

FORT HOOD, TEXAS

CONTRACT NO. DACW43-98-D-0512

**U.S. ARMY, FORT HOOD, TEXAS
COLOR INFRARED (CIR) AND NATURAL COLOR DIGITAL
ORTHOPHOTOGRAPHY AND DTM DATA COLLECTION
U.S. ARMY CORPS OF ENGINEERS
EARTH DATA, INC.
TASK ORDER NO.**

DESCRIPTION OF WORK

Natural Color and CIR digital orthophotography at 1:12000 and digital terrain model (DTM) data with irregular post spacing shall be produced of portions of Fort Hood, Texas. The area for aerial photography collection for the production of Natural Color and CIR orthophotography includes approximately 560,000 acres over Fort Hood and surrounding private lands. DEM data will be obtained for production of the digital orthophotos and will be suitable for generation of 3 m contours. The final mapping products requested are 56 Natural Color and CIR digital orthophoto quarter quads (DOQQs) at a horizontal scale of 1:12000 with a 1-m horizontal resolution delivered as GeoTiff files and a resample to 2.5-m resolution; 3 m contours attributed with appropriate z values delivered as ArcInfo 7.1 coverages as well as Microstation 95 .dgn files with spot elevations (index and intermediate contours will be separate layers); DTM data with irregular post spacing for use in both ArcInfo GRID and ERDAS Imagine .img formats; a compressed data set of the 1-m resolution DOQQs and the 2.5-m mosaic using Mr. SID (six sets to be produced); two sets of the Natural Color and CIR contact prints; Aerotriangulation (AT) solution of the control data and a final A/T report; Airborne Global Positioning System (GPS) control will be used in conjunction with minimal ground survey control, provided by Fort Hood, to perform aerotriangulation (AT); and a digital line index will also be produced. All photography will be flown at approximately 20,000 ft Above Mean Terrain (AMT) at a photo negative scale of 1:40000. **The orthophoto maps will fully comply with ASPRS Class I Standards for mapping at a horizontal scale of 1:12000 with a ground sample distance of 1 m. Datum will be WGS 84/NAD 83 (m), NGVD 29 represented as Mean Sea Level (MSL), UTM Zone (m) 14R.**

INFORMATION SUPPLIED BY THE GOVERNMENT

Maps showing project areas.

WORK TO BE PERFORMED BY THE CONTRACTOR

Contractor shall provide equipment, supplies, facilities, and personnel to accomplish the following:

- a. Contractor will establish aerial photo and a ground survey control network including airborne GPS that will support the aerial photography and DEM/DTM data capture. The Contractor will fly and photograph (in Natural Color and CIR) the project area at an altitude of approximately 20,000' AMT with a negative scale of 1:40000 in Natural Color and CIR. The contractor will produce a digital line index in ArcInfo format of the

aerial flight. The aerial photography will be captured during leaf off conditions. The Natural Color and CIR aerial photography will be accomplished with airborne GPS utilizing dual frequency/multi channel receivers. The aerial photography will be flown with 80% forward lap and approximately 40% side lap. GPS data collection and processing will include UTM meters and MSL elevation for each photo center. All airborne GPS planning including survey network layout, benchmarks to be used, etc. shall be approved by CEMVS-ED-SG prior to initiation of project. The plan submitted shall include but not be limited to maps indicating proposed GPS network, benchmarks to be used, flight lines, and project area.

b. Additional ground survey data will be collected for use in the mapping process. The plan for additional ground survey control required for mapping and procedures to accomplish the ground survey control will be submitted to CEMVS-ED-SG for approval prior to initiation of the project. Ground control will be provided by Fort Hood. **All survey data shall be in the Universal Transverse Mercator (UTM) System, Zone 14R (meters). Horizontal control shall be in NAD 83/WGS 84. Vertical datum will be NGVD 29 (MSL).** All surveys shall be accomplished in accordance with the technical section of Contract DACW43-98-D-0512.

c. Two sets of Natural Color and CIR contact prints will be made in accordance with the technical section of Contract DACW43-98-D-0512. One set of prints will be used as control photos for mapping. The control prints will have all ground control marked on the back and front of each photo. All photography will include in the border areas the GPS UTM meters, the negative scale (as a ratio), the dates of photography, flight line and frame numbers and the title "Fort Hood, TX".

