9/1/81

12 METER MILLIMETER WAVE TELESCOPE
MEMO No. 75

SPECIFICATIONS
REFLECTOR STRUCTURE - 12 METER ANTENNA

1.0 General

1.1 General Statement of Work

The work described herein shall consist of the furnishing of all materials, labor, supervision, services, equipment and other items required for the fabrication and delivery to Green Bank, W. VA. of a 12 meter diameter reflector structure. The reflector structure specified herein is a replacement reflector for an existing telescope which operates at millimeter wavelengths and after assembly will be installed on the existing pedestal and elevation structure. Since the new reflector structure must fit to existing interface points dimensions as shown on the drawings must be rigidly adhered to.

The work set forth in this specification does not include the furnishing of the surface panels which NRAO is procuring under separate contract.

To assist the proposer in his understanding of the requirements of this specification the proposer should be aware that NRAO plans to replace the existing reflector in the following steps:

(a) Assemble the new reflector structure in Green Bank

(b) Install and adjust surface panels on the reflector structure

(c) Remove surface panels, pack and ship to Tucson, Arizona

(d) Disassemble the reflector structure into the largest pieces possible for truck shipment and ship to Tucson, Arizona.

(e) Re-assemble reflector structure at Tucson

(f) Remove exisiting reflector

(g) Install new reflector structure

(h) Install and adjust surface panels

1.2 Drawings, Specification, Data

1.2.1 Drawings furnished herewith and made a part of this specification are as follows:

NRAO Drawings

Dwg. No.	Sheet/s	Rev.	Description

NRAO Photographs

No. 7326 - 2 Rear view 36 ft. telescope

No. 7961 Elevation Structure 36 ft. telescope

1.2.2. All designs, drawings and technical data submitted with this RFP are the property of AUI and the Government and may be used without restriction in the performance of this work. The Subcontractor shall prepare such additional shop working drawings, shop sketches or procurement sketches as are deemed necessary.

All drawings, sketches, purchase orders and other pertinent papers prepared by the Subcontractor or his Subcontractors pursuant to this sub - contract become the sole property of AUI and the Government and, without, limitation thereto may be used for:

(a) contruction, repair, and maintenance of the work, and (b) replacing any part of the work or the entire work by AUI.

During the progress of the work the subcontractor shall deliver to AUI four (4) blueprints of each of any shop drawings used or proposed to be used, in the prosecutuion of the work; and one (1) copy of each purchase order or Subcontract as issued for purchased parts, materials, components or services procured by the subcontractor pursuant to this subcontract.

1.2.3. All work which is called for in the specifications but not shown on the drawings [or shown on the drawings] but not called for in the specifications shall be executed and performed by the subcontractor as if described in both. Should any conflict exist between the drawings and specifications, it shall be referred to AUI's engineer for his-written decision. Should any work be required which is not denoted in the drawings or specifications either directly or indirectly, but which is necessary for the proper carrying out of the intent of the specifications, the Subcontractor shall perform all such work and furnish all such material as fully as if it were particularly set forth.

1.3 Special Terms and Conditions

1.3.1 Direction of the Work

Direction of the work in accordance with the terms of this subcontract will be assigned by AUI to the Associate Director for Technical Services (or his written designate) who will have authority to act on behalf of AUI in all matters relating to the work.

1.3.2 Liason During Program

At least two coordination meetings will be held between management and technical personnel of the Subcontractor and AUI prior to the start of fabrication work. The place and time of such meetings shall

be determined by the AUI Associate Director. Additional meetings, as, required, between AUI technical representatives and Subcontractor personnel will be held at Subcontractor's home plant or fabrication plant during fabrication.

1.3.3 Shipment, Unloading and Protection

All components shall be properly prepared, packaged if necessary, and marked for subsequent assembly and supported for shipment. Loading for shipment to Green Bank, shipment to Greenbank and protection during shipment shall be the responsibility of the Subcontractor.

All unloading, receiving, storage and protection of the material after delivery to Green Bank shall be the responsibility of AUI.

1.3.4 Progress Schedules and Reports

The Subcontractor shall, within fifteen (15) days after notice of award of the Subcontract, prepare and submit to the AUI Associate Director for Technical Services three (3) copies of a schedule showing the order in which the Subcontractor proposes to carry on the work, the dates on which he will start each phase or subdivision thereof (including the procurement of materials). The Subcontractor shall enter on the progress schedule the actual progress at the end of each month and deliver to the AUI Associate Director three (3) copies thereof immediately following the end of the month.

The Subcontractor shall not make changes of any kind in the approved progress schedule which will affect the completion date of the program without a formal change in the subcontract.

