



Ohio Department of Transportation

Guidelines for Electronic Design Deliverables

Office of CADD & Mapping Services

4/30/2018

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CHAPTER 1 - GENERAL

ALL PROJECTS SUBMITTED ON OR AFTER JULY 30TH, 2018 MUST ADHERE TO THE GUIDELINES FOR ELECTRONIC DESIGN DELIVERABLES.

This manual provides information regarding the exchange of electronic design deliverables between ODOT, and Districts or consultants. Electronic design deliverables include, but are not limited to [CADD files](#), [Alignment files](#), [Surface files](#), the [Project Index Excel file](#), [General Summary Excel file](#), all tables found in the plan set, and any other files that contain design information for the project.

The content of all final submissions shall be complete, with no omissions. The project must follow ODOT's **Project Submittal Process** found in [Chapter 10](#) of this manual.

Any questions regarding items not included in this manual, or interpretations of this manual should be addressed to the **Office of CADD and Mapping Services**, [CADD Services](#) section, located in ODOT's Central Office using the support request form linked below:

https://odot.formstack.com/forms/cadd_servicerequest

Consultants, contractors, and suppliers should direct questions regarding interpretations of this manual to the **Office of CADD and Mapping Services**, CADD Services section, through the ODOT Project point of contact (i.e., Manager, Job Manager, Consultant Manager, etc.) as applicable.

1.1 ODOT CADD STANDARDS

ODOT CADD Standards for MicroStation, GEOPAK, and OpenRoads are maintained and distributed by the CADD Services section of the ODOT **Office of CADD and Mapping Services**. Users can access the ODOTcadd standards via **The Office of CADD and Mapping Services' [YouTube channel](#)**, which provides step-by-step instructions on how to set up the ODOTcadd standards. Also, for more information, the ODOT [CADD Engineering Standards Manual](#) is available in PDF format.

For internal users, the ODOTcadd standards for MicroStation and GEOPAK are located in the following folder:

I:\ODOTcadd\Standards

For external users, the [ODOTcadd Standards downloadable files](#) for MicroStation, GEOPAK, and other engineering applications can be found on the ODOT CADD Services website.

Questions about these standards, and/or requests for enhancements, should be directed to the **CADD Services** section using the following **CADD Services Support Request Form**:

https://odot.formstack.com/forms/cadd_servicerequest

1.2 REJECTION OF ELECTRONIC DATA SUBMISSIONS

One of ODOT's guiding principles is to be a productive, lean, efficient, and effective organization. To achieve that mission, it's vitally important for ODOT processes and workflows to work smoothly and efficiently from project conception through when construction is completed. The submission of information that is incomplete or incorrect can cause problems during the preparation of the plan package, delays in the bidding process, or issues during construction.

The Project Manager shall be the point of contact for all communication between the contractor or consultant, and ODOT. An email notification shall be sent to the Project Manager if compliance with these guidelines is not met.

Ultimately, ODOT reserves the right to reject any electronic data, or files, that do not meet the requirements outlined in these guidelines. All errors, omissions, or areas that do not conform to the guidelines in this document must be corrected prior to resubmitting the electronic data and files for review.

CHAPTER 2 - CADD FILES

Acceptable CADD file formats are Bentley “.dgn” and Autodesk “.dwg”. CADD files required to be submitted consist of the following two types:

1. Basemap files
2. Sheet files

Basemap data shall be submitted as separate “.dgn” or “.dwg” files, and are independent from sheet files.

If Bentley products are used to develop CADD files, then submitted CADD files shall be version v8i or greater.

If Autodesk products are used to develop CADD files, then submitted CADD files shall be version 2014 or greater.

The content of all final submission CADD files delivered to the Department shall match the content of any PDF file(s). **Editing the PDF file(s) without updating the CADD file(s) shall not be permitted.**

ODOT provides a custom program, **ODOT_Files.mvba**, which assists in the creation and naming of the “.dgn” basemap and sheet files. The program, including documentation, is available on the [ODOT CADD Standards](#) website. Also see the **Office of CADD and Mapping Services**, CADD Services [YouTube Channel](#) for more information.

