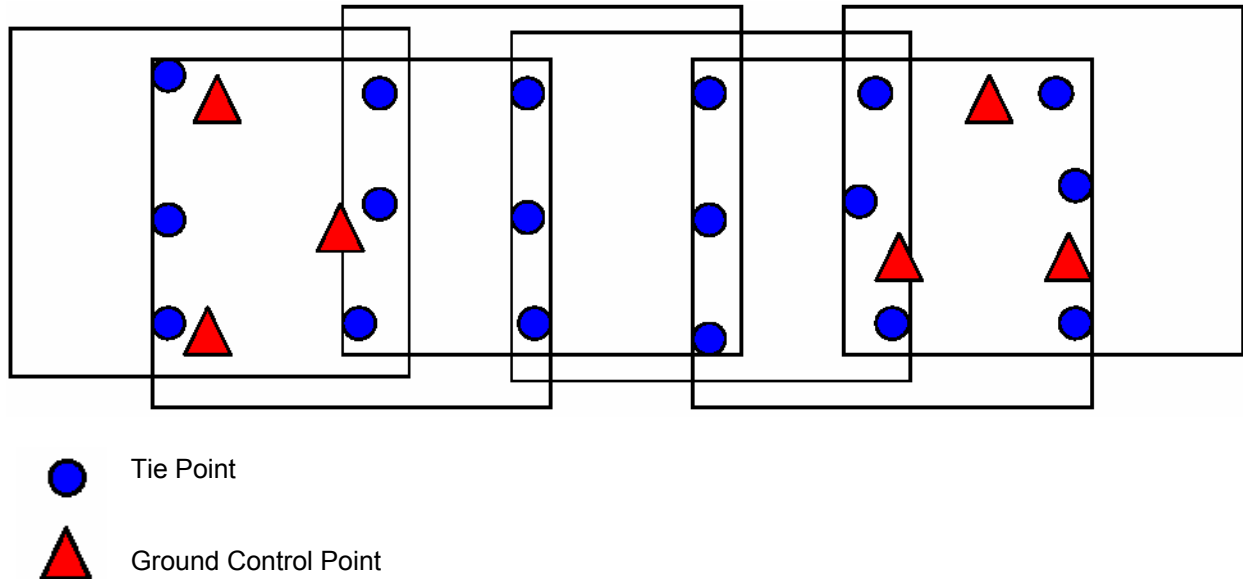


How Many GCPs do I Need for my Air Photo Project?

