Oregon Aerial Imagery Index Data Standard

Version 1.01

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D R A F T

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1.0 Introduction

The Oregon Aerial Imagery Index Data Standard is a five part geospatial metadata index representing aerial or satellite image project areas, photo flight lines, photo centers, image extents, and effective area of images within a project.

1.1 Mission and Goals of Standard

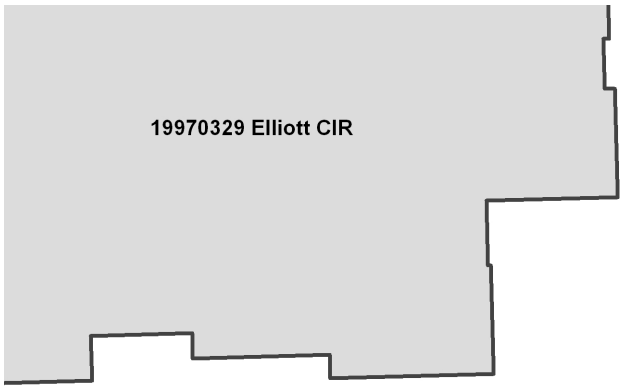
The purpose Oregon Aerial Imagery Index Data Standard is to create a standard for use by agencies and other organizations in Oregon to readily share spatial metadata about aerial or satellite imagery projects and photographs. The resulting layers could then be used to help create orthoimagery products or to enable the distribution of digital copies of the photographs over a network or the Internet.

1.2 Relationship to Existing Standards

The Oregon Aerial Imagery Index Data Standard is a supplement to the Oregon Orthoimagery Standard with is based on the FCGC Content Standards for Digital Orthoimagery (FGDC-STD-008-1999).

1.3 Description of Standard

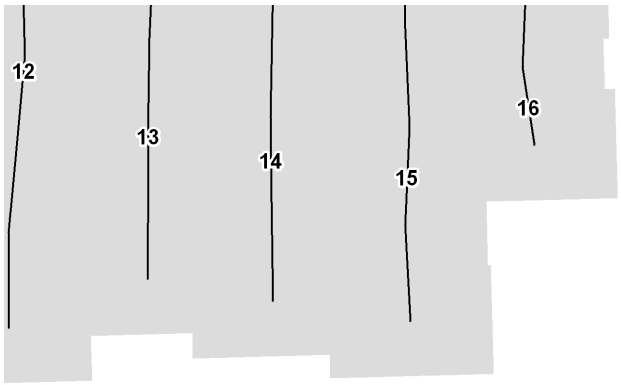
The database will contain information about various aspects of aerial photography projects and will consist of five related spatial layers and one project table.



1.3.1 Aerial image project areas

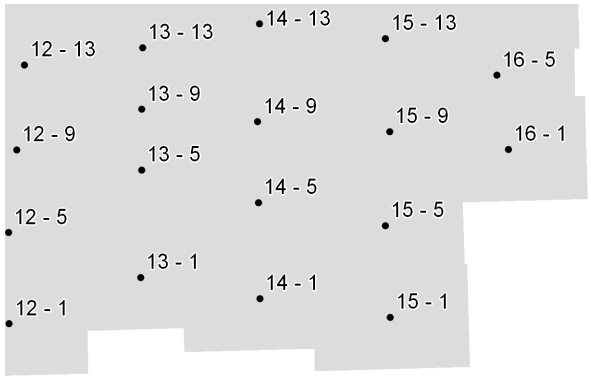
The Aerial image project areas layer consists of polygons of project boundaries. This layer is useful for data exploration on a statewide or regional basis. This layer is optional for the standard

1.3.2 Photo flight lines



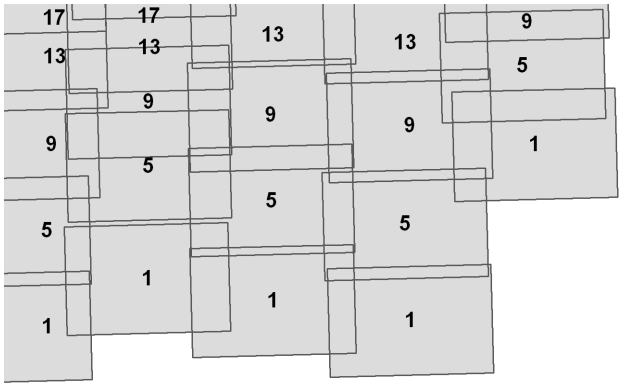
The Photo flight lines layer consists of the approximate flight lines with the vertexes at each photo center. This layer is useful in displaying the flight pattern and determining adjacent photo locations. This layer is optional for the standard.

