

Cartographers and Photogrammetrists

Summary



Cartographers and photogrammetrists measure, map, and chart the Earth's surface.

Quick Facts: Cartographers and Photogrammetrists	
2012 Median Pay	\$57,440 per year \$27.62 per hour
Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2012	12,100
Job Outlook, 2012-22	20% (Faster than average)
Employment Change, 2012-22	2,400

[What Cartographers and Photogrammetrists Do](#)

Cartographers and photogrammetrists collect, measure, and interpret geographic information to create maps and charts for political, educational, and other purposes.

[Work Environment](#)

Although cartographers and photogrammetrists spend much of their time in offices, certain jobs require extensive travel to locations that are being mapped. Some photogrammetrists perform aerial surveys.

[How to Become a Cartographer or Photogrammetrist](#)

A bachelor's degree in cartography, geography, geomatics, or civil engineering is the most common path of entry into this occupation. Cartographers and photogrammetrists must be licensed in some states.

[Pay](#)

The median annual wage for cartographers and photogrammetrists was \$57,440 in May 2012.

[Job Outlook](#)

Employment of cartographers and photogrammetrists is projected to grow 20 percent from 2012 to 2022,

faster than the average for all occupations. Increasing use of maps for national security and local government planning should fuel employment growth. For this reason, job prospects are likely to be excellent for photogrammetrists.

Similar Occupations

Compare the job duties, education, job growth, and pay of cartographers and photogrammetrists with similar occupations.

More Information, Including Links to O*NET

Learn more about cartographers and photogrammetrists by visiting additional resources, including O*NET, a source on key characteristics of workers and occupations.

What Cartographers and Photogrammetrists Do



Cartographers and photogrammetrists are employed at firms in architectural and engineering services, and also in local and federal government agencies.

Cartographers and photogrammetrists collect, measure, and interpret geographic information to create maps and charts for political, educational, and other purposes.

Cartographers are mapmakers who use principles of cartographic design to make user-friendly maps. Photogrammetrists are specialized mapmakers who use aerial photographs, satellite images, and light-imaging detection and ranging technology (LIDAR) to build models of the Earth's surface and its features for purposes of creating maps.

Duties

Cartographers typically do the following:

- Collect and create visual representations of geographic data, such as annual precipitation patterns
- Examine and compile data from ground surveys, reports, aerial photographs, and satellite images
- Prepare thematic maps in digital or graphic form for environmental and educational purposes
- Update and revise existing maps and charts

Photogrammetrists typically do the following:

- Plan aerial and satellite surveys to ensure complete coverage of the area in question
- Collect and analyze spatial data, such as elevation and distance
- Develop base maps that allow geographic information system (GIS) data to be layered on top

Cartographers and photogrammetrists use information from geodetic surveys and remote sensing systems, including aerial cameras and satellites. Some also use light-imaging detection and ranging (LIDAR) technology. LIDAR systems use lasers attached to planes or cars to digitally map the topography of the Earth. Because LIDAR is often more accurate than traditional surveying methods, it can also be used to collect other forms of data, such as the location and density of forest canopies.

Cartographers and photogrammetrists increasingly work on online and mobile maps. Interactive maps are growing in popularity, and cartographers and photogrammetrists collect data and design these maps for mobile phones and navigation systems.

Cartographers and photogrammetrists also create maps and perform aerial surveys for local governments to aid in urban and regional planning. Such maps may include information on population density and demographic characteristics. Some help build maps for federal agencies for work involving national security.

A cartographer who creates maps using geographic information system (GIS) technology is often known as a **geographic information specialist**. GIS technology is typically used to assemble, integrate, analyze, and display spatial information in a digital format. Maps created with GIS technology combine spatial graphic features with nongraphic information. These maps are useful for providing support for decisions involving environmental studies, geology, engineering, land-use planning, and business marketing.

Work Environment



Cartographers typically do fieldwork to collect and verify data used in creating maps.

Cartographers and photogrammetrists held about 12,100 jobs in 2012.

