaced) should be defined by hatching with a dot-dashed line style. Some designers prefer to use concrete stippling to delineate proposed concrete sidewalks or entrances, and others use cross hatching to delineate areas for other purposes.

When placing stippling and hatching on the plans, you must use the method described below.

Hatching, Cross-hatching, Stippling for Resurfacing, Concrete, demolition and pavement milling will be placed in a reference file by the roadway plans designer. The filename for this reference file will be Division +UPC#pat.dgn and patterning should be placed on levels listed below.

Erosion control stippling areas will be placed by the hydraulic designer, and should be coordinated with the roadway designer for inclusion into the pattern reference file.

The **levels** that should be used in this reference file when placing hatching and stippling patterns are:

Level	Use	Level	Use	Level	Use
Level 1	for hatching	Level 2	for cross hatching	Level 3	for resurfacing (milling)
Level 4	for stippling	Level 5	for concrete	Level 6	for erosion control

The **steps** are as follows:

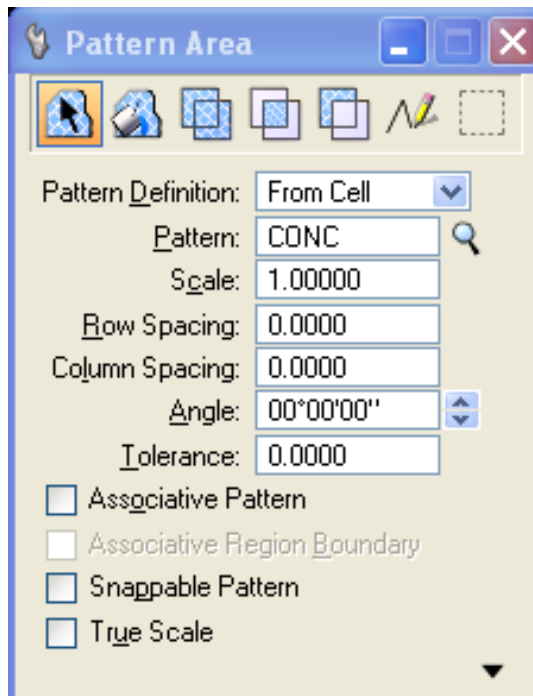
- Set proper level.
- Place shape to be patterned. (It is recommended that shapes are placed thus: level 51 (for hatching), 52 (for cross hatching), 53 (for dot-dash hatching), 54 (for pavement stippling), 55 (for concrete items stippling), and 56 (for EC stone) be used when placing these shapes).
- Set line weight to 1

- Set line style to 0 (LC=0). For resurfacing line style will be 4 (LC=4).
- Once the patterning process is completed, and the pattern reference file is attached to the plan sheets, levels 51-56 should be turned off on the pattern reference file attached to the plan sheets.
- See data below for other attributes. Cell for stippling is in dsymgeo.cel or **mdsymgeo.cel**

Select **Tools**, then **Main**, then **Patterning** from the MicroStation Menu Bar.



Select **Pattern**, then **Scale**, then enter **Row**, **Column Spacing** and **Angle** if necessary.



NOTE: As the demolition of pavement hatching areas and the pavement stippling areas can be used for quantifying plan pay item quantities, it is important that these shapes be accurately depicted.

Steps for Patterning	Steps for Patterning
For Hatching select hatch area. Set spacing Set pattern angle	For Cross-hatching select xhatching Set spacing Set pattern angle
For Resurfacing set line style to LC=4 (dot-dash) Set spacing Set pattern angle	For Stippling select pattern area Select cell - stip Set pattern scale Set row spacing Set column spacing Set pattern angle (Associative patterning must be used.)
For Concrete select pattern area Select cell - conc Set pattern scale Set row spacing Set column spacing Set pattern angle	For Erosion Control select pattern area Select cell rocky Set pattern scale Set pattern angle at 90° Set spacing to 0

Associative patterning must be used for stippling.

The STIP, CONC, and ROCKY cells needed for patterning can be found in the dsymgeo.cel, mdsymgeo.cel and drainage Cell Libraries.

D.3.2 Pattern Angle, Scale, Spacing, Row and Column Spacing

D.3.2.1 Imperial Patterning

25 SCALE PATTERN

Pattern	Angle	Scale	Spacing
(HATCHED)	PA = 135°	PS = 1.0	SPACING = 6.8
(HATCHED)	PA = 45°	PS = 1.0	SPACING = 6.8
(HATCHED)	PA = 90°	PS = 1.0	SPACING = 6.8
(XHATCH)	PA = 135° , 45°	PS = 1.0	SPACING = 6.25, 6.25
(STIPPLE)	PA = 45°	PS = 4.0	RS = 2.5, CS = 2.5
(CONC)	PA = 0°	PS = .25	RS = 0, CS = 0
(RESURFACE135)	PA = 135°	PS = 1.0	SPACING = 3.75 LC = 4
(RESURFACE45)	PA = 45°	PS = 1.0	SPACING = 3.75 LC = 4
(ECS ROCKY209)	PA = 90°	PS = .75	SPACING = 0
(ECS ROCKY210)	PA = 90°	PS = .625	SPACING = 0
(ECS ROCKY211)	PA = 90°	PS = .5	SPACING = 0
(ECS ROCKY212)	PA = 90°	PS = .25	SPACING = 0

50 SCALE PATTERN

Pattern	Angle	Scale	Spacing
(HATCHED)	PA = 135°	PS = 1.0	SPACING = 13.6118
(HATCHED)	PA = 45°	PS = 1.0	SPACING = 13.6118
(HATCHED)	PA = 90°	PS = 1.0	SPACING = 13.6118
(XHATCH)	PA = 135° , 45°	PS = 1.0	SPACING = 12.5, 12.5
(STIPPLE)	PA = 45°	PS = 8.0	RS = 5, CS = 5
(CONC)	PA = 0°	PS = .5	RS = 0, CS = 0
(RESURFACE135)	PA = 135°	PS = 1.0	SPACING = 7.5 LC = 4
(RESURFACE45)	PA = 45°	PS = 1.0	SPACING = 7.5 LC = 4
(ECS ROCKY209)	PA = 90°	PS = 1.5	SPACING = 0
(ECS ROCKY210)	PA = 90°	PS = 1.25	SPACING = 0
(ECS ROCKY211)	PA = 90°	PS = 1.0	SPACING = 0
(ECS ROCKY212)	PA = 90°	PS = .5	SPACING = 0

100 SCALE PATTERN

Pattern	Angle	Scale	Spacing
(HATCHED)	PA = 135°	PS = 1.0	SPACING = 27.22
(HATCHED)	PA = 45°	PS = 1.0	SPACING = 27.22
(HATCHED)	PA = 90°	PS = 1.0	SPACING = 27.22
(XHATCH)	PA = 135° , 45°	PS = 1.0	SPACING = 25, 25
(STIPPLE)	PA = 45°	PS = 16.0	RS = 10, CS = 10
(CONC)	PA = 0°	PS = 1.0	RS = 0, CS = 0
(RESURFACE135)	PA = 135°	PS = 1.0	SPACING = 15 LC = 4
(RESURFACE45)	PA = 45°	PS = 1.0	SPACING = 15 LC = 4
(ECS ROCKY209)	PA = 90°	PS = 3.0	SPACING = 0
(ECS ROCKY210)	PA = 90°	PS = 2.5	SPACING = 0
(ECS ROCKY211)	PA = 90°	PS = 2.0	SPACING = 0
(ECS ROCKY212)	PA = 90°	PS = 1.0	SPACING = 0

D.3.2.2 Metric Patterning

250 SCALE PATTERN

Pattern	Angle	Scale	Spacing
(HATCHED)	PA = 135°	PS = 1.0	SPACING = 1.8
(HATCHED)	PA = 45°	PS = 1.0	SPACING = 1.8
(HATCHED)	PA = 90°	PS = 1.0	SPACING = 1.8
(XHATCH)	PA = 135° , 45°	PS = 1.0	SPACING = 1.6, 1.6
(STIPPLE)	PA = 45°	PS = 0.85	RS = .75, CS = .75
(CONC)	PA = 0°	PS = .1	RS = 0, CS = 0
(RESURFACE135)	PA = 135°	PS = 1.0	SPACING = 1.0 LC = 4
(RESURFACE45)	PA = 45°	PS = 1.0	SPACING = 1.0 LC = 4
(ECS ROCKY209)	PA = 90°	PS = .2	SPACING = 0
(ECS ROCKY210)	PA = 90°	PS = .15	SPACING = 0
(ECS ROCKY211)	PA = 90°	PS = .1	SPACING = 0
(ECS ROCKY212)	PA = 90°	PS = .06	SPACING = 0

500 SCALE PATTERN

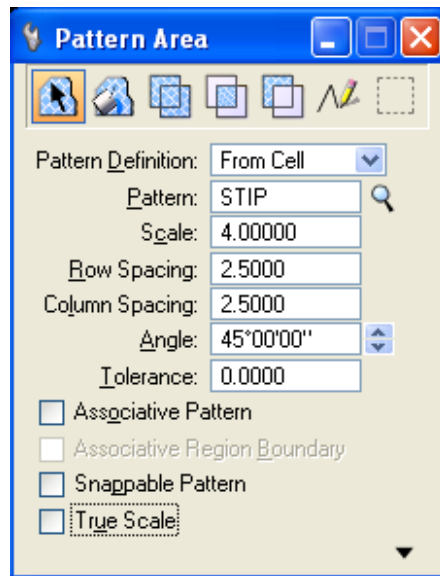
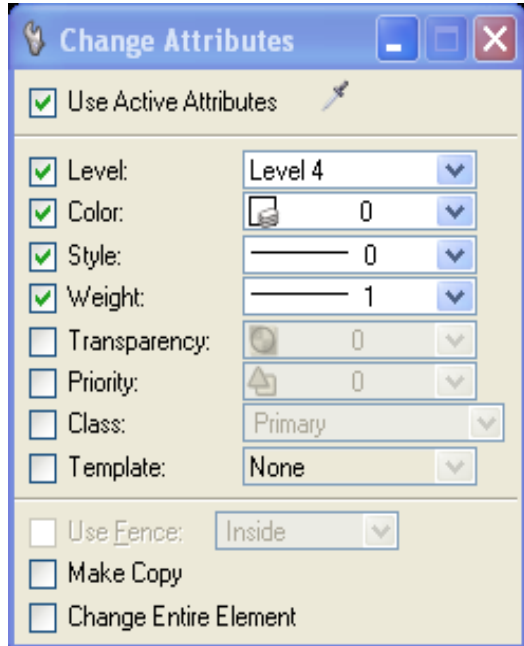
Pattern	Angle	Scale	Spacing
(HATCHED)	PA = 135°	PS = 1.0	SPACING = 3.6
(HATCHED)	PA = 45°	PS = 1.0	SPACING = 3.6
(HATCHED)	PA = 90°	PS = 1.0	SPACING = 3.6
(XHATCH)	PA = 135° , 45°	PS = 1.0	SPACING = 3.2, 3.2
(STIPPLE)	PA = 45°	PS = 1.7	RS = 1.5, CS = 1.5
(CONC)	PA = 0°	PS = .2	RS = 0, CS = 0
(RESURFACE135)	PA = 135°	PS = 1.0	SPACING = 2.0 LC = 4
(RESURFACE45)	PA = 45°	PS = 1.0	SPACING = 4.0 LC = 4
(ECS ROCKY209)	PA = 90°	PS = .4	SPACING = 0
(ECS ROCKY210)	PA = 90°	PS = .3	SPACING = 0
(ECS ROCKY211)	PA = 90°	PS = .2	SPACING = 0
(ECS ROCKY212)	PA = 90°	PS = .12	SPACING = 0

1000 SCALE PATTERN

Pattern	Angle	Scale	Spacing
(HATCHED)	PA = 135°	PS = 1.0	SPACING = 3.6
(HATCHED)	PA = 45°	PS = 1.0	SPACING = 3.6
(HATCHED)	PA = 90°	PS = 1.0	SPACING = 3.6
(XHATCH)	PA = 135° , 45°	PS = 1.0	SPACING = 3.2, 3.2
(STIPPLE)	PA = 45°	PS = 3.4	RS = 3, CS = 3
(CONC)	PA = 0°	PS = .2	RS = 0, CS = 0
(RESURFACE135)	PA = 135°	PS = 1.0	SPACING = 2.0 LC = 4
(RESURFACE45)	PA = 45°	PS = 1.0	SPACING = 4.0 LC = 4
(ECS ROCKY209)	PA = 90°	PS = .4	SPACING = 0
(ECS ROCKY210)	PA = 90°	PS = .3	SPACING = 0
(ECS ROCKY211)	PA = 90°	PS = .2	SPACING = 0
(ECS ROCKY212)	PA = 90°	PS = .12	SPACING = 0

