
Roadway Design

Consultant CADD Help

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CADD Overview for Consultants

Introduction

As stated in the “CADD SOFTWARE REQUIREMENTS” section of Chapter 1 of this manual, all designers, including consultants, working on Roadway Plans for MDOT shall use Microstation and GeoPak (Current version or consultants can see contract for minimum version) and standard files developed by Roadway Design for this software to develop the plans.

The CADD files created with this software are required to be submitted at various print times for each project.

PDF Images of the Plan Sheets are also required at various print times. The requirements of the PDF images are stated in the “Electronic Plans” section of this document.

An overview of what is required at the following print times is described in the table below.

Print Type	Printed Sheets (Full Scale)		Printed Sheets (1/2 Scale)		PDF Images		CADD Files	
	Plans	XS	Plans	XS	Plans	XS	Plans	XS
Conceptual Plans	-	-	4 Sets	-	Yes	-	-	-
Preliminary ROW	-	-	1 Set	-	Yes	-	-	-
Draft Field Inspection	-	-	4 Sets	-	-	-	-	-
Field Inspection	-	-	1 Set	1 Set	Yes	Yes	-	-
Draft Final ROW	-	-	4 Sets					
Final ROW	-	-	1 Set	1 Set	Yes	Yes	Yes	Yes
Final ROW Revisions	-	-	1 Set	1 Set	Yes	Yes	Yes	Yes
Office Review	-	-	1 Set	1 Set	Yes	-	-	Yes*
Final Plans	1 Set	-	-	-	-	Yes	Yes	Yes

* Only required for projects whose total Earthwork volume is greater than 200,000 C.Y.

PRELIMINARY Right-of-Way PLANS

What is required electronically upon initial submittal of Final R.O.W. plans:

When printed reproducible and PDF images are submitted as Final R.O.W. plans the electronic CADD files specified below shall also be submitted on CD/DVD, or emailed to the primary Roadway Design contact. These CADD files shall be submitted along with the plans with a project description (Project Number, Route, County, etc.) listed on the exterior of the disk along with the words "Final ROW". As mentioned earlier, the CADD files shall be developed with **MICROSTATION & GEOPAK** using Roadway Design's CADD manual as the CADD specifications. The electronic CADD files can be in a compressed zipped (.ZIP) format or a compressed self-extracting (.EXE) format. The name of this ZIP or EXE file shall be RWproject#.ZIP(or EXE).

The following files shall be submitted:

1. Title Sheet (title.dgn)
2. Plan/Profile Sheets with reference files intact (wk*.dgn)
3. Reference Files: topo.dgn, ali.dgn, ep.dgn, row.dgn, drain.dgn, des.dgn
4. Typical Sections (ts.dgn)
5. Cross-Sections (xs*.dgn & lay*.dgn)
6. JOB*.GPK file (GeoPak cogo database file.)

Note that PDF images are required also. These can be placed on the same CD/DVD as the CADD files in a directory called PDFS.

Revisions

ROW revision dates and sheets numbers that were revised shall be placed on the Layout Sheet. The actual description of the revision and date shall be shown on each revised sheet. CADD files which changed as a result of right-of-way revisions shall be submitted with the revised reproducible drawings/PDF images as stated above except that they shall be labeled "DATE" ROW REVISION (Project Number, Route, County, etc.). Submit revised files as stated above. The "DATE" is the DATE of the revision which should match the date of the revision on the plans.

SPECIFIC WORK REQUIREMENTS FOR PHASE B -- FINAL CONTRACT PLANS

What is required electronically upon initial submittal of Final Contract plans:

When printed reproducibles are submitted as Final CONTRACT plans the electronic CADD files shall also be submitted. As mentioned earlier, contract plan sheets shall be developed with **MICROSTATION & GEOPAK**. All related electronic files shall be submitted with original drawings on CD/DVD's with a project description (Project Number, Route, County, etc.) and the words "Final Plans" listed on the exterior of the disk. In lieu of CD/DVD's, the CONSULTANT may transmit the files by e-mail. The electronic CADD files may be in a compressed (zipped) format.