The industries that employed the most cartographers and photogrammetrists in 2012 were as follows:

Architectural, engineering, and related services	33%
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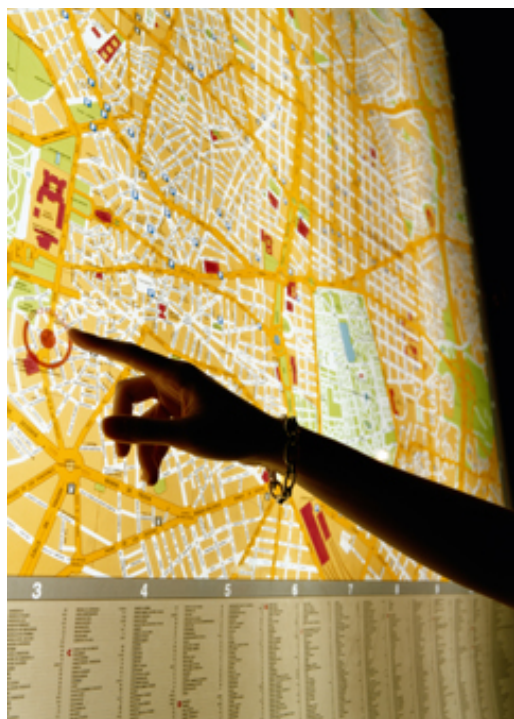
Local government, excluding education and hospitals	23
Management, scientific, and technical consulting services	11
Federal government, excluding postal service	6
State government, excluding education and hospitals	4

Although cartographers and photogrammetrists spend much of their time in offices, certain jobs require extensive fieldwork to acquire data and verify results. For example, cartographers may travel to the physical locations that they are mapping to better understand the topography. Similarly, photogrammetrists may do fieldwork to plan ground control for an aerial survey and to validate interpretations. Some photogrammetrists may fly in special aircrafts to calibrate cameras and equipment that take aerial photographs.

Work Schedules

Most cartographers and photogrammetrists work full time. Those who do fieldwork often have longer workdays.

How to Become a Cartographer or Photogrammetrist



Cartographers and photogrammetrists measure, analyze, and interpret geographic information to create maps and charts.

A bachelor's degree in cartography, geography, geomatics, civil engineering, or a related field is the most common path of entry into this occupation. Some states require cartographers and photogrammetrists to be licensed as surveyors, and some states have specific licenses for photogrammetrists.

Education

Cartographers and photogrammetrists usually have a bachelor's degree in cartography, geography, geomatics, or surveying. (Geomatics combines the science, engineering, mathematics, and art of collecting and managing geographically referenced information.) Although it is not as common, some have a bachelor's degree in engineering, forestry, or computer science. Some people enter this occupation after working as [surveying and mapping technicians](#).

Growing use of GIS (geographic information system) technology has resulted in cartographers and photogrammetrists needing more education and stronger technical skills—including more experience with computers—than in the past. Taking courses in computer programming, engineering, mathematics, GIS technology, surveying, and geography usually are required for those looking to become a cartographer or photogrammetrist.

Cartographers must also be familiar with Web-based mapping technologies, including newer modes of compiling data that incorporate the positioning capabilities of mobile phones and in-car navigation systems.

Photogrammetrists must be familiar with remote sensing, image processing, light-imaging detection and ranging (LIDAR), and they must be knowledgeable about using the software necessary for these tools.

High school students interested in becoming a cartographer or photogrammetrist should take courses in algebra, geometry, trigonometry, drafting, and computer science.

Licenses, Certifications, and Registrations

Licensing requirements for cartographers and photogrammetrists vary by state. A number of states require cartographers and photogrammetrists to be licensed as surveyors, and some states have specific licenses for photogrammetrists. Although licensing requirements vary by state, candidates must have a minimum of a high school diploma and pass a test.

Cartographers and photogrammetrists may also receive certification from the [American Society for Photogrammetry and Remote Sensing](#) (ASPRS). Candidates must meet experience and education requirements, and pass an exam. Although certification is not required, it can demonstrate competence and may help candidates get a job.

Other Experience

Many aspiring cartographers and photogrammetrists benefit from internships while in school. Internships offer an opportunity for students to learn practical skills, thus reducing time in training by employers.

Important Qualities

Computer skills. Both cartographers and photogrammetrists must have experience working with computer datasets and coding. Because maps are created digitally, knowing how to edit them on a computer is essential.

Critical-thinking skills. Cartographers work from existing maps, surveys, and other records. To do so, they must be able to determine the thematic and positional accuracy of each feature being mapped.

