

NATIONAL RADIO ASTRONOMY OBSERVATORY
EDGEMONT ROAD
CHARLOTTESVILLE, VIRGINIA 22901
TELEPHONE 804-296-0211 TWX 510-587-5482

October 23, 1981

Mr. Louis E. Becker
Vice-President
TIW Systems, Inc.
1284 Geneva Drive
Sunnyvale, California 94086

ADDITIONAL BASELINE TO INTERFEROMETER
MEMO No. 153

Subject: Subcontracts AUI-198 and AUI-199

Dear Mr. Becker:

Enclosed please find fully-executed copies of Subcontracts AUI-198 and AUI-199 providing for the fabrication and erection of a 14.2 meter telescope in the vicinity of Monterville, West Virginia. Prior to the execution of Subcontract AUI-198, we added to Paragraph VI.C. of Schedule A the following sentence: "The total amount of U.S. duty shall be reimbursed upon submission of a certified invoice, together with evidence of payment." The progress payment schedule which you submitted under cover of your letter of October 21, 1981 has been referred to our engineering staff and they will get in touch with you to finalize the progress payment milestones as provided in Paragraph VI.B. of Schedule A.

You expressed some concern about the holdback of progress payments in a situation where final acceptance was not complete because of minor "punch-list" requirements. Under Article OAC1 of Schedule B, Standard Terms and Conditions, AUI may make such payments of the amount of the holdback as will protect AUI without unduly burdening the subcontractor.

We look forward to a pleasant and fruitful relationship with TIW and yourself. Please do not hesitate to get in touch with Mr. Richard Fleming, Post Office Box 2, Green Bank, West Virginia, 24944, if you have any questions concerning these matters.

Cordially,

J. Marymor, Manager,
Contracts/Legal

Enclosures

cc: R. Fisher
R. Fleming ✓
H. Hvatum
D. Hovatter
W. Klepczynski
B. Peery
T. Riffe

PRIME CONTRACTOR: Associated Universities, Inc.

SUBCONTRACTOR: TIW Systems, Inc.

This is an agreement made this *23rd* day of *October*, 1981, between Associated Universities, Inc. (hereinafter called "AUI"), a New York corporation, and TIW Systems, Inc. (hereinafter called the "Subcontractor"), a California corporation, with its principle offices located in Sunnyvale, California.

AUI has entered into a contract (hereinafter called the "Prime Contract") with the United States of America (hereinafter called the "Government"), represented by the National Science Foundation (hereinafter called the "Foundation"), designated as Contract No. NSF AST 79-08925, for the construction, maintenance, and operation of a Radio Astronomy Observatory (hereinafter called the "Observatory").

The Subcontractor is willing to perform the work required by AUI, and AUI wishes the Subcontractor, in furtherance of the Prime Contract, to perform that portion of the work hereinafter more fully described.

ARTICLE I - SCOPE AND PERFORMANCE OF THE WORK

- A. The Subcontractor shall furnish all the labor and other personnel, materials, plant, and equipment necessary to perform the work described in Schedule A, incorporated herein and thereby made a part hereof, and in accordance with all the Specifications and Terms and Conditions of this Subcontract, included in Schedule 3, made a part hereof, and incorporated herein.

SCHEDULE A - STATEMENT OF WORK

*In
original
RFP*

- SCHEDULE B - FIXED PRICE SUPPLY CONTRACT TERMS AND CONDITIONS
SCHEDULE C - SPECIFICATIONS

- B. Work under this Subcontract shall commence promptly upon delivery to the Subcontractor of a copy hereof executed by AUI and shall be completed within the time specified in Schedule A.

ARTICLE II - COMPENSATION

- A. The total fixed price of this Subcontract is established at \$576,510, subject to any limitations herein. Payment to the Subcontractor of this amount shall constitute full compensation for the proper performance of the Subcontractor's undertakings hereunder.

ARTICLE III - NOTICES

- A. All notices and communications shall be in writing and mailed or delivered to the Purchasing Officer, National Radio Astronomy Observatory, Post Office Box 2, Green Bank, West Virginia, 24944, and to the Subcontractor at the address shown above, or to such other place or places as AUI or the Subcontractor, as the case may be, shall designate in writing.

ARTICLE IV - INSPECTION AND ACCEPTANCE

Final inspection and acceptance shall be performed in accordance with the requirements contained in the Schedules attached hereto.

ARTICLE V - ASSIGNMENT TO THE GOVERNMENT

This Subcontract shall be assignable by AUI to the U.S. Government. Subject to such assignment and acceptance thereof by the Government, this Subcontract shall not bind or purport to bind the Government.

TIW Systems, Inc.

By: _____

Louis E. Becker

Title: Vice President

Date: October 21, 1981

Associated Universities, Inc.

