[redacted] 4/8-64

original Table A2
omitted from this photocopy.

superceded by revision contained
in letter of 5 Mar 64

cover letter from [redacted] dated 20 Feb 64,
also omitted from this photocopy.

25X1

Proposal No. 112-GD64
A & B

[redacted]

25X1

PROPOSAL A

AIRBORNE DATA ACQUISITION

I. INTRODUCTION

To determine the significance and value of [redacted] augmenting conventional aerial photography as they both might be used to determine location and rate of military activities over a period of time, [redacted] proposes to use its sensor equipped B-25 aircraft to acquire [redacted] and conventional aerial photography over several targets which are indicators of military build-up. 25X1 25X1 25X1

A certain amount of redundancy in image collection is necessary for interpreters to devise guide lines in their use of both types of imagery for military build-up analyses.

Therefore, we propose to fly day and night missions over each of seven selected features for seven consecutive days. Reconnaissance type aerial cameras (K-17C or similar) will be used on daylight missions; [redacted] We will photograph light patterns with fast films such as TRI-X or Royal X Pan on one night mission and collect [redacted] 25X1 25X1

Accurate records will be maintained of all factors which may affect image quality, including aircraft, sensor and environmental parameters. Daily we will measure geometric resolution with black and white test patterns and calibrate temperature-to-gray scale relationship.

All acquired imagery will be processed under strict quality control. Calibrated step wedges will be exposed on each roll of film.

II. PROGRAM REQUIREMENTS

A. Features

Daily variations in images generated by the selected installations may become extremely important in times of emergency. Twenty-four hour remote sensor reconnaissance systems will allow analysts and observers to assess these changes and recommend appropriate response.

These features are:

- Airfields - Major municipal airports or military bases, especially those with considerable traffic and complete repair and

storage facilities.

- Railroad marshalling yards - Those capable of organizing full length freight and passenger trains. Must have complete storage and repair facilities.

- Truck Terminal - Motor freight docks, warehouses and garages, with access to major road networks and rail sidings.

- Shipyard and Port Facilities - Drydocks, piers, loading and unloading facilities (cranes, conveyors) rail sidings, of both commercial and military types.

- Facilities under rapid construction - Residential, commercial or military buildings, road and bridge construction, suburban mass housing, airports under construction.

- Military storage depots - Extensive warehouse, munitions, open storage areas of all classes.

- Military Motor Pool - Storage and repair facilities for all classes of military vehicles.

25X1

B. Sensors and Aircraft Modifications

2. Aerial Photography

To meet program objectives we will use a reconnaissance type aerial camera, e.g., a K-17C, to obtain complete photographic coverage of all features.

In general, these specifications will apply: 60% forward lap; 15% side lap, if more than one run is needed; no gap in coverage over areas of interest; cloud cover not to exceed 10%; haze filters to be used as necessary. Photo scale will be 1:5,000 or larger depending on aircraft altitude and focal length of the lens.

25X1 3. Aircraft Modifications 25X1

Currently two P-2 aerial cameras are mounted in [redacted] B-25 aircraft. For this assignment we plan to remove these and install a 9" format reconnaissance aerial camera, e.g., the K-17C, and a suitable mount. However, if suitable camera space is available elsewhere in the plane, both camera systems may be used. Procurement, airframe modification and installation of camera and mount will require about 30 days.