Revisions:

All additions or revisions will require the submittal of revised electronic CADD files on CD/DVD, or Emailed to the primary Roadway Design contact, with filenames contained thereon (noted as revised) listed on the exterior of the disk. CONSTRUCTION revision dates and sheets numbers that were revised for a particular date, shall be placed on the Detailed Index sheet. CADD files which changed as a result of construction revisions shall be submitted with the revised reproducible drawings as stated above except that they should be labeled "Final Plans Revision" "DATE" (Project Number, Route, County, etc.)

Cross-Sections format for Final Contract Plans when GeoPak is not used

If your project is older and did not require the use of GeoPak and cross-sections were not processed with GeoPak, ASCII text files containing the station, offset, elevation (SOE) of each break point of the existing ground, proposed finished grade, and proposed subgrade surfaces (disregarding subsurface pavement surfaces) as described below shall be submitted. A design file shall also be submitted called XSALI.DGN which contains all survey baselines for the project's cross-sections. These ASCII SOE files shall be placed in a sub-directory of the Electronic files directory called \FinalSOE.

FORMAT

The format of the stations, offset, elevation text files will be one of the two options as shown in the examples below.

OPTION 1

```
382+00.00  -166.00  289.30  -150.00  287.80  -125.00  287.50  -100.00
287.20     -75.00  286.90  -56.00  286.90  -38.00   286.90  -24.00
286.10     -19.00  287.30  -12.00  287.70   0.00   287.80   12.00
287.60      20.00  287.10   33.00  284.10  44.86   275.77   53.22
275.77      61.77  278.69   76.54  276.50  104.30  276.53
139.79   276.53   162.08  275.98  175.00  276.40
383+00.00  etc.
```

OPTION 2

382+00.00	-166.00	289.30
382+00.00	-150.00	287.80
382+00.00	-125.00	287.50
382+00.00	-100.00	287.20
382+00.00	-75.00	286.90
382+00.00	-56.00	286.90
382+00.00	-38.00	286.90
382+00.00	-24.00	286.10
382+00.00	-19.00	287.30
382+00.00	-12.00	287.70
382+00.00	0.00	287.80
382+00.00	12.00	287.60
382+00.00	20.00	287.10
382+00.00	33.00	284.10
382+00.00	44.86	275.77
382+00.00	53.22	275.77
382+00.00	61.77	278.69
382+00.00	76.54	276.50
382+00.00	104.30	276.53
382+00.00	139.79	276.53
382+00.00	162.08	275.98
382+00.00	175.00	276.40
383+00.00,	etc.	

FILENAMES & EXAMPLES

The filenames of the ascii files will be as follows:

XSroute-exist.SOE - contains Station, Offset, Elevation (SOE) of the existing ground data

* If existing subsurface layer(s) are present, create a SOE file for each surface and name the SOE file the same as the Existing Ground but add a 1, 2, etc. to the filename..

(i.e. XS84-exist1.SOE, XS84-exist2.SOE)

XSroute-des.SOE - contains SOE of the Design Subgrade

* If there is a break in the proposed finished grade (i.e. 4-lane, 2-way, divided median with undisturbed existing ground between the embankments), the station, offset, elevation data of each roadbed shall be broken down in separate files or the SOE points of the existing ground between the embankments needs to be included.

* If the Design Soil is being controlled (Another Design surface below the subgrade), create a SOE file for this surface and name the SOE file the same as the Design Subgrade but add a 1, 2, etc. to the filename.

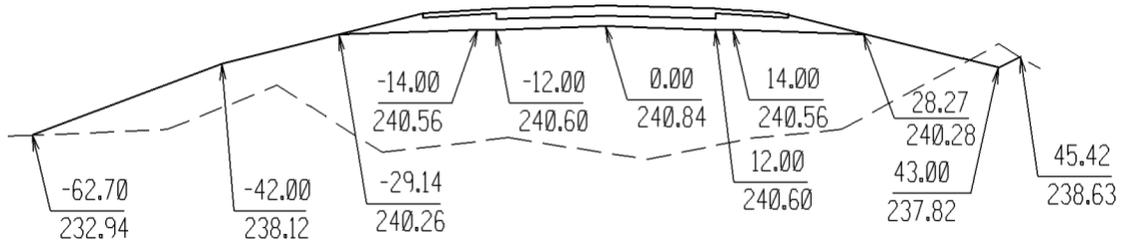
(i.e. XS84-des1.SOE, XS84-des2.SOE)