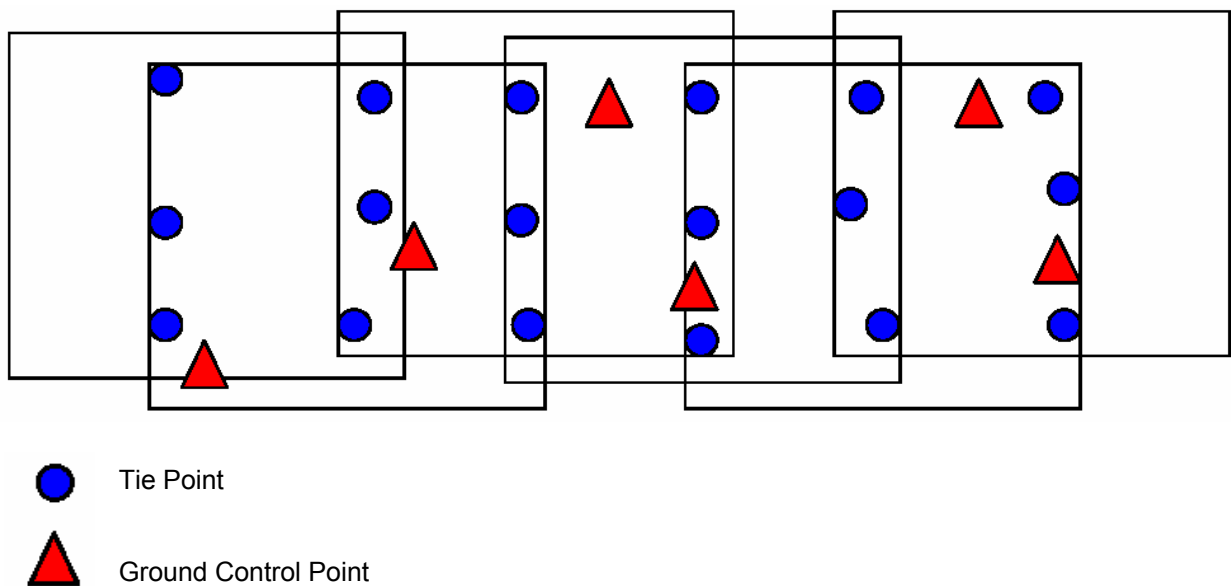


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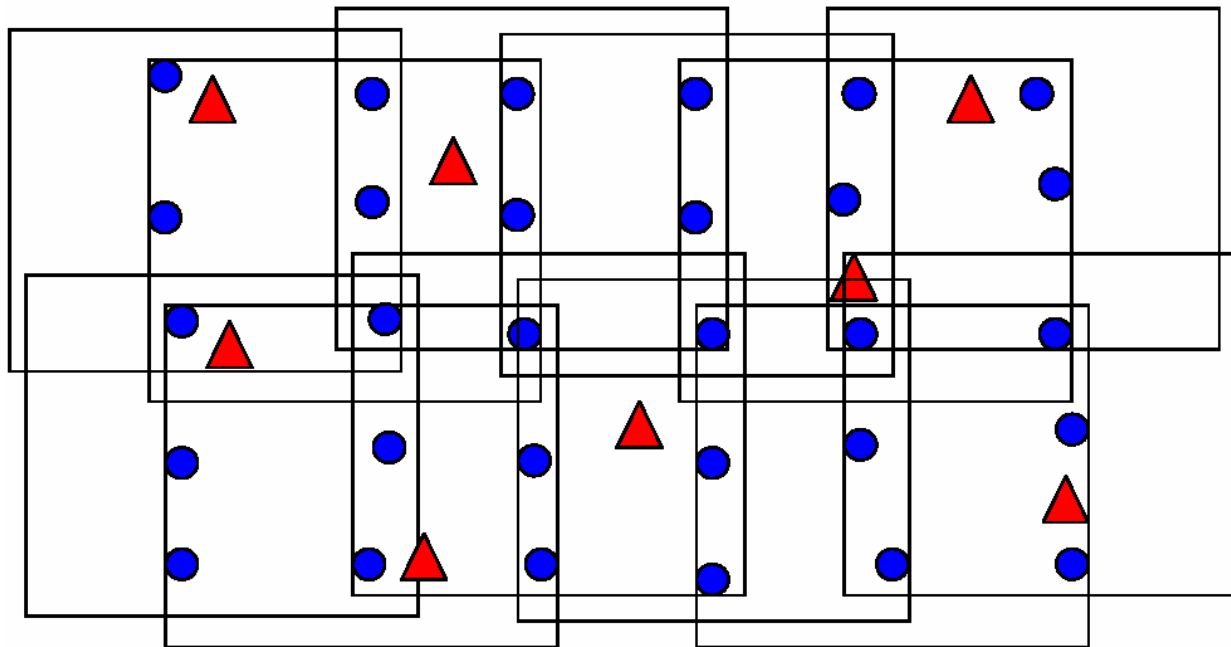
In traditional photogrammetry, ground control is usually considered to require a minimum of 3 GCPs, on every 4th or 5th photo. In the diagram below, I have shown six photos with 60% overlap. In the traditional distribution, you would collect three GCPs in the first model, then use tie points only for a number of photos, then three GCPs in the fourth or fifth model. If you are doing this "bridging" between your ground control, you have to make sure that your Tie Points are collected in the area of 3-way overlap between the images. Note that the last sets of tie points at each end of the strip would only have two way overlap.





Now, in digital methods, people tend to be much more flexible. Often, the GCPs are distributed randomly throughout the project. The minimum requirement is that you have at least two GCPs on at least one photo in the project, to ensure scale. However, I generally suggest that you have a few photos with 3 GCPs, as this provides correct levelling and scale. Tie points can hold the rest of the project together.



Now, don't forget that if you have multiple strips, the strips will also have about 20% overlap. When collecting tie points between strips, you would also want to make sure you collect in the overlap areas, allowing you to collect some tie points on as many as 6 photos at a time.



-  Tie Point
-  Ground Control Point

So, what is the minimum per photo? It isn't usually calculated that way. Technically, you can triangulate a project with as little as 3 or 4 GCPs for the entire block. Of course, you wouldn't do that normally because your accuracy would be terrible. Look at the way that the block is laid out, and decide on a good distribution of points. Again, aim for at least a few photos with a minimum of 3 GCPs, as this will give you good solid levelling. Also, keep in mind that you want to collect enough GCPs that some can be used as independent Check Points, and not used in the block bundle adjustment.

You should also keep in mind that many contracts or mapping jurisdictions set out prescribed numbers of GCPs for mapping projects. This may be the overriding factor in your decision.

You should also consider that there are tradeoffs between the quality and the quantity. For example, if I have data where little or no GCPs are available, I can get a solution with 3 or 4, though accuracy will suffer. On the other hand, if I collect hundreds and hundreds of GCPs, I may not be continually gaining additional accuracy because of the redundancy, and the inherent variability in the control information. So, keep the law of diminishing returns in mind.