Idaho Technology Authority (ITA)

ENTERPRISE STANDARDS – S4000 – INFORMATION AND DATA

Category: **S4247 – Elevations Layer Data Exchange Standard**

CONTENTS:

I. DEFINITION

See ITA Guideline G105 (ITA Glossary of Terms) for definitions.

II. RATIONALE

A statewide Elevation layer and data standard, which is part of the Elevation data theme, is a critical source of information for agriculture and precision farming, natural resources conservation, infrastructure and construction management, geologic resource assessment as well as hazard mitigation, flood risk management, forest resources management, renewable energy resources, river and stream resource management, water supply and water quality.

Standardized elevation data supports those user groups by providing bare-earth elevation (point cloud and/or raster) data that has a high spatial resolution and is highly precise and accurate. Additionally, derived products such as slope and aspect raster datasets are easily generated from the proposed bare-earth elevation dataset.

Having a unified, single source of such data enables many other types of analysis, evaluation, modeling, and planning.

This data standard supports agencies that collect data and ensures that new collections will be compatible with the bare-earth elevation data. Additionally, a predictable standard, including a standard schema, will provide the consistency needed for use in automated processes, repetitive analyses, and publications.

III. APPROVED STANDARD(S)

See Attachment

IV. APPROVED PRODUCTS(S)

Any GIS Software, either desktop or online, capable of ingesting and displaying Open Geospatial Consortium (OGC) Web Map Standard (WMS) services.

V. JUSTIFICATION

A statewide Elevation dataset is a critical source of information for a large group of users from a variety of industries. A data exchange standard supports the use of Elevation in a predictable format, improves collaboration and encourages use of this dataset.

VI. TECHNICAL AND IMPLEMENTATION CONSIDERATIONS

Any GIS Software, either desktop or online, capable of ingesting and displaying Open Geospatial Consortium (OGC) Web Map Standard (WMS) services.

VII. EMERGING TRENDS AND ARCHITECTURAL DIRECTIONS

Data will be shared in accordance with Enterprise Standard S4250 – Enterprise Geographic Information System (GIS) Data Sharing Standards.

VIII. PROCEDURE REFERENCE

The format, content, and development of this standard adhere to ITA Policy P5030 - Framework Standards, ITA Standard S4250 - Data Sharing Standards and ITA Standard S4220 - Geospatial Metadata.

IX. REVIEW CYCLE

Review will occur on an annual basis.

X. CONTACT INFORMATION

For more information, contact the ITA Staff at (208) 605-4064.

REVISION HISTORY

07/20/2023 – Standard Presented to the IGC-EC

STATE OF IDAHO

Idaho Elevation Data Exchange Standard

Part of the Elevation Theme

Version 1
Effective July 20, 2023

Developed by the Elevation Technical Working Group

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CONTENTS

1. **Introduction to the Elevation Data Exchange Standard**

A statewide Elevation layer and data standard, which is part of the Elevation data theme, is a critical source of information for agriculture and precision farming, natural resources conservation, infrastructure and construction management, geologic resource assessment as well as hazard mitigation, flood risk management, forest resources management, renewable energy resources, river and stream resource management, water supply and water quality.

Standardized elevation data supports various user groups by providing bare-earth elevation (point cloud and/or raster) data that has a high resolution and a high precision. Additionally, derived products such as slope and aspect raster datasets are easily generated from the proposed bare-earth elevation dataset. Having a unified, single source of such data enables many other types of analysis, evaluation, modeling, and planning. This data standard will support agencies that collect data, and ensure that new collections will be compatible with the bare-earth elevation data. Additionally, a predictable standard, including a standard schema, provides the consistency needed for use in automated processes, repetitive analyses, and publications.

The Elevation Standard described in this document is intended to facilitate integration and sharing of up-to-date Elevation data and enhance the dissemination and use of Elevation information. This standard does not instruct on how Elevation databases are designed for internal use or preclude users from using other sources of elevation data.

This standard was developed by the Elevation Technical Working Group, a subgroup of the Idaho Geospatial Council – Executive Committee (IGC-EC). This standard will be reviewed on an annual basis and updated as needed.