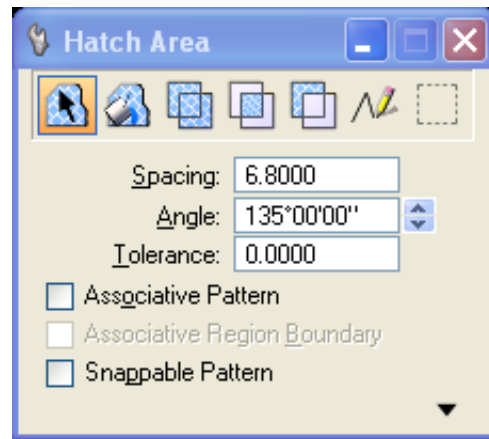
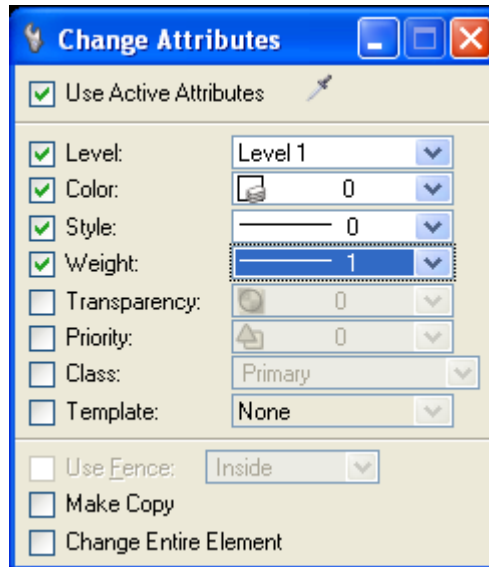
D.3.2.3 Example of settings for Pavement Stippling

Pavement Stippling for a 25 scale imperial project will be placed using these attributes and pattern area settings:



D.3.2.4 Example of settings for Pavement Hatching

Demolition of Pavement Hatching for a 25 scale imperial project will be placed using these attributes and hatch area settings:



D.4 Standard Levels (Metric & Imperial Projects)

D.4.1 Layering Scheme Policy

Survey files will be developed using the appropriate “CADD Level Structure” version.

- Version '95 is to be utilized on surveys initiated after July 1, 1995.
- Version '86 is appropriate for files developed prior to July 1, 1995.

It is not necessary to change the level structure on projects under development. Design files shall be developed using the level and file structure used for the Survey. Unique situations must be reviewed on a case by case basis to determine which level structure is to be utilized.

Example:

- A project being developed in accordance with the latest version of the level structure may use portions of old plans and/or old surveys.
- A new survey may tie to an existing survey developed using the old version level structure.

D.4.2 Levels and Content

D.4.2.1 Standard Levels for Design Projects with Surveys Completed after July 1, 1995

Level	Description
Level 1	Baselines: (25 & 250 Scale) WT = 10, LC = 0 (50 & 500 Scale) WT = 8, LC = 0 Sub-tangents WT = 3, LC = 3
Level 2	Bridges WT = 6, LC = 0
Level 3	Edge of Pavement WT = 6, LC = 0, Text Size = B Private Entrances WT = 4, LC = 0, Text Size = B * Bicycle Trail WT = 4, LC = 0, Text Size = B
Level 4	Curb and Gutter WT = 4, Text Size = B (Custom Line Style)

Level	Description
Level 5	Curb WT = 4, Text Size = B (Custom Line Style)
Level 6	Paved Shoulder WT = 4, LC = 0, Text Size = B
Level 7	Sidewalk WT = 4, LC = 0, Text Size = B * Bicycle Trail WT = 4, LC = 0, Text Size = B
Level 8 - 9	Not Assigned
Level 10	Steps WT = 4, LC = 0, Text Size = B
Level 11	Fences WT = 4, Text Size = B (Custom Line Styles)
Level 12	Directional Arrows(Cells), Pavement Stripping, and Flush Median Delineation WT = 0, LC = 0, Text Size = B
Level 13	Retaining Walls WT = 4, LC = 0, Text Size = B
Level 14	Concrete Slabs, Columns, Signs, & Posts WT = 4, LC = 0, Text Size = B
Level 15	Not Assigned
Level 16	Guardrail & Jersey Barrier WT = 4, Text Size = B (Custom Line Style)
Level 17	Not Assigned
Level 18	Paved Ditches WT = 4, LC = 0, Text Size = B
Level 19	Miscellaneous Drainage Items Placed by Road Designers WT = 4, Text Size = B
Level 20	Railroads, Etc. WT = 4, LC = 0, Text Size = B

Level	Description
Level 21	Not Assigned
Level 22	Limits of Construction WT = 5 Cut Lines LC = 5, CO = 2 Fill Lines LC = 3, CO = 3
Level 23	Right of Way WT = 6, LC = 0, Text Size = B Temp. Easements WT = 6, LC = 6, Text Size = B Perm. Easements WT = 6, LC = 4, Text Size = B
Level 24 - 29	Not Assigned
Level 30	Proposed noise barrier walls & Annotation WT=2
Level 31 - 54	Annotation for Levels 1 - 24 Construction Baseline Text, Sta. - Text Size A Sta. & Baseline Labels, Equality - Text Size A P.I. Intersection Labels & Curve Data - Text Size B Begin & End Construction - Text Size C
Level 55 - 60	Not Assigned
Level 61	Sealing & Signing Blocks Base Plan Sheet, Scale Bar North Arrow, Match Lines WT = 5, LC = 0 Project Number, Sheet Number Text Size = A, WT = 5, LC = 0
Level 62 - 63	Not Assigned

Levels 31 thru 36 Used for descriptive text

* Note: Bicycle Trail will be shown on Pavement level unless it is being built as sidewalk.

D.4.2.2 Standard Levels for Design Projects with Surveys Completed before July 1, 1995

Level	Description
Level 21	Baselines: (25 & 250 Scale) WT = 10, LC = 0 (50 & 500 Scale) WT = 8, LC = 0 Sub-tangents WT = 3, LC = 3
Level 22	Bridges WT = 6, LC = 0 Edge of Pavement WT = 6, LC = 0 Private Entrances WT = 4, LC = 0 Curb and Gutter WT = 4 Sidewalk WT = 4, LC = 0
Level 23	Fences, Guard Rail, Etc. Retaining Walls WT = 4, LC = 0 (Custom Line Styles)
Level 24	Drainage, Storm Sewers, Drop Inlets Erosion Control, and Ditches WT = 4 (Custom Line Style)
Level 25	Rail Road Work WT = 4 (Custom Line Style)
Level 26	Utility Adjustments
Level 27	Right of Way WT = 6, LC = 0 Temp. Easements WT = 6, LC = 6 Perm. Easements WT = 6, LC = 4
Level 28	Utility Easements WT = 6, LC = 4
Level 29	Wetlands Mitigation WT = 0
Level 30	Limits of Construction WT = 5 Cut Lines LC = 5, CO = 2
Level 31	Construction Baseline Text, Sta. - Text Size A Sta. & Baseline Labels, Equality - Text Size A

Level	Description
	P.I. Intersection Labels & Curve Data - Text Size B Begin & End Construction - Text Size C
Level 32	Edge of Pavement and Entrance Labels - Text Size B Curb and Gutter and Sidewalk Labels - Text Size B
Level 33	Fence, Guardrail, and Retaining Wall Labels - Text Size B
Level 34	Drainage Drop Inlet, Etc. Labels - Text Size B
Level 35	Rail Road Work Labels - Text Size B
Level 36	Utility Adjustments Labels - Text Size B
Level 37	Proposed Right of Way and Easement Labels - Text Size B
Level 38	Utility Easement Pluses - Text Size B
Level 39	Wetlands Labels - Text Size A
Level 40	Construction Limits Labels - Text Size B
Level 41	Not Assigned
Level 42	Directional Arrows(Cells), Pavement Striping, and Flush Median Delineation WT = 0, LC = 0
Level 43 - 50	Not Assigned
Level 51	Clip Boundary Border WT = 3, LC = 0
Level 52 - 59	Not Assigned
Level 60	Base Plan Sheet, Scale Bar North Arrow, Match Lines WT = 5, LC = 0 - Text Size B
Level 61 - 63	Not Assigned

D.4.2.3 Standard Levels for Hydraulics Projects with Surveys Completed after July 1, 1995

Level	Description
Level 1	Pipes from 4" to 42" (Custom Line Style)
Level 2	Pipes 48" and Larger (Custom Line Style)
Level 3	Standard Box Culverts LC = 0, WT = 10
Level 4	Endwalls (Cells)
Level 5	End Sections (Cells)
Level 6	Ditches and Flumes WT = 4, LC = 0 (Custom Line Style)
Level 7	Energy Dissipaters, Pipe Spillout, and Spring Boxes (Cells)
Level 8	Manholes and Junction Boxes (Cells)
Level 9	Drop Inlets DI - 1, DI - 5, and DI - 9 Series (Cells)
Level 10	Drop Inlets DI - 2 Series (Cells)
Level 11	Drop Inlets DI - 3 Series (Cells)
Level 12	Drop Inlets DI - 4 Series (Cells)
Level 13	Drop Inlets DI - 7 Series (Cells)
Level 14	Drop Inlets DI - 10 Series (Cells)

Level	Description
Level 15	Drop Inlets DI - 11 and DI - 13 Series (Cells)
Level 16	Drop Inlets DI - 12 Series (Cells)
Level 17	Drop Inlets DI - 14 Series (Cells)
Level 18	Special Design Items (Endwalls, Inlets, etc.)
Level 19	Underdrains (CD-1 & 2, UD-1 & 2, etc.) (Custom Line Style)
Level 20	Underdrain Outlet Pipe and EW-12 Endsections (Custom Line Style & Cells)
Level 21	Stone & Outlet Protection (EC-1, RipRap Channel, etc.)(Cells)
Level 22	SWM Basin Items (Basin, Risers, Weirs, Etc.)
Level 23	SWM Basin (Baseline/Alignment)
Level 24	SWM Basin (Plan View/Contours)
Level 25	SWM Basin (Miscellaneous Items)
Level 26	SWM Basin (Descriptions/Notes)
Level 27	Typical Ditch Details
Level 28 - 30	Not Assigned
Level 31 - 60	Annotation for Levels 1 – 30 Note: All Drainage Structure Labels on Level 31 Text Size = B, Unless Noted Otherwise

Level	Description
Level 61	Base Plan Sheet, Scale Bar North Arrow, Match Lines WT = 5, LC = 0 Project Number, Sheet Number Text Size = A, WT = 5, LC = 0
Level 62	Not Assigned
Level 63	Project Notes

D.4.2.4 Standard Levels for Erosion & Sediment Control Design Completed after January 1, 2000

Level	Description
Level 1	PHASE I Erosion Control Items (TFB, TSF, Turb. Curtain)(Custom Line Style)
Level 2	PHASE I Erosion Control Ditch Items (EC-2, EC-3, etc.)(Custom Line Style)
Level 3	PHASE I Erosion Control Stone (EC-1, RipRap, Check Dams)(Cells)
Level 4	PHASE I Erosion Control Items (Sediment Traps & Basins)
Level 5	PHASE I Erosion Control Items (Diversion Dikes & Ditches)(Custom Line Style)

Level	Description
Level 6	PHASE I Erosion Control Items (Temporary Diversion Channels)(Custom Line Style)
Level 7	PHASE I Erosion Control Items (Miscellaneous Diversion Items)
Level 8	PHASE I Erosion Control Items (Brush Barriers, Level Spreaders, etc.)
Level 9	PHASE I Miscellaneous Erosion Control Items
Level 10	PHASE I Temporary Drainage (Pipes)(Custom Line Style)
Level 11	PHASE I Proposed Drainage (Pipes)(Custom Line Style)
Level 12	PHASE I Proposed Drainage (SWM)
Level 13	PHASE I Existing Contours (LC=1, WT=1)
Level 14	PHASE I Proposed Contours
Level 15	PHASE I Symbols, Legend and Notes
Level 16	PHASE II Erosion Control Items (TFB, TSF, Turb. Curtain)(Custom Line Style)

