Disclaimer: This document is a basic outline for Road Design Modeling and does not cover every possible scenario. See Appendix A for additional resources and links to training content.

KDOT ROAD DESIGN PROJECT SETUP

Using Bentley Open Roads Designer – CONNECT Edition

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Project file folder structure for Corridor Design

The KDOT method

Our goal is to manage state highway projects in a way that OpenRoads Designer can operate in the most efficient manner possible, while allowing roadway designers the ability to easily store, locate, & track their work. While this guide closely follows Bentley's best practices & recommendations, the following guidelines were developed & written specifically for a KDOT Roadway Designer.
It is **important** to note that CONNECT edition project design relies on referencing instead of copying/merging design files. Referencing allows dynamic updates throughout each step of the design process.

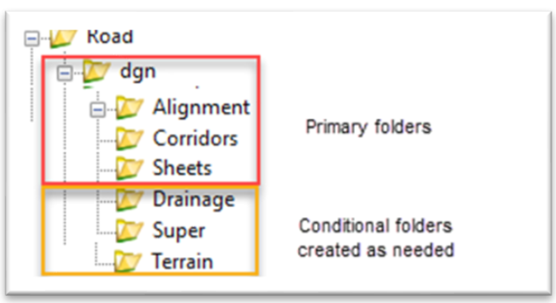
Directories

Purpose

The goal of these recommendations is to help a road design team

- build 3D models in a logical & easily shareable fashion.
- simultaneously collaborate on various model subunits such as ML alignments, ditch alignments, side roads, drainage alignments, profiles, phases, & corridors.

Depending on the nature of the project, you may need to add additional subfolders under the primary project folder. Listed below are the primary & conditional folders & their purpose. NOTE: It is best practice to create folders as you need them. For example, if you only have one terrain, it is not necessary to create a folder. **See Design Files & Order of Creation**



DGN – This folder holds your base file, working file, & any other files not housed in another folder.

Alignment (Geometry) – This folder holds all the 2D horizontal & vertical alignments. I.E. ML, Profile, Side Road, etc.

Corridors – This folder will hold your Corridor file(s) and .ITL file(s)

Sheets – This folder contains your sheet dgns

Drainage, Super, & Terrain- The folders are conditional depending on project requirements. For example, a complex project might have multiple terrains, superelevation with phased construction, & require a detailed drainage analysis.

Design Files & Order of Creation

New DGN Creation Guidelines

- The new DGN should be created using KDOT-OpenRoads_Seed_2D.dgn or KDOT-OpenRoads_Seed_3D.dgn (Terrains only).
    - See **CONNECT Seed** Files
- Assign the Geographic Coordinate System
    - The GCS used should match the GCS listed in the Survey Book
    - To select a GCS, search for Coordinate in the OpenRoads search ribbon
- **Important Note:** The Terrain & Profile should be set to active in every file where applicable.

Terrain (RTE file) created in the Terrain folder using 3D seed (conditional)

If you do not have multiple terrains, it is best practice to directly reference the Survey Terrain (stm.dgn) instead of creating an RTE file. Road Design may need to create one or more terrain DGNs from a source other than survey data.
The RTE file will reference the following:

- 3D Terrain (from Survey) stm.dgn
- Any other necessary data/files to create the road terrain

NOTE: For example, a project requiring phasing would have multiple terrains, whereas an emergency repair project might only use LiDAR data to create a single terrain.

Alignment (RAL file) created in the Alignment Folder using 2D seed

A typical KDOT project will begin at this level. The existing horizontal & vertical alignments are provided by Survey. It is recommended that separate dgn container files be created for each alignment.
Examples include: Mainline, Offset, Sideroad, Shoofly, Ramp
These files can then be referenced together for analysis during the design process.
The RAL file(s) may have the following reference attachments:

- Other Alignment(s) ral.dgn (Road Alignment); sal.dgn (Survey Alignment)
- Survey Terrain(s) stm.dgn
- Road Terrain(s) rte.dgn (if applicable)
- 2D Topo (from Survey) stp.dgn

Superelevation (RSP file) created in the Super Folder (as needed) using 2D seed

Superelevation tools calculate how much banking to apply to curves in the horizontal alignment. These tools also compute how the road will transition from normal crown to a fully banked curve & back again.
The RSP (Superelevation) file may have the following references attached:

- Terrain File(s)
- Road Alignment(s) ral.dgn

Contains at least one superelevation section, a roadway template, calculated Superelevation, & the Superelevation shape. A Superelevation report should be generated from this file.

Drainage (RDR file) created in the Drainage Folder (as needed) using 2D seed

These files may include Culverts, Bridges, etc.
The RDR (Drainage Modeling) file(s) may have the following references attached:

- Survey Alignment(s) sal.dgn
- Road Alignment(s) ral.dgn
- Terrain File(s) rte.dgn or stm.dgn
- 2D Topo (from Survey) stp.dgn

The RDR can be a reference in the COR (Corridor) file.

Base File (RBS file) created in the DGN Folder using 2D seed

This is a 2D plan view of the proposed project or portion thereof & what is typically delivered to other internal bureaus such as Right of Way & Bridge as well as Contractors. The base file contains 2D geometry (even Profiled) that would be used downstream on the plans. Examples: Edge of pavement, edge of shoulder, guardrail pad footprints, construction limits, etc.
The RBS (Base) file may have the following references attached to display the proposed design:

- Survey Alignment(s) sal.dgn
- Road Alignment(s) ral.dgn
- Terrain(s) rte.dgn
- 2D Topo (from Survey) stp.dgn
- Corridor(s) rco.dgn

NOTE: References can be turned on/off as required by the Road Design team & downstream users.