1.3.5 Work Progress

The Subcontractor shall utilize sufficient forces, fabrication plant and equipment and shall work such hours, including overtime operation, extra shifts or holiday work as may be necessary to insure the prosecution of the work in accordance with the approved progress schedule. If in the opinion of the AUI Associate Director, the Subcontractor falls behind the progress schedule, he will notify the Subcontractor in writing, and the Subcontractor shall take such steps as may be necessary to improve his progress and regain his schedule position.

1.3.6 Progress Breakdown for Scheduling and Payment

No monthly progress payment shall be made until the progress schedule has been updated and submitted.

The Subcontractor shall, within fifteen (15) days after award of the Subcontract, prepare and submit to the AUI Associate Director for approval a breakdown of the program costs in a manner and format described in its proposal for use in scheduling the work and for payment. This breakdown shall be comprehensive enough so that adequate control of progress payments can be exercised by AUI. Sub-items shall total to the price breakdown submitted in the proposal or as negotiated prior to award at the sub-contract.

1.3.7 Progress Payments

1.3.7.1 Progress payments shall be made in accordance with Exhibit _____, Article_____, of the terms and conditions except as set forth below.

1.3.7.2 Progress payments will be based on the percentage of acceptable work completed, and the Subcontractor shall permit AUI personnel

to physically identify materials delivered. The Subcontractor shall file a monthly statement (with his invoice) detailing the percentage of completion in accordance with paragraph 1.3.6 above.

1.3.7.3 Upon completion and acceptance of all work under each separate authorized or scheduled item of the Subcontract work, the Subcontractor will be paid the Subcontract price of such items, less the amount of prior progress payments.

1.3.7.4 Each progress payment shall be 90% of the amount equal to the Subcontractor's reported percentage of completion as approved by AUI's Associated Director.

2.0 Applicable Documents

The following documents of issue in effect at the date of contract award form a part of this document of this specification insofar as applicable. Wherever this specification conflicts with the below named specifications, standards, and other publications, the requirements of this specification shall govern.

American Institute of Steel construction - Manual of Steel Construction, Latest Edition.

American Society for testing materials - standards for materials of the ASTM where referred to in this specification or on the drawings.

American Welding Society Handbook - Sect. I, Chapter 10.

3.0 Materials

3.1 Structural Steel

All structural steel used in the fabrication of the reflector structure shall be as specified on the drawings. In general, all steel is specified on the drawings as ASTM A36 steel. The sub-contractor shall specify in his purchase order for the A36 steel that the steel shall be a silicon-killed fine grain steel with a maximum carbon content of 0.28 percent. Where structural members are welded, only certified welders shall perform the welding and the type of welding rod used as well as the welding process used shall be approved by AUI.

4.0 Fabrication

Fabrication shall be in accordance with good fabrication practice as set forth by the American Institute of Steel Construction and shall be to the dimensions and tolerances set forth on the drawings. Mis-manufactured parts shall be discarded and not repaired unless prior approval is obtained from AUI. Mis-aligned holes (for bolting) for 2 or more mating parts such that correct size of bolts can not be installed may be corrected by drilling or reaming until a round matching hole in each part is obtained and a larger diameter bolt whose diameter is 1/16 inch less than the hole diameter installed. Hole size is not to be increased more than 25%.

Shop sub-assembly shall be by either welding or bolting (as set forth on the drawings) but components to be field assembled shall preferably be by high strength (ASTMA325) bolting. All holes shall be drilled or sub-punched and reamed according to good practice so that connection clearances may be held to a minimum.

Fabricated parts shall be shop assembled into the sub-assemblies as shown on Drawings _____. Basically these sub-assemblies shall consist of the following:

(1) 2 pieces Main Hub
(2) 8 pieces ~~Mina~~ Main Radial Trusses
(3) 8 pieces inner trusses (circumferentsal)
(4) 8 pieces intermediate trusses (circumferentsal)
(5) 8 pieces outer trusses (circumferential)
(6) - pieces outrigger assemblies
(7) — pieces Feed legs and Apex assembly

These are considered as being the largest practical pieces for shipment from fabrication plant to the assembly site at Green Bank, remaining parts shall be shipped as loose pieces or bundled for shipment.

All parts shall be identifed by part number as set forth on the drawings.

Subcontractor shall furnish the required number, size and length of bolts for final assembly of the reflector structure plus 10% excess (with minimum excess of four bolts) in each size and length of bolt.

5.0 Protective Finish

All surfaces shall be cleaned of rust, mill scale, oil or grease, all according to best commercial practice, wire brushing of full steel surfaces shall be considered a minimum requirement for cleaning of all steel surfaces, (a) Any stratified rust, blisters or mill scale shall be removed by power impact tools, rotary scalers, or power grinding equipment. If oil or grease are present, these shall be removed by solvent washing. Steel surfaces shall be prime painted within 24 hours of wire brushing or cleaning.