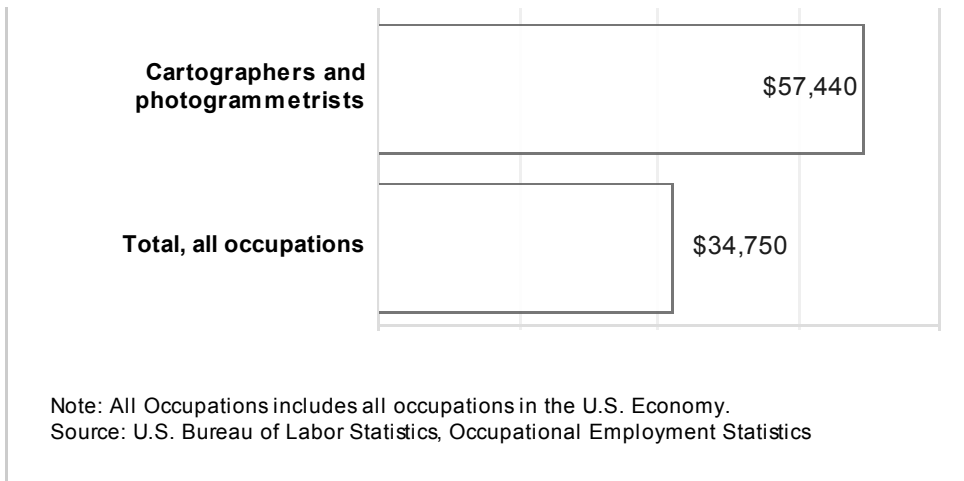
Decision-making skills. Both cartographers and photogrammetrists must make decisions about the accuracy and readability of a map. They must decide what information they need in order to meet the client's needs.

Detail oriented. Cartographers must focus on details when conceiving a map and deciding on the features needed on a final map. Photogrammetrists must pay close attention to detail when interpreting aerial photographs and remotely sensed data.

Problem-solving skills. Cartographers and photogrammetrists must be able to identify and resolve issues with the tools available to them.

Pay

Cartographers and Photogrammetrists	
Median annual wages, May 2012	
Architects, surveyors, and cartographers	\$66,380



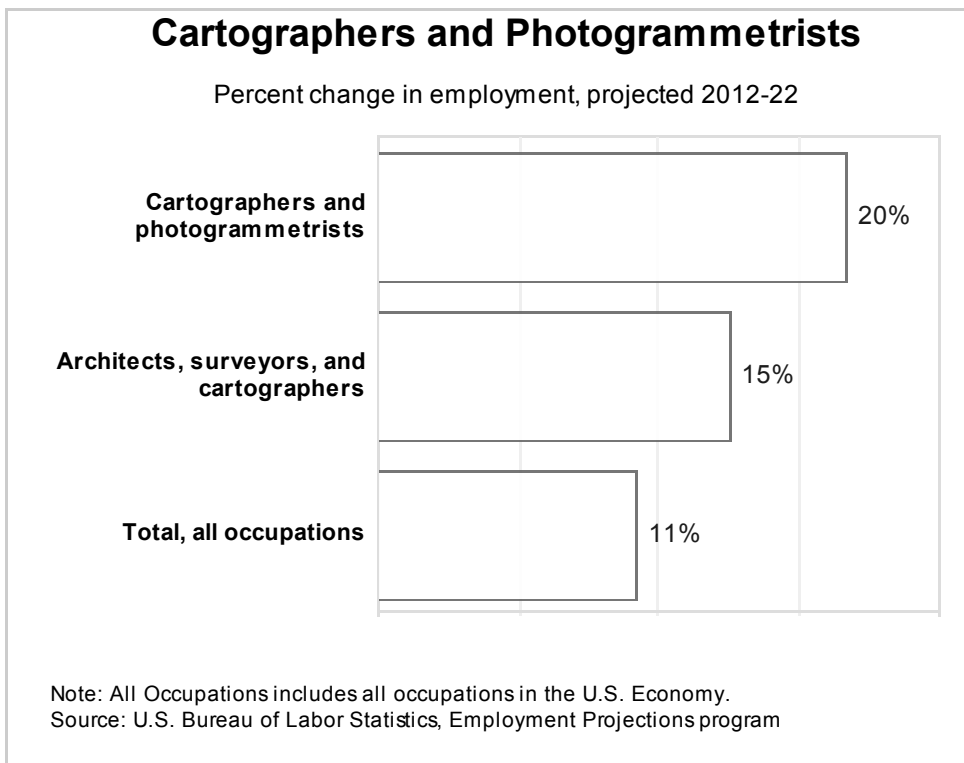
The median annual wage for cartographers and photogrammetrists was \$57,440 in May 2012. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$34,850, and the top 10 percent earned more than \$94,980.

