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STATEMENT OF WORK

EOI SYSTEM DEFINITION PHASE I

PROCESSING FACILITY CONTRACTORS

1.0 INTRODUCTION

System studies and technology programs performed to date have provided the data required to proceed into the System Definition Phase for an operational EOI System. System Definition will be accomplished in two phases. Phase I will cover a period of approximately four months and encompasses the development of preliminary EOI System and segment designs to a level of definition adequate to permit selection of an EOI System and program approach. The segment design will enable definition of subsystem design requirements adequate for initiating subsequent detailed design. Phase II will cover a period of about nine months resulting in detailed designs and program scheduling developed in sufficient depth to initiate hardware acquisition.

Phase I tasks will be performed by three candidate Processing Facility contractors. The preparation of a

preliminary plan for the Phase II effort is included in these tasks. The Phase II plan along with the other Phase I study results will be evaluated by the Program Office to select two contractors for Phase II contract awards. Following the Phase II System Definition effort, a single Processing Facility contractor will be chosen for system hardware acquisition.

Data that has been developed in the various sponsored technology programs will be made available to all contractors in order to permit a consistent basis for performing the System Definition studies. Additional data is expected from technology programs conducted concurrently with System Definition. The Program Office will make available to all contractors any significant results of potential impact on the studies. Interface meetings and data exchanges between System Definition and technology development contractors are to be subject to the guidelines specified in Attachment 10.

1.1 Purpose

The purpose of the effort specified by this Statement of Work is to:

- Conduct comprehensive preliminary design studies necessary to allow the selection of an EOI Processing Facility configuration.

- Develop Processing Facility designs adequate to enable the initiation of detailed design of subsystems.
- Provide the basis for selecting two contractors to conduct Phase II System Definition.

1.2 Scope

Work performed by the contractor in compliance with this Statement of Work shall be based on the tasks defined in Section 2.0, and the requirements, guidelines and data provided in the Attachments. It is intended that the contractor shall perform these tasks in sufficient depth to define and substantiate the following, for both system Configuration A (Para. 2.1) and a system Configuration B (Para. 2.2):

(1) A recommended Processing Facility configuration

(2) Recommended Processing Facility subsystem design approaches

(3) Comparative cost and schedule data

(4) Development and operational program schedule/plans

(5) The estimated performance of the Processing Facility.

All documentation shall be prepared in a concise manner, and be adequate to permit an evaluation of the

contractors' approaches for selection of two contractors for Phase II System Definition contract award. The documentation shall be submitted in accordance with the format and schedule specified in Section 3.0.

Specifically excluded from the effort defined by this Statement of Work are the development of detailed management plans, testing plans, manufacturing plans, quality assurance plans, schedules, etc., other than those aspects related to or supporting the necessary cost and schedule trade studies.

2.0 TASK DESCRIPTIONS

2.1 Task I: System Configuration A Study

2.1.1 Processing Facility Configuration Study

The contractor shall develop a recommended Processing Facility configuration that satisfies the system functional requirements defined in Attachment 1 for system Configuration A. It is intended that this task concentrate primarily on the major trades that impact the operational concept, technical risk, and cost. The configuration should conform to the baseline P/F characteristics

provided in Attachment 6, and the programmatic guidelines provided in Attachment 7. However, the contractor is encouraged to utilize originality in developing the best overall approach to the design of the Processing Facility. The contractor may deviate from the above attachments only if such a variance is substantiated.

The contractor shall identify alternative concepts for satisfying the functional requirements. Consideration shall be given to all aspects of the Processing Facility, including: image data recording, processing and writeout, latent image processing, improved image processing, data storage and retrieval, engineering performance monitoring, processing status and control, facility characteristics and environment, photointerpretation, and hard-copy reproduction and dissemination. To be specifically addressed are alternative concepts for implementation of the on-line and off-line processing, processing control, status monitoring, archival storage and retrieval of image data,

photo handling, and the sharing of equipment and/or general purpose computers with other ground system segments.