Simple spot brushing is sufficient

No painting is to be performed when the surface to be painted is wet, nor when the air temperature is less than 50°F, nor when the relative humdiity exceeds 70 percent.

The Subcontractor shall apply a prime coat of Sherwin-Williams, E41N1 Kromik Primer, applied full body by brush. Application by brush over cleaned surfaces is preferred to spraying in order to achieve superior metal-primer contact and superior corrosion protection. As an alternate if the sub-contractor chooses to clean all surfaces by sand-blasting to near white metal condition, AUI will approve application of the primer by spray painting. A minimum 1.5 dry film thickness should be attained. A minimum drying time of 18 hours shall elapse after priming before additional coats of paint are applied.

The sub-contractor shall apply an intermediate coat of Sherwin-Williams, metallastic B53W10 according to the manufacturers instructions, in a manner to obtain a minimum dry film thickness of 2.0 mils. This is a white rust inhibition undercoat and should be tinted with lamp black or carbon black to a contrasting shade so that complete coverage of the final coat can be readily determined.

The sub-contractor shall propose as an ~~alternate~~ option the shop application of a finish coat of Sherwin-Williams B53WA3 white silicone enamel with a minimum dry film thickness of 2.0 mils applied according to manufacturers instructions. Both the intermediate and finish may be applied by spraying.

~~RFP-VLA-323~~

EXHIBIT E

INSTRUCTIONS TO PROPOSERS

1.0 GENERAL

Proposals shall contain a separate technical and business section ~~proposals~~ and a pricing section. All information set forth herein for each section shall be provided.

~~All written materials referred to in this RFP are on file at the National Radio Astronomy Observatory in Socorro, New Mexico.~~

2.0 DELIVERY SCHEDULE

2.1 In developing their proposals and attendant schedules, time requirements, manpower requirements, procurement planning, production tooling, etc., vendors should base their proposals on the following overall schedule.

Element of Work	Weeks ~~Month~~ After Award															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Project Planning & Mfg. Engr.	---	---														
~~AUI Review~~ Materials		~~///~~														
~~Parts & Equipment~~ Procurement																
Fabrication																
Ship ~~and Assemble~~							~~////~~	~~////~~	~~////~~							
~~Acceptance Test~~									~~////~~	~~////~~						

2.2 As shown by the above schedule, AUI will require up to one month for review and approval of the proposer's manufacturing and procurement plans, test and acceptance procedures, and any proposed changes to any equipment or design details. Up to one month is allotted for testing and acceptance of the completed vehicle.

3.0 PROPOSER'S RESPONSIBILITY

Each proposer is responsible for inspecting the site and for reading and being thoroughly familiar with the Proposal documents. The failure or omission of any proposer to do any of the foregoing shall in no way relieve the proposer from an obligation in respect to his proposal.

As a sizable portion of the work will be done at the VLA Site, proposers are encouraged to familiarize themselves with the location and local conditions and facilities. Site visits may be arranged by contacting Mr. William G. Horne, 505/772-4202, or Mr. L. M. Temple, 505/772-4260, Associated Universities, Inc., Post Office Box O, Socorro, New Mexico 87801

The subject of this RFP is the second, plus an option for a third, of such vehicles. The prototype transporter is presently in use by AUI at the VLA Site, performing its function. This existing vehicle may be examined and photographed by proposers for the purpose of clarification of specifications and drawings.

4.0 PROPOSAL EVALUATION

In addition to price, the following factors will be considered in making the award:

4.1 Availability and competence of experienced management, production and engineering personnel to be assigned to the program.

4.2 Proposer's experience and experience record on similar programs.

4.3 Proposer's manufacturing and assembly plans and proposed manufacturing and assembly facilities.

4.4 Proposer's financial stability and resources.

4.5 Proposer's schedule as set forth in the Proposal.

4.6 Proposer's familiarity with the requirements of the work as demonstrated by his proposal.

4.0 ~~5.0~~ FORM OF THE PROPOSAL

4.1 ~~5.1~~ Technical Section based on AUI Design

4.1.1 ~~5.1.1~~ Design Concepts - present any desired discussion of the AUI design sufficient to demonstrate an understanding of the ~~purpose, functions, and operating requirements of the transport vehicle~~ work required. Present here any comments subcontractor may have as to suggested alternates to ~~equipment, components, or method of accomplishment of function~~ design of output of sub-assembly.

4.1.2 ~~5.1.2~~ Materials - present any discussion of specific materials, equipment parts, and any other items included in the design.