Level	Description
Level 17	PHASE II Erosion Control Ditch Items (EC-2, EC-3, etc.)(Custom Line Style)
Level 18	PHASE II Erosion Control Stone (EC-1, RipRap, Check Dams)(Cells)
Level 19	PHASE II Erosion Control Items (Sediment Traps & Basins)
Level 20	PHASE II Erosion Control Items (Diversion Dikes & Ditches)(Custom Line Style)
Level 21	PHASE II Erosion Control Items (Temporary Diversion Channels)(Custom Line Style)
Level 22	PHASE II Erosion Control Items (Miscellaneous Diversion Items)
Level 23	PHASE II Erosion Control Items (Brush Barriers, Level Spreaders, etc.)
Level 24	PHASE II Miscellaneous Erosion Control Items
Level 25	PHASE II Temporary Drainage (Pipes)(Custom Line Style)
Level 26	PHASE II Proposed Drainage (Pipes)(Custom Line Style)

Level	Description
Level 27	PHASE II Proposed Drainage (SWM)
Level 28	PHASE II Existing Contours (LC=1, WT=1)
Level 29	PHASE II Proposed Contours
Level 30	PHASE II Symbols, Legend and Notes
Level 31 - 60	Annotation for Levels 1 – 30 Note: All Drainage Structure Labels on Level 31 Text Size = B, Unless Noted Otherwise
Level 61	Base Plan Sheet, Scale Bar North Arrow, etc. WT = 5, LC = 0 Project Number, Sheet Number Text Size = A, WT = 5, LC = 0
Level 62	Not Assigned
Level 63	Project Notes

D.4.3 Profile Sheet Level Structure

- Level 1** Alignment (Design Profile), Tangent Lines, VPI's
- Level 11** Original profile
- Level 31** Reference Line, Annotation, Station/Elevation Points

D.5 Standard Text Sizes (Metric & Imperial Projects)

D.5.1 Imperial Text

Text Size	Scale	Text Size	Weight
A	1" = 100' 1" = 50' 1" = 25'	16' 8' 4'	5 5 5
B	1" = 100' 1" = 50' 1" = 25'	12' 6' 3'	5 5 5
C	1" = 100' 1" = 50' 1" = 25'	16' 8' 4'	7 7 7
D	1" = 100' 1" = 50' 1" = 25'	12' 6' 3'	7 7 7

NOTE: Text Size for other scales may be computed by dividing the desired drawing scale by 100 and multiplying the value for 1" = 100'.

EXAMPLE: For a desired scale of 1" = 10' for type A text

$$\text{Compute: } 10/100 = 0.10$$

$$0.10 \times 16 = 1.6'$$

SCALE	Text Size	Weight
-------	-----------	--------

1" = 10'	1.6'	5
----------	------	---

D.5.2 Metric Text

Text Size	Scale	Text Size	Weight
A	1 : 250 1 : 500	1.0m 2.0m	5 5
B	1 : 250 1 : 500	0.75m 1.5m	5 5
C	1 : 250 1 : 500	1.0m 2.0m	7 7
D	1 : 250 1 : 500	0.75m 1.5m	7 7

D.5.3 Profile Sheet Text Sizes

IMPERIAL

25 SCALE	50 SCALE	100 SCALE
Reference Line Text = 3.0	Reference Line Text = 6.0	Reference Line Text = 12.0
Vert. Align. Annotation = 3.0	Vert. Align. Annotation = 6.0	Vert. Align. Annotation = 12.0
VPI Data = 3.0	VPI Data = 6.0	VPI Data = 12.0
Profile Elevations = 3.0	Profile Elevations = 6.0	Profile Elevations = 12.0
Stations = 3.0	Stations = 6.0	Stations = 12.0
Elevations = 3.0	Elevations = 6.0	Elevations = 12.0

METRIC

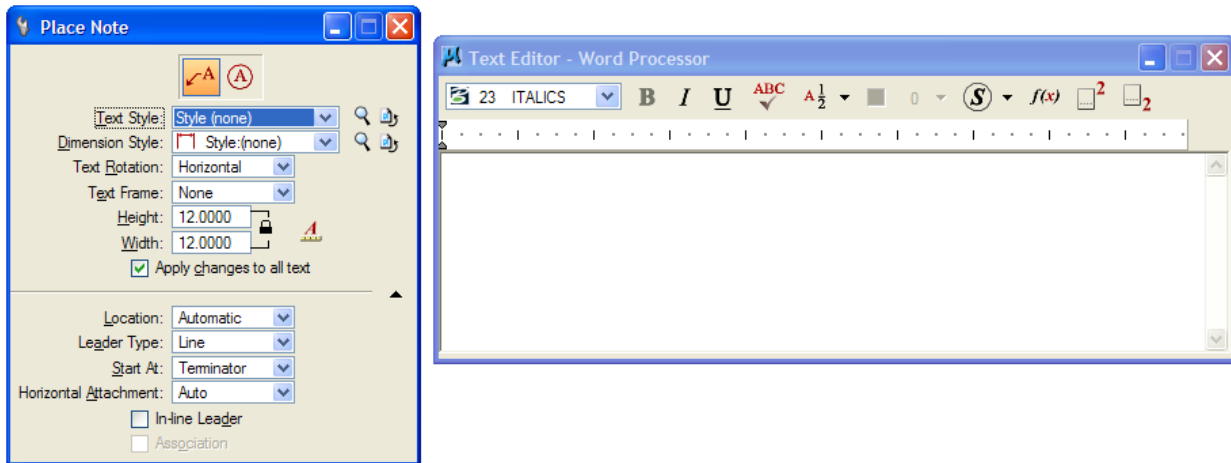
1 :250	1 : 500	1 : 1000
Reference Line Text = 1.0	Reference Line Text = 2.0	Reference Line Text = 4.0
Vert. Align. Annotation = 1.0	Vert. Align. Annotation = 2.0	Vert. Align. Annotation = 4.0
VPI Data = 1.0	VPI Data = 2.0	VPI Data = 4.0
Profile Elevations = 1.0	Profile Elevations = 2.0	Profile Elevations = 4.0
Stations = 1.0	Stations = 2.0	Stations = 4.0
Elevations = 1.0	Elevations = 2.0	Elevations = 4.0

D.5.4 Using the Place Note Command

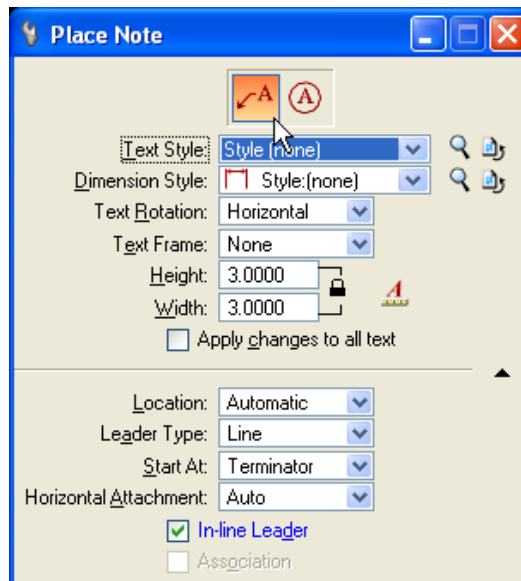
This command is used to place a line(s) of text with a leader line and an arrowhead for labeling items.



After you have selected the **Place Note** command, a dialog box will open that looks like one of the two images shown below.



Set the dialog box to **Place Note** mode.



Text Style should be set to **Style (none)**. **Dimension Style** should be set to **Style:(none)**.

The **Text Rotation** drop down list has three options: **Horizontal**, **Vertical**, or **In Line**. These options set the rotation of the text relative to the leader line. **Text Frame** should be set to **None**. Set appropriate **Height** and **Width** of text in accordance with the project scale.

The **Location** can be set to **Manual** or **Automatic**. These options determine whether the leader line can be placed with multiple segments or one segment.

- If set to **Manual**, the leader line can be place with multiple segments of a line.
- If set to **Automatic**, the leader line can only be placed with one segment of a leader line.

Leader Type should be set to **Line**.

The **Start At** options control how the note is placed: **Terminator** or **Text**.

- **Terminator** — If selected, the first data point that you enter places the end of the terminator, and the last data point places the text.
- **Text** — If selected, the first data point that you enter places the text, and the last data point places the end of the terminator. You can place multiple leaders on a single piece of text by holding the <Ctrl> key down. Each data point you select (after the first data point), places an additional leader on the text.

The **Horizontal Attachment** sets the leader attachment side: **Auto**, **Left** or **Right**.

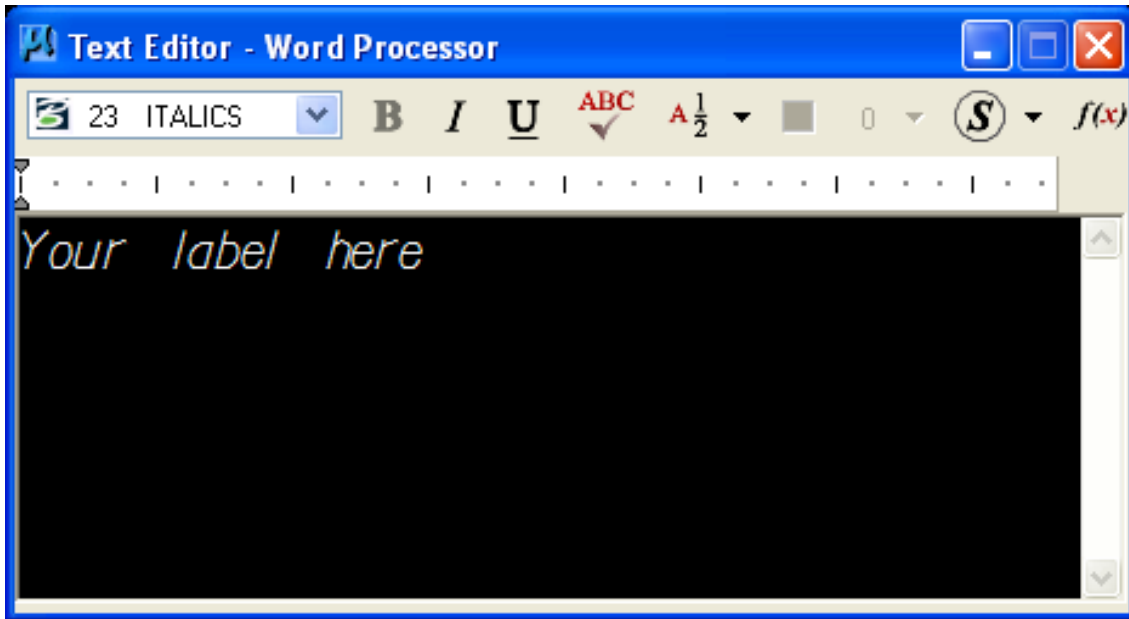
Auto – Multiple lines of text are aligned based on the relationship between the last and the next to last data points. For example, if the next to last data point is to the right of the last data point, the text is right justified.

Left – Multiple lines of text are aligned along their left side.

Right – Multiple lines of text are aligned along their right side.

If the **In-line Leader** is turned on an extra segment of the leader will be placed that aligns with the text. Turning this off and setting **Start At** to **Text** enables a note to be placed without a leader.

Once you have made the appropriate choices, focus into the **Text Editor** window and set the Font to 23 (*Italics*). Now begin typing in your text.



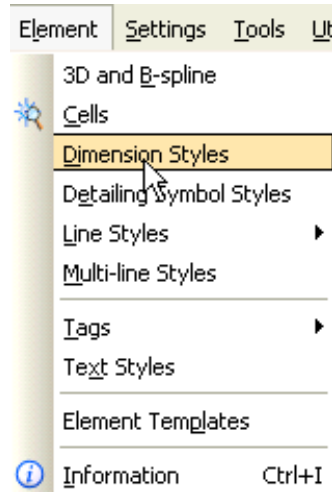
Place a data point to position the arrowhead, and then place a second data point to position the text. Move the mouse left or right to determine where text will be anchored (either left or right side).



