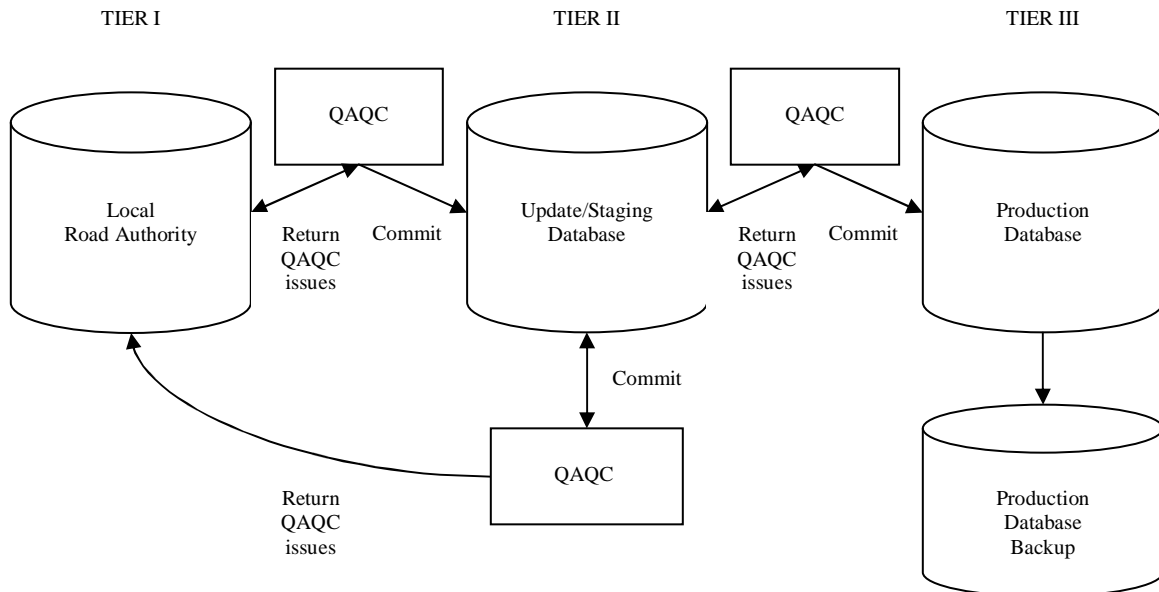


# Oregon Transportation Network (OR-Trans) Quality Assurance/Quality Control (QAQC) Process

## INTRODUCTION

Over the past several years, the OR-Trans effort, through the Transportation Framework Implementation Team (T-FIT) group has worked to develop a standard for transportation framework data. This standard along with member's needs guided the content of the database which subsequently has been developed to house Oregon's road centerline data. Data was acquired from local agency road authorities through verbal partnership agreements that acknowledged the benefit of a single repository for road (transportation framework) data. Where data was not available, OR-Trans developed data through various funding sources and in coordination with Oregon Emergency Management data development projects to fill in the "holes" that existed in GIS data for road networks in Oregon. This data, along with the local road authority data is now being integrated in the All Roads database 3 – Tier database system.

### 3 – Tier System



Work must continue to integrate and verify each dataset. It is also critical to the success of the OR-Trans effort to identify permanent custodians for the data that was developed. It is the goal of the OR-Trans effort to transfer the responsibility of improvement and maintenance of any data developed through this project to local road authorities. It is also the goal of the effort that the mutual coordination will foster an environment for mutual sharing of this data through the All Roads database to any data user.

## **PURPOSE**

This document will outline QAQC steps necessary, for each data set that is received and loaded into the OR-Trans database, to be reviewed and validated for accuracy and consistency. In order to accurately represent the data received from local data custodians, several steps must be taken to ensure that the data is accurate and complete and that it meets the minimum standards for transportation framework data as outlined in the “Oregon Road Centerline Data Standard, Version 4.0” (ORCDS), viewable at <http://egov.oregon.gov/DAS/IRMD/GEO/fit/transportation/docs/OregonRoad3.pdf> . It is critical that the data also be able to integrate with other data in the database. So review and validation of the data will need to occur after it is loaded into database.

## **THE QAQC PROCESS**

### **Reviewing Source Datasets**

Upon receipt of a dataset from a local road authority, a series of “checks” will occur to insure that the data meets the standards defined in the ORCDS. These checks occur using the native format of the submitted data. The data will be reviewed in the following ways:

- Check for metadata.
  - See ORCDS for requirements.
- Check for the minimum required geometry elements.
  - See ORCDS for requirements.
- Check for minimum required attribute elements.
  - See ORCDS for requirements.