1.3.3 Photo centers



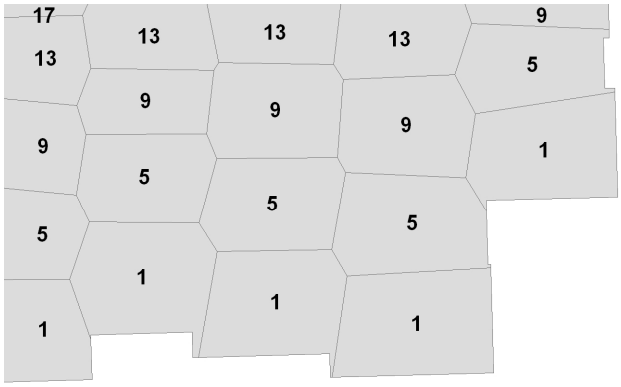
The Photo centers layer consists of point locations of the center of each photo exposure. This layer can be used to search and display photo locations as well as creation of flight index maps. This layer is required for the standard.

1.3.4 Image extents



The Image extents layer consists of overlapping polygons of the extent of each photo exposure. This layer can be used for display of the actual area captured in the image. This layer is optional for the standard.

1.3.5 Image effective area



The Image effective area layer consists of adjacent polygons within a project area representing the closest image location. This layer can be used to hyper-link to non-georeferenced images. This layer can be constructed from the Photo centers layer by creating Thiessen or Voronioi polygons. This layer is optional for the standard.

1.3.6 Project information (non-spatial)

The Project information table is a flat database table that contains critical information about the photo project, the image specifications, the vendor, and the managing organization. This table may be linked to the five spatial layers through the use of the photo project number.

1.4 Applicability and Intended Use of Standard

The Oregon Aerial Imagery Index Data Standard is intended to serve as a geospatial metadata tool for organizations to share location information about aerial photo collections.

1.5 Standard Development Procedures

The Oregon Aerial Imagery Index Data Standard is developed by the Oregon Orthoimagery Framework Implementation Team with input from interested parties. Outreach efforts to professional societies, the photogrammetry industry, and aerial photography vendors will be conducted.

1.6 Maintenance of Standard

This standard will be updated by the Oregon Orthoimagery Framework Implementation Team when issues arise from members or from interested parties.

2.0 Body of the Standard

2.1 Scope and Content of the Standard

The scope of the Oregon Aerial Imagery Index Data Standard is intended for organizations in Oregon that maintain aerial photo indexes and share that data with other entities. The standard is intended for near vertical imagery including satellite imagery and does not meet the needs of oblique imagery indexes.

2.2 Need for the Standard

The standard is needed to ensure the efficient and accurate communication about the location and temporal information about aerial photograph data sets that could be shared between organizations.

2.3 Participation in Standards Development

The process for this standard included research into data maintained by organizations outside of Oregon, and examination of data elements in use by entities in Oregon.

2.4 Integration with Other Standards

The Oregon Aerial Imagery Index Data Standard complements other Oregon Framework layers, but is not dependent on other layers for coincident geometry. This standard is a portion of the Orthoimagery Standard and provides locational metadata to enhance orthoimagery produced following that standard.

2.5 Technical and Operation Context

2.5.1 Data Environment

The data environment for this standard is a mix of vector data types; polygons, points, lines, overlapping polygons, and a related table.

