

# STATE OF MONTANA

## JOB DESCRIPTION

*Montana state government is an equal opportunity employer. The State shall, upon request, provide reasonable accommodations to otherwise qualified individuals with disabilities.*

**Job Title: Photogrammetrist I/Photogrammetrist II Position Number: 35010, 35005, 35003**

**Location: Helena Department: Transportation**

**Division and Bureau: Engineering Division/ Highways Bureau**

**Section and Unit: Photogrammetry and Survey Section/Survey Unit**

**Job Overview:** This position is a Photogrammetrist I/Photogrammetrist II for the Montana Department of Transportation Photogrammetry and Survey Section. The position is responsible for the Collecting, analyzing and interpretation of geographic information provided by control surveys, aerial photographs, LiDAR, UAV Drone and satellite. For planning and performing photogrammetric processes to develop engineering design level 3D models including DEM (Digital Elevation Models), DSM (Digital Surface Models) and DTM (Digital Terrain Models) from aerial survey data. The position reports directly to the Photogrammetry and Survey Section Supervisor.

### **Essential Functions (Major Duties or Responsibilities):**

#### **Aerial Survey Data assimilation, orientation, bridging & aerial triangulation - 50%**

##### **Level I**

- Supervised activities subject to review and approval by supervisor or senior Photogrammetrists:
  - Enters imagery into aerial survey software along with additional information regarding camera lens distortion, fiducial coordinates, photo control coordinates, photograph information, horizontal and vertical datum information.
  - Rectify digital imagery to remove digital image distortion which provides the mapping quality stereo imagery for aerial correlation routines and mapping purposes.

##### **Level II**

- Enters imagery into aerial survey software along with additional information regarding camera lens distortion, fiducial coordinates, photo control coordinates, photograph information, horizontal and vertical datum information.
- On the digital photogrammetric systems, performs interior, relative, and absolute orientation of stereoscopic instruments of the direct projection type or universal type.,

- Analyze interior orientation results and identify and resolve any ambiguities.
- Observe and measure photo control and pass points for each stereoscopic model and execute the aerial triangulation program for determining the mathematical relationship between the photogrammetric models and the ground.
- Review and analyze aerial triangulation results for inconsistencies and/or problem areas and resolves any ambiguities to ensure bridging results meet project requirements for mapping accuracy, and other subsequent photogrammetric processes using photogrammetric knowledge, applying mathematical and statistical knowledge as it pertains to least squares adjustments.

## **Compilation of Aerial Survey Data - 20%**

### **Level I**

- Supervised activities subject to review and approval by supervisor or senior Photogrammetrists:
  - Review, edit and make cartographic additions to aerial survey information captured in the design file to ensure accuracy and uniformity to MDT design Standards.
  - Combine data from multiple data sources including, terrestrial and Mobile, and airborne LiDAR, Static and Real Time Kinematic (RTK) Global Positioning Systems (GPS), photogrammetric systems used on manned and unmanned (UAS) aircraft, as well as a variety of new systems and technology as they emerge into the geospatial arena into a single 3D model per project specific design.
- Performs quality control checks of compiled aerial survey data to ensure adherence to MDT standards and accuracy of the final model to meet NSSDA (National Standard for Spatial Data Accuracy).
- Convert final 3D surface models from the serial survey software to the standard MDT CADD format for placement on DMS (Document Management System).

