D6.01 General

This chapter defines the delivery requirements for electronic engineering data compiled, analyzed, and developed in support of project delivery. These represent key components of engineering processes in related disciplines.

The provider is responsible for resolving all omissions, deficiencies, and errors in a timely manner to prevent any negative impacts on the customer's project schedule.

All electronic project files and data shall be stored and organized as defined in this manual (see Deliverables 3 and Deliverables 4*)*.

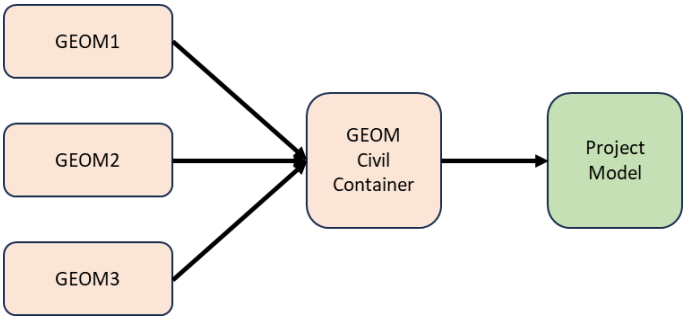
D6.02 Data Organization

When working on WSDOT projects, the following key points should be considered to effectively organize civil data:

- Each core engineering data type element (design file) should be in a separate DGN file.
- Data type element DGN files and supporting components should be referenced together into civil container files. This multiple DGN/model collection or "Federated" file approach allows for multiple users focused on different portions of the project to interact with each other's data in near real time.
- Each civil container shall be referenced to the project model.

Each data type is organized in the same basic approach. For example, each corridor alignment (core data type *GEOM*etry) is stored in a separate DGN file. All corridor GEOM elements are referenced into a GEOM civil container file. This allows for a project view of all alignments/GEOM. Each alignment has a corridor DGN file representing the roadway templates applied and superelevations referenced. Those corridor DGN files are referenced to a corridor civil container file. The resulting data type civil containers are referenced to the project model.

Figure D6-1 Basic data type DGN file reference model



The above applies to all civil data types such as Alignments (GEOM), Corridors, Terrains, Drainage, Traffic Systems, and any other data broken out into portions of the project footprint such as by alignment corridor.

Referencing any model including civil containers to another DGN file should be done by reprojecting via assigned Geographic Coordinate Systems (GCS). If both files do not have GCS assigned, references should be *Coincident World* to align both datasets to the same coordinate values.

Each reference may have more than one level of nested references. Be aware of the impacts to downstream customers of setting nested reference depth too shallow.

D6.03 Requirements for Specific Data Types

There are many OpenRoads data types required to develop and manage project data. Those that have specific requirements are detailed in this section.

D6.03(1) General requirements

All civil elements must be assigned an appropriate Feature Definition. If there is not an appropriate Feature Definition, assign an Element Template.

All Feature Definition elements representing controlling geometry must include a Feature Name with the route designation.

If an appropriate feature definition or element template is not available in the WSDOT CAE environment, contact the WSDOT HQ CAE Help Desk.

All electronic project files and data shall be stored and organized as defined in this manual (see Deliverables 3 and Deliverables 4).

D6.03(2) Terrains

Terrain models represent the resulting ground/design surface generated from survey field data, roadway corridors, ponds, or other 3D surface modelling efforts.

A Complex Terrain Model (CTM) is a single model that acts as a container file by referencing multiple terrain models. This provides a full view of all terrains in the project and how they align with each other. This container file allows for adjustments to individual terrains without impacting downstream reference connections.

Terrains shall be generated in a separate DGN file for each corridor. Terrain models are needed for obtaining quantities, clash detection, creating final merged design terrain, and for creating new terrain DGN files representing staging areas.

The Project Model DGN file shall contain a Complex Terrain Model (CTM) including each corridor terrain to coordinate and represent all impacted/new surfaces by the project effort. This allows for identifying overlaps and gaps between corridor efforts.

Existing terrain(s) generated from collected survey data shall comply with this manual (see Deliverables 5).

Uses seed file WSDOT_2D_Seed.dgn. OpenRoads Designer will automatically create a 3D default model to display the 3D terrain model.

D6.03(3) Geometry

This file is intended to store the horizontal and vertical geometric definitions for each corridor alignment and the associated minor geometry elements.

There will be one geometry file for each alignment.

Each geometric element shall be assigned an appropriate *Feature Definition*.

Uses seed file WSDOT_2D_Seed.dgn.

D6.03(4) Project Specific Roadway Templates Library

The roadway template library (*.ITL) contains all predefined and custom roadway templates used in generating the project roadway corridors.