Working File (RWF file) created in the DGN Folder using 2D seed

This will have the Base File (rbs.dgn) referenced and any other files that are needed for design review. It will also contain any 2D geometry used to create the corridor but not displayed on the final plan set. Examples: Special ditches, preliminary 2D linework, flood areas, pavement match lines, complex elements used for corridor refinements, etc. The RWF file is also used by Designers & Squad/Design leaders to check the design, add comments, measure areas, make quick observations & sketches without affecting the design files.

Corridor (RCO file) created in the Corridor Folder using 2D seed

A corridor file contains all the terrains, alignments, superelevation files, template drops, & point controls/overrides needed to create the 3D model.
The Corridor (RCO) file may have the following references attached:

- Terrain file(s) rte.dgn or stm.dgn
- Road Alignment(s) ral.dgn
- Superelevation rsp.dgn
- Drainage Modeling rdr.dgn

Corridor Partitioning. It is highly recommended on long highway projects to break up the corridor into one-mile-long sections. This is done to reduce corridor processing/regeneration times & to facilitate collaboration.

Sheeting

Road Design Plan Sets

Road Design Plan Sets are generated from multiple sources. Some of the dgns that are included in a set include but are not limited to:

- Title Sheet (RTI file)
- Plan Sheets (RPL file)
- Profile Sheets (RPR file)
- Plan/Profile Sheets (RPP file)
- Cross Section Sheets (RXS file)
- KDOT Standard Drawings Sheets

New file designation: RSC (Road Sheet Composition) would reference either just the base file or corridor and be used to contain all **named boundaries** for creating plan, profile, & cross section sheets. A designer could have one RSC per alignment that would be sheeted, or per sheet view (plan, profile, plan & profile, XS)

Plan Sheets (RPL file) created in the Sheets Folder using 2D seed

Profile Sheets (RPR file) created in the Sheets Folder using 2D seed

Plan/Profile Sheets (RPP file) created in the Sheets Folder using 2D seed

Cross Section Sheets (RXS file) created in the Sheets Folder using 2D seed

Plan (rpl), Profile (rpr), Plan/Profile (rpp), & Cross Section (rxs) sheets should reference the appropriate dgns.
Levels & references can be turned off to display the appropriate information on the sheets.
For example, Cross Section sheets (rxs) would utilize the 2D/3D view of the corridor to cut sheets.

Presently, KDOT Road title block cells used in ProjectWise use title block integration. Therefore, **separate ".dgn" containers should be created for each plan, profile, & cross section sheet model and use the applicable file extension as noted above.** If all sheet models are stored inside of *one* dgn container, each title block cell will *only* inherit the ProjectWise attributes of the parent dgn.

- KDOT Road Title block cells delivered with the workspace for external partners are designed for use with Sheet Index and do not have to have separate dgn containers.

Using Named Boundaries

Named Boundaries are used to generate sheets in CONNECT Edition Software. KDOT has created resources that can be selected via dropdown menu during the Place Named Boundary dialog. Please see Training Resources for additional information on Named Boundary creation.

Generating PDF's

There are several ways to generate PDFs of Plan Sets. KDOT provides pen table and settings files for use with sheet models.

Workspace Resources

CONNECT Seed Files

The KDOT CONNECT Seed files are untouched dgns that have been updated with KDOT specific settings. Using the KDOT seed files will prevent issues stemming from attempting to bring data forward from older platforms.

Current workspace seed files have been aligned with the product in which they will be used.

These are the OpenRoads seed files:

- KDOT-OpenRoads_Seed_2D.dgn
- KDOT-OpenRoads_Seed_3D.dgn

3D seed files are used for the creation of Terrains.
2D seed files are used for everything else (Geometry, Corridors, Superelevation, etc.) These 2D files let ORD create & manage 3D models.

KDOT Standard Drawings

Typical Section, compaction, other details
Standards that have been converted to CONNECT edition will have a note stating this & will need to be CADconformed in CONNECT. Standards that do not have a note stating it is CONNECT will need to be CADconformed in v8i.

Template Library

Best practice is to copy the master KDOT template library into the Corridor folder for your project & then rename it.

- The master KDOT .itl can be found in the following locations:
    - **ProjectWise**: *CADD_Resources\Workspaces\KDOT-XX.XX.XX-workspace\workspaces\KDOT\Standards_Civil\Template Library\KDOT_Civil_Templates.itl*
    - **Delivered Workspace**: *KDOT_10.10\Standards_Civil\Template Library\KDOT_Civil_Templates_10.10.itl*

- Make sure you are pointed to this "local" copy of the KDOT .itl before proceeding.
- Go to: OpenRoads Modeling>Corridors>Template>Create Template
- Navigate to the copied .itl in your KDOT project Corridor folder

Appendix A

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File Naming Convention Updates

See KDOT Graphics Standards Manual & subsequent update memos can be found on KART or on the KDOT Intranet KDOT CADD Support webpage.

Training Resources

Internally, KDOT CADD Users TEAM houses links to training content. Externally, KDOT training can be found here: CADD Training Resources.

Other Training Resources

Bentley Resource Center
This website has links to Bentley Training content, Coffee Corner sessions, Virtual Conference sessions, & product specific content. NOTE: You will need to enter your KDOT email address & enter a validation code which should be good for 30 days. There is no charge to use this site.

External KDOT CADD Support Website (ksdot.org)

KDOT CADD Support YouTube Channel

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