4.1.3 ~~5.1.3~~ Manufacturing Plan - should include a discussion of the following:
place or source of manufacture;
utilization of lower tier subcontractors;
special equipment or tooling;
method of transporting and shipping components to the ~~Site~~ Green Bank Site;
control of tolerances and quality assurances.

~~5.1.4 Field Assembly Plan - should include a discussion in detail of the following:~~
~~the various steps in field assembly of the transporter;~~
~~type of field equipment and facilities to be utilized;~~
~~assembly and erection techniques proposed - explain how tolerances will be achieved and maintained;~~
~~utilization of lower tier subcontractors;~~
~~protection and storage of unassembled components at the Site.~~

5.1.6 Test and Acceptance Plan - should include a discussion in detail how the proposer intends to prove that the transporter meets all specifications, including the following:

mechanical,
structural,
electrical,
environmental.

4.1.4 ~~5.1.6~~ Exceptions taken to AUI Specifications - should include a detailed listing of exceptions taken to the AUI specifications, together with any alternate specifications proposed, and reasons for the exceptions.

4.2 ~~5.2~~ Business Section

This portion shall include data on the proposer's experience, personnel, and resources which qualify it for the MLA Program. It should include the following:

4.2.1 ~~5.2.1~~ General Company Data - include general and specific data concerning past experience and work relating to the work in this proposal; data on equipment of similar size and character designed and constructed.

4.2.2 ~~5.2.2~~ Technical Capabilities - in the fields of engineering, test, and reliability.

4.2.3 ~~5.2.3~~ Key Personnel - list key management and technical personnel expected to be assigned to this program. Include brief resumés.

4.2.4 ~~5.2.4~~ Organization Charts - provide organization chart showing proposed organization and how it fits into the company organization. Include names and functions of all key personnel.

4.1.5 ~~5.2.5~~ Lower Tier Subcontractors and Consultants - list all proposed subcontractors and consultants, giving the specific proposed areas of performance, qualifications, and capabilities, as set forth in Paragraphs ~~5.2.1~~ 4.2.1 through ~~5.2.4~~ 4.2.4.

4.2.4 ~~5.2.6~~ Work Backlog - specify the total backlog of work under contract or subcontract, and the estimated completion dates for this backlog.

4.2.1 ~~5.2.7~~ Financial Capacity - include latest financial statement and last yearly report of company and parent organization.

~~5.3 Master Summary Schedules~~

~~5.3.1 This portion shall include a schedule showing all aspects of the work from a preliminary review through documentation of acceptance test results.~~ Indicate starting and completion dates and significant milestones for accomplishing tasks, such as preliminary review and planning, design review, procurement, fabrication, shipment, assembly, and test of the transporter.

5.3.2 This portion shall include a schedule of manpower to be assigned to each portion of the work, together with estimated man-hours. This schedule may be combined with the schedule required in the preceding paragraph.

4.1.3 ~~5.4~~ Subcontract Pricing

4.3.1 ~~5.4.1~~ Details of Pricing for ~~Transporter No. 2~~ Reflector Structure - All price information shall be included as a separate section of the vendor's proposal. Pricing in the contractor's format shall be submitted in sufficient detail to permit an analysis of all costs proposed. Suggested (but not all-inclusive) cost areas to be

covered are such elements as direct material, material overhead, direct engineering and direct manufacturing labor, along with appropriate overhead rates, general and administrative expenses, shipping and all other charges to be considered in the final price.

4.3.2 ~~5.4.2~~ Should the use of ~~equipment~~ materials or components other than those set forth in the drawings and specifications be proposed, such ~~equipment~~ materials or components shall be separately set forth in the proposal, together with their unit price and the change in price resulting from the use of the alternate ~~equipment~~ materials or component.

4.3.2 ~~5.4.3~~ Should the proposer suggest changes in the design, form, configuration, fit, size, materials, or function of any features of the ~~transport vehicle~~ reflector structure, such change shall be separately set forth together with the price change for such alternate.

~~5.4.4~~ Any special tooling or special test equipment as defined in Exhibit C, SPECIAL TERMS AND CONDITIONS, Paragraph 11.0, Special Tooling and Special Test Equipment, proposed for use on this subcontract shall be itemized and set forth as a separate charge in the pricing.

4.3.4 5.4.5 Option and Pricing for ~~Transporter No. 3~~ Finish Paint Coat - ~~The offeror is requested to include in his proposal an option covering one each additional transporter. Details for the pricing of this optional transporter shall be the same as shown in Paragraphs 5.4.1, 5.4.2, 5.4.3, and 5.4.4 above except that any increase or decrease in price shall be clearly identified. Should the optional transporter be required, the following clause shall be included in any resultant subcontract:~~

The proposer shall include a price option for the application of a finish coat of paint as set forth in Paragraph ---- of the specifications.