### **Reviewing Loaded Attributes**

Once a dataset is loaded, a thorough review off the data attributes must occur to determine if any attributes are erroneous, inconsistent or otherwise absent. Many key attributes link the data to the owner and the origin of the data and to overlook or mishandle any of the attributes could significantly impact results from the use of this data.

- Sort of each column to determine any missing attributes.
- Filter each column to determine if unexpected attribute values exist (values that are in a list and a value that is not in the list is present).

### **Validating Loaded Attributes**

Part of ensuring that the attributes that were loaded are correct is to validate those attributes against known or expected values. While there are some values that have to be compared against each other (end milepoint is greater than begin milepoint for example) other attributes will have to be compared against expected results (road owner for roads

within the city of Woodburn that are owned by Woodburn have Woodburn, or its equivalent value code, for Woodburn).

- Compare values of measure (mp, address) for increasing order. Ensure that values are numeric and meet the standards for the database.
- Validate values of codes against look up tables to ensure no mis-keys, transpositions or omissions occurred.
- Compare values against other know data (city roads within the city limits matches the value or its equivalent for the data of the spatial boundary).
- Validate that data is parsed out as per database requirements.

### **Reviewing Loaded Geometry**

Geometry is loaded into the database based on ownership. For any particular dataset, the owner of that dataset, who is also the owner of the roads that fall under their jurisdiction, the roads owned by that agency are the only roads that will be loaded. If the dataset contains data that has roads owned by other agencies then if those road owners acknowledge that the data contributor is submitting data on their behalf, those roads will be loaded also.

- Duplicate Geometry (multiple alignments of the same road).
  - Geometry owned by more than one road authority.
- Missing Geometry (obvious gaps in data).
  - Ownership not identified or determined and not loaded.

### **Validating Loaded Geometry**

Validating the geometry is necessary because GIS lines require that each feature be a line. Some software may create poly line collections that make certain functions difficult in data and the subsequent analysis that occurs on that data.

- Validate geometry using software functions that assess the content of the geometry.

### **Validating Loaded Geometry Connectivity**

One aspect of the geometry of the linework for the roads is that continuous roads be represented by continuous geometry, across jurisdictional boundaries. This aspect of not having gaps or overlaps, node mismatches or nearly coincident geometry is critical to representing the linear network. Additionally, when any road intersects another road, based on the ORCDS, the road being intersected must have a “break” in the linework and those segments must have unique information about them.

- Geometry Undershoots.
  - Undershoots occur when the end of a linear geometry falls short of intersecting another geometry as it should.

- Geometry Overshoots.
  - Overshoots occur when the end of a linear geometry extends beyond the point at which it should intersect with and stop at another geometry.
- Node Mismatches.
  - Node mismatches are created when a point geometry or the end of a linear geometry falls short of intersection with a vertex of another geometry.
- Unbroken intersecting geometry.
  - Unbroken intersecting geometry occurs when features cross over or overlap one another instead of intersecting only at their end points.
- Non-coincident intersecting geometry.
  - Non-coincident intersecting geometry occurs when features cross over or overlaps one another without creating corresponding vertices at the intersection.
- Nearly coincident geometry.
  - Nearly coincident geometry occurs when an interior vertex of one geometry falls short of either a vertex of another geometry or an edge of another geometry.

### **Document the Issues**

Each preceding step is critical to determine what issues are present. These issues will determine steps that need to be taken to remedy them. The issues must be recorded for each road authority and the nature of the issue. This list will allow individuals involved in the remediation process a list that they can work through.

- Document each occurrence of an issue relating to geometry and attributes for each road authority that submits data for themselves or on behalf of other road authority(s).

### **Develop Recommendations**

Each preceding step is critical to determine what issues are present. These issues will determine steps that need to be taken to remedy them. Recommendations will be made for each

- Attribute values that are inconsistent, erroneous or missing will be referred back to the road authority for verification and correction and the recommendation of resolving those issues will be included.
- Geometry issues which include undershoots, overshoots, node mismatches, unbroken intersecting geometry, non-coincident intersecting geometry and nearly coincident geometry will be identified and a spatial location for the correction (as a point) will be recommended.
- Identify all road authorities that issues involve. Where there are conditions that one road authority's data intersects another road authority's data and an issue is present that both those road authorities are involved.
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## **Coordination**

The critical component for getting any issue identified through the attribute and geometry validation is communicating those findings with the road authorities. This effort must include any road authority that an issue is found with their data. It also includes coordination between multiple authorities where there are conditions that multiple road authority's data are involved.

- Contact each road authority involved with each issue (organized by road authority). Report the issues and the recommendations to each road authority involved. If the road authorities are not able to resolve the data then ODOT as the data steward for the OR-Trans effort will facilitate assisting the road authorities through a resolution.

**OR-Trans Flow Model**