d. The Contractor will produce aerotriangulation quality diapositives. The Natural Color and CIR film will be scanned directly from the roll for orthophoto preparation and the control will be transferred for digital orthophoto rectification.

e. Utilizing GPS survey data along with conventional ground control (panel data and photo identifiable data) perform analytical aerotriangulation to generate sufficient photo control points to accomplish ASPRS Class I Mapping at a horizontal scale of 1:12000 with a DEM suitable for generation of 3 m contours.

f. Compression of the DOQQ data using the MrSID software to place all the DOQQs on one CD-ROM (six sets to be furnished).

g. DEM and contour data will be delivered in digital ARC/INFO GRID format and Microstation '95 (.dgn) formats on CD-ROMs.

h. The contractor shall check and approve processed film. Images required for orthophoto production will be scanned for 1-m pixel resolution utilizing a Zeis SCAI scanner or equivalent and resampled to 2.5-m pixel resolution.

Digital imagery will be set up and oriented on an Autometric Softplotter System or equivalent and spatial resection and coordinate transformation will be performed. As a quality control check the following will be performed prior to ortho rectification:

The RMSE of the fiducial will be calculated and examined for accuracy.

RMSE for each control point used in the resection will be reported. Any unacceptable RMSE will be discarded.

The newly resectioned image will be visually checked for pixel drop out and/or other artifacts that may

degrade the final orthophoto image.

DEM data will be in ArcInfo GRID format and will be checked to verify that each point has a feature code. The coordinate/projection system will also be verified at this stage in the process.

Scaled and hillshade DEM images will be inspected for missing or poor data.

Rectification of all required imagery will be performed and checked. All control panels or visible photo identifiable points will be visited on the screen and the X and Y of the location will be displayed. This information will be checked against the ground survey data. Visual checks of the image quality will be performed. Radiometric variation will be checked with image histogram analysis including linear contrast stretch, user selected contrast stretch, histogram normalization and histogram clipping.

i. Produce digital orthophotos of the site at 1:12000 with a pixel resolution of 1 m. Digital orthophoto data will be raster file form in GeoTiff format. **The orthophoto files will be referenced to UTM Zone 14R (meters), NAD 83/WGS 84 and NGVD 29 (MSL).**

j. The Contractor will produce one set of the DTM files in ArcInfo GRID format and ERDAS Imagine .img format on CD-ROM.

4. Delivery items:

a. Copy of computer printout of aerotriangulation solution. Aerotriangulation report as defined in 3c.

b. Copy of camera calibration reports.

c. Two sets each of Natural Color and CIR digital orthophoto files and topographic data files at a horizontal scale of 1:12000 with a 1-m pixel resolution as well as files resampled to 2.5-m pixel resolution; the DTM delivered in both ArcInfo GRID and ERDAS Imagine .img formats on CD-ROM; 3-m contour files attributed with appropriate z values delivered as ArcInfo coverages and Microstation 95 .dgn files with the index and intermediate contours as separate layers. The digital orthophoto files will be in GeoTiff format~and the topographic files will be in ARC/INFO Coverages and Microstation 95 .dgn format. All digital files (orthophotos, DTM and contours) will be on CD-ROM.

d. All survey data (including ground surveys and airborne GPS surveys), raw GPS files (airborne and ground), and any other survey information developed and or collected for the project.

e. Two sets of prints, and one set of diapositives (one A/T set).

f. Digital flight line index for the project indicating the flight lines and beginning and ending frames for each flight line along with altitude and negative scale of the photography.

g. Return all manuscript copies, horizontal & vertical control information, aerial photographs, pugged diapositives, and aerial film to the government when the project is completed.

h. A mosaic of the 56 resampled 2.5-m DOQQs, color matched CIR and Natural Color on CD-ROM (two copies).

i. Compression of the 1 meter DOQQ data and 2.5-m mosaic using the MrSID software to place all the

DOQQs on one CD-ROM (six sets to be furnished).

SCHEDULE AND SUBMITTAL

a. The contractor will deliver all final products including CD-ROM digital data files on:

b. All material to be furnished by the contractor shall be delivered at the Contractor's expense to: **U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT, 1222 SPRUCE STREET, ST. LOUIS, MO., 63103-2833.**

6. Time extensions:

In the event, these schedules are exceeded due to causes beyond the control and without fault or negligence of the Contractor, this delivery order will be modified in writing and the delivery order completion date will be extended one calendar day for each calendar day of delay.