

# Contracting Of Aerial Photography

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## Introduction

ONCE A municipality has determined the need for aerial photography, several questions arise concerning the contracting process. Four of the most notable ones being:

1. Which companies are capable of performing the job?
2. How should the request for proposals be phrased and what specifications used?
3. How can one be sure of obtaining the desired product or results?
4. Once the photography is completed, who owns the aerial film negatives?

The above questions imply the prior knowledge of some of the basics of aerial photography. However, many of us are not familiar with the intricacies of aerial photography and photogrammetry. The need for the photography reveals several more questions. Some of the more notable ones being:

1. What scale of photography should be produced?
2. Is false colour, colour, or black and white photography required?
3. What focal length camera and lens should be used?
4. Is stereoscopic coverage required?

The intent of this article is to attempt to answer these questions in such

a manner as to enable one to contract for aerial photography.

In cases where the specifics of the photo requirements are not known, the shortest route to satisfactory results will be to contact a competent aerial photography/mapping company and ask them for assistance.

## The Canadian Association of Aerial Surveyors (CAAS)

There are many such firms across Canada and most of them are members of the Canadian Association of Aerial Surveyors (CAAS).

The CAAS is an independent organization of private aerial survey companies whose members, in the opinion of their peers, have reached a level of competence and stability which will enable them to meet the requirements of the Association concerning their ethical and professional conduct.

A list of twenty-five member firms of the CAAS and their subsidiaries and branches is available from the CAAS, 46 Elgin Street, Ottawa, Ontario. (Those with an asterisk have Canada Land Surveyors specializing in photogrammetry on their staff.)

If there is a fair amount of doubt on the part of the client concerning the specifics of the proposed photography, an aerial survey firm should be selected and, municipal regulations permitting, a consultant/client relationship established, resulting in the accomplishment of the required photography. The aerial survey firm will consult with the client

and establish photographic criteria designed to meet the client's exact needs. He will use this experience and technical background to produce innovative solutions to propose to the client and he will provide sufficient technical and cost information to allow the client to choose the best package for his purposes. The proposal will indicate the specifications to be adhered to, the products to be delivered and, in most instances, indicate a firm fixed fee for his services.

If municipal regulations state that technical services such as aerial photography must be obtained on tender basis but, on the other hand, it is possible to engage consultants on a short term basis in order to establish specifications, then the municipality should hire as consultants an aerial survey firm who are not themselves interested in contracting for the photography. In addition to setting requirements and specifications, it may be desirable to have the consulting firm also inspect the results of the work to ensure that the specifications have been met.

In circumstances where lack of funds or municipal regulations prohibit hiring consultants, the municipality can still obtain technical advice on what kind of photography it should obtain to meet its requirements. Most members of the CAAS will still provide advice and recommendations for the purpose of establishing scope of work and specifications, even if they are aware they are in a tender situation. In these cases it is important that the client inform the company *before* the information is supplied that it will be used in tender documents.

There is nothing more frustrating for the aerial survey company than to find that after submitting a comprehensive and well thought out proposal on what they assumed to be a sole source basis, the ideas, and sometimes the exact words of their proposal are returned to them as part of a general tender call.

Once the kind of photography needed has been determined there is the matter of specifications. Those municipalities who have already decided on the kind of photography they need may have sufficient technical expertise on their own staff to enable them to establish specifications and to measure the results against those specifications.

Those remaining municipalities who have directly engaged the services of a firm to provide the aerial photography, will have a set of specifications supplied as part of the firm's proposal, while those who have hired a firm as consultants to establish requirements and perhaps evaluate results will be provided with specifications to be included in the tender documents.

The remaining municipalities can, if they wish, cover the matter of specifications by simply inserting in the tender documents a clause similar to the following "All photography obtained shall meet the requirements of the Specification for Aerial Survey Photography, as published by the ICAS."