2.1 FILE NAMING CONVENTION

The efficient sharing and transfer of information from consultants and/or contractors to ODOT, and vice versa, relies on the use of a systematic file naming convention. All files submitted electronically shall adhere to ODOT's standard CADD file naming convention.

For ODOT projects, CADD files shall follow the naming convention defined in [Section 304](#) of the **CADD Engineering Standards Manual**.

2.2 BASEMAP FILES

For “.dgn” files, basemaps shall be contained within a design model. For “.dwg” files, basemaps shall be contained within a model space.

All project basemap files, if created, are required for project submittal. The following are examples of basemap files:

- Existing Survey (i.e., 12345_BE001.dgn)
- Proposed Roadway (i.e., 12345_BP001.dgn)
- Right-of-Way (i.e., 12345_BR001.dgn)

A complete list of basemap files can be found in [Section 304](#) of the **CADD Engineering Standards Manual**. Also see the **Office of CADD and Mapping Services**, CADD Services [YouTube Channel](#) for more information.

2.3 SHEET FILES

When “.dgn” files are used, sheets shall be contained within a Sheet model. When “.dwg” files are used, sheets shall be contained within a paper space.

All project sheet files, if created, are required for project submittal. The following are examples of sheet files:

- Roadway Title Sheet (i.e., 12345_GT001.dgn)
- Roadway General Notes (i.e., 12345_GN001.dgn)
- Roadway Plan & Profile (i.e., 12345_GP001.dgn)

A complete list of sheet files can be found in [Section 304](#) of the **CADD Engineering Standards Manual**.

CHAPTER 3 - ALIGNMENT FILES

All alignment files (existing and proposed), if created, are required for project submittal in the form of a [LandXML file](#). All LandXML files shall be accompanied by an [Alignment Report](#). The [Native Format](#) used to generate the alignments is also required.

3.1 FILE NAMING CONVENTION

The efficient sharing and transfer of information from consultants and/or contractors to ODOT, and vice versa, relies on the use of a systematic file naming convention. All files submitted electronically shall adhere to ODOT’s standard CADD file naming convention.

For ODOT projects, horizontal alignments and vertical (profile) alignments shall follow the naming convention defined in [Section 306.2](#) of the **CADD Engineering Standards Manual**.

LandXML files shall have the same name as the horizontal alignment contained in the file. Report files shall have the same name as the LandXML file.

3.2 LANDXML FILES

LandXML files can be used to import and export horizontal, vertical, and terrain model information between various software packages supporting the LandXML format. **Note:** *ODOT cannot guarantee the accuracy of horizontal and vertical alignment information exported to LandXML format and imported into another software package, due to differences in interpretation of the LandXML 1.2 schema between different software packages.* The results of a LandXML import should always be checked for accuracy using the content of the horizontal and vertical alignment report files, the GEOPAK .gpk file, alignment basemap file, or the contract plans.

Only one horizontal alignment should be contained within a single LandXML file. Each horizontal alignment LandXML file should also contain its associated vertical alignments, if they exist.

For information on how to generate a GEOPAK alignment LandXML file [click here](#).

3.3 ALIGNMENT REPORT FILES

For every alignment LandXML file there shall be an alignment report file. Alignment report files shall contain the horizontal and vertical alignment information for **one** alignment only. The following information shall be included in the alignment report file:

Required Horizontal Information:

- A listing of all elements contained in the chain
- Northing and Easting coordinates, and stations for all horizontal key points (i.e., PI, PC, PT, SC, CS, CC, etc.)
- Bearings and distances between all key points
- Curve and spiral data
- Station equations and coordinates

All stations, distances, and coordinates shall be shown to three decimal places. All bearings shall be shown to one tenth of one second. Each alignment report shall be stored as an ASCII text file or a PDF file.

Required Vertical Information:

- Station and elevation for all vertical alignment key-points (VPI, VPC, VPT, etc.)
- Entrance and exit grades for vertical curves
- Vertical curve length
- K-Value for each vertical curve
- Stopping sight distance for crest vertical curves
- Station equations

All stations, distances, grades, and elevations shall be shown to two decimal places. Each alignment report shall be stored as an ASCII text file or PDF file.