1.1. **Mission and Goals of the Standard**

The Elevation Standard supports a statewide dataset that is consistent with applicable state and national standards. It establishes the minimum attributes and geospatial database schema for the Elevation Framework. The Standard will communicate with, and may have similar attributes to, other Idaho Framework data standards. It encourages agencies with geospatial LiDAR derived elevation data to contribute to the Elevation Framework.

The Elevation Framework will be appropriately shared and benefit all. The fields in the Elevation Data Exchange Standard will be general enough to incorporate basic information without requiring major changes in internal data models. This standard allows for expansion to a more complex data structure and schema.

1.2. **Relationship to Existing Standards**

This Elevation Exchange Standard is related to the [Idaho Statewide LiDAR Plan Version 1.1](#) and will be related to the LiDAR Raw Point Cloud Data Standard, once this standard has been developed.

1.3. **Description of the Standard**

This standard describes the vision and geospatial data structure of an Elevation Framework in the state of Idaho. This standard is devised to be:

- Simple, easy to understand, and logical.
- Uniformly applicable, whenever possible
- Flexible and capable of accommodating future expansions
- Dynamic in terms of continuous review

1.4. **Applicability and Intended Uses**

This standard applies to the Elevation element of the Elevation theme of The Idaho Map (TIM).

When implemented, this elevation data standard will enable access to and exchange of these data. A predictable standard will support and improve data collaboration, enable greater coordination in collecting updated or missing data, and help identify and report errors. As well as allow agencies to incorporate these data into their own data products knowing that the data standard and schema will be consistent over time.

This standard does not consider data sharing agreements, contracts, transactions, privacy concerns, or any other issues relating to the acquisition and dissemination of Elevation data.

1.5. **Standard Development Process**

The Elevation Technical Working Group is a voluntary group of private, city, county, tribal, state, and federal representatives. In 2022, the Elevation Technical Working Group Chair began developing the standard for the Elevation Framework using the standard development automation tools developed by the IGC-EC to generate the first draft of the Standard. This standard was then reviewed and edited by the members of the Elevation Technical Working Group.

After initial development the draft standard document was shared with the Idaho Geospatial Council Executive Committee (IGC-EC) and the Idaho Geospatial Council (IGC) in accordance with the review and approval process described in ITA Policy P5030 Framework Standards Development.

1.6. Maintenance of the Standard

This standard will be revised on an annual basis and in accordance with ITA Policy P5030 - Framework Standards Development.

2. Body of the Standard

2.1. Scope and Content

The scope of the Elevation Data Exchange Standard is to describe the format and schema of a statewide layer displaying elevations in Idaho, along with its relationship to other existing standards and plans.

2.2. Need

Elevation data is needed because location based elevation is crucial for agriculture and precision farming, natural resources conservation, infrastructure and construction management, geologic resource assessment and hazard mitigation, flood risk management, forest resources management, renewable energy resources, river and stream resource management, water supply and water quality. Additionally, it is needed as a precursor or input to other studies and planning activities. These include emergency management, transportation infrastructure, natural resources, education, environmental health, and many others.

It is important that these data follow a standard to ensure quality and an understanding of the dataset. Additionally, a predictable data format as described in this standard will enable other data providers to contribute to this dataset, as well as allow agencies to use this data in automated process and models.

2.3. Participation in the Standard Development

The development of the Elevation Data Exchange Standard adheres to the the ITA Policy P5030 - Framework Standards Development. The Elevation Standard Team tasked with

development, invite input and comments from private, county, state, and federal organizations. As the standard is reviewed in accordance with Policy P5030 requirements, there will be opportunity for broad participation and input by stakeholders. The process will be equally broad for input on updates and enhancements to the standard. As with all Idaho Framework standards, public review and comment on the Elevation Data Exchange Standard is encouraged.

2.4. Integration with Other Standards

The Elevation Data Exchange Standard follows the same format as other Idaho geospatial framework data standards. The Elevation standard may contain some of the same attributes as other framework standards and may adopt the field name, definition, and domain from the other standards to promote consistency.