2.5.2 Reference Systems

The coordinate reference systems typically used in Oregon are the Universal Transverse Mercator (UTM) the Oregon State Plane system and the custom Oregon Lambert coordinate system. The UTM zones are zone 10, which comprises all land in Oregon to the west of 120 degrees west longitude, and zone 11, which comprises all land to the east of 120 degrees west longitude. The State Plane North and State Plane South zones are divided along the county boundaries near 44 degrees north latitude. The Oregon Lambert coordinate system is known by the EPSG # 2992.

2.5.3 Global Positioning Systems (GPS)

GPS is an appropriate tool to collect location information as aerial images are captured. However, for documentation of historic image photo centers other location tools are more appropriate.

2.5.4 Integration of Themes

Data produced following the Oregon Aerial Imagery Index Standard will support and enhance the use and delivery of orthoimagery as well as non ortho corrected imagery. Within the standard the flight line vertexes are snapped to the photo center points.

2.5.5 Encoding

N/A

2.5.6 Resolution

The resolution of the data will correspond to the resolution of the imagery being cataloged.

2.5.7 Accuracy

The accuracy of the features that represent the location of aerial images is contained as an attribute in the individual data layers.

2.5.8 Edge Matching

The requirements and nature of aerial photography is that images overlap, therefore the features that represent the location of those images also overlap. There is no need to edge match features produced following the Oregon Aerial Imagery Index Data Standard.

2.5.9 Feature Identification Code

The Oregon Aerial Imagery Index Standard will use the Federal Geographic Data Committee guidelines for agency identification; 2 digit FIPS code, 3 digit agency or organization code (e.g. “41DSL”). This code will be the first digits of the unique project identification code. Each agency may design a project number scheme based on their business needs, provided that the first five digits are consistent and different from other organizations.

2.5.10 Attributes

The attributes are organized in to five related geospatial layers and one database table.

2.5.10.1 Photo project area polygons

Optional layer. Key data elements in this layer are, a) project identifier, and b) year.

2.5.10.2 Photo flight lines

Optional layer. The vertexes in this layer are snapped to the Photo center point layer. Key data elements in this layer are, a) project identifier, b) flight date, and c) line number.

2.5.10.3 Photo center points

Required layer. Key data elements in this layer are, a) project identifier, b) flight date, c) line number, and d) photo number.

2.5.10.4 Photo image extent polygons

Optional layer, also known as photo footprints. Key data elements in this layer are, a) project identifier, b) flight date, c) line number, and d) photo number.

2.5.10.5 Effective image extents polygons

Optional layer. This layer nests inside of the Photo project area layer. Key data elements in this layer are, a) project identifier, b) flight date, c) line number, and d) photo number.

2.5.10.6 Project information table

Required table. Key data elements for this table are, a) project identifier, and b) year.

2.5.11 Transactional Updating

The update process for the data produced following this standard is the responsibility of each organization that develops and maintains this data.

2.5.12 Records Management

The adherence to the use of the unique ID for each photo project will require cooperation between organizations.

2.5.13 Metadata

The standard follows the Framework Metadata Standard for geospatial data.

3.0 Data Characteristics

3.1 Spatial Data Elements

3.1.1 Photo project area polygons, optional data layer

Item Name	*Type & Size*	*Req*	*Description*
project_id	Text 50	Yes	A unique ID number assigned by the contracting agency. Used to link to the project information table.
flight_year	Text 4	Yes	The year the imagery was collected, yyyy

3.1.2 Photo flight lines, optional data layer

Item Name	*Type & Size*	*Req*	*Description*
project_id	Text 50	Yes	A unique ID number assigned by the contracting agency. Used to link to the project information table.
flight_date			The calendar date the flight was flown, yyyymmdd
flight_line_#	Text 5	Yes	The flight line number, may contain letters
fly_height_average			The average flying height above ground ?? MSL, Feet??
flight_azimuth			The average flight line azimuth direction
line_overlap			The average overlap between lines ?? percent or dist?
photo_overlap			The average overlap within lines ?? percent or dist?