By: _____

Title: Director

Date: October 23, 1981

Statement of WorkI. Scope of Work

The Subcontractor shall supply all labor, material, and services to design, manufacture, and fabricate a 14.2 meter diameter antenna in accordance with National Radio Astronomy Observatory Specification for an Antenna for a Radio Telescope, May 12, 1981 (Schedule C) with the following modifications, additions, and clarifications set forth in TIW proposal No. AN272, July 30, 1981 and agreed to in negotiations between AUI and TIW, September 10, 11, 1981.

A. The following modifications, additions, and clarifications are made to the NRAO Specification (Schedule C):

1. Mechanical Parameter Summary (Page 12):

- a. Diameter: 14.2 Meters
- b. f/D: .40
- c. Counterbalancing: Counterbalance shall contain 3000 pounds of removal weights for purposes of trimming the counterbalance; removal weights shall consist of no less than 25 pieces nor more than 50 pieces.

2. Reflector Assembly (Page 17):

Panel surface shall be riveted, with button head rivets, to the panel structure.

3. Feed Legs and Apex (Page 18):

The support structure (feed legs and apex) shall conform to Specification (Schedule C) using Sterling drawing NR-1000, sheet 1 of 32, and NRAO drawing 30D000001 for dimensions for the adjustable feed support package; adjustable feed support and installation to be furnished by AUI. Feed legs and apex structure are to be redesigned with trussed members as per TIW sketch SK-09-11, dated 9/11/81, to meet requirements of specifications for pointing, minimum shadowing, and deflection of apex when moved from zenith to horizon. Design of the feed legs and apex structure shall be subject to written approval by AUI prior to fabrication.

4. Drive Equipment (Page 20):

- a. Drive motors shall be open drip-proof motors with double ended shaft, continuous blower, and removable weatherproof housing over the total drive package. The motor shall drive the drive train with the proper sized timing belt.

- b. A slip clutch shall be installed in the drive system between the motor and the brake for the purpose of limiting torque on the brake and gear assembly.

5. Cable Wrap (Page 22):

Openings for cables pulling through the plate at the azimuth platform shall be equipped with radial rollers to protect cables. Details as to type, location, size of holes, and method of installing cables shall be submitted to AUI for approval in writing.

6. Protective Coating (Page 25):

Delete the following paragraphs of section 3.2 of Schedule C: Primers 2.10, 2.11; Preparation of Primers & Coatings 3.1, 3.2; Cleaning of Aluminum Surfaces 3.16, 3.17; and add the following:

- a. The reflector surface shall be wash primed and prime coat applied by the sheet aluminum manufacturer, using their standard process, prior to fabrication of the panels. Two (2) coats of triangle No. 6 shall be applied in the field after erection in accordance with the specifications.

Delete section 3.3 of Schedule C and add the following in lieu thereof:

- b. All metal parts of the pedestal, yoke, back-up structure, feed legs, apex structure, and underside of the reflector panels shall have a prime coat of sentrix zinc 17CR applied prior to shipment of the antenna to the site. After erection at the site, the prime coat shall be touched up or repaired and two (2) coats of sentrix "Tornesit" High Build Chlorinated Rubber White applied. Prime wash, prime coat, and final coats shall be applied in accordance with the manufacturer's recommendations and specifications.

7. Engineering, Design and Shop Drawings (Page 26):

The Subcontractor shall submit for AUI's review the analysis of the structure showing compliance with the specifications for pointing accuracy, deflection of focal point, horizontal shift, and torsional twist in the structure due to off center drive and the elimination of an elevation shaft.

II. Delivery

A. The antenna shall be completed and ready for delivery to the site on or before June 30, 1982.

B. Operation and Maintenance Manuals shall be supplied 30 days prior to commencement of acceptance testing at Monterville, West Virginia.

III. Inspection

A. Preliminary inspection of the fabricated, manufactured, and purchased parts of the antenna, as well as all test assemblies of components scheduled by TIW Systems, Inc., shall be accomplished by AUI and TIW Systems, Inc. TIW Systems, Inc. shall give AUI at least ten (10) days advance notice of all major component or assembly tests.

AUI shall have a right to inspect the work at any time during the period of performance, on a non-interference basis; TIW Systems, Inc. shall provide reasonable office space and other necessary support for AUI inspection personnel at the TIW Systems, Inc. manufacturing facility.

B. Final inspection of the antenna shall be accomplished upon completion of erection and test under Subcontract AUI-199.

IV. Transportation

Delivery of the telescope shall be F.O.B. the Monterville, West Virginia antenna site.

V. Compensation

In consideration of the Subcontractor's undertaking hereunder, Subcontractor shall receive the fixed sum of Five Hundred Seventy-Six Thousand, Five Hundred Ten (\$576,510) Dollars, which sum includes Fourteen Thousand, Eight Hundred and Eighty (\$14,880) Dollars for U.S. import duty.

VI. Progress Payments

A. The Subcontractor shall receive progress payments on account of the work in accordance with the progress payment schedule mutually agreed upon between AUI and TIW Systems, Inc.