In May 2012, the median annual wages for cartographers and photogrammetrists in the top five industries in which these specialists worked were as follows:

Federal government, excluding postal service	\$84,850
Local government, excluding education and hospitals	57,780
Management, scientific, and technical consulting services	57,180
Architectural, engineering, and related services	55,260
State government, excluding education and hospitals	51,910

Most cartographers and photogrammetrists work full time. Those who do fieldwork often have longer workdays.

Job Outlook



Employment of cartographers and photogrammetrists is projected to grow 20 percent from 2012 to 2022, faster than the average for all occupations. However, because it is a small occupation, the fast employment growth will result in only about 2,400 new jobs over the 10-year period.

Overall, cartographers and photogrammetrists are likely to be in demand to ensure the reliability and accuracy of maps produced and updated.

In addition, increasing use of maps for national security and local government planning should fuel employment growth. The growing number of mobile and Web-based map products also should result in new jobs for cartographers and photogrammetrists.

Photogrammetrists, in particular, will be needed to manage the aerial, satellite, and light-imaging detection and ranging (LIDAR) images that are now common.

Cartographers will also be needed to visualize spatial information and design the final presentation of information for clients. Their design skills help data become more accessible to users.

Job Prospects

Photogrammetrists are expected to have excellent job opportunities. There has been a large increase in the amount of mapping data available and photogrammetrists will be needed to interpret and refine this data. These workers will also be needed to calibrate cameras and other tools when collecting this data.



Employment projections data for Cartographers and Photogrammetrists, 2012-22

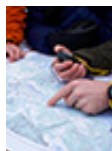
Occupational Title	SOC Code	Employment, 2012	Projected Employment, 2022	Change, 2012-22		Employment by Industry
				Percent	Numeric	
Cartographers and photogrammetrists	17-1021	12,100	14,500	20	2,400	[XLS]

SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program

Similar Occupations

This table shows a list of occupations with job duties that are similar to those of cartographers and photogrammetrists.

	OCCUPATION	JOB DUTIES	ENTRY-LEVEL EDUCATION	2012 MEDIAN PAY
	Civil Engineers	Civil engineers design, construct, supervise, operate, and maintain large construction projects and systems, including roads, buildings, airports, tunnels, dams, bridges, and systems for water supply and sewage treatment.	Bachelor's degree	\$79,340
	Environmental Scientists and Specialists	Environmental scientists and specialists use their knowledge of the natural sciences to protect the environment and human health.	Bachelor's degree	\$63,570



Geographers

They may clean up polluted areas, advise policy makers, or work with industry to reduce waste.

Geographers study the earth and its land, features, and inhabitants. They also examine phenomena such as political or cultural structures as they relate to geography. They study the physical and human geographic characteristics of a region, ranging in scale from local to global.

Bachelor's degree

\$74,760



Landscape Architects

Landscape architects plan and design land areas for parks, recreational facilities, private homes, campuses, and other open spaces.

Bachelor's degree

\$64,180



Surveying and Mapping Technicians

Surveying and mapping technicians assist surveyors, cartographers, and photogrammetrists. Together, they collect data and make maps of the earth's surface. Surveying technicians visit sites to take measurements of the land. Mapping technicians use geographic data to create maps.

High school diploma or equivalent

\$39,670




Surveyors

Surveyors make precise measurements to determine property boundaries. They provide data relevant to the shape and contour of the Earth's surface for engineering,

Bachelor's degree

\$56,230

	<p><u>Urban and Regional Planners</u></p>	<p>map making, and construction projects.</p> <p>Urban and regional planners develop plans and programs for the use of land. Their plans help create communities, accommodate population growth, and revitalize physical facilities in towns, cities, counties, and metropolitan areas.</p>	<p>Master's degree</p>	<p>\$65,230</p>
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Contacts for More Information

For more information about cartographers and photogrammetrists, visit

[Cartography and Geographic Information Society](#)

For career information about photogrammetrists, photogrammetric technicians, remote sensing scientists, image-based cartographers, or geographic information system specialists, visit

[American Society for Photogrammetry and Remote Sensing](#)

For information about careers in remote sensing, photogrammetry, surveying, GIS analysis, and other geography-related disciplines, visit

[Association of American Geographers](#)

O*NET

[Cartographers and Photogrammetrists](#)

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