### **Level II**

- Compiles planimetric and topographic map detail of difficult areas as exemplified by extremely congested culture, precipitous terrain, heavy vegetative cover, and hidden areas, wherein extensive interpretation of aerial photography is required to create a 3D CADD design file to be used in Engineering and design operations.
- Review, edit and make cartographic additions to aerial survey information captured in the design file to ensure accuracy and uniformity to MDT design Standards.
- Construct and analyze 3D models including DEM (Digital Elevation Models), DSM (Digital Surface Models) and DTM (Digital Terrain Models) from compiled aerial survey data.
- Combine data from multiple data sources including, terrestrial and Mobile, and airborne LiDAR, Static and Real Time Kinematic (RTK) Global Positioning Systems (GPS), photogrammetric systems used on manned and unmanned (UAS) aircraft, as well as a variety of new systems and technology as they emerge into the geospatial arena into a single 3D model per project specific design.
- Perform quality control checks of compiled aerial survey data to ensure adherence to MDT standards and accuracy of the final model to meet NSSDA (National Standard for Spatial Data Accuracy).

- Convert final 3D surface models from the aerial survey software to the standard MDT CADD format for placement on DMS (Document Management System).
- Produce final photo mosaics and geo referenced orthophotos and geo referenced photo mosaics.

## **Project Planning - 20%**

### **Level I**

- Makes landowner contacts to obtain permission to survey and to identify and resolve minor survey related complaints and concerns.
- Supervised activities subject to review and approval by supervisor or senior Photogrammetrists
  - Design of individualized control layouts and designs aerial flight plans to be used for acquisition of the aerial survey photography. This includes determining flight line locations; determine flying height, photographic endlap and sidelap which is necessary information to be used by the pilot and the aerial photographer.
  - Compiles photo identification control point information to be used in the bridging operations.
  - Perform operational photogrammetric work in the field or office to assists in establishing horizontal and vertical values of control points using applicable survey procedures dependent upon terrain conditions and accuracy requirements.

### **Level II**

- Works with the Project Manager to identify project specific design, project mapping issues, mapping limits and accuracy requirements.
- Designs the individualized photo control plan and designs aerial flight plans to be used for acquisition of the aerial survey photography. This includes determining flight line locations; determine flying height, photographic endlap and sidelap which is necessary information to be used by the pilot and the aerial photographer.
- Inspects the final photography for quality and determines if the aerial photography is acceptable for aerial surveying and design mapping purposes.
- Directs the process of identifying and transferring photo control point information from flight plans to the final imagery and drafting a schematic for use in subsequent aerial survey operations.
- Compiles or directs the compilation of photo identification control point information and requests a field survey of these points to be used in the bridging operations.
- Makes landowner contacts to obtain permission to survey and to identify and resolve minor survey related complaints and concerns.

## **Engineering Survey Review and Approval, Equipment Calibration - 10%**

### **Level I**

- Review of consultant surveys to ensure quality, consistency, efficiency, and compliance with standards and policies.
- Adjusts, maintains and cleans aerial survey equipment to assure proper alignment, operation, and safety in accordance with manufactures recommendations.

- Supervised activities subject to review and approval by supervisor or senior Photogrammetrists
  - routinely verify calibration and/or calibrates aerial survey equipment (e.g.- stereoscopic instruments, aerial film scanner. etc.) to ensure accurate information is being compiled. Equipment is run through a series of calibration verification procedures and programs and by using mathematical and aerial survey knowledge in analyzing the results.
- Orders and maintains an inventory of supplies to assure availability when needed.

## Level II

- Coordinate review of in-house and consultant surveys to ensure quality, consistency, efficiency, and compliance with standards and policies.
- Review approval of self-performance and consultant survey.
- Routinely verifies calibration and/or calibrates aerial survey equipment (e.g.- stereoscopic instruments, aerial film scanner. etc.) to ensure accurate information is being compiled. Equipment is run through a series of calibration verification procedures and programs and by using mathematical and aerial survey knowledge in analyzing the results.
- Tests and analyzes new procedures and equipment and evaluate time efficient and cost-effective aerial survey methods and procedures. Report findings and recommendations to management.

**Supervision:** The number of employees supervised is: 0

### Physical and Environmental Demands:

- Extensive statewide travel (travel is estimated to range from 10% to 30% of the time)
- Lifting objects more than 30 lbs.
- Continual walking or standing and the ability to walk over uneven terrain or in water.
- Exposure to extreme weather conditions and high-speed traffic.
- Operation of motor vehicles, survey, and related equipment.