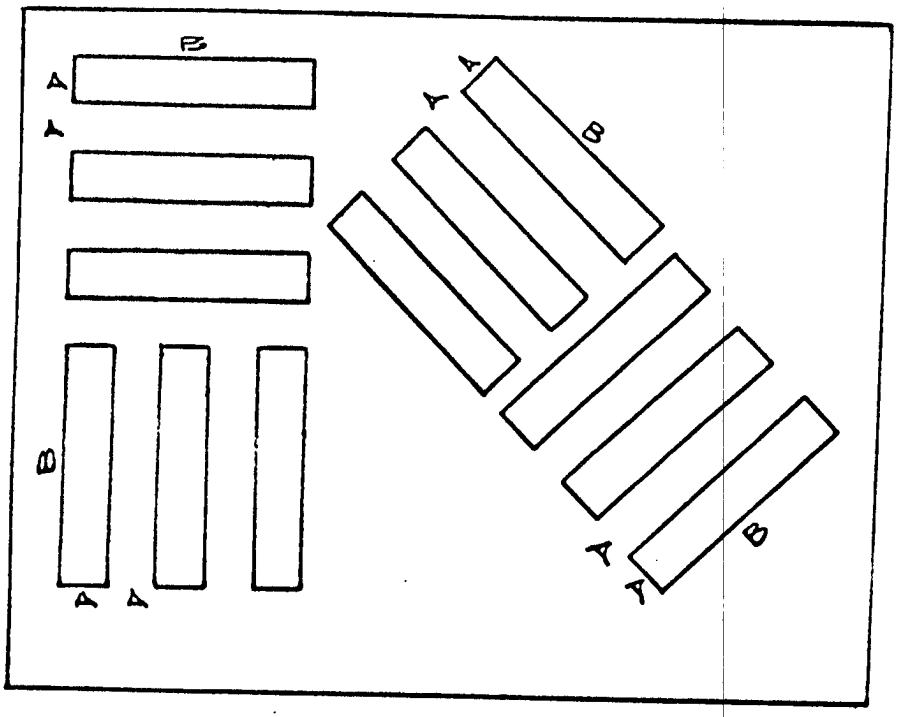
SSD/RS-7 system is rated at two milliradian resolution (at 1000 feet it will resolve objects two feet apart). Resolution approaching one milliradian can be gained by mechanical (as opposed to optical or electronic) modifications such as changing detectors, closer machining of critical components and fine adjustments.

C. Resolution Checks

Resolution test patterns of different sizes and materials similar to photographic resolution charts will be used for calibration and testing. Figure A-1 shows an example of a resolution chart design. Two complete sets of charts will be prepared: one will have black bars on white or aluminum background; the second will be the reverse.

For temperature/gray scale calibration, we may, for example, fill several 24" x 24" trays with water at varying temperatures - above, at, and below ambient temperature. A ground observer will record water temperature as near time of fly-over as possible.

We will test other possible designs from several under consideration for both geometric and temperature checks. They will be recorded before and after each flight.



A RANGES FROM 6" TO 18"
B = 24"

FIG. A-1

III. PROGRAM OPERATIONS

A. Selected Area

We studied several metropolitan areas to determine the area of operations best suited to the program objectives. Tentative areas were reviewed for completeness of features, available support for the aircraft, and probable time needed to obtain the required seven flights over each facility. Table A-1 compares possible areas of operation with categories of interest.

As a result of the analysis we strongly recommend San Diego as the operational area. The San Diego area has all targets listed, excellent weather this time of year and good air service to Dallas for rapid shipment of exposed film. In addition, local military and naval facilities offer additional target areas and constantly changing conditions.

25X1

Senior [redacted] personnel are intimately acquainted with San Diego and its environments. They know its climate, facilities and people. They have virtually unlimited access to information which will greatly facilitate the entire operation.

Final site selection, however, will rest with the sponsor.

B. Data Collection

To obtain an understanding of diurnal variation of signature characteristics we propose day and night missions over each feature for seven consecutive days, weather permitting.

All flight parameters will be determined by image analysts after on-site reconnaissance of selected sites. They will determine flight line heading, spacing, times of operations and altitudes subject to safety regulations and sponsor approval. Day missions will be made between 0900 and 1500 hours (local time) each day; night flights as close to 12 hours later as possible, but at least one hour after sunset and one hour before sunrise.