EXAMPLE (Design Subgrade): XS84-DES.SOE

```

245+00.000 R 1 -62.70 232.94 -42.00 238.12 -29.14 240.26 -14.00
240.56 -12.00 240.60 0.00 240.84 12.00 240.60 14.00 240.56 28.27
240.28 43.00 237.82 45.42 238.63
246+00.000 R 1 etc.

```

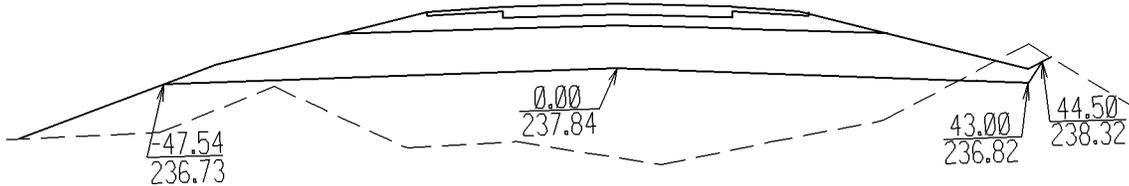


EXAMPLE (Select Fill): XS84-DES1.SOE

```

245+00.000 R 1 -47.54 236.73 0.00 237.84 43.00 236.82 44.50
238.32

```



XSroute-pave.SOE - contains proposed finished grade

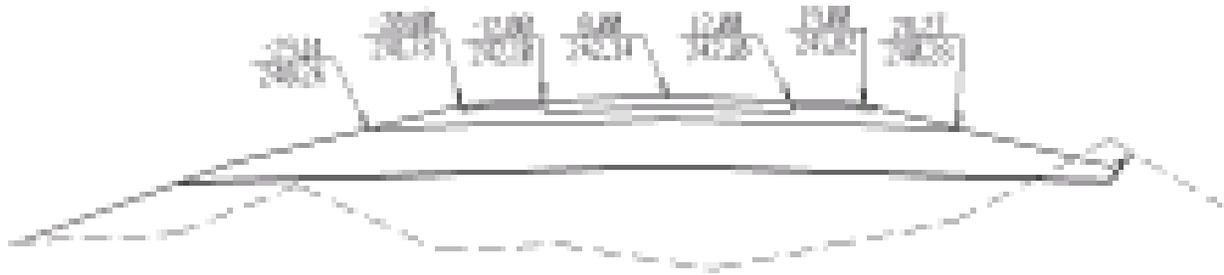
* If there is a break in the proposed finished grade (i.e. 4-lane, 2-way, divided median with undisturbed existing ground between the embankments), the station, offset, elevation data of each roadbed shall be broken down in separate files.

EXAMPLE (Finished Grade): XS84-PAVE.SOE

```

245+00.000 R 1 -29.14 240.26 -20.00 241.78 -12.00 242.10 0.00
242.34 12.00 242.10 19.00 241.82 28.27 240.28

```



ELECTRONIC PLANS

OVERVIEW

The following are Roadway Design's requirements for submittal of plans in Electronic (.PDF) Format. The PDF images can be produced any way you wish as long as the format listed below is met. Various ways the PDF images can be created include scanning to PDF, Bentley's PDF Driver, and other PDF Document creators. We have described batch creating these images using Microstation's Print Organizer.

PDF Specifications:

Specifications required of the PDF's are listed below.

