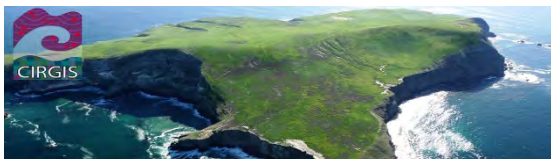


Revised Proposal to
Channel Islands Regional GIS
for
Project Monitoring and Quality Review Services



Submitted to:

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MONITORING & QUALITY REVIEW SERVICES 2017/2018

TECHNICAL APPROACH

Our methodology crafts the project in a manner that proceeds logically from becoming acquainted with CIRGIS's project requirements, to the actual monitoring of the data and quality review of the deliverables. In the ensuing pages, we outline a scope of work that will lead to the delivery of a successful high resolution imagery project.

We understand that CIRGIS will select a vendor to collect the following resolutions:

- A. Project Area #1: 12 inch coverage - Net Square Miles = ~830
- B. Project Area #2: 6 inch coverage - Net Square Miles = ~506
- C. Project Area #3: 3 inch coverage - Net Square Miles = ~707
- D. Project Area #4: 9 Inch oblique – Net Square Miles = ~325
- E. Project Area #5: 3 Inch oblique – Net Square Miles = ~107

GCS will work closely with CIRGIS to make sure that all imagery meet specifications stated in the RFQ and vendor contract.

SCOPE OF WORK

PROJECT MONITORING AND QUALITY REVIEW PLAN

Quality can be defined as meeting or exceeding the client's expectations and those expectations should be clearly detailed in the Quality Review Plan. The Quality Review Plan is designed to make sure that CIRGIS's expectations are met. GeoSpatial Consulting Services would be contracted by CIRGIS to ensure that there is no conflict of interest.

GeoSpatial Consulting Services approach to communication is to work closely with CIRGIS to build a consensus, review project status, and discuss any technical issues that might arise. Communication is imperative to the successful completion of a project and GeoSpatial Consulting Services is committed to making that happen.

The Quality Review Plan is dependent on the specific photogrammetric methodology that the selected vendor designs. A detailed Quality Review Plan can only be developed when the selected vendor's methodology is reviewed. Here are some basic tasks that will need to be carried out for this image acquisition. There will also be a detailed set of acceptance criteria related to each of these tasks.

1. Develop a Quality Review Plan for CIRGIS including acceptance criteria for digital orthophotos, oblique imagery, aerial triangulation, ground control, digital photography and digital terrain model.
2. Monitor the digital image collection and review raw imagery compared with the acceptance criteria.

3. Prepare a report for each AT block with results of adjustment statistics compared with AT Acceptance Criteria.
4. Prepare horizontal accuracy assessment reports consistent with NSSDA (National Standard for Spatial Data Accuracy) specifications.
5. Review tiles and compare aesthetic and geometric characteristics to Orthophoto Acceptance Criteria.
6. Review tiles for completeness and that there are no gaps in coverage.

Deliverables:

Quality Review Plan

MONITOR DIGITAL PHOTOGRAPHY COLLECTION

We will assist CIRGIS in reviewing the proposed flight and control layout map with consideration of the proposed flying methods, flight breaks, and other details. During the aerial photography period we will be available to inspect the imagery to determine if it meets the standards for aerial photography set forth by ASPRS.

GCS will monitor the weather daily along with the collection of the digital photography by the selected vendor. All materials will be inspected to determine if it meets all contract requirements and specifications. Any exposures provided that, in GCS's or its clients reasonable opinion, do not meet the specifications shall be deemed rejected and the vendor shall be provided prompt written notice thereof which includes the specific basis for the rejection. We will conduct an inspection of selected raw digital images during the aerial mission to verify consistency.

A California licensed land surveyor will review the final control report and documentation.

- Review control layout map
- Review flight map for flight breaks and flying height
- Review camera calibration
- Review image quality (on site if needed)
- Review control methodology and final network adjustment

GCS will keep a daily flight log of weather that day, flight lines and exposures captured on that day, time of day flights occurred and which cameras were active that day. This will be kept as a spreadsheet. This file will be available to CIRGIS each week to review.

Deliverables:

Summary Report of the Collection, including weather reports and collection dates and times.

WEEKLY PROGRESS REPORTS

The Project Status Report will be a document that is used as a means of formal regular reporting on the status of the Project Monitoring and Quality Review project to key stakeholders. GCS will provide weekly progress reports for the duration of the project. The project begins in late February and ends when the final deliverables have been received and accepted by all funding partners. The progress report will include sections on what took place that week, what is expected over the next week, budget report, any issues or deficiencies noticed and any project recommendations. This report will be sent via email to CIRGIS's project manager every Friday.

Deliverables:

Weekly Progress Reports

GROUND CONTROL

We will review any ground control supplied by the partners as well as any additional ground control used by the vendor to verify that it is all in the same datum and epoch. We will also verify that it is signed off by a licensed California Land Surveyor.

There must be adequate ground control to meet the accuracy requirements of the selected scale of mapping. We will check the control layout to insure that adequate ground control is used in conjunction with airborne GPS. All control used in the production of products for this effort shall conform to acceptable errors as set forth by the FGDC or FGCC.