A mission manager will be aboard the aircraft for each data flight. He will direct all operations and assure that all pertinent data is recorded including:

- Aircraft altitude above terrain
- Heading
- Ground speed

LOCATION	Airfields	R. R. Yards	Truck Terminal	Rapid Construction	Military Storage Depot	Military Motor Pool	Sea Ports & Facilities	Total	Days Req'd to Comp. (Est.)
Dallas/Ft. Worth	3	2	3	3	0	2	0	13	9
Houston/Galveston	3	3	3	3	2	2	3	19	15
San Diego	3	2	3	2	3	3	3	19	11
Balt./Wash.	3	3	3	2	3	3	3	20	18
Buffalo	3	3	3	2	0	0	2	14	20
New Orleans	3	2	3	2	0	0	2	12	15

Rating

3 Complete facility, heavy traffic, large capacity

2 Complete facility, moderate traffic, capacity

1 Smaller facility, little traffic, capacity

0 None or unknown

TABLE A - 1

- Air temperature at altitude
- Wind direction and velocity
- 25X1 [redacted] system settings (gain control, V/H factor)
- Camera settings (shutter speed, lens aperture)
- Film types and ASA ratings

The mission manager shall also obtain meteorological data from the base airfield or other source, facility log sheets which show traffic flow within time period of interest and other pertinent data.

C. Schedule

We will begin aerial operations approximately thirty days after contract award. Mating the 9" format camera to the aircraft, improving the resolution of the SSD/RS-7 and temperature/gray scale calibration experiments will use most pre-operation time.

During this time period, one of our personnel will visit the selected site, preferably with the Government Contract Monitor, to study the facilities and installations. Operations planning will evolve from this trip. Table A-2 shows the proposed schedule.

Imagery reproduction can begin while the aircraft is still in the field. Exposed film can be airmailed to Dallas daily for immediate processing. Then, depending on the amount of imagery collected, it should be processed and reproduced (including flight line plots) within three to four weeks after flying is completed.

IV. REPORTING

A. Reproduction and Delivery Items

All film will be processed according to strict quality control. Calibrated step wedges will be exposed at the beginning and end of each roll of film with a Model FM15( ) Sensitometer. Gamma curves will be drawn and all processing data will be recorded.

We will furnish:

- Original negative
- Duplicate film positive

- Contact paper print
- Description of Processing (developer, time, temperature)
- Density/Log Exposure Curves

Duplicate film positives and paper prints will be exposed on a two speed Sonne continuous strip printer. We will process in either a Morse B-5 film developing unit or a Maurer Model 255 film processor. Film processed on the Morse unit will be air-dried; the Maurer is a dry-to-dry processor. Figure A-2 shows [redacted] new remote sensor image reproduction facility.

25X1

B. Presentation

On completion of all assignments we will review the aims and accomplishments of the program in a presentation to the Government Contract Monitor. Briefing material in the form of slides, charts or other display media will be provided.