2.5. Technical and Operation Context

2.5.1. Data Environment

The data environment is a digital Other with a specific, standardized set of attributes pertinent to the Elevation Framework. Elevation data shared under this standard must be in a format supporting Others.

2.5.2. Reference Systems

The Elevation dataset will be published in the Idaho Transverse Mercator NAD83 spatial reference system (EPSG 8826), which is the State of Idaho's single-zone, statewide system. Data is not required to be submitted in the IDTM NAD83 (IDTM83) coordinate system but must have a correctly defined spatial reference system clearly described in the metadata.

2.5.3. Global Positioning Systems (GPS)

Some data provided might contain geometry from GPS methods, and the provided metadata should describe this, if applicable. Various, and depends on the collection quality, date, and for what agency or standard. Typically, a high-grade onboard INS, combined with RTK-GPS ground validation locations in various ecological conditions (e.g. vegetated and non-vegetated).

2.5.4. **Interdependence of Themes**

These Elevation data have a geometry that is coincident with other framework data, such as ridge lines and cliffs. Other datasets should be coincident with some components of this dataset, such as break lines when the elevation data is of sufficient quality and is delivered with lidar-derived break lines or similar data source.

2.5.5. **Encoding**

When data is imported into and exported from the Elevation Framework, encoding will take place to convert data formats and attributes.

2.5.6. **Resolution**

Until statewide coverage of same-quality data is achieved, no specific requirements for resolution are specified in this standard. Resolution will be documented in the metadata.

2.5.7. **Accuracy**

Until statewide coverage of same-quality data is achieved, no specific requirements for accuracy are specified in this standard. Accuracy will be documented in the metadata.

2.5.8. **Edge Matching**

No edge matching is required between jurisdictions, or between this and other framework layers.

2.5.9. **Unique Identifier**

A Globally Unique ID (GUID) exists for this dataset. Each unique value identifies a specific lidar project area of interest (collection area) and is maintained as the dataset is updated.

2.5.10. **Attributes**

Attributes for public and intergovernmental distribution are described in Section 3 of this standard.

2.5.11. **Stewardship**

Perpetual maintenance and other aspects of lifecycle management are essential to Elevation Framework. Details of stewards, their roles and responsibilities, and processes are set forth, or are being planned to set forth in an Elevation Framework Stewardship Plan and related documents.

2.5.12. **Records Management and Archiving**

Records are managed and archived at ISU's GIS TReC, as well as partially redundantly at Boise State's BCAL group. Originating or funding agencies will maintain internal records according to their own protocols.

2.5.13. **Metadata**

The Elevation Framework metadata will describe the methods used to update and aggregate the individual Elevation data contributions, processes or crosswalks performed, definition of attributes, and other required information. This metadata will conform to the metadata standards as set out in ITA Standard S4220 Geospatial Metadata.

3. **Data Characteristics**

3.1. **Minimum Graphic Data Elements**

The geometry of the features in Elevation Framework is a raster.

3.2. **Optional Graphic Data Elements**

Not applicable.

3.3. **Standard Attribute Schema**

Field Name	Data Type	Length	Description	Examples
GUID	GUID		GUID for the data collection (i.e. "Project")	Adams County 2019
Value	32-bit floating point	n/a	Elevation for pixel in meters accurate to 0.05 meter	1065.35

3.4. **Data Quality**

Data quality considerations for elevations include:

a) All Data Collection efforts or Projects have a unique GUID stored within the dataset.
b) VRMSE is +/- 0.05 meters

Appendix A: References

Idaho Technology Authority (ITA). *Information and Data Policy P5000, Category: P5030 Framework Standards Development Policy.* https://ita.idaho.gov/psg/p5030.pdf

Idaho Technology Authority (ITA). *Enterprise Standards S4000 Geographic Information Systems (GIS) Data, Category: S4220 Geospatial Metadata.* https://ita.idaho.gov/psg/s4220.pdf

Elevation Technical Working Group and Idaho Lidar Consortium. 2018. *Idaho Statewide Lidar Plan Version 1.1* Idaho_Statewide_Lidar_Plan_Final_2018.pdf

Appendix B: Glossary

See ITA Guideline G105 (ITA Glossary of Terms) for definitions.