Trade studies shall be performed only to a level of detail necessary to define the characteristics and to conduct comparative evaluations of the candidate approaches. Studies performed shall include at least the following:

(1) Functions to be performed

(2) Technology boundaries that constrain subsystem design

(3) Development risk items

(4) Controlling characteristics or performance parameters

(5) Interfaces with other EOI System segments

The contractor shall conduct such evaluations as required to select and validate a recommended configuration and concept of operation for the Processing Facility. This evaluation shall be based on appropriate criteria developed by the contractor to rank the alternative concepts.

Appropriate factors for at least the cost, technical and schedule risk reliability, flexibility and performance shall be included.

The contractor shall prepare a Processing Facility Configuration Study Report documenting the recommended configuration and the trades performed in arriving at the selection. The recommended configuration should be completely defined, and include a recommended development schedule and costs from 2.1.3. The report shall include a configuration lay-out, a functional block-diagram displaying all subsystems and subsystem interfaces, a description of all subsystem functions, operational timelines and data flow, and estimated facility characteristics required, such as number and type of equipment, floor space, utilities, personnel, cost, etc. Trade study results and other supporting data should be included in a concise form to allow Program Office evaluation of the alternative configuration considered.

2.1.2 Subsystems Study

The contractor shall develop recommended design approaches for all subsystems and equipment necessary to implement the preferred Processing Facility configuration and concept of operation from subtask 2.1.1. Alternative subsystem design approaches shall be investigated and trade studies performed within the framework of the subsystem requirements established in subtask 2.1.1. These studies shall provide an accurate assessment of the level of technology required for the implementation of each functional operation required and a quantitative comparison with the technology currently available and/or projected. Any item considered as a high risk development shall be identified.

A preferred design approach shall be selected for each subsystem. All preferred subsystem designs shall be clearly defined, including a complete description, definition of all equipment, functional block-diagram and necessary logical schemes, performance

characteristics, etc. Comparative data for the alternative approaches considered should be sufficient and concise to allow evaluation of the selection rationale.

2.1.3 Schedule/Cost Study

The contractor shall prepare a development and operational program schedule for the recommended Processing Facility for system Configuration A.

The contractor shall conduct a comprehensive cost study of the recommended configuration approach to include at least summary cost data at the facility, subsystem and module levels. Summary cost estimates should include recurring and non-recurring elements with hardware, software and manpower breakdowns. Cost accumulation results should be prepared according to Fiscal Year.

Results of this study shall be documented in the Processing Facility Configuration Study Report according to a data sheet to be provided by the Program Office.

2.2 Task II: System Configuration B Study

2.2.1 Processing Facility Configuration Study

The contractor shall develop a recommended Processing Facility configuration that satisfies the system functional requirements defined in Attachment 1 for system Configuration B. It is intended that this task concentrate primarily on the major trades that impact the operational concept, technical risk, and cost. The configuration should conform to the baseline P/F characteristics provided in Attachment 6, and the programmatic guidelines provided in Attachment 7. However, the contractor is encouraged to utilize originality in developing the best overall approach to the design of the Processing Facility. The contractor may deviate from the above attachments only if such a variance is substantiated.

The contractor shall identify alternative concepts for satisfying the functional requirements. Consideration shall be given to all required aspects of the Processing Facility, including: image data recording, processing and writeout,

latent image processing, engineering performance monitoring, processing status and control; facility characteristics and environment, photointerpretation, and hard-copy reproduction and dissemination. To be specifically addresssed are alternative concepts for implementation of the on-line processing mode, processing control, status monitoring, photo-handling and sharing of equipment and/or general purpose computers with other ground system segments.

Trade studies shall be performed only to a level of detail necessary to define the characteristics and to conduct comparative evaluations of the candidate approaches. Studies performed shall include at least the following:

(1) Functions to be performed

(2) Technology boundaries that constrain subsystem design

(3) High development risk items

(4) Controlling characteristics or performance parameter

(5) Interfaces with other EOI System segments

(6) Collocation with R/F-O/F

The contractor shall conduct such evaluations as required to select and validate a recommended configuration and concept of operation for the Processing Facility. This evaluation shall be based on appropriate criteria developed by the contractor to rank the alternative concepts. Appropriate factors for at least the cost, technical and schedule risk, reliability flexibility and performance shall be included.