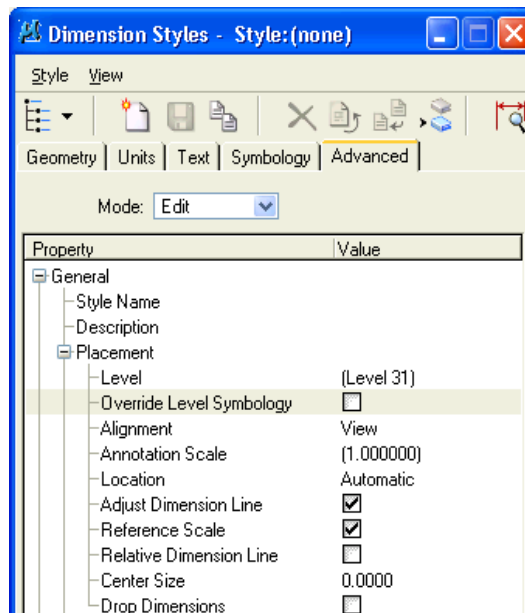
D.5.5 Dimension Styles

Using the above method to label items on your plan sheets does have some restrictions. The text cannot be placed at an active angle other than **0 degrees**. If you try to **rotate** the text, after placement, the leader line and arrowhead will also rotate. Also unless you created this design file after April 15, 2002, you will have to make some dimension changes to get the arrowhead to show up properly. Listed below are the steps you will need to follow to set your design file up correctly.

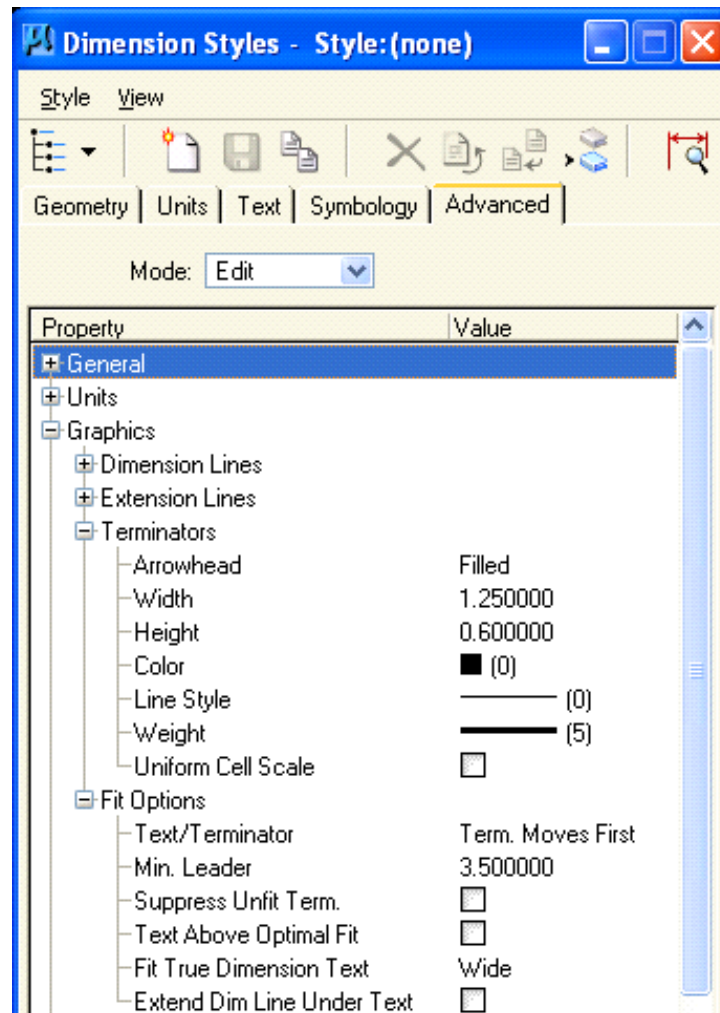
1. In the MicroStation Menu Bar click on **E**lement, then **D**imension Styles.



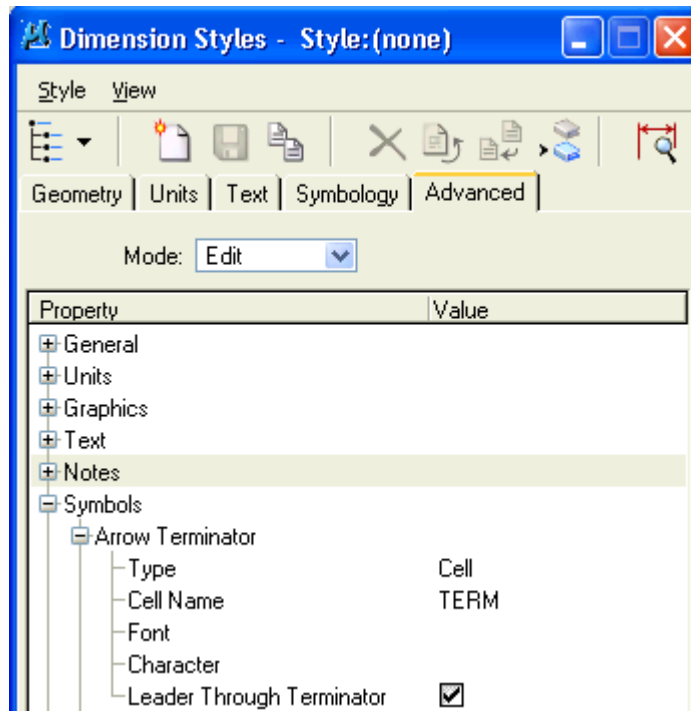
2. In the **Dimension Styles** dialog box click on the **Advanced** tab. Under the Property heading expand the **General** tool then expand the **Placement** tool. Set **Alignment** to **View** and **Location** to **Automatic**. Toggle on **Adjust Dimension Line**.



- In the **Dimension Styles** dialog box click on the **Advanced** tab. Under the Property heading expand the **Graphics** tool. Under **Graphics** expand the **Terminators** tool and expand the **Fit Options** tool. Under **Terminators** set **Arrowhead** to **Filled**, **Width** to **1.25** for imperial or metric, **Height** to **0.6** for imperial or metric. Under **Fit Options** set **Min. Leader** to **3.5** for imperial or **1** for metric.



- In the **Dimension Styles** dialog box click on the **Advanced** tab. Under the Property heading expand the **Symbols** tool. Under **Symbols** tool expand the **Arrow Terminator** tool and set **Type** to **Cell** and type in **Term** for **Cell Name**. Either dsym95 of mdsym95 cell library must be attached for proper terminator cell.



After you have completed the steps above, save settings by clicking on **File** then **Save Setting** in the microstation menu.

D.6 Standard Line Weights (Metric & Imperial Projects)

D.6.1 Profile Sheet Line Weights and Thicknesses

Profile Sheet	Weights	Profile Sheet	Line Code
Reference Lines	3	Reference Lines	0
Vertical Alignment	8	Vertical Alignment	0
Tangent Lines	2	Tangent Lines	0
Original Profiles	5	Original Profiles	3









D.6.2 Line Weights and Thicknesses

MicroStation Line Weight	Plotter Line Thickness
WT = 0	0.0075 inches
WT = 1	0.0125 inches
WT = 2	0.0150 inches
WT = 3	0.0175 inches
WT = 4	0.0200 inches
WT = 5	0.0225 inches
WT = 6	0.0275 inches

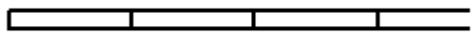
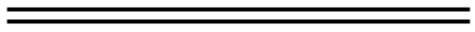





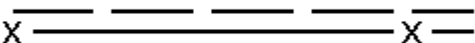
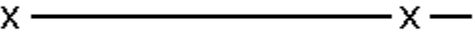
MicroStation Line Weight	Plotter Line Thickness
WT = 7	0.0325 inches
WT = 8	0.0375 inches
WT = 9	0.0450 inches
WT = 10	0.0500 inches
WT = 11	0.0525 inches
WT = 12	0.0550 inches
WT = 13	0.0575 inches
WT = 14	0.0600 inches
WT = 15	0.0625 inches
WT = 16	0.0650 inches

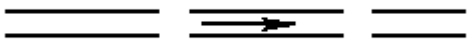


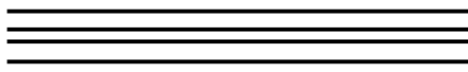
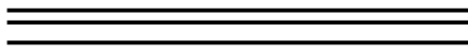





D.7 Standard Line Styles (Metric & Imperial Projects)

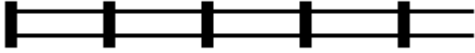
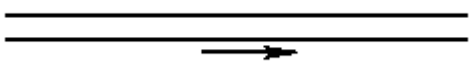
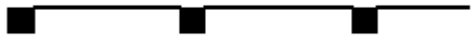
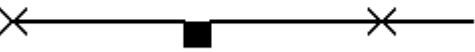


D.7.1 Default Line Styles

Line Style	Line Code	Description
	LC = 0	Solid
	LC = 1	Dotted
	LC = 2	Medium Dash
	LC = 3	Long Dash
	LC = 4	Dot Dash
	LC = 5	Short Dash
	LC = 6	Dash Dot Dot
	LC = 7	Long Dash/Short Dash

D.7.2 Standard Custom Line Styles for Proposed Plans

Custom Line Style	Line Style Name	Line Style Description	Line Style Scale	Line Weight
	bbfc	Brush Barrier with Filter Cloth	job	4
	cg2-s	Curb St'd. CG - 2	Off	4
	cg3-s	Mountable Curb St'd. CG - 3	Off	4
	cg6-s	Curb & Gutter St'd. CG - 6	Off	4
	cg7-s	Mountable Curb & Gutter St'd. CG - 7	Off	4
	ec2-s	Erosion Control Treatment St'd. EC - 2	**	4
	ec3-s	Erosion Control Treatment St'd. EC - 3	**	4
	fcfen	Filter Cloth on Exist. or Prop. Fence	job	4
	fen	Fence(all types)	job	4

Custom Line Style	Line Style Name	Line Style Description	Line Style Scale	Line Weight
	gfbd	Graded Flat Bottom Ditch	job	4
	gvd	Graded "V" Ditch	job	4
	mb3-s	Median Barrier St'd. MB - 3	job	4
	mb7d-s	Median Barrier St'd. MB - 7D	Off	4
	mb7f-s	Median Barrier St'd. MB - 7F	Off	4
	pc*	Prop. Pipe Culverts(42" and Smaller)	Off	0
	pc*	Prop. Pipe Culverts(48" and Larger)	Off	10
	pcud4	Pipe for St'd. UD - 4	Off	0
	pcud6	Pipe for St'd. UD - 6	Off	0
	pgr	Prop. Guardrail	job	4

Custom Line Style	Line Style Name	Line Style Description	Line Style Scale	Line Weight
	ptrac	Prop. Rail Road Track	Off	4
	pvfbd	Paved "V" or Flat Bottom Ditch	Off	4
	tfb	Temp. Filter Barrier	job	4
	tsf	Temp. Silt Fence	job	4
	turctn	Turbidity Curtain	job	4
	vepcop	Prop. Underground Power Cable	job	4

Metric line code names are the same, except they end in "-m" .

* Denotes Pipe Culvert size (i.e. PC18 = 18"pipe).

** = Scale factor controls width of treatment material.

Line Style Scale has three settings as follows:

job = scale factor is on and value field should be set to **.25** for 25/250 scale
or **.50** for 50/500 scale.

Off = Turn toggle switch off.

4' width = scale factor off

6' width = scale factor on, value field = 1.5

8' width = scale factor on, value field = 2

D.8 Standard Cell Libraries

This section contains graphic examples of all cells found in dsymgeo, dsym, mdsymgeo, and mdsym cell libraries which are symbols created for use in drafting the design of a project. Other symbols will be placed in this library as they are created and approved by the CADD Manager.

NOTE: These cells are **not to be changed** without the permission of the Location and Design CADD Manager.

NOTE: For the most up to date cells, please attach the Cell Library in Microstation or use the Design and Computation Manger in GEOPAK.

NOTE: The * is used as a wildcard for items such as pipes and drop inlets to avoid duplication of drawings in this manual. Wherever you see an asterisk (*), you should replace it with the appropriate pipe size or drop inlet size (name).