- a) Adobe PDF – Multi-Page (**Plans must be in order.**)
- b) Color:
 - Plan & Profile Sheets – Color – Controlled by Pen Tables **RwdPdf_Color.tbl** or **RwdPdf_Color_Final.tbl**
 - The Pen tables establish different colors based on levels for the following elements in the resulting prints:
 - Proposed Elements - Black
 - Proposed Hydraulic Elements - Blue
 - Existing Elements - Maroon
 - Profile Grid – Light Brown
 - Elements will need to be on correct levels.
 - All Other Sheets – Black & White (Including Erosion Control Sheets)
 - Exceptions - Colors are allowed on any special design sheets where the designer thinks color will aid in clarity (i.e. Traffic Control). Any Special Design Sheets where color is used shall follow the Plan & Profile sheets in the plans (Group all color sheets together) and should have a legend explaining the difference in the colors. Only darker colors should be used on these Special Design Sheets and red and green cannot be used. If Pen Tables other than described above is used, they should be submitted with CADD File deliverables.
- c) Size - All Electronic Prints (Images) need to be Full Scale (22"x34.6")
- d) Content - Ensure all data is present on the PDF images (Correct Levels On/Off, Correct Reference Files On/Off, etc.)

- e) Rotation - The PDF's should be rotated so that they are readable when opened.
- f) Resolution – 400-600 DPI
- g) RWDPDF.set should be used in the creation of the PDF's with IPlot.
- h) RWDPDF.pltcfg should be used in the creation of the PDF's with Microstation Plot.
- i) PDF Version – 1.7 minimum.
- j) Other settings required which are set by default using RWDPDF.pltcfg in Microstation Plot but have to be manually set under “PDF Format Configuration” if using Iplot:

Engineering Links (On)
 Searchable Text (On)
 Level Label (Off)
 Disable Save Views/Reference Bookmarks (On)

PDF Viewing

- Viewing PDF plan sets on your computer - Windows Explorer can be used to thumbnail individual PDF's in a folder. Just choose Large Icons as the View. You can also utilize explorer's Preview Pane when sorting through a large number of images. To increase the speed of the thumbnailing we use PDF-XChange Viewer and make it the default reader for PDF's.

File Format

Adobe PDF- Portable Document Format (Black & White)

It is recommended that you use the supplied modified version of the Bentley PDF Print Driver to create all PDF's since it contains the desired attributes. This driver and its attributes can be found in Chapter 13 – Plotting of the CADD Manual.

File Name

FMSNUMBER -Date-Print Type.PDF

Examples are below. Note that each Final ROW revision requires 2 documents to be submitted, one with only revisions, and the other with the most current ROW plans. Cross Sections should be submitted in separate multi-page files. Final Construction Plans are still submitted on paper.

Examples for each print type:

100078-201000-2009-04-05-HydraulicSurvey.PDF

100078-201000-2009-04-05-Conceptual.PDF

100078-201000-2009-09-05-PreROW.PDF

Field Inspection 100078-201000-2009-11-05-FI.PDF

Final ROW 100078-201000-2010-01-08-FinalROW.PDF

Final ROW XS 100078-201000-2010-01-08-FinalROWXS.PDF

ROW Revision 1

100078-201000-2010-02-03-FinalROW.PDF *(Contains all sheets with revisions – Current set of plans) (Not required if project is close to or past Office Review stage).*

100078-201000-2010-02-03-FinalROWRev.PDF (Contains Title Sheet & just revised sheets.)

ROW Revision 2 100078-201000-2010-04-08-FinalROW.PDF *(Contains all sheets with revisions – Current set of plans) (Not required if project is close to or past Office Review stage).*

100078-201000-2010-04-08-FinalROWRev.PDF (Contains Title Sheet & just revised sheets.)

100078-301000-2010-11-10-OfficeReview.PDF

100078-301000-2010-11-10-FinalXS.PDF

Notes:

a) IT IS CRITICAL TO HAVE THE FILES IN ORDER (SHEET ORDER) in the multi-page document.

b) The FMSNumber should be 13 characters (100078-201000) and should be the ROW FMS # for ROW related plans & the Construction FMS # for all plans printed for Office Review & Final Plans.

c) The Date should be a date close to the actual print request or the actual date of a revision.

d) You can have multiple XS PDF's (minimum 100 sheets) if needed for PDF performance when you have a project that has a large number of cross section sheets.

Delivery

CD/DVD or FTP. These should be labeled with the words “**Electronic Plans**”, Type Printing, Project No, Route, & County. They can be included with CADD files under a directory called PDFS if the CADD files are required for the printing.