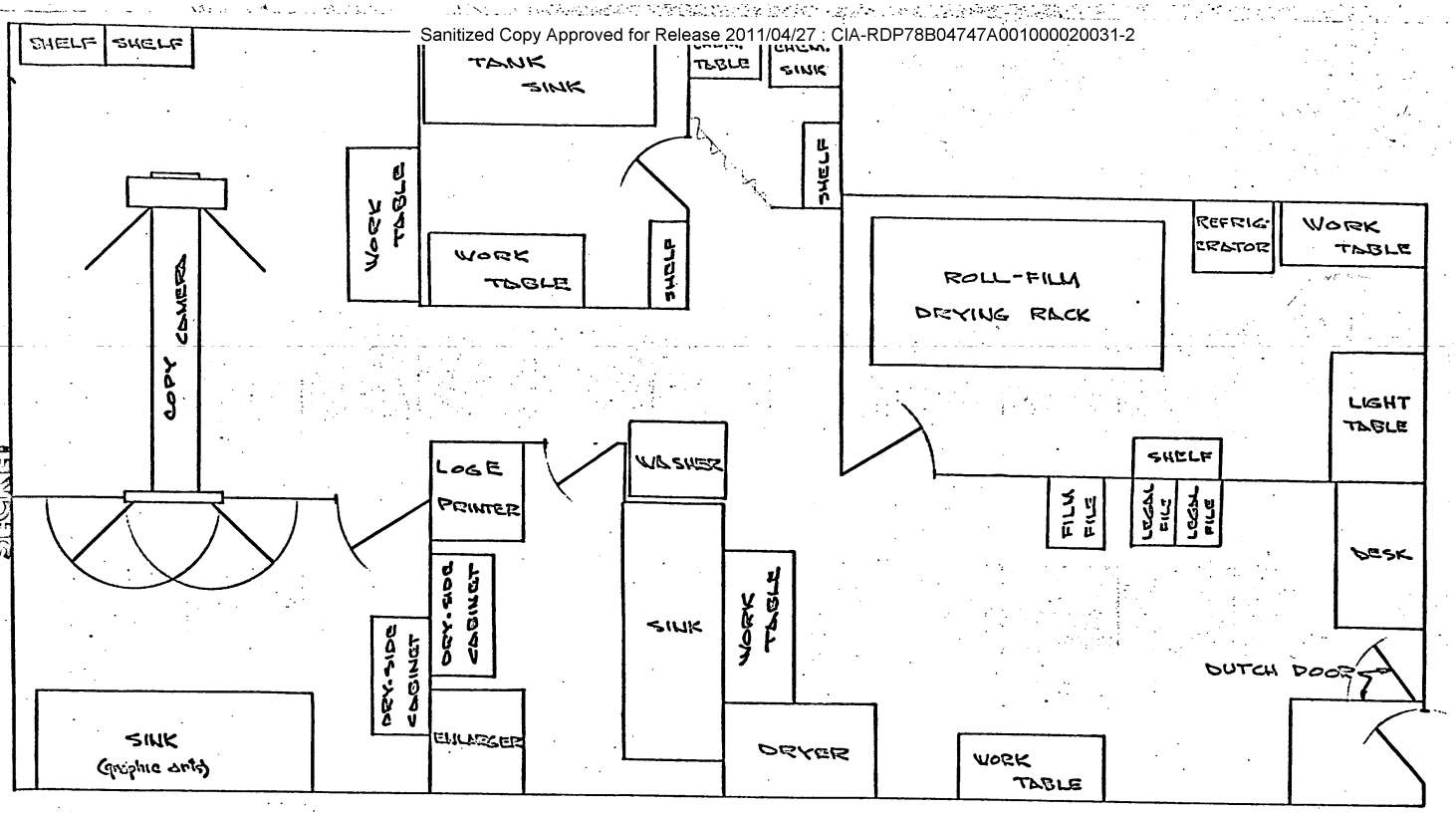


FIG. A2

SECRET

SECRET

PROPOSAL B

GROUND DATA ACQUISITION

I. INTRODUCTION

Ground truth* data, as acquired by [redacted] in direct support of its airborne Terrain Analysis system operation, provides definitive and quantitative inputs for multisensor image interpretation. When multisensor interpretation techniques are firmly established the need for such data in support of airborne sensing operations over industrial complexes, rural land areas, areas of commercial mineral production and the like will be unnecessary. Today, however, ground truth data must be collected to insure accurate, and precise interpretation of single and complex facilities. Acquisition of ground truth data enables interpreters to take full advantage of modern sensors' high resolution capabilities, and distinguish, for example, between rectangular exposed rock surfaces and vehicles; between subterranean voids and areas of higher moisture contents in the local soils; and many other similarly appearing unidentified objects under conditions adverse to aerial photography. 25X1

Ground verification at [redacted] is accomplished by highly trained and experienced teams of earth scientists. These personnel - experienced in such diverse fields as geology, geography, forestry, pedology, meteorology and geophysics - perform their specialized tasks coincident with aircraft flyover. They sample both static and dynamic terrain and atmospheric parameters. Some natural and cultural features identified quantitatively for optimum interpretation of remote sensor imagery are: 25X1

1) Meteorological parameters - including wind direction and velocity, dry and wet bulb temperatures, dewpoint, relative humidity, illumination and rainfall.