D.8.1 Design Symbols Cell Libraries

dsymgeo.cel

mdsymgeo.cel

Cell Name	Cell Description	Cell Name	Cell Description
9D12*	CG9D W 12 - W50, R 6-R8.5 No Sidewalk	9D12S*	CG9D W 12- W50, R 6-R8.5 with Sidewalk
ABDDDES	Abandoned Pipe Description	ADDEAS	Utility Relocation Easement Note
APTYP	Allowable Pipe Types Chart	BB	Brush Barrier Symbol
BCDES	Box Culvert Description	BDPLMC	Bedding Detail Minimum Cover for Pipes
C12100	Curb Cut Ramp 100' Radius	DB	Dewatering Basin
CCDDDES	Concrete Pipe and Endsection Description	CCLDES	Large Pipe and Endsection Description
CDDDES	Pipe and Endsection Description	CDTYI	Check Dam Type 1 Symbol
CDTYII	Check Dam Type 2 Symbol	CE	Construction Entrance Symbol

Cell Name	Cell Description	Cell Name	Cell Description
CFNOTE	Note Showing Symbols for Cut/Fill	CFSYML	Cut/Fill Symbol Left
CFSYMR	Cut/Fill Symbol Right	CG12 *	Curb Cut Ramp Standard CG-12
CG12L/R *	Curb Cut Ramp CG-12, 3' or 4' Wide, 12.5' R Lt. or Rt.	CG9D16	16' Standard CG-9D Entrance
CIP	Culvert Inlet Protect Symbol	COMPLN	Complete Plan Assembly Note
CONC	Concrete Symbol for Patterning	CR1	Cable Barricade
DICDES	Curb Inlet Description	DIDES	Drop Inlet Description
DIRARC	Curved Directional Traffic Flow Arrow	DIRARS	Straight Directional Traffic Flow Arrow
DIRASC	Directional Traffic Flow Arrow (Comb.)	DISTA	Drop Inlet Silt Trap Ty. A
DIBT	Drop Inlet Silt Trap Ty. B	DITCH	Ditch Flow Arrow
DOPNT	Demolition of Pavement Note	D12A *	Standard DI-12A Multigrate Drop Inlet (4' to 14')
ENTDES	Entrance Pipe Description	EQ	Equality Symbol
EQLIZ	Equal Station Symbol	ES *	Standard ES-1 Endsection for Pipes
FCSYML	Fill/Cut Symbol Left	FCSYMR	Fill/Cut Symbol Right
FEBCB	Standard Fence FE-B Corner Brace	FEBLB	Standard Fence FE-B Line Brace
FECL *	Standard FE-CL Gate (3' to 14')	FEG *	Standard FE-G Gate (3' to 16')
FECLCB	Standard Fence FE-CL Corner Brace	FECLLB	Standard Fence FE-CL Line Brace

Cell Name	Cell Description	Cell Name	Cell Description
FECLV	Standard Fence FE-CL Vinyl Line Brace	FECLVB	Standard Fence FE-CL Vinyl Corner Brace
FEREG	Reset Existing Gate	FEW1CB	Standard Fence FE-W1 or 2 Corner Brace
FEW1LB	Standard Fence FE-W1 or 2 Line Brace	FISTMP	Field Inspection Stamp
FLOWA	Flow Arrow	FOA11	Standard FOA-1 Ty. 1 Fixed Object Attch.
FOA12	Standard FOA-1 Ty. 2 Fixed Object Attch.	FOA21	Standard FOA-2 Ty. 1 Fixed Object Attch.
FOA22	Standard FOA-2 Ty. 2 Fixed Object Attch.	FOA3	Standard FOA-3 Fixed Object Attch.
FOA4 \$	Standard FOA-4 Ty. 1, 2 or 3 Fixed Object Attch. (\$ = 1, 2, 3)	GR3T	Standard GR-3 Terminal Treatment
GR7LT	Standard GR-7 Terminal Treatment Left	GR7RT	Standard GR-7 Terminal Treatment Right
GR7W	Standard GR-6 Terminal Treatment Weather	GR7350	Standard GR-7 Terminal Treatment NCHRP
GR8T1	Standard GR-8 Terminal Treatment Ty. 1	GR8T2	Standard GR-8 Terminal Treatment Ty. 2
GR9LT	Standard GR-9 Terminal Treatment Left	GR9RT	Standard GR-9 Terminal Treatment Right
IAA	Inter. Anchor Assembly	IAB *	Impact Attenuator (3 to 7)
IAM *	Mod. Impact Attenuator (8 to 22)	IAST1	Impact Attenuation Service Ty. 1
IAST1A	Impact Attenuation Service Ty. 1A	IAS2 *	Impact Attenuation Service Ty. 2 (1 to 15)

Cell Name	Cell Description	Cell Name	Cell Description
IATL2	Impact Attenuator TL2	IATL3	Impact Attenuator TL3
LAYPLN	CADD Generated Layered Plan Note	LOGCD	Log or Rock Check Dam
LS	Level Spreader	LSS	Level Spreader Symbol
MB5I	Standard MB-5 Median Barrier Terminal Ty. 1	MB5II	Standard MB-5 Median Barrier Terminal Ty. 2
MH12	Standard MH-1 or 2 Manhole	NA	North Arrow
NPCE	Note for Permanent Construction Easement	NSCG	Norfolk Standard Curb and Gutter
NSGR	Non Standard Guardrail	NTCE	Note for Temporary Construction Easement
PARCEL	Circle for Placing Parcel Numbers	PCPLUG	Precast Pipe Plug
PDRAIN	Permanent Drainage Easement Plus	PDTA	Proposed Ditch Type A
PDTB	Proposed Ditch Type B	PDTC	Proposed Ditch Type C
PDTD	Proposed Ditch Type D	PDTE	Proposed Ditch Type E
PERMIT	Blank sheet border for Permit Drawing	PPLUG	Plugging of Pipe
PPMST	Proposed Pad Mounted Switch	PPPC	Proposed Placement Protective Covering
PREEAS	Note for Preliminary Easement for Utility	PS2	Pipe Spillout
RADOFF	Radial Offset Detail	RCDAM	Rock Check Dam
RECDD	Drainage Description Double Block	RECSD	Drainage Description Single Block

Cell Name	Cell Description	Cell Name	Cell Description
REFIND	Reference Index Box	RGR7	Remove Exist. GR-7 Terminal
RM1	Standard RW-1 Right of Way Monument	RM2	Standard RW-2 Right of Way Monument
ROCK2	Rock Check Dam Ty. 2	SBAR1	Graphic Scale Bar 1" = 100'
ROCKCD	Rock Check Dam	ROCKY	Erosion Control Stone Pattern
SBAR25	Graphic Scale Bar 1" = 25'	SBAR50	Graphic Scale Bar 1" = 50'
SDBRGR	Special Design Bridge Attachment	SDDTAM	Temporary Asphalt Median
SDGBA	Special Design GRBR Attachment	SI1	Standard Sign Island Type 1
SSIDES	Shoulder Slot Inlet Symbol	ST	Temp. Sediment Trap Symbol
STIP	Stipple Pattern	STMDES	Storm Sewer Description
SWMDES	SWM Description	TAPER	Straight Line Taper Typical
TDC	Temp. Diversion Channel Symbol	TEASE	Temporary Easement Plus
TERM	Line Terminator (Arrowhead)	TFBS	Temp. Filter Barrier Symbol
TSD	Temp. Slope Drain Symbol	TSDRA	Temp. Slope Drain
TSFS	Temp. Silt Fence Symbol	TST	Temp. Sediment Trap
TTC	Temp. Turbidity Curtain Symbol	UNCONS	Stamp Unapproved Construction Plans
UNRWC	Stamp Unapproved Plans	UTEASE	Utility Easement Plus

* Denotes Sizes of sidewalks, curbs, guardrails, Number of Barrels and/or Bays, and Length of Gates, etc. (Cells from other Libraries may be included above).

D.8.2 Drainage Cell Library

Cell Name	Cell Description	Cell Name	Cell Description
10GTY1	Standard DI-10G Med. Barrier Drop Inlet Ty. 1	10GTY2	Standard DI-10G Med. Barrier Drop Inlet Ty. 2
10H1 *	Standard DI-10H Med. Barrier Drop Inlet Ty. 1 (4' to 20')	10H2 *	Standard DI-10H Med. Barrier Drop Inlet Ty. 2 (4' to 20')
10I1 *	Standard DI-10I Med. Barrier Drop Inlet Ty. 1 (6' to 20')	10I2 *	Standard DI-10I Med. Barrier Drop Inlet Ty. 2 (6' to 20')
10JTY1	Standard DI-10J Med. Barrier Drop Inlet Ty. 1	10JTY2	Standard DI-10J Med. Barrier Drop Inlet Ty. 2
10JTY3	Standard DI-10J Med. Barrier Drop Inlet Ty. 3	10K1 *	Standard DI-10K Med. Barrier Drop Inlet Ty. 1 (4' to 20')
10K2 *	Standard DI-10K Med. Barrier Drop Inlet Ty. 2 (4' to 20')	10K3 *	Standard DI-10K Med. Barrier Drop Inlet Ty. 3 (4' to 20')
10L1 *	Standard DI-10L Med. Barrier Drop Inlet Ty. 1 (6' to 20')	10L2 *	Standard DI-10L Med. Barrier Drop Inlet Ty. 2 (6' to 20')
10L3 *	Standard DI-10L Med. Barrier Drop Inlet Ty. 3 (6' to 20')	11AC *	Standard EW-11A Endwall for Conc. Pipe (12" to 24")
11AM *	Standard EW-11A Endwall for C.M. Pipe (12" to 24")	14B1 *	Standard DI-14B Med. Barrier Drop Inlet Ty. 1 (4' to 20')
14B2 *	Standard DI-14B Med. Barrier Drop Inlet Ty. 2 (4' to 20')	14C1 *	Standard DI-14C Med. Barrier Drop Inlet Ty. 1 (6' to 20')
14C2 *	Standard DI-14C Med. Barrier Drop Inlet Ty. 2 (6' to 20')	14D1	Standard DI-14D Med. Barrier Drop Inlet Ty. 1
14D2	Standard DI-14D Med. Barrier Drop Inlet Ty. 2	14D3	Standard DI-14D Med. Barrier Drop Inlet Ty. 3
14E1 *	Standard DI-14E Med. Barrier Drop Inlet Ty. 1 (4' to 20')	14E2 *	Standard DI-14E Med. Barrier Drop Inlet Ty. 2 (4' to 20')
14E3 *	Standard DI-14E Med. Barrier Drop Inlet Ty. 3 (4' to 20')	14F1 *	Standard DI-14F Med. Barrier Drop Inlet Ty. 1 (6' to 20')
14F2 *	Standard DI-14F Med. Barrier Drop	14F3 *	Standard DI-14F Med. Barrier

Cell Name	Cell Description	Cell Name	Cell Description
	Inlet Ty. 2 (6' to 20')		Drop Inlet Ty. 3 (6' to 20')
2S3CM *	Standard EW-2S Conc. & C.M. Endwall 30° Skew 2 to 1 Slope (42" to 96")	2S4CM *	Standard EW-2S Conc. & C.M. Endwall 45° Skew 2 to 1 Slope (42" to 96")
2SC3 *	Standard EW-2S Conc. Endwall 30° Skew 1.5 to 1 Slope (42" to 96")	2SC4 *	Standard EW-2S Conc. Endwall 45° Skew 1.5 to 1 Slope (42" to 96")
2SM3 *	Standard EW-2S C.M. Endwall 30° Skew 1.5 to 1 Slope (42" to 96")	2SM4 *	Standard EW-2S C.M. Endwall 45° Skew 1.5 to 1 Slope (42" to 96")
6S3C *	Standard EW-6S Conc. Endwall 30° Skew (12" to 36")	6S3M *	Standard EW-6S C.M. Endwall 30° Skew (12" to 36")
6S4C *	Standard EW-6S Conc. Endwall 45° Skew (12" to 36")	6S4M *	Standard EW-6S C.M. Endwall 45° Skew (12" to 36")
71C *	Standard EW-7 Conc. Endwall 1.5 to 1 Slope (42" to 96")	71M *	Standard EW-7 C.M. Endwall 1.5 to 1 Slope (42" to 96")
72C *	Standard EW-7 Conc. Endwall 2 to 1 Slope (42" to 96")	72M *	Standard EW-7 C.M. Endwall 2 to 1 Slope (42" to 96")
7S1C *	Standard EW-7S Conc. Endwall 30° Skew 1.5 to 1 Slope (42" to 96")	7S1M *	Standard EW-7S C.M. Endwall 30° Skew 1.5 to 1 Slope (42" to 96")
7S2C *	Standard EW-7S Conc. Endwall 30° Skew 2 to 1 Slope (42" to 96")	7S2M *	Standard EW-7S C.M. Endwall 30° Skew 2 to 1 Slope (42" to 96")
7SM1 *	Standard EW-7S C.M. Endwall 45° Skew 1.5 to 1 Slope (42" to 96")	7SM2 *	Standard EW-7S C.M. Endwall 45° Skew 2 to 1 Slope (42" to 96")
APTCLV	Allowable Pipe Type Culverts Chart	APTSS	Allowable Pipe Type Storm Sewer Chart
BDPLMC	Bedding Material for Pipe with less than Minimum Cover Detail	D12A *	Standard DI-12A Multigrate Drop Inlet (4' to 14')
D12B *	Standard DI-12B Multigrate Drop Inlet (4' to 14')	D12C *	Standard DI-12C Multigrate Drop Inlet (4' to 14')