3.4 NATIVE FORMAT

In addition to the LandXML files, the native format used to create the alignments shall also be included with a project's plan package submission. For projects using Bentley GEOPAK, the ".gpk" file shall be submitted. For projects using Autodesk Civil 3D, or Bentley OpenRoads Designer, the native alignments are contained within the alignment basemap files, which are covered in [Section 2.2 Basemap Files](#).

CHAPTER 4 - SURFACE FILES

All surface files (existing and proposed), if created, are required for project submittal in the form of a LandXML file. The native format used to generate the surfaces is also required.

4.1 FILE NAMING CONVENTION

The efficient sharing and transfer of information from consultants and/or contractors to ODOT, and vice versa, relies on the use of a systematic file naming convention. All files submitted electronically shall adhere to ODOT's standard CADD file naming convention.

For ODOT projects, Digital Terrain Models (DTM) shall follow the naming convention defined in [Section 305](#) of the **CADD Engineering Standards Manual**.

4.2 EXISTING DIGITAL TERRAIN MODELS (DTM)

All existing surfaces shall be submitted in LandXML format. The native format used to generate the existing surfaces are also required. For projects using Bentley GEOPAK, the native format submitted shall be GEOPAK (.tin). For projects using Autodesk Civil 3D or Bentley OpenRoads Designer the native surfaces are contained within the existing basemap file, which are covered in [Section 2.2, Basemap Files](#).

For information on how to generate a GEOPAK surface LandXML file [click here](#).

4.3 PROPOSED DIGITAL TERRAIN MODELS (DTM)

All proposed surfaces shall be submitted in LandXML format. For projects using Bentley GEOPAK and which cannot create LandXML files for proposed conditions, a ".gen" file shall be submitted in place of the LandXML file. For projects using Autodesk Civil 3D, or Bentley OpenRoads Designer, the native surfaces are contained within the proposed basemap file, which are covered in [Section 2.2 Basemap Files](#).

For information on how to generate a GEOPAK (.gen) file [click here](#).

CHAPTER 5 - ENGINEERING DATA

All projects are required to submit the following engineering data files:

- Project Index Excel file
- General Summary Excel file
- all tables found in the plan set
- any other files that contain design information for the project

All **Engineering Data Files** should be stored in the project's *\EngData folder*.

5.1 FILE NAMING CONVENTION

The Project Index Excel file and the General Summary Excel file are required to follow the standard naming convention as detailed below:

The Project Index Excel file name shall be **XXXXXX_ProjectIndex.xlsm**.

Where:

XXXXXX = the project's Project Identification Number (PID) number

The General Summary Excel file name shall be **CTY-XXXXXX-GENSUM.xlsm**.

Where:

CTY = the project's primary county in 3-character abbreviation form

XXXXXX = the project's PID number

All other engineering data files are not required to follow a standard naming convention.

5.2 PROJECT INDEX FILE

The **Project Index File** is an Excel file which contains the file names of all design and coordinate geometry information. Therefore, whenever files are submitted or exchanged with the Department, a **Project Index File** in Microsoft Excel format shall be provided. It is also required for internal projects when a project is archived.

ODOT provides a custom program, **ODOT_ProjectIndexer.exe**, which creates the Project Index Excel file. The program, including documentation, is available on the [ODOT CADD Standards](#) website.

For information on how to generate a Project Index file [click here](#).

The **Project Index File** should be stored in the project's *\PlanPackage* directory and is based on the ODOTcadd standards file directory structure and file naming convention found in the [CADD Engineering Standards manual](#). Because of this, any modifications to the file structure or file names will render the program nonfunctional.

The **Project Index File** can also be completed by manually entering information into the **ODOTcadd_ProjectIndex.xlsm** template. The **Project Index File** template can be found in the ODOT CADD Standards folder:

\ODOTcadd\Standards\ODOT\ProjectTools

5.3 GENERAL SUMMARY

Per Section 1307.1 of the [Location and Design Manual, Volume 3](#), the General Summary for all projects shall be required in an Excel format using the standard spreadsheet **CTY-PID-GENSUM.xlsm**. This spreadsheet is available in the ODOTcadd standards, or on the [Office of Estimating's](#) website.