2) Soil parameters - including temperatures at surface, 1", 3", 6" and 9" below surface, color, compactibility and moisture content.

3) Vegetation parameters - including height, diameters, spacing and color temperatures.

4) Rock outcrop parameters - including type, temperature, chemical composition and hardness.

5) Fixed installations - including structure, composition, color and temperature.

*Determining the actual state of terrestrial surface environment in support of airborne remote sensor operations.

Also, qualitative estimates of natural and cultural feature emissivities are made.

II. INSTRUMENTATION

Although the specific type of data collected is dependent upon mission objectives, an indication of ground truth operations may be gained by examining a collection form used on one of [redacted] commercial mineral exploration projects (TAS-8 M) or one devised for an industrial complex (TAS-8R). 25X1

The field experience of [redacted] Terrain Analysis ground truth teams has produced a most unique package of instruments (Figures B-1 - B-3). These instruments are the product of compatibility planning and field testing. They include such innovations as a battery aspirated psychrometer (much superior to the sling types), a Polaroid camera, specially designed platform mount enhancing instrument utilization and easing data recording (Figures B-4 and B-5), and surface contact thermometers for fixed installations. For a complete list of instruments for [redacted] ground truth field crews see Table B-1. 25X1 25X1

The knowledge acquired in such recent diverse field operations as:

1) mineral exploration in Utah and Canada

2) petroleum reconnaissance in West Texas

3) electric power plant studies in Dallas, and

4) diverse military target data collection

25X1 has allowed [redacted] to acquire a ground truth facility unique in completeness and utility for support of remote reconnaissance imagery interpretation.

III. PROGRAM OPERATIONS

A. Area

25X1 [redacted] highly recommends San Diego as the location at which requirements of this program can best be met with minimal weather difficulties and optimum variety and choice of commercial and military features of interest. (See Proposal A)

B. Data Collection

To assure reliable ground truth data collection we propose at least

Form TAS-8M
(Circle applicable choices - place X in non-applicable spaces)

GROUND TRUTH DATA LOG

A. GENERAL

A/C Speed _____ MPH Altitude _____ ft. Classify CONFIDENTIAL when given

Topo. Quad. _____ Flight Number _____

Observer _____ Sortie Number _____

WO# _____ Site# _____ If night, number hours since insolation _____

Date _____ Starting Time _____ AM-PM _____ XST _____ DST _____

Location _____ Altitude _____ feet

B. ATMOSPHERE

Air Temp. (Dry) _____ °F (Wet) _____ °F Relative Humidity _____ %

Wind Direction (Azimuth) _____ Wind Velocity _____ MPH

Cloud Cover _____ /10th(s) Max. Visibility _____ miles

Base of Clouds _____ feet Cloud Types _____

Thickness of Clouds _____ feet _____ Days-Hours since last PPT.

Amount of last PPT _____ inches

C. OPEN TERRAIN

1. Surface Materials

Soil Composition _____

Rock Types _____ Soil Types _____

Soil Temperatures: at surface _____ °F at 1" _____ °F

at 3" _____ °F at 6" _____ °F at 9" _____ °F

Soil Moisture Content _____ % Munsell Color # _____

Soil Compaction _____

Rock Temperatures: Site #1 _____ °F Site #2 _____ °F

Ground Cover (Circle)

Clean, Dew, Frost, Snow, Rain Coated, Ice Coated, _____ (Other)