Cell Name	Cell Description	Cell Name	Cell Description
D2BB *	Standard DI-2BB Curb Drop Inlet (4' to 20')	D2CC *	Standard DI-2CC Curb Drop Inlet (6' to 20')
D2EE *	Standard DI-2EE Curb Drop Inlet (6' to 20')	D2FF *	Standard DI-2FF Curb Drop Inlet (6' to 20')
D3BB *	Standard DI-3BB Curb Drop Inlet (4' to 20')	D3CC *	Standard DI-3CC Curb Drop Inlet (6' to 20')
D3EE *	Standard DI-3EE Curb Drop Inlet (4' to 20')	D3FF *	Standard DI-3FF Curb Drop Inlet (6' to 20')
D4BB *	Standard DI-4BB Curb Drop Inlet (6' to 20')	D4CC *	Standard DI-4CC Curb Drop Inlet (8' to 20')
D4EE *	Standard DI-4EE Curb Drop Inlet (6' to 20')	D4FF *	Standard DI-4FF Curb Drop Inlet (8' to 20')
DI1	Standard DI-1 Drop Inlet	DI1A	Standard DI-1A Drop Inlet
DI12*	Standard DI-12 Multigrate Drop Inlet (4' to 14')	DI13*	Standard DI-13 Shoulder Slot Inlet (Ty. 1 or 2)
DI14A1	Standard DI-14A Med. Barrier Drop Inlet Ty. 1	DI14A2	Standard DI-14A Med. Barrier Drop Inlet Ty. 2
DI2A	Standard DI-2A Curb Drop Inlet	DI2AA *	Standard DI-2AA Curb Drop Inlet
DI2B *	Standard DI-2B Curb Drop Inlet (4' to 20')	DI2C *	Standard DI-2C Curb Drop Inlet (6' to 20')
DI2D	Standard DI-2D Curb Drop Inlet	DI2DD	Standard DI-2DD Curb Drop Inlet
DI2E *	Standard DI-2E Curb Drop Inlet (6' to 20')	DI2F *	Standard DI-2F Curb Drop Inlet (6' to 20')
DI3A	Standard DI-3A Curb Drop Inlet	DI3AA	Standard DI-3AA Curb Drop Inlet
DI3B *	Standard DI-3B Curb Drop Inlet (4' to 20')	DI3C *	Standard DI-3C Curb Drop Inlet (6' to 20')
DI3D	Standard DI-3D Curb Drop Inlet	DI3DD	Standard DI-3DD Curb Drop Inlet
DI3E *	Standard DI-3E Curb Drop Inlet (4' to 20')	DI3F *	Standard DI-3F Curb Drop Inlet (6' to 20')

Cell Name	Cell Description	Cell Name	Cell Description
DI4A	Standard DI-4A Curb Drop Inlet	DI4AA	Standard DI-4AA Curb Drop Inlet
DI4B *	Standard DI-4B Curb Drop Inlet (6' to 20')	DI4C *	Standard DI-4C Curb Drop Inlet (8' to 20')
DI4D	Standard DI-4D Curb Drop Inlet	DI4DD	Standard DI-4DD Curb Drop Inlet
DI4E *	Standard DI-4E Curb Drop Inlet (6' to 20')	DI4F *	Standard DI-4F Curb Drop Inlet (8' to 20')
DI5	Standard DI-5 Ditch Drop Inlet	DI7	Standard DI-7 Median Drop Inlet
DI7A	Standard DI-7A Median Drop Inlet	DI7B	Standard DI-7B Median Drop Inlet
DI9	Standard DI-9 Pipe Tee Section Drop Inlet	DISTA	Drop Inlet Silt Trap Ty. A Label
DISTB	Drop Inlet Silt Trap Ty. B Label	DITCHA	Detail Ditch Type A
DITCH NODE	Ditch Node beginning and end	DITCHB	Detail Ditch Type B
DITCHC	Detail Ditch Type C	DITCHD	Detail Ditch Type D
DITCHE	Detail Ditch Type E	E114*	Standard EW-11 Endwall for Pipes, 4 to 1 Slope (12" to 60")
E116 *	Standard EW-11 Endwall for Pipes, 6 to 1 Slope (12" to 60")	E2A1 *	Standard EW-2A Endwall for Ellip. Pipes, 1.5 to 1 Slope
E2A2 *	Standard EW-2A Endwall for Ellip. Pipes, 2 to 1 Slope	E2C1 *	Standard EW-2 Endwall for Conc. Pipes, 1.5 to 1 Slope (42" to 96")
E2M1 *	Standard EW-2 Endwall for Corrugated Metal Pipes, 1.5 to 1 Slope (42" to 96")	E2M2 *	Standard EW-2 Endwall for Corrugated Metal Pipes, 2 to 1 Slope (42" to 96")
EC23 *	Detail EC-2 and 3	ECS *	Standard EC-1 Erosion Control Stone (Endsections 12" to 60")
EC1 *	Standard EC-1 Erosion Control Stone (Endwalls 12" to 84")	EG1	Standard EG-1 Energy Dissipator
EG1A	Standard EG-1A Energy Dissipator	ES *	Standard ES-1 Endsection for

Cell Name	Cell Description	Cell Name	Cell Description
			Pipes (12" to 60")
ES1A *	Standard ES-1A Endsection for Pipes (23" to 53")	ES2 *	Standard ES-2 Endsection for Pipes (12" to 60")
ES3 *	Standard ES-3 Endsection for Pipes (17" to 71")	EW10 *	Standard EW-10 Endwall for Pipe Arches (13" to 41")
EW1 *	Standard EW-1 Endwall for Concrete Pipes (12" to 36")	EW11 *	Standard EW-11 Endwall for Pipes, 3 to 1 Slope (12" to 60")
EW1M *	Standard EW-1 Endwall for Corrugated Metal Pipes (12" to 36")	EW1A *	Standard EW-1A Endwall for Elliptical Pipes (23" to 53")
EW12 *	Standard EW-12 CM End wall for Underdrain, 2 to 1 & 4 to 1 (4" and 6")	EW2 *	Standard EW-2 Endwall for Pipes, 2 to 1 Slope(42" to 96")
EW6 *	Standard EW-6 Endwall for Double Pipes (12" to 36")	EW6M *	Standard EW-6 Endwall for Pipe Arches
EW9 *	Standard EW-9 Endwall for Pipe Arches (13" to 41")	FLOWA	Flow Arrow
JB-1	Junction Box (Generic)	LS	Level Spreader
MH1	Standard MH-1 or 2 Manhole	MH2	Standard MH-2 Manhole
MH12	Standard MH-1 or 2 Manhole	PCPLUG	Precast Pipe Plug Detail
PS2	Pipe Spillout	PSPLUG	Abandoned Pipe Plug Detail
RCDAM1	Rock Check Dam Type 1	RCDAM2	Rock Check Dam Type 2
RECDD	Drainage Description Double Ellipse	RECSD	Drainage Description Single Ellipse
ROCKY	Erosion Control Stone Pattern	SWM1	SWM Drainage Structure
TST	Temp. Sediment Trap		

* Denotes Varying Types, Sizes and Lengths of Items.

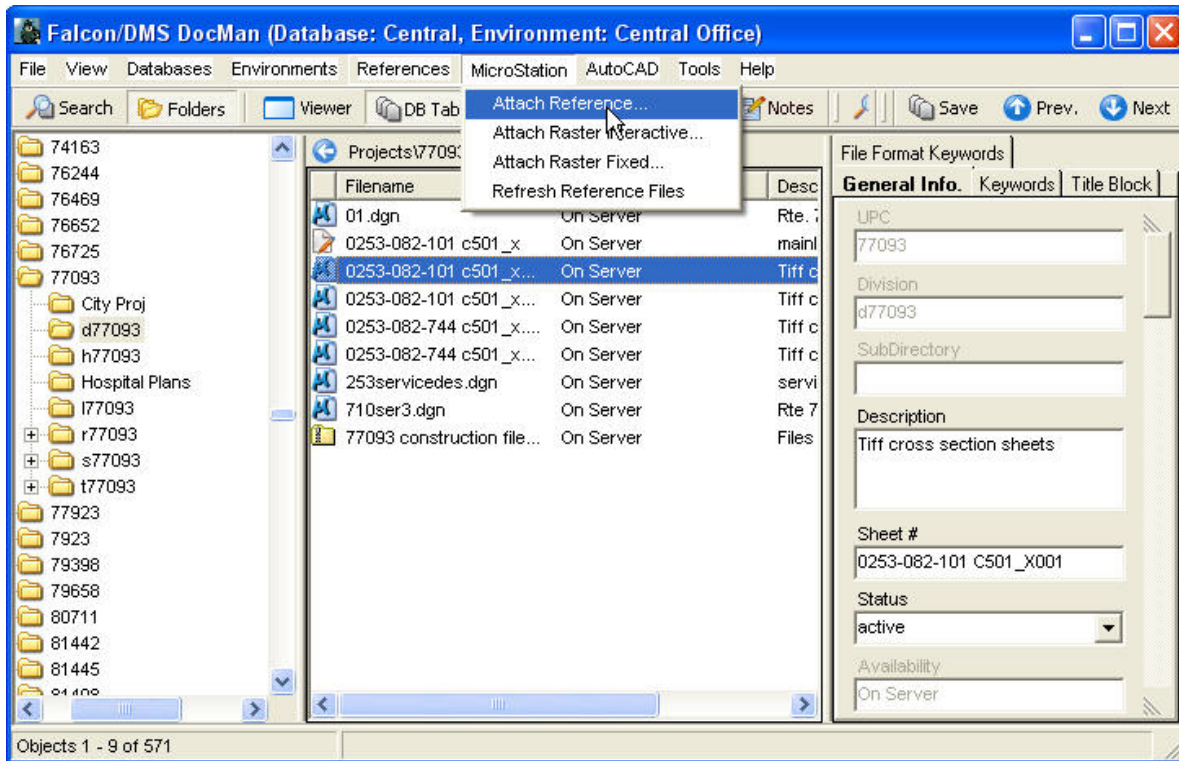
D.9 Creating Cross Section Plot File for Electronic Submission

The following procedure will not work properly if you have dropped status of cross section sheet cells.