This Excel spreadsheet is used to transfer all plan quantities directly into the **Office of Estimating's** AASHTOWare software. The spreadsheet can be copied, or linked, to a CADD file containing a standard sheet border for inclusion in the plan set.

There are several videos available which detail the use of the **CTY-PID-GENSUM.xlsm** spreadsheet. They can be found on the ODOT CADD Services [YouTube channel](#).

5.4 TABLES

All tables shown in the plan set shall be submitted in Excel format. This includes but is not limited to curb and pavement tables, superelevation spreadsheets, pavement details, bridge summaries, and sub-summaries.

5.5 SUPPLEMENTAL ENGINEERING DATA FILES

The Department requires that all supplemental engineering data files (i.e., Hec-Ras, etc.) that are required by the Scope of Services document, be delivered in the native format used to produce them. Reference the respective technical manual (i.e., **Bridge Design Manual**, etc.) for software requirements.

CHAPTER 6 - SURVEY FILES

6.1 SURVEYOR REPORT

The Surveyor Report is an Excel file that contains all the pertinent information a surveyor would need. This includes Datum and Coordinate information, scale factors, Monument tables, etc. See the [ODOT Surveying and Mapping Specifications](#) website for more information.

For information on how to generate a Surveyor Report file [click here](#).

6.2 FIELDBOOK FILE

The field book file is a file that contains the processed survey information. This can be a .dgn file, .dwg file, or for older projects a .gpk.

CHAPTER 7 - PLAN SET

The Project Manager is responsible for generating and/or providing the final plan set documents. ODOT requires the Final Plan Set in PDF format for electronic submission.

The content of the plan set's CADD files delivered in the final plan package shall match the content of any PDF file(s). **Editing the PDF file(s) without updating the CADD file(s) shall not be permitted.**

ODOT provides a custom **MicroStation .PSET** file for printing the PDF plan set using Print Organizer. See the **Office of CADD and Mapping Services**, CADD Services [YouTube Channel](#) for more information.

For information on how to print using a MicroStation Print Organizer .PSET file [click here](#).

7.1 FILE NAMING CONVENTION

As with CADD files, PDF files must follow a systematic file naming convention in order to be efficiently shared by users. The plan set PDF file(s) shall be generated directly from the CADD design files. Therefore, the content of all final CADD files delivered to the Department shall match the content of the PDF file(s). PDF file names shall conform to the naming convention set forth in the [PDF Submission Procedure](#) document.

7.2 VECTOR DATA

To efficiently use PDF Plan sets in Construction all pages of the PDF, with exception to the title sheet, shall be in vector format. PDF files shall not be rasterized.

CHAPTER 8 - 3D MODELS

Three-dimensional (3D) models are a valuable tool used in design, as well as construction. They allow for faster, and more accurate designs. And when using a 3D model with GPS machine control, productivity is increased and costs are decreased. In fact, 3D models are among the few select technologies that are promoted by the [Federal Highway Administration](#) (FHWA) because of their potential to cost-effectively accelerate highway construction. Per FHWA:

“Three-dimensional (3D) modeling in transportation construction is a mature technology that serves as the building block for the modern-day digital jobsite. The technology allows for faster, more accurate and more efficient planning and construction. As the benefits are more widely recognized, many in the U.S. highway industry will transition to 3D modeling over the traditional two-dimensional (2D) design process.”

ODOT currently uses Bentley's OpenRoads technology in design, and in all ground survey data processed. The OpenRoads technology is specifically designed to help users produce a 3D model of their project. For more information on OpenRoads technology, see the [ODOT GEOPAK OpenRoads Technology for Civil Design Manual](#) and the [ODOT GEOPAK Survey with OpenRoads Technology Manual](#).

If a 3D model is created for the project using Bentley's OpenRoads technology, then an “.icm” file should be submitted.

Note: ODOT provides 3D model files to the contractor as a courtesy. Contractors are completely responsible for any digital data converted, or derived from model data provided by ODOT.

CHAPTER 9 - SUBMISSION OF ELECTRONIC FILES

9.1 SUBMISSION OF ELECTRONIC FILES TO THE DISTRICT

There are times when a design entity other than ODOT (i.e., consultant, local public agency, etc.) prepares the Construction plans. In this case, the final plan and all associated electronic files shall be submitted to the District office. Whenever files are submitted or exchanged with the Department, a Project Index file as referenced in [Section 5.2](#) shall be included.