### **The Interdepartmental Committee on Air Surveys (ICAS)**

ICAS is the Interdepartmental Committee on Air Surveys which coordinates all Federal aerial photography requirements. Federal departments which have established their photographic requirements prior to each photo season, send them to the Secretary of the ICAS who is headquartered at the Surveys and Mapping Branch of the Department of Energy, Mines and Resources in Ottawa. The Secretary assembles all of the requirements into logical packages according to geographic location and the type and scale of photography. He then establishes specifications, calls tenders, awards the work and finally, after inspection, accepts or rejects the photography and authorizes payment.

The Interdepartmental Committee of Air Surveys (ICAS) also maintains a list of aerial photography contractors qualified to do Federal work, which is available to the public.

Since most aerial photographers in

Canada have done Federal photo work at one time or another, they have on hand copies of the ICAS specifications and are used to working to ICAS standards. Therefore, in the absence of more complete specifications, inserting a clause in the tender stating the photo work should meet ICAS standards provides a familiar goal for the aerial photographer to work towards and, if necessary, a yardstick against which the results can be measured.

On a given project all ICAS standards may not be met by the product photography but whether or not this is grounds for rejection will depend upon the purpose of the photography. For instance, aerial photography taken to monitor a changing condition such as, for example, the amount of overflow from a manufacturing plant into a creek, would not be seriously jeopardized if the crab along the flight line somewhat exceeded the limits set by the ICAS specifications or if there was a small cloud in a corner of one of the photographs.

Generally speaking, the most stringent requirements for aerial photography exist when photogrammetric mapping is the end product and aerial photography taken for these purposes should be examined most critically for adherence to ICAS standards. In other cases, the determining factor should be whether or not the project requirements can be met with the product photography. In the latter cases, insertion of a clause requesting that the photography must meet ICAS standards will have served its intended purpose of providing the municipality with a basis for checking the photography, regardless of whether or not the specifications are ultimately rigidly enforced. Common sense should prevail in all circumstances, even where specifications are extremely detailed.

Statements such as "there shall be NO blemish of any kind on the film" if rigidly interpreted could mean the rejection of a complete film because of a single scratch on one negative. This could mean a cost to the contracting company of thousands of dollars for re-flying. Therefore, any client who acts in that way can expect, when calling for photography under the same specifications, to be asked to pay for such rigidity.

On the other hand, most responsible air survey companies accept a reasonable level of protection for the client. Although the client may be prepared to commit funds on the basis of extremely loose or no specifications, it

is not really beneficial to either party and may result in unnecessary disputes.

Copies of the ICAS specifications may be obtained from the Canada Map Office, 615 Booth Street, Ottawa, Ontario K1P 0E9 at a price of \$5.00 per copy.

Although it is generally understood that the client municipality retains ownership of the original aerial film and the contractor stores it on his behalf, the municipality may wish to insert a clause in the specifications confirming that ownership resides with the municipality. This would prevent any future misunderstandings. However, if the potential for resale of the photography is high, the aerial photographic contractor may wish to negotiate with the municipality for the resale rights. In such cases the original purchase price of the photography will probably be lower or, alternatively, rebates based on sales may be provided.

Before leaving the matter of specifications, it may be useful to list some of the common terms used in aerial photography and to briefly explain their meaning. Most of the specifications concerning aerial photography flight deviations are applied against these terms:

**CRAB:** A condition caused when the camera has not been oriented with the track of the airplane. Usually caused by improper compensation of the camera for aircraft heading changes made to eliminate drift. Excessive crab may cause lack of coverage.

**DRIFT:** The amount of lateral displacement of an aircraft from its true course, usually due to action of the wind.

**FORWARD OVERLAP:** The amount, usually expressed as a percentage, by which successive photographs in a strip overlap one another. Sixty percent is the most common forward overlap and for mapping purposes the minimum of 55% is usually specified. Stereoscopic coverage is not possible with overlaps less than 50%.

**SIDE OVERLAP:** The amount, usually expressed as a percentage, by which adjacent strips of photographs overlap one another. For mapping purposes, 30% side-lap is usually specified.

**FLIGHT ALTITUDE:** The height at  
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which the photography must be taken to produce the required scale. Usually expressed as ASL (Above Sea Level) in which case the required altitude above ground is added to the mean ground height.