### Knowledge, Skills and Abilities (Behaviors):

#### Level I

Knowledge of: Basic mathematics of photogrammetry including algebra, geometry, and trigonometry; stereoscopic instruments and photogrammetric applications; photo-identification of control; topographic and cartographic practice; aerial photographic practice; field procedure for control surveys; photointerpretation; concepts of photogrammetric engineering and surveying.

#### Level II

Stereoscopic instruments and photogrammetric applications; photo-identification of control and control planning; surveying practice related to photogrammetry; aerial survey contract preparation and administration; principles of photogrammetric engineering and surveying; map accuracy evaluation. Ability to: effectively communicate in writing and verbally at a level required for

successful job performance; prepare plans, specifications and estimates for large and complex aerial survey projects; plan, direct, and coordinate the work of others; analyze situations accurately and take effective action; dictate correspondence and prepare reports.

**Minimum Qualifications (Education and Experience):**

**Level I Photogrammetrist:**

The required knowledge and skills are typically acquired through a combination of advanced education and experience equivalent to a Bachelor’s Degree in Land Surveying, Geomatics, or a related field from an accredited college or university. Related degree must include significant coursework in survey related math, drafting, and surveying techniques, principles and practices.

This position requires a minimum of 6 months experience, training, or education in the operation of precision stereoscopic instruments.

Certifications, licensure, or other credentials include: n/a

Alternative qualifications include: Any combination of additional related work experience and education equivalent to the minimum qualifications.

**Level II Photogrammetrist:**

The required knowledge and skills are typically acquired through a combination of advanced education and experience equivalent to a Bachelor’s Degree in Land Surveying, Geomatics, or a related field from an accredited college or university. Related degree must include significant coursework in survey related math, drafting, and surveying techniques, principles and practices.

This position requires a minimum of 3 years progressively responsible experience performing the duties equivalent to a Level I Photogrammetrist.

Certifications, licensure, or other credentials include: Registration as a Montana Professional Land Surveyor (PLS) is preferred.

Alternative qualifications include: Any combination of additional related work experience and education equivalent to the minimum qualifications.

**Special Requirements:**

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|--|--|
| <input type="checkbox"/> Fingerprint check | <input checked="" type="checkbox"/> Valid driver’s license |
| <input type="checkbox"/> Background check  | <input type="checkbox"/> Other; Describe                   |
| 035 Union Code                             | Safety Responsibilities                                    |

The specific statements shown in each section of this description are not intended to be all inclusive. They represent typical elements and criteria considered necessary to perform the job successfully.

**Signatures**

My signature below indicates the statements in the job description are accurate and complete.

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<b>Immediate Supervisor</b>	<b>Title</b>	<b>Date</b>
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<b>Administrative Review</b>	<b>Title</b>	<b>Date</b>
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My signature below indicates that I have read this job description.

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<b>Employee</b>	<b>Title</b>	<b>Date</b>
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**Human Resources Review**

**Level 1**

**Job Code Title: Photogrammetrist 1      Job Code Number: D11101**

**Level 2**

**Job Code Title: Photogrammetrist 2      Job Code Number: D11102**

My signature below indicates that Human Resources has reviewed this job description for completeness and has made the following determinations:

- |   |  |
|---|--|
| <input type="checkbox"/> FLSA Exempt                        | <input checked="" type="checkbox"/> FLSA Non-Exempt        |
| <input type="checkbox"/> Telework Available                 | <input checked="" type="checkbox"/> Telework Not Available |
| <input checked="" type="checkbox"/> Classification Complete | <input type="checkbox"/> Organizational Chart attached     |

**Human Resources:**

Tiffany Thornton	HR Generalist	5-19-2023
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<b>Signature</b>	<b>Title</b>	<b>Date</b>
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