The District shall review the electronic documents submitted to the Department to ensure accuracy and that the required files have been provided.

Electronic files shall be supplied to ODOT via CD, DVD, or other media as approved by the District, pursuant to the project's Scope of Services document. The electronic files submitted should be in a zipped folder.

CHAPTER 10 - FILING PROJECTS TO CENTRAL OFFICE

PLEASE NOTE THIS CHAPTER IS FOR ODOT INTERNAL USE ONLY

10.1 PLAN PACKAGE

The plan package for a project is to be submitted in accordance with the schedule prepared by Central Office and the Districts. The plan package must include documentation confirming that the project is eligible and ready to be advertised for bids.

After the plans have been completed and are ready to be advertised for bid, the project must follow ODOT's electronic plan submittal process which requires all ODOT Districts to submit a plan package. The project's plan package, used by both the [Office of Contracts](#) and the [Office of Estimating](#), contains all files and information relevant to the project (i.e., cost estimate, construction plan, and CADD files, etc.).

Electronic documents (i.e., Project Index File) shall be reviewed prior to submission to ensure the required files are provided.

When a design agency other than ODOT (i.e., consultant organization, etc.) prepares the construction plans, the final plans shall be submitted to the District Office. The District will then submit the project's plan package to Central Office.

10.2 PLAN PACKAGE SUBMISSION

Submission of the Final Plan Package is part of the [Final Engineering/ROW \(FE\) Phase](#) of ODOT's **Project Development Process (PDP)**. It is required that plan package submittal documentation be created and submitted in electronic format. Filing a project involves three main stages:

1. Complete Plan Package Submittal eForm
2. Copy required files to Central Office server
3. Email the **Office of Contracts** notification of project filing

10.2.1 Plan Package Submittal eForm

All ODOT-let projects shall be submitted to Project Coordination via the **ODOT Plan Package Submittal** internal SharePoint site located here:

<http://portal.dot.state.oh.us/Divisions/Planning/estimating/PlanSubmittal/default.aspx>

This website contains helpful information regarding Plan Package submittal, file naming, network links, office contact information and Frequently Asked Questions.

Prior to submitting a project's plan package to the **Office of Contracts**, the ODOT [Plan Package Submittal eForm](#) must be completed.

For help in completing this form, please refer to the [Electronic Plan Package Submittal Help Guide](#) located on the Office of Estimating's website. Please contact the **Office of Estimating** with questions.

10.2.2 Copy Electronic Project Files to Central Office Server

After the **Plan Package Submittal eForm** has been filled out, the project files are to be copied to the following Central Office server, [\\Ctrfs100\district\\$](#). In this directory, there are folders for each District. Inside the Districts folder there are 4 folders that are to be used for copying project files. A project folder needs to be created inside each of these 4 folders.

The project folder's name shall be **CTY-PID**, where:

CTY represents the project's main county, in 3-character abbreviation form
PID represents the project's Project Identification Number

1. Addenda Folder

See the [PDF Submission Procedure](#) for information on how to submit an addendum.

2. Excel Folder

The General Summary Excel file, (**CTY-PID-GENSUM.xlsm**), shall be copied here. See [Section 5.3](#) of this document for naming convention.

3. Plans Folder

The filed PDF plan set shall be copied to this folder. For naming convention, refer to [Chapter 7 – Plan Set](#).

In addition to the filed PDF plan set, the following PDF files, if required by the project, shall be copied to the Plans folder:

- Bidders List (Type B Only)
- Construction Duration Document
- DCA Concurrence
- Design Build Detailed Pay Items List
- Design Build Scope of Services
- Design (C2) Estimate
- Emergency Assessment
- Emergency Consultation Form
- Emergency Declaration

- Emergency DSR
- Emergency Photos
- Emergency Request Form
- FAA Coordination
- FHWA Waiver (If required)
- Interstate Maintenance Agreement
- Local Agreements
- Misc. Agreements
- Non-Federal Funded Environmental Clearance
- Ohio EPA NOI
- Park Board Resolutions
- Preliminary Legislation
- Railroad Agreement
- Railroad Clauses
- Railroad Detail Estimate
- Right of Way Certification
- Special Provisions