**SOLAR ALTITUDE:** The altitude, expressed in degrees, of the sun above the horizon. For most aerial photography in Canada a minimum solar altitude of 30° is specified.

**SNOW AND LEAF-FREE:** Indicates that the photography must be taken, in the case of Spring photography, after the snow has left the ground and before the leaves are on the trees. In Autumn, the reverse applies. For photogrammetric mapping with small contour intervals, Spring photography is preferable to Autumn because the winter snows will have compacted field grasses and low bushes, making more accurate contouring possible.

Having now established the requirements and the specifications, if the municipality has not already engaged a firm to carry out the work on a sole-source basis, it is ready to go to tender.

For this purpose, the standard municipal tendering forms are probably adequate but if those forms contain clauses requiring the supply of bid or performance bonds with the tender, these should be deleted. Bid bonds are an anachronism in professional work such as aerial photography and mapping and, considering the very nature of the work, performance bonds are unnecessary. By the time the contractor has spent hundreds, or even thousands, of his own dollars in mobilizing and attempting to carry out the work, through all kinds of difficulties such as bad weather, mechanical failure, human failure, etc., there is already enormous incentive to complete the work and get paid.

On smaller projects the tender forms should provide for payment of 75% to 90% of the contract fee on completion of the flying, with the balance to be paid on delivery and acceptance of the photography. On larger projects there should be a provision for progress payments based upon production. The requirements and specifications previously prepared should form part of the tender package.

The number of firms asked to bid will depend upon municipal regulations but this is usually a minimum of three. When deciding who to ask to tender,

the municipality should keep geographical location in mind. Since ferry costs are often the largest part of the costs of a project, chances are that the firms located closest to the project area will be able to provide the best prices. This is not always the case, however, because even a local firm can be committed to a project hundreds of kilometres away during the very period when the municipality wants its photography done, while another firm based in another Province may have a contract in the near vicinity. Aerial photographers, by their very nature, are highly mobile and are apt to be found far from home.

Municipalities not located within reasonable distance of the operational bases of the aerial photographers may still be able to take advantage of the possible presence of an aerial photographic airplane in their vicinity by finding out if the Federal or Provincial Governments have any projects scheduled in their area. The Secretary of the ICAS can advise what nearby Federal projects are scheduled fairly early in the year and once the contracts have been awarded, can provide the name of the Contractor. For information on Provincial contracts the Provincial Surveys and Mapping Branches should be contacted.

Although ferry costs often form the largest part of the cost of an aerial photography project, municipalities should realize that even if a photographic aircraft is located at their own municipal airport and their photographic project is small, the cost of their project will not be insignificant. The assumption is often made that because the project involves, say, only 30 minutes of flying, it can be bought very cheaply. Most people do not realize the magnitude of the investment in equipment the photographic contractor has probably made. Modern cameras cost over \$200,000, airplanes from \$50,000 to \$200,000, lab equipment \$100,000 and so on. In addition, he must pay his pilot, navigator and camera operator for a full day, even though the 30 minute flying job might be all they are able to do on that day. Considering these cost factors, even though a small project might cost a minimum of \$900 to \$1,200, aerial photography in Canada is still one of the world's best bargains!

In summary,

There is a large number of competent, qualified aerial photography and mapping firms in Canada capable of arranging for or providing aerial photography.

If the client has established that a need exists for aerial photography but is in doubt as to what kind and to what specifications, he should consult with an aerial survey firm.

Where the client requires consulting services the most satisfactory arrangement is apt to be where he engages the aerial survey firm on a professional basis.

Where a consulting arrangement is not possible, the client should ensure himself that the requirements and specifications to be used will produce the desired result before he goes to tender.

Specifications should not be rigidly applied unless the failure to meet specifications impairs the usefulness of the photography in its intended purpose.

Economics can be achieved by determining if Federal or Provincial aerial photographic work has been scheduled for an area near the project and by utilizing the same Contractor.

Aerial photography and mapping are highly technical, professional services and the relationship between the client and the contractor should reflect that fact.

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