B. Progress payment schedule shall be presented to AUI within 45 days after award of this contract; no payment shall be made against this schedule unless approved in writing by AUI.

C. Progress payments made in accordance with Article 0A1 shall not exceed 90 percent of the invoice amount and in no event shall exceed 90 percent of the total subcontract amount less the sum set forth for U.S. import duty. The total amount of U.S. duty shall be reimbursed upon submission of a certified invoice, together with evidence of payment.

D. The balance withheld on account of progress payments shall be paid upon issuance of final acceptance of the antenna at the Monterville, West Virginia site.

VII. Guarantee

Subcontractor shall guarantee the work done under this contract in accordance with Article 54, Schedule B, hereof, for one year after final inspection and acceptance of the antenna.

PRIME CONTRACTOR: Associated Universities, Inc.

SUBCONTRACTOR: TIW Systems, Inc.

This is an agreement made this 23rd day of OCTOBER, 1981, between Associated Universities, Inc. (hereinafter called "AUI"), a New York corporation, and TIW Systems, Inc. (hereinafter called the "Subcontractor"), a California corporation, with its principle offices located in Sunnyvale, California.

AUI has entered into a contract (hereinafter called the "Prime Contract") with the United States of America (hereinafter called the "Government"), represented by the National Science Foundation (hereinafter called the "Foundation"), designated as Contract No. NSF AST 79-08925, for the construction, maintenance, and operation of a Radio Astronomy Observatory (hereinafter called the "Observatory").

The Subcontractor is willing to perform the work required by AUI, and AUI wishes the Subcontractor, in furtherance of the Prime Contract, to perform that portion of the work hereinafter more fully described.

ARTICLE I - SCOPE AND PERFORMANCE OF THE WORK

- A. The Subcontractor shall furnish all the labor and other personnel, materials, plant, and equipment necessary to perform the work described in Schedule A, incorporated herein and thereby made a part hereof, and in accordance with all the Specifications and Terms and Conditions of this Subcontract, included in Schedule B, made a part hereof, and incorporated herein.

SCHEDULE A - STATEMENT OF WORK

SCHEDULE B - FIXED PRICE SUPPLY CONTRACT TERMS AND CONDITIONS

SCHEDULE C - SPECIFICATIONS

- B. Work under this Subcontract shall commence promptly upon delivery to the Subcontractor of a copy hereof executed by AUI and shall be completed within the time specified in Schedule A.

ARTICLE II - COMPENSATION

- A. The total fixed price of this Subcontract is established at \$33,726, subject to any limitations herein. Payment to the Subcontractor of this amount shall constitute full compensation for the proper performance of the Subcontractor's undertakings hereunder.

ARTICLE III - NOTICES

- A. All notices and communications shall be in writing and mailed or delivered to the Purchasing Officer, National Radio Astronomy Observatory, Post Office Box 2, Green Bank, West Virginia, 24944, and to the Subcontractor at the address shown above, or to such other place or places as AUI or the Subcontractor, as the case may be, shall designate in writing.

ARTICLE IV - INSPECTION AND ACCEPTANCE

Final inspection and acceptance shall be performed in accordance with the requirements contained in the Schedules attached hereto.

ARTICLE V - ASSIGNMENT TO THE GOVERNMENT

This Subcontract shall be assignable by AUI to the U.S. Government. Subject to such assignment and acceptance thereof by the Government, this Subcontract shall not bind or purport to bind the Government.

TIW Systems, Inc.

By: _____

Louis E. Becker

Title: Vice President

Date: October 21, 1981

Associated Universities, Inc.

By: _____

Title: Director

Date: October 23, 1981

Statement of Work

I. Scope of Work

A. The Subcontractor shall furnish labor, materials, tools, and equipment to install a 14.2 meter antenna fabricated by TIW Systems, Inc. under Subcontract AUI-198 on a site located near Monterville, West Virginia, off West Virginia Route 15. Open storage space within a fenced enclosure will be provided by AUI at the site.

B. Subcontractor shall be responsible for on-site testing in accordance with TIW Systems, Inc. proposal No. AN-272, dated July 30, 1981, and Specification for an Antenna for a Radio Telescope, May 12, 1981.

1. A test acceptance plan shall be submitted for approval of AUI prior to commencement of acceptance tests.
2. AUI shall be notified in writing ten days prior to the commencement of acceptance tests and may witness the performance of each test in accordance with the approved test plan.

C. Subcontractor shall paint and finish the antenna prior to final acceptance by AUI.

II. AUI Responsibility

A. AUI shall furnish the foundation upon which the antenna will be installed. Any delay in the availability of the foundation due to AUI shall result in a day to day extension of the subcontract schedule; however, such delay shall not result in any increase in the subcontract price.

B. AUI will provide D.C. power to the antenna for testing