The contractor shall prepare a Processing Facility Configuration Study Report documenting both the recommended configuration and the trades performed in arriving at the selection. The recommended configuration should be completely defined, and include a recommended development schedule and costs from 2.2.3. The report shall include a general configuration lay-out, a functional block-diagram displaying all subsystems and subsystem interfaces, a description of all subsystem functions, operational timelines and data flow, and estimated facility characteristics required, such as number

and type of equipment, floor space, utilities, personnel, cost, etc. Trade study results and other supporting data should be included in a concise form to allow Program Office evaluation of the alternative configurations considered.

Off-line processing and archival storage and retrieval of image data are not to be included in system Configuration B. However, the contractor shall investigate the costs associated with implementing them and include the results as an appendix to the P/F Configuration Study Report.

2.2.2 Subsystems Study

The contractor shall develop recommended design approaches for all subsystems and equipment necessary to implement the preferred Processing Facility configuration and concept of operation from subtask 2.2.1. Alternative subsystem design approaches shall be investigated and trade studies performed within the framework of the

subsystem requirements established in subtask 2.2.1. These studies shall provide an accurate assessment of the level of technology required for the implementation of each functional operation required and a quantitative comparison with the technology currently available and/or projected. Any item considered as a high risk development shall be identified.

A preferred design approach shall be selected for each subsystem. All preferred subsystem designs shall be clearly defined, including a complete description, definition of all equipment, functional block-diagram and necessary logical schemes, performance characteristics, etc. Comparative data for the alternative approaches considered should be sufficient and concise to allow evaluation of the selection rationale.

2.2.3 Schedule/Cost Study

The contractor shall prepare a development and operational program schedule for the recommended Processing Facility for system Configuration B.

The contractor shall conduct a comprehensive cost study of the recommended configuration approach to include at least summary cost data at the facility, subsystem and module levels. Summary cost estimates should include recurring and non-recurring elements with hardware, software and manpower breakdowns. Cost accumulation results should be prepared according to Fiscal Year.

Results of this study shall be documented in the Processing Facility Configuration Study Report according to a data sheet to be provided by the Program Office.

2.3 Task III - System Configuration B Block Change Study

The contractor shall develop a recommended block change plan for the preferred system Configuration B Processing Facility that provides for a Configuration A capability by 1978-1979. It is intended that this task concentrate primarily on defining the requirements, schedule and costs of an orderly block change at the segment and key subsystem level.

The contractor shall perform configuration change trade studies that consider at least the cost, technical risk, deployment, operational time lines, critical design characteristics, long lead procurement or development items and extent of retesting required.

2.4 Task IV - Software Requirements Definition Study

The contractor shall perform such studies as are necessary to define the major software packages required to support all aspects of the development and operation for the recommended Processing Facility design for both Configuration A and B. The functions to be performed by each major software package shall be identified and estimated costs and schedules prepared. Any critical development or risk areas should be clearly identified. It is intended that

this study should not involve the detailed analysis of implementation techniques or computer program details.

The software requirements to be defined shall consider all aspects of the Processing Facility development and operation, to include the required support for hardware design, testing, integration and check-out, normal operations, diagnostic and maintenance, and system performance evaluation. Executive routines and software problems associated with time-sharing of computers with the O/F shall be addressed. These requirements should be grouped according to major logical functional blocks of software, along with identification of primary data requirements and interfaces.

Functional block diagrams shall be developed displaying all major software packages, major data files and interfaces in addition to supporting analyses.