Deliverables:

Ground Control Review Report

AEROTRIANGULATION

We will review the Bulk Orientation values to look for any anomalies. The bulk orientation files contain both the Relative Orientation and the Absolute Orientation solutions for each stereo model computed from the AT results. This information ultimately drives the positional accuracy of all mapping products generated from the AT run. We will closely examine the Sigma values in both the Relative and Absolute Orientation against the criteria established for the project. Any models that did not compute or those with high sigma values will be pointed out to CIRGIS in the AT summary report and could potentially be noted as a possible source of error in the mapping products that were produced from that AT solution.

Deliverables:

AT Review Report

DIGITAL TERRAIN MODEL

We will review the DTM to verify that it meets the necessary accuracy requirements to produce the products for this high resolution imagery collection. The digital elevation model must at minimum meet the accuracy standards sufficient to produce the digital orthophotography at the selected scale. If collected by standard photogrammetric means or by LiDAR the data should meet those standards.

Deliverables:

DTM Review Report

PILOT PROJECT DEVELOPMENT FOR PROTOTYPE IMAGES

GCS will work with CIRGIS to designate the areas for the pilot project, review the prototype images with CIRGIS, and work with the selected vendor and CIRGIS to verify that all resolutions of the imagery collection meets the acceptance criteria and that the imagery meets the accuracy requirements. GCS would recommend that the partners deliver a minimum of four surveyed check points in each of the four prototype areas so that we can do a NSSDA accuracy check to verify that the delivered imagery will meet the stated accuracy specifications. GCS will also do an aesthetic and geometric check of all tiles in the prototype to verify that they meet all of the image acceptance criteria developed in the Quality Review Plan.

Deliverables:

Pilot Project Prototype Image Review Reports

QUALITY REVIEW OF IMAGERY AND PROCESSING DELIVERABLES

GCS would like to receive imagery from the selected vendor on a regular basis as soon as they begin the final orthophoto processing. Each delivery is to only include tiles not previously QC'd by GCS. The vendor should provide a file listing of all tiles included in each delivery. GCS will download all files to a server and verify that all files were received. Any discrepancy will be reported immediately to the vendor.

GCS's initial review process includes automated and visual steps. GCS will review **all** tiles for aesthetic and geometric compliance with the acceptance criteria. GCS recommends that CIRGIS also have a NSSDA accuracy assessment developed to verify that the delivered data set meets the stated accuracy requirements. GCS can provide the necessary effort to develop the assessment, but the budget does not allow for the collection of the necessary survey grade check points. If partners can provide those check points we would be happy to do the calculations.

GCS will scroll the set of images at zoom level, allowing the user to stop at any point to mark any errors discovered on the image. The technician will enter the type of error encountered (by pre-determined library of abbreviations) to a discrepancy database linked to Shape files with exact coordinates. The technician can also add a comment, providing more detailed information on the nature of the problem.

The technician continues through each image in the same fashion until all areas have been reviewed. Once processing is complete, a report is generated listing all errors, and their location on the images. Error reports are transmitted to the vendor for correction and to CIRGIS for information. GCS will load all image tiles/files for the project area. As file names are displayed, this also provides the ability to easily review file names/numbers for adjacent files/tiles.

We will zoom-in or zoom-out to review images at different scales, and the process is designed so as to methodically scroll all image areas at speeds set to examine the imagery in greater detail and to identify areas for red-lining. Deficiencies are recorded with annotations so small files can be emailed to CIRGIS and the vendor. Accepted tiles are cataloged as green, and rejected tiles are cataloged as red. Yellow are used for tiles pending approval. GCS will perform re-reviews to ensure corrections have been made.

The following is a small sample of the criteria that will be developed for the orthophotos and be a part of the Quality Review Plan. GCS will develop similar criteria for the digital acquisition, aerotriangulation, ground control, obliques and DTM. These criteria will be the basis by which each task of this project is reviewed.

Acceptance Criteria
CIRGIS 2015 Color Orthophotography Services

Image Appearance	The difference in average pixel values on either side of a mosaic seam-line should generally not exceed 70 (30 preferred), when measured on a homogeneous surface with similar characteristics (water surfaces are exempt from this requirement). Greater differences may be allowed if the correction will cause significant degradation of the image content on either side. No image will be rejected for such radiometry inconsistencies without prior approval of CIRGIS.
Radiometry	Radiometry should be consistent throughout the imagery, on large and small scales. Mosaic seamlines should not produce great visual (tonal, brightness) differences in imagery on either side (water being exempt from this requirement). In some instances, greater differences may be allowed if the correction will cause significant degradation of the image content on either side. Color balancing between tiles should be as consistent as possible. Image prototypes will be reviewed and approved by CIRGIS prior to orthoimagery production. The prototypes will provide a guide and expectation of final imagery appearance.
Smears	Normally corrected by adding mass points or breaklines to DEM as necessary to reflect actual terrain or by image processing where appropriate. Where DEM corrections or image processing will result in reduced horizontal accuracy or misrepresentation of the location or appearance of important features (buildings, roads, etc.), the smear will remain untreated. No image will be rejected for smears without prior approval of CIRGIS.
Mosaic lines	No mosaic lines through buildings. No mosaic lines through above ground transportation structures carrying automobiles or trains unless unavoidable.
Metadata	Meets minimum FGDC Content Standard.
Building lean within Downtown areas	The maximum displacement of a 10 story building at the edge of a model will be 16 feet (~ 1.6 feet per story)
Bridges	Accuracy of multi-layered bridge decks identified by CIRGIS. 3D breaklines required to ensure continuity of deck surfaces

Deliverables:

Quality Review Reports for each collection and processing deliverable