Outcrop: Dip _____ Strike _____ Thickness _____

2. Vegetation Height _____ ft.

Type _____ Veg. Munsell Color # _____

D. CULTURAL FEATURES (describe)

Roads _____ Railroads _____

Pipelines _____ Dwellings _____

Powerlines _____ T & T lines _____

Agriculture _____ Livestock _____

Surface H_2O _____ Other _____

E. UNUSUAL FEATURES (if any, describe) _____

Dimensions _____ Shape _____

Identifying characteristics _____ Composition _____

Munsell color # _____ Temperatures: #1 _____ °F #2 _____ °F

Remarks:

GROUND TRUTH - FIXED INSTALLATION DATA COLLECTION TAS-8R

STRUCTURE	HEIGHT: STORIES	1		2		3-4		4-5	MULTI-		ROOF TYPE							ROOF MATERIAL					
	HEIGHT: FEET	0-5	5-10	10-15	15-20	20-30	30-40	40-50	50-100	>100	SHED	GABLE	HIPPED	PYRAMID	ARCH	DOME		SHINGLE	TAR-PAPER	SLATE	METAL	ETERNITE/ CONCRETE	
WOOD																							
MIXED																							
WALL BEARING																							
LIGHT STRUCTURAL FRAME																							
HEAVY STRUCTURAL FRAME																							
MULTI-STORY STRUCTURAL FRAME																							
SPECIAL																							

GROUND TRUTH INSTRUMENTS

Rain gauges
Increment Borers
Biltmore Sticks
DBH Tapes
First Aid and Snake Bite Kits
Soil Augers
Resolving Targets for Visual and [redacted] 25X1
Penetrometers
Package (suitcase) + mounting platform
Polaroid Camera and Film (12 BW + 4 color)
Thermocouples + switch box and readout + ext. lines w/12 probes
Psychron + spare parts
Annemometer
Barometer - Altimeter
Light Meter and case
Stickon Thermometers (8)- No
Munsell Books
Log Books and loose leaves
Brunton, ball and socket joint and tripod
Radio - Motorola
Binoculars
Clipboard and forms
Pocket Stereoscope
Measuring Tape - K & E
Misc. Items, e.g., field hammer, pencils, pens

TABLE B - 1

one two-man team for each facility. Teams will begin data collection 24 hours in advance of scheduled data flights, and remain through out the entire operation.

They will observe, record and photograph:

- Climatological data
- Vegetation
- Soil types
- Construction data (type of buildings, materials, road surfaces)
- Number of buildings, vehicles, ships or aircraft
- Daily changes in appearance through construction, number of transient vehicles, or meteorological effects.

If applicable and available, they will procure log sheets showing daily movement of vehicles, ships or aircraft. They will obtain complete weather summaries from the nearest U. S. Weather Bureau to supplement their own observations.

One ground crew (probably the one stationed at the airfield) will erect and monitor the resolution and temperature tests described in Proposal A.

The emissivities are to be measured by a Perkin Elmer Model GFR-6 Field Radiometer or a Barnes Model R-8D-1 which will be utilized by one field team each day and night and then transferred to the other six ground teams on the six succeeding day - night flights. This method is used as the emissivities will not vary greatly during the period of data collection and the instrument cost is high. Investigations of other low cost units used by the U. S. Geological Survey have clearly indicated the lack of portability, lack of applicability and lack of accuracy.

Field personnel, drawn from our Terrain Analysis, have had considerable ground data collection experience for both Governmental and Commercial assignments. Every team will have at least one well experienced man.

Our equipment includes air-to-ground and ground-to-ground radio communication. All personnel are licensed radio-telephone operators.

Date reduction and preparing color coded maps will begin after completion of field operations. Table B-2 shows planned schedule.