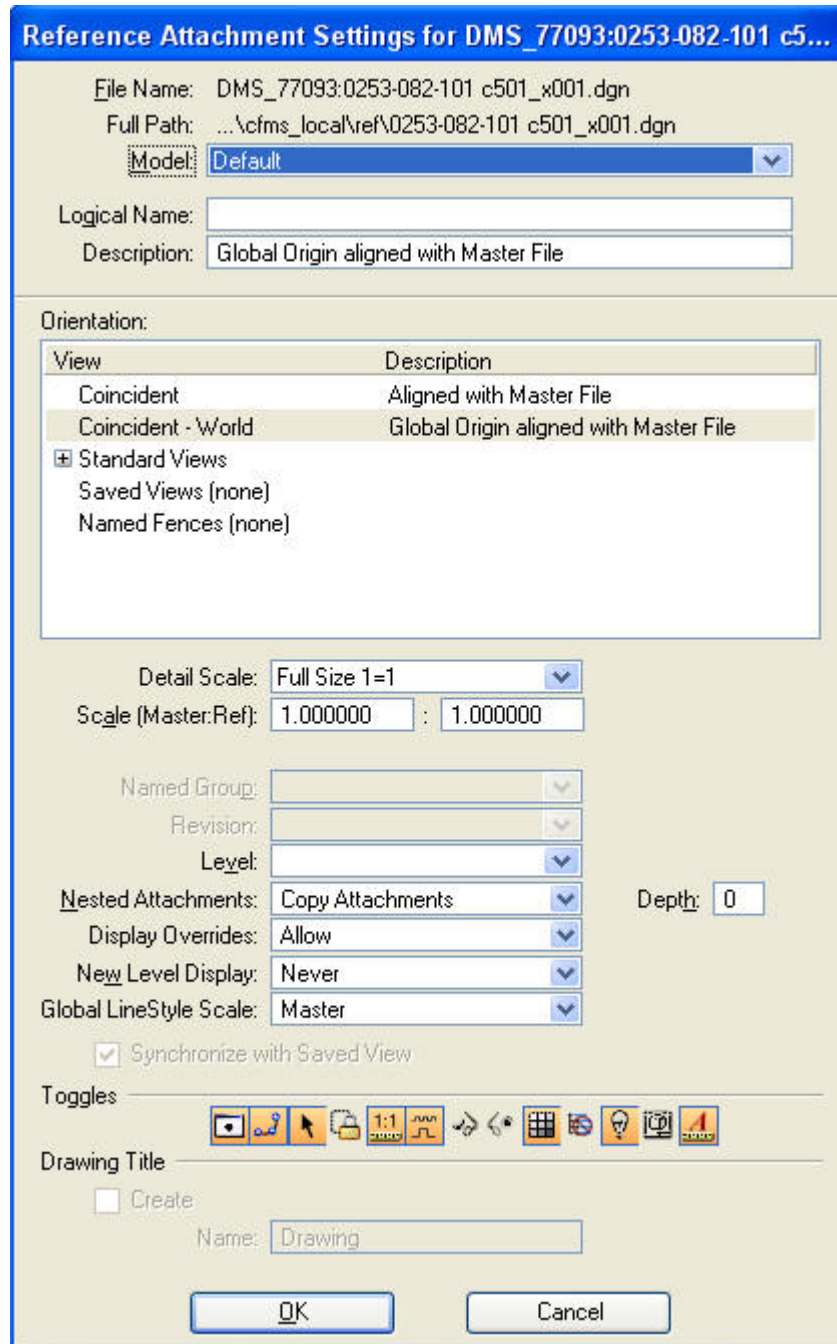
Create a new MicroStation file using the appropriate seed file (geopakxsh.dgn or mgeopakxsh.dgn) and name the file the same as the **project number _x.dgn** (Example: **0172-114-v02 c501_x.dgn**).

D.9.1 GEOPAK Cross Sections

Reference up mainline cross section sheet file in Falcon.



Then use **Copy Attachments** with a depth set to 1

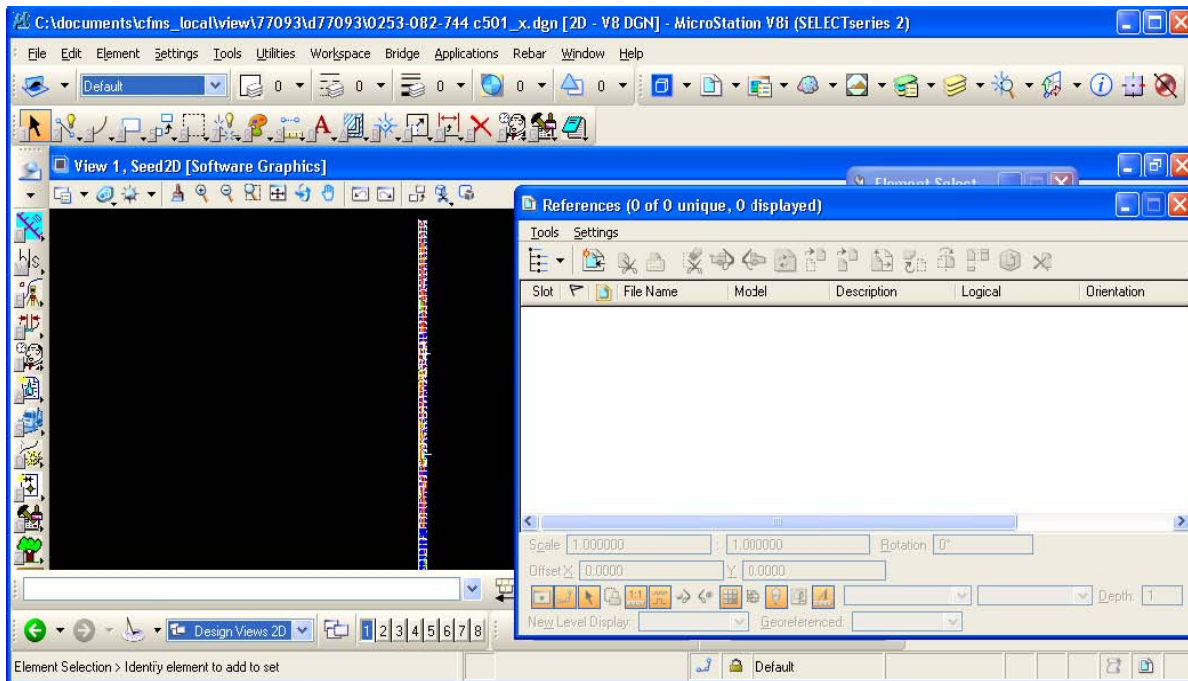


Fence and **Copy** cross sections from reference file in MicroStation. (Make sure you offset the copied cross sections from the original stack. This is necessary because all cross section reference files will attach at the same location which would make it difficult to distinguish between the copied cross section and the new attached cross sections).

Next detach all reference files.

Make sure you reference the files in order starting with file that contains cross section sheet 1.

Reference up all other pertinent cross section files one by one and repeat the previous steps. Copy the cross sections so they are just above the previous cross section sheets. They should be in the same order they would come in the plan assembly (bottom to top)



The Cadd section will plot the cross sections to PDF upon a request from the Designers. Make sure the sheets are named and numbered properly or they will be returned to you to redo.

Designers should send an email with a brief description of the project including the following details when the cross sections need to be plotted.

File Name

UPC #

File location in falcon (data base and environment)

Location PDF files shall be placed (current drawings or plan file room)

If you have any questions please contact the CADD Support Helpdesk via email CADDsupport@Vdot.Virginia.gov. or call toll free 888.683.0345 or local 804.786.1280.

D.10 VDOT Standard Data

VDOT STANDARD DATA: The following VDOT standard data is available in electronic format from VDOT.

D.10.1 MicroStation Seed Files

For all Seed Files names and Descriptions see [Chapter 3.1.3.1](#).

D.10.2 MicroStation Cell Libraries

Cell Library Name	Description
annotate.cel	Contains standard symbols for annotating plans.
bwMOT.cel	Contains Maintenance of Traffic signs for MOT plans. (Black and White)
drainage.cel	Contains standard drainage items for hydraulics projects.
dsymgeo.cel	Contains standard items for imperial project (Drop Inlets, Pipe Culverts, Standard Symbology, etc.)
geopakgint.cel	Contains standard Geotechnical symbols.
landscape2d.cel	Contains standard Landscaping items (Trees, Shrubs, Patterns etc.)
landscape3d.cel	Contain 3D cell of standard Landscaping items (Trees, Shrubs etc.)
lgennote.cel	Contains all the General Notes used for plans
materials	Contains Material items (Details, Notes, Typical, Symbols, etc.)

Cell Library Name	Description
mdrainage.cel	Contains standard drainage items for hydraulics metric projects.
mdsymgeo.cel	Contains standard items for metric project.
mlightin.cel	Contains standard lighting items for metric projects.
MOT.cel	Contains Maintenance of Traffic signs for MOT plans.(Color)
MOTE.cel	Contains cells to depict existing Maintenance of Traffic signs for MOT plans.
msheet95.cel	Contains standard plan, profile, cross section sheets, scale bars and north arrow for metric plans.
msignal.cel	Contains standard signal delineations for metric Traffic Engineering plans.
mstdtyp95.cel	Contains standard typical section items for metric plans.
Msurv.cel	Contains standard items used in developing survey topography for metric projects.
noise.cel	Contains Symbols for Noise Abatement plans.
Panels-MUTCD.cel	Contains standard signs and plaques listed the Manual on Uniform Traffic Control Device (MUTCD).
Panels-MUTCD_WAPM.cel	Contains standard signs and plaques listed in MUTD and the Virginia Work Area Protection Manual (WAPM).

Cell Library Name	Description
Panels-Supplement.cel	Contains supplement signs and plaques in accordance with MUTD.
Panels-Supplement-WAPM.cel	Contains supplement signs and plaques in accordance MUTD and WAPM.
PHsheet.cel	Contains sheet cells for use in development of Public Hearing displays.
phtyp.cel	Contains perspective typical sections for use in development of Public Hearing information.
rwV14.cel*	Contains as-builts items on the named As-built level structure.
section.cel	Contains two Guardrail sections L and R.
sheet2000.cel	Contains standard plan, profile, cross section sheets, scale bars and north arrow for imperial plan development that also allows for true half size printing (11x17).
sign.cel	Contains standard signage delineations for Traffic Engineering plans.
stdtyp95.cel	Contains standard typical section items for imperial plans.
survey.cel	Contains standard items used in developing survey topography for imperial projects.
surveyphoto.cel	Contains Photogrammetry items on the Photogrammetry level.

* Rev 2/18

Cell Library Name	Description
SurveyV14.cel*	Contains updated survey items on the Survey levels.
TEDBorder.cel	Contains items for Traffic Engineering plan sheets such as Border Information, Quantity Summary sheet, title sheet, etc.
TEDPaveLeg.cel	Contains text and symbols to be placed in the legend of Traffic Engineering pavement markings plan.
TEDPaveMark.cel	Contains items for Traffic Engineering plans such as pavement marking arrows, pavement marking call-outs, pavement marking letters, etc.
TEDPlanLabel.cel	Contains text and symbols to be used in labeling Traffic Engineering plans.
TEDSheet1.cel	Contains items to be used for creating Plan Index, General Notes and Legends for the first sheet of the Traffic Engineering plan set.
TEDSignal-Lighting.cel	Contains items for Traffic Engineering Signal and Lighting plans such as signal heads, controller cabinets, junction boxes, signal poles, luminaire arms, lighting pole foundations, labels, call-outs, etc.
TEDSigning.cel	Contains items for Traffic Engineering Signing plans such as sign structure symbols, signing call-outs, etc.
TEDSumQuan.cel	Contains items for creating Summary of Quantities Sheets for Traffic Engineering

* Rev 2/18

Cell Library Name	Description
	plans.
VDOTplats.cel	Contains items for creating VDOT Plats such as Borders, General Notes, Scale Bar, etc.

D.10.3 MicroStation Pen Tables

Used for plotting MicroStation files.

Pen Table Name	Used For
bfull.tbl	Bridge Plots
bhalf.tbl	Half Size Bridge Plots
half_v95.tbl	Half Size Roadway Design Plots
half_v95_row.tbl	Half Size Right of Way Plots
half_v95traffic.tbl	Half Size Traffic Engineering Plots
ld_v95.tbl	Roadway Design Plots
ld_v95_row.tbl	Right of Way Plots
ld_v95traffic.tbl	Traffic Engineering Plots
ld_xsc.tbl	Cross Sections Plots
ld_xsc_10_scale.tbl	Change the line styles from dashed to solid and reduce the lines weights so the design and exiting ground shows up better on Cross Sections Plots

ld_xsc_5_scale.tbl	Change the line styles from dashed to solid and reduce the lines weights so the design and exiting ground shows up better on Cross Sections Plots
ld_v95_utilities_color.tbl*	Utility (UT) sheet plots
rw_sheet.tbl	Right of Way (RW) sheet plots

* Rev 2/18

D.10.4 MicroStation Font Libraries

Font Name	Description
desstyl.rsc	Contains VDOT developed line styles for imperial files.
font.rsc	Contains standard fonts for metric and imperial project development.
mdesstyl.rsc	Contains VDOT developed line styles for metric files.
msurv.rsc	Contains VDOT developed line styles for metric survey files.
pavement.rsc	Contains VDOT developed line styles for pavement markings.
photogrammetry.rsc*	Contains VDOT developed line styles for photogrammetry files.
survey.rsc	Contains VDOT developed line styles for imperial survey files.
surveyV14.rsc	Contains VDOT developed line styles for survey files.
traffic.rsc	Contains VDOT developed line styles for imperial traffic files.