For the standard file naming convention of these files see:

<http://portal.dot.state.oh.us/Divisions/Planning/estimating/PlanSubmittal/SitePages/PPSFNC.aspx>

4. Reference Only Folder

Existing plans should be combined into a .zip file and copied to the **Reference Only** folder. The .zip file for existing plans shall be named **CTY-PID-ExistingPlans.zip**

The .zip file created from the Project Indexer program shall be copied here. This .zip file shall contain all electronic files specified in this document, with the exception of those found in [Chapter 7 – Plan Set](#).

Every file in this .zip file shall be listed in the Project Index Excel file. The .zip file shall be named **CTY-PID-CADDFiles.zip**, where:

CTY = the project's main county in three (3)-character abbreviation form
PID = the project's PID number

Any changes to the files contained within the .zip file requires that the .zip file be updated and recopied to Central Office's server.

Note: It is imperative that this .zip file be reviewed to ensure not only that it contains the required files, but also to ensure that it does not contain files which should not be provided to bidders (i.e., cost estimates).

The Government Accounting Standards Board (GASB) form shall be copied to:

<\\itcfs007\odrive\GASB>

The Utility note shall be copied to:

<\\itcfs007\odrive\UtilityNotes>

The naming convention for these files can be found at the following link:

<http://portal.dot.state.oh.us/Divisions/Planning/estimating/PlanSubmittal/SitePages/PPSFNC.aspx>

10.2.3 Office of Contracts Notification of Project Filing

The District shall submit an email to the following Plan Submission email address to alert **Central Office Contracts** that the project has been filed:

CEN.Contracts_PlanSubmittal@dot.ohio.gov

Note: The project has not been officially filed until this email has been sent.

10.3 POSTING FILES FOR BIDDING PROCESS

The **Office of Contracts** will post the electronic files (existing plans, design files, calculations, etc.) on the ODOT website for access during the bidding process. The District shall review the electronic documents submitted to the Department from external sources to ensure the required electronic files have been provided. The electronic files submitted to the District from an external source may include additional files that should not be provided to bidders via the **Office of Contracts**. Therefore, it is the District's responsibility to ensure that the information provided to the **Office of Contracts** contains only required documents.

10.3.1 File Extensions

Standard file name extensions for information submitted to, or exchanged with, ODOT shall be as follows:

File Type	Extension
MicroStation Design Files	.dgn
MicroStation Cell libraries	.cel
MicroStation/GEOPAK Resource File	.rsc
GEOPAK Criteria Files	.x
GEOPAK Cross Section Input Files	.inp
GEOPAK GPK Files	.gpk
GEOPAK Triangle Models	.tin
Postscript Sheet Image Files	.ps
Adobe Acrobat Files	.pdf
Microsoft Word Documents	.docs or docx
Microsoft Excel Spreadsheets	.xls, .xlsm or .xlsx
Microsoft Project Files	.mpp
XML Files	.xml

10.3.2 Title Sheet

The plan Title Sheet shall be converted into a PDF. After the Title Sheet has been signed, it shall be scanned and incorporated into the multi-page PDF plan set. At this time, it is acceptable for the Title Sheet to be a scanned document.

10.3.3 File Naming

As with CADD files, PDF files must follow a systematic file naming convention in order to be efficiently shared by users. Therefore, PDF files shall be generated directly from the CADD design files. PDF file names shall conform to the following format:

XXXXXXXX_PID_AsFiled.pdf

Where: XXXXXXXX = The eight-digit date that the plan was filed on.

PID = The six-digit Project Identification Number associated with the project.

Note: If the PID number is only five digits long, add a leading zero.

Examples:

Date: May 9, 2017 → 20170509_123456_AsFiled.pdf
Six Digit PID #

Date: July 17, 2017 → 20170717_012345_AsFiled.pdf
Five Digit PID #
w/leading zero

Note: Although Geotechnical Exploration Sheets are considered a separate component of the plans, they shall be combined with the final PDF plan set. Refer to ODOT's [PDF Submission Procedure](#) document for more information regarding PDF file naming.