GROUND TRUTH

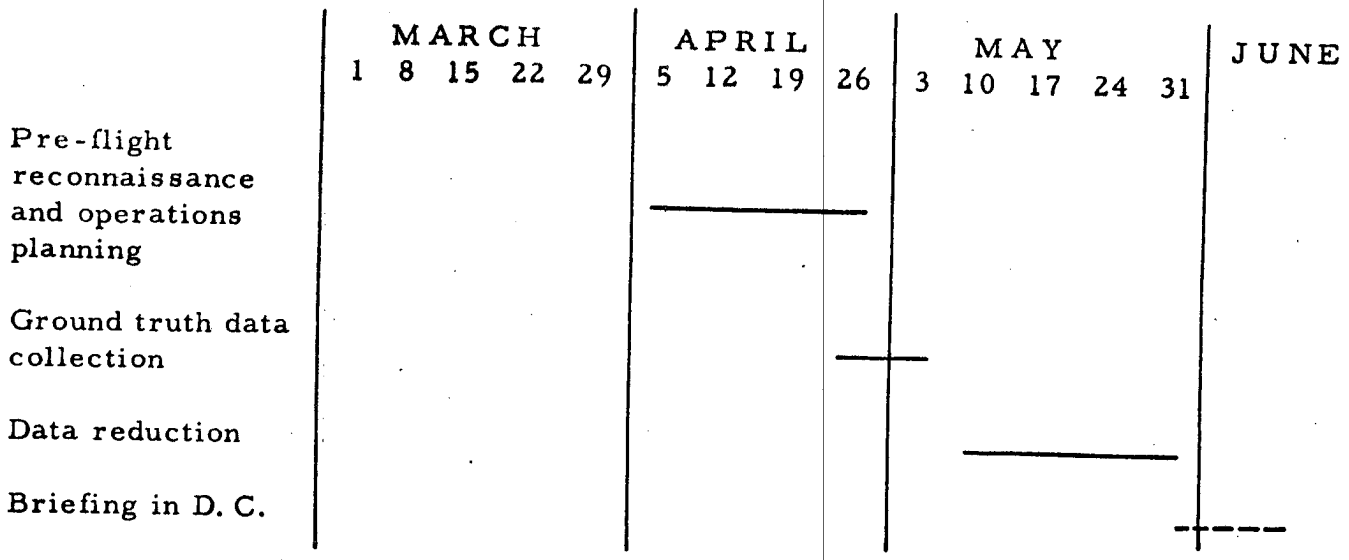


TABLE B - 2

C. Schedule of Operations

Prior to airborne operations, ground truth personnel will visit the selected city, preferably with the Government Contract Monitor. They will select field locations for the ground truth teams, arrange for weather data and traffic logs to be available.

Actual ground operations will begin at least 24 hours before the first scheduled data flight. Ground truth teams will remain on duty during all flights.

IV. REPORTING

A. Delivery Items

When all field operations are completed, color coded overlays on maps or charts of each facility will be prepared. They will show:

- Construction materials of buildings, roofs, roads, runways
- Shape of buildings and roofs
- Terrain materials
- Vegetation coverage

Flight lines and limits of coverage for each sensor will appear as separate overlays.

We will locate either on the overlays or in accompanying textual reports, all positions where field crews made special observations, records, or photographs.

B. Presentation

On the completion of all assignments we will review the aims and accomplishments of the program in a presentation to the Government Contract Monitor. Briefing materials in the form of slides, charts, or other display media will be provided.

SUPPLEMENT TO PROPOSAL B

Our ground truth teams will begin recording data 24 hours before flyover. Naturally the number of observers and what they can accomplish is limited. We propose that one or two wide angle time lapse cameras be erected at selected sites to photographically record all phenomena for 24 hours. For example, if it were mounted at an airport, it could record all traffic within its field of view.

This will include not only take-offs and landings, but how long aircraft remain at the terminal, number of service trucks and other transient phenomena which will not appear on the field's traffic log. Correlating this with [redacted] imagery and other ground truth data will produce a complete pattern or record of all movement or change.

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Next 5 Page(s) In Document Denied