D.10.5 Workspace Files

.ucf	User configuration file for workspace variables for MicroStation V8i.
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D.10.6 GEOPAK Configuration Files

Criteria Files	Cross section criteria are used to draw cross section features outside of the mosaic of superelevation shapes typically representing pavement. Operationally, the software constructs the cross section features derived from the mosaic of shapes first. Then, the
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* Rev 2/18

	software constructs the remaining portions of the cross section through the application of criteria emanating out from the outer edges of the mosaic of shapes.
D&C Manager	A tool that allows the user to pick from standardized items and special applications for drafting.
Labels	Labeling tools allow a user to place smart labels in a MicroStation drawing. These labels have the ability to calculate XYZ coordinates, station, offset, direction, length, radius, degree of curvature, etc. of the associated element. It also allows you to pick symbology from the D&C Manager.
Macros	Special applications for creating tangent lines, curve widening, labeling R/W pluses, creating Superelevation Diagrams, and numbering cross section sheets, etc.
Sheets	Contains motif files and layout standards for plan/profile sheet clipping.
Standards	Contains standard tables of design speeds for curves
Superelevation	. Contains standard superelevation tables

D.10.7 VDOT Insertable Sheets - (as requested)

Insertable sheets can be copied into a MicroStation file by means of referencing the desired drawing. VDOT personnel can locate the insertable sheets through the **Falcon Document Manager** under the eng-ser folder. For the entire list of insertable sheets, set your Falcon/DMS database to Central Office and Central Office Environment. Then scroll to the eng-ser Folder and select **insert** for imperial sheets or **minsert** for metric sheets. Some of the insertable sheets have been moved to the MicroStation Cell Library. See [Appendix A](#) for a list of the insertable sheets that now reside in **sheet2000.cel**. The Consultants can locate the insertable sheets under the download folder within their ftp server site provided by VDOT.

The appropriate Insertable Sheet (**Now a Sheet Cell**) does not have to be included in applicable plan assemblies to explain the level structure anymore.

Although the following Insertable Sheets are now available in the **sheet2000** Cell Library as a cell, **the CADD Level Structure sheets are no longer required as part of the plan set.**

- ['95 CADD LEVEL STRUCTURE SHEET](#)
- ['86 CADD LEVEL STRUCTURE SHEET](#)

This sheet is not to be assigned a one series sheet number and does not have to follow the Alignment Data Sheet in the Plan assembly.

D.11 Generating and Submitting PDF Files *

D.11.1 Database Fields

When you are ready to create PDF files for Current Drawings, Pre Advertisement Conference, Final Submission, Pre-Award Revision or Construction Revision you must first make sure the following fields are filled in correctly in Falcon DocMan to insure that the PDF files are submitted properly.

D.11.1.1 General Information

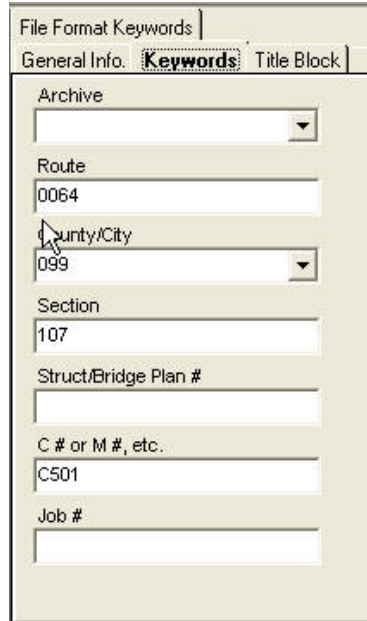
The “**Description**” and “**Document #**” must be filled in for each plan sheet. In the “**Document #**” field, place the sheet number. If the sheet number is 1 thru 9 place a zero (0) in front of the sheet number. (For example if the sheet number is 1c the Document # should be 01c.) If the file is not a plan sheet, then the field should be blank

The screenshot shows a web-based form titled 'General Info.' with three tabs: 'General Info.', 'Keywords', and 'Title Block'. The 'General Info.' tab is active. The form contains the following fields:

- UPC: 57546
- Division: d57546
- SubDirectory: (empty)
- Description: Title Sheet
- Sheet #: 01
- Status: index (dropdown menu)
- Availability: On Server
- Last Modify Date: 07/06/2004
- Last Checked Out By: tracy.wood
- Created On: 03/14/2003
- Created By: wood_tm
- File Format: igds (dropdown menu)

D.11.1.2 Keywords

The project information must be filled in with your project number as shown below. The route number should be 4 digits, such as 0123 and the section number 3 digits. County/City is a pick list.

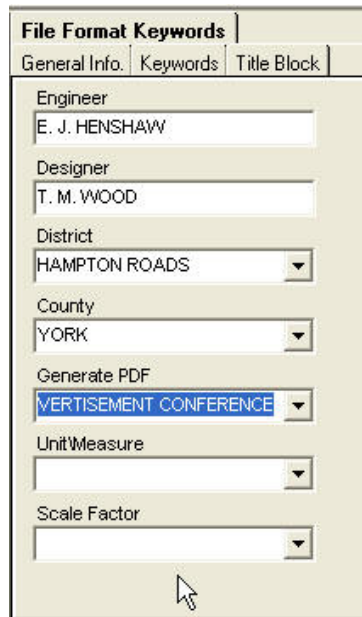


The screenshot shows the 'File Format Keywords' dialog box with the 'Keywords' tab selected. The fields are as follows:

Field	Value
Archive	[Dropdown]
Route	0064
County/City	099
Section	107
Struct/Bridge Plan #	[Empty]
C # or M #, etc.	C501
Job #	[Empty]

D.11.1.3 Format Keyword

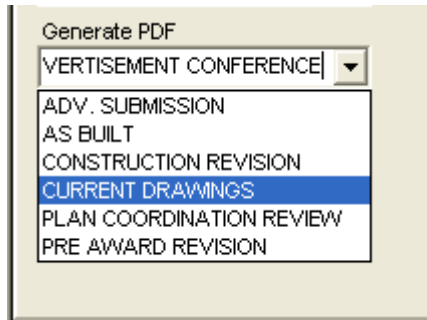
The Engineer, Designer, District and County should be filled in for informational purposes. The File Format Keyword field for "Generate PDF" is a required database field. The user should use the down arrow to select one of the choices.



The screenshot shows the 'File Format Keywords' dialog box with the 'Keywords' tab selected. The fields are as follows:

Field	Value
Engineer	E. J. HENSHAW
Designer	T. M. WOOD
District	HAMPTON ROADS
County	YORK
Generate PDF	VERTISEMENT CONFERENCE
Unit/Measure	[Dropdown]
Scale Factor	[Dropdown]

The stages to Generate PDFs are as follows:

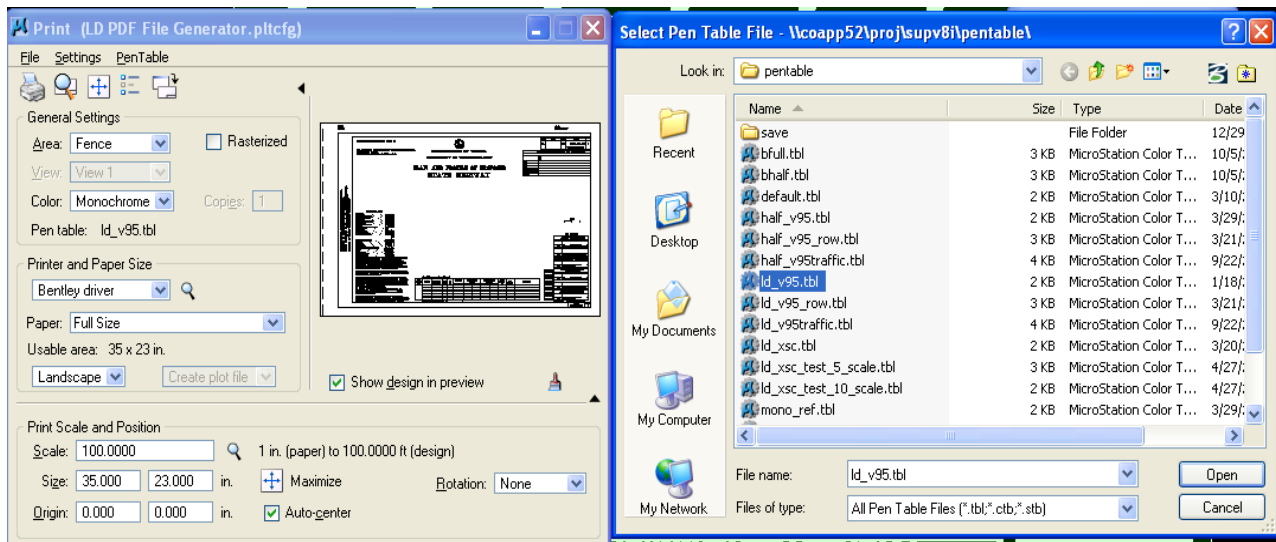


Remember to select “SAVE”. The choices above will indicate what stage the PDF files are being submitted for. The CADD support staff will make the PDF files available on the Falcon Web Suite under Current Drawings if “current drawings” is selected.

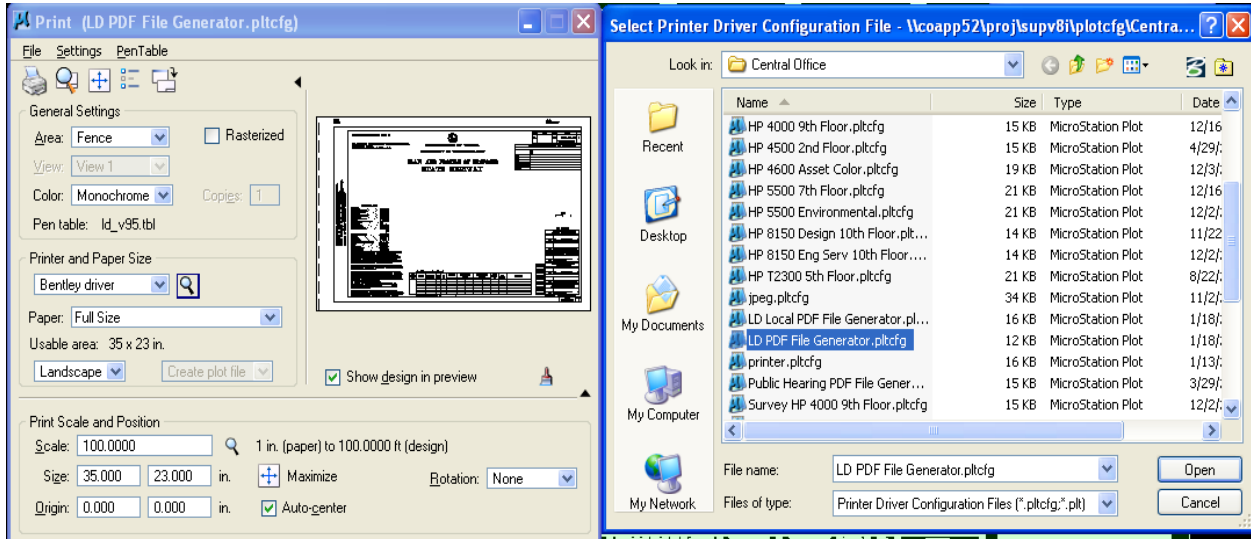
If Plan Coordination Revision or any stage after is selected, the PDF files go directly into the Falcon Web Suite under Plan File Room.

D.11.2 Generate PDF File

Once all the required database fields are set, the dgn files are ready for the user to use MicroStation V8i Plotting software to generate the PDF files. To create a PDF file open the dgn file in MicroStation. Fence the file the same as if you were going to plot the sheet. Then go to **File - Print**. Print box will open. At the top click on **Pen Table** then click **Attach**. The Pen Table box will open. Select the appropriate pen table and click **Open**.



Now click on the Bentley Driver search tool. Pick the **LD PDF File Generator.pltcf** file and then click **Open**. The size will be set to 35 X 23 inches. Do not change the size even if it's a metric project. Click on **Print** then **Save**. This will create the PDF file.



To view the PDF file go to \\501coidms01\location&design\$\Z2nd sub tifs\Central Office

****Note: As of July 1, 2009 the required format will be PDF files. All information referring to PDF Files will be revised to show the creation of PDF files. This change is to coincide with the new policy concerning the Signing and Sealing of plans. Digital Signatures will now be required to complete the Electronic Submission process.***