2.5 Task V: Processing Facility Performance Analysis

The contractor shall define appropriate analysis tools necessary to provide the basis for prediction and evaluation of the overall performance of the Processing Facility. These tools shall be applied to evaluation of the recommended Processing Facility design for both system Configuration A

and B relative to the system requirements. Variations about the basic concept and subsystem designs shall be evaluated to define potential refinements.

The analysis performed should consider all aspects of the Processing Facility performance, to include processing times, data, recording and retrieval, reliability, sensitivities, error budgets and image quality. All mission phases shall be considered including specifically operation during periods of degraded performance and deployment of full-system capability in addition to normal operations. Both the on-line and off-line processing mode of operation are to be considered.

This analysis should also include an availability analysis of the P/F. The contractor shall conduct analyses to determine the most likely failure modes of the P/F equipment and develop design criteria for reliability assurance. Mean Time Between Failures (MTBF) for each major subsystem and functional module should be defined. Failure modes of other elements of the EOI System should be addressed and specifically problems associated with failures of the transducer subsystem on image reconstruction should be detailed. An analysis of the P/F maintainability should be included. The contractor should assess P/F maintainability

by examining the P/F designs for accessibility and replacement of modules. Mean Time To Repair (MTTR) data shall be developed along with the definition of methods and types of test equipment required for maintenance.

2.6 Task VI: Phase II Preliminary Plan

The contractor shall prepare a preliminary plan of the efforts to be conducted during Phase II of the EOI System Definition. This plan shall define the contractor's program to develop during this phase, for both system Configuration A and system Configuration B, detailed Processing Facility designs, firm costs, schedules and comprehensive management plans. Also to be included is a section describing the contractor's resources and capabilities intended for application during Phase II System Definition and the System Acquisition Phase.

3.0 DELIVERABLES

The following list of documents shall constitute the deliverables for Phase I System Definition.

3.1 Oral Briefings

3.1.1 Progress Reports

The contractor program manager shall present a monthly oral vu-graph progress report. Location

of this briefing will be usually at the customer's facility. The duration of the briefing should not exceed 90 minutes.

3.1.2 Deliverables

One set of vu-graphs plus six (6) copies of briefing shall be delivered to the customer two (2) days prior to the scheduled presentation.

3.2 P/F Configuration Study Report

The P/F Configuration Study Report shall be prepared according to the following outline. This document shall be limited to 200 pages total for the Final Report and 100 pages total for the Preliminary Report.

Part I - System Configuration A Study

Section 1: Preferred P/F Configuration

Section 2: Schedule/Cost Data

Section 3: P/F Configuration Trade Studies

Part II - System Configuration B Study

Section 1: Preferred P/F System Configuration

Section 2: Schedule/Cost Data

Section 3: P/F Configuration Trade Studies

Part III - System Configuration B Block Change Study

Section 1: Preferred P/F Block Change Concept

Section 2: Schedule/Cost Data

Section 3: P/F Configuration Change Trade Studies

The following delivery dates apply to the P/F Configuration Study Report:

Preliminary - 2 November 1970 (6 copies)

Final - 15 December 1970 (6 copies)

3.3 Preliminary Performance Requirements Specifications

This deliverable shall consist of a single document, page limited, prepared according to the following outline. Six copies of the Preliminary Performance Specifications are due 15 December 1970.

Part I - System Configuration A

Section 1: Preliminary P/F Segment Specification

Section 2: Preliminary P/F Software Requirements Specification

Part II - System Configuration B

Section 1: Preliminary P/F System Specification

Section 2: Preliminary P/F Software Requirements Specification.

3.4 Design Studies Report

The Design Studies Report shall be page limited and

consist of the following sections. Six copies of this report are due for delivery on 15 December 1970.

Section 1: P/F Design Studies

Section 2: P/F Performance Analysis Studies

3.5 Phase II - Preliminary Plan

The Phase II Preliminary Plan shall be submitted in a single document, page limited, according to the following outline. Six copies of this plan are due for delivery 15 December 1970.

Section 1: Task Description

Section 2: Task Plan/Schedule

Section 3: Resources and Capabilities

Section 4: Management Plan