3.1.3 Photo center points, required data layer

Item Name	*Type & Size*	*Req*	*Description*
project_id	Text 50	Yes	A unique ID number assigned by the contracting agency. Used to link to the project information table.
flight_date	Int 8	Yes	The calendar date the flight was flown, yyyymmdd
exposure_time			The local time the image was collected
flight_line_#	Text 5	Yes	The flight line number, may contain letters
photo_number	Int 3	Yes	The exposure or frame number
latitude			The latitude of the sensor when the image was collected
latitude_accuracy			The estimated accuracy of the latitude value
longitude			The longitude of the sensor when the image was collected
longitude_accuracy			The estimated accuracy of the longitude value
location_determination			The method used to determine latitude and longitude.
??altitude			The average altitude of the sensor ??Feet??
height			The height above ground (?? above MSL ??) ??Feet??
height_accuracy			The estimated accuracy of the height value
height_method			The method used to determine height
cloud_cover			The approximate percentage of cloud or fog cover in the image
snow_cover			The approximate percentage of snow cover on the ground in the image

smoke_haze			A code value for image degradation due to smoke or haze. 0 = none, 5 = severe
crab_code			A code for image displacement due to sensor crab. 0 = none, 5 = severe
tilt_code			A code for image displacement due to sensor tilt. 0 = none, 5 = severe
photo_link			A hyperlink to the image location on a network or Internet
?sun_angle			A code for poor sun angle?
?sun_azimuth			A code for poor sun azimuth?

3.1.4 Photo image extent polygons, optional data layer

Item Name	*Type & Size*	*Req*	*Description*
project_id	Text 50	Yes	A unique ID number assigned by the contracting agency. Used to link to the project information table.
flight_date	Int 8	Yes	The calendar date the flight was flown, yyyymmdd
flight_line_#	Text 5	Yes	The flight line number, may contain letters
photo_number	Int 3	Yes	The exposure or frame number

3.1.5 Effective image extents polygons, optional data layer

Item Name	*Type & Size*	*Req*	*Description*
project_id	Text 50	Yes	A unique ID number assigned by the contracting agency. Used to link to the project information table.
flight_date	Int 8	Yes	The calendar date the flight was flown, yyyymmdd
flight_line_#	Text 5	Yes	The flight line number, may contain letters
photo_number	Int 3	Yes	The exposure or frame number
photo_link			A hyperlink to the image location on a network or Internet

3.2 Non Spatial Data Elements

3.2.1 Project information table, required table

Item Name	*Type & Size*	*Req*	*Description*
project_id	Text 50	Yes	A unique ID number assigned by the contracting agency. Used to link to the spatial index layers.

flight_year	Text 4	Yes	The year the imagery was collected
flight_date_start			The calendar date the flight was started
flight_date_end			The calendar date the flight was completed
project_name			The name of the photo project
camera			A link to the camera specifications
focal_length			The focal length of the camera
vendor			The company or organization that collected the imagery
purchaser			The organization that acquired the imagery
repository			The organization that stores the film or master copy of the imagery
medium			Film negative, Film positive, Film diapositive, Raster
roll_numbers			The film roll number(s)
emulsion			The type of film, Color, B&W, CIR, film brand?
sensor_type			RGB, 4-Band, 7-Band, Hyperspectral
format			The physical dimensions of the negative or the file format of digital images
scan_date			The date the film was scanned to digital format
resolution			The ground pixel size of the scanned images
scale			The target or average scale of the images collected
number_lines			The number of flight lines in the project
number_images			The number of images contained in the project
datum_horizontal			The horizontal datum used in identification of photo centers

References

FGDC Content Standard for Digital Orthoimagery
http://www.fgdc.gov/standards/projects/FGDC-standards-projects/orthoimagery/orth_299.pdf

FGDC Standard for Digital Orthoimagery
http://www.fgdc.gov/standards/projects/FGDC-standards-projects/framework-data-standard/GI_FrameworkDataStandard_Part2_DigitalOrthoimagery.pdf

???FGDC Standard for Swath Data
http://www.fgdc.gov/standards/projects/FGDC-standards-projects/swath_data/FGDC-STD-009-1999.doc

Specifications for Aerial Photography Database Files, Ministry of Agriculture and Lands, British Columbia.
http://ilmbwww.gov.bc.ca/bmgs/airphoto/specs/DATABASE_SPECS_05022008.pdf