Each project should include and be directed by default to a [*ProjectName*].itl containing the current (at the time of work area creation) WSDOT standard template library stored in the Project *Design*_*CADD**Templates* folder. If this file is not present, contact WSDOT HQ CAE Help Desk for assistance.

Custom project roadway templates may be added to this library.

If the project requires multiple designers working and managing custom roadway templates at the same time, multiple ITLs are needed so that each designer's work is not overridden by others.

Prior to delivery to Construction, all templates must be copied into the *ProjectName.itl* and re-pathed to ensure functionality from that central ITL.

D6.03(5) Corridor

A corridor DGN file shall be created and used to apply roadway templates and superelevations along each alignment (Geometry) and the applicable project terrain(s).

Each roadway alignment requiring any corridor development will have at least one corridor DGN file.

Each non-roadway or site corridor such as a bridge berm, retention pond, retaining wall, and creek will be treated as a separate corridor design. Each design will including their own geometry, corridor, and other associated DGN files. The files will be named and stored per this manual (see Deliverables 3 and Deliverables 4).

Each corridor model shall have an appropriate *Feature Definition* assigned.

Use seed file *WSDOT_2D_Seed.dgn*. OpenRoads Designer will automatically create a 3D default model to display the 3D terrain model.

D6.03(6) Superelevation

A superelevation DGN file shall be created and used to develop and manage the superelevation for each corridor alignment.

Uses seed file WSDOT_2D_Seed.dgn.

D6.03(7) Cross Section

The objective of cross sections is to view, assess roadway earthwork volumes (Cut and Fill) and the layers of roadway components such as subgrade, at user specified station intervals along the corridor alignment. Two methods can be employed to generate a set of cross sections.

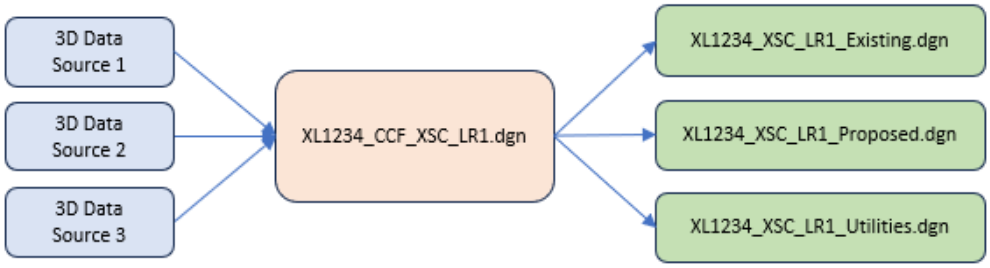
- Using a named boundary group
- Stacked mode

Deliverable roadway cross sections shall be corridor\alignment or reference line based.

Each corridor\alignment shall have a cross section DGN file representing final design at regular intervals and key stations. There may be more than one set of cross sections per corridor.

For site cross sections, a defined reference line shall be included.

Figure D6-2 Cross section data diagram



Within OpenRoads, any element displayed in 3D can be visualized in the cross section view. This can include bridges, culverts, signs, etc. drawn in 3D in other files. The cross sections are created by referencing multiple files together (corridor, terrain, structures, drainage network, etc.).

Uses seed file WSDOT_2D_Seed.dgn.

D6.03(8) Civil Container Files

Civil container files do not contain data themselves but are intended to have all active and current referenced DGN files for each data type element such as geometry, corridors, drainage, utilities, proposed terrains, etc. This should only include the final version of each alignment (geometry) or alignment basemap for example.

Any change made to the DGN files in data type folders will be reflected in the associated container(s). Review the impacted container whenever you make any changes. This approach is more efficient in assessing and identifying any necessary changes.

Do not make changes to the container file other than adding, removing, or modifying references.

Civil Containers shall use the same seed as the data type they contain.

D6.03(9) Project Model

The Project Model includes references of all appropriate civil containers, terrains, and base information. This allows for overall view of the project elements and cross-discipline clash detection.

The project Geographic Coordinate System (GCS) shall be assigned to each Civil Container DGN file.

Uses seed file *WSDOT_2D_Seed.dgn*.

D6.03(9) Report Files

Generate supporting HTML\XML report folders and store them in the same location as the source DGN file. Examples of reports can represent control, geometry, quantities, and superelevations.

Example reports include:

- End Area volumes
- XML alignment reports
- Superelevation transition reports
- Other text reports that describe geometry or surface elements generated during the design process.

Designers should use descriptive names that relate directly to the design function performed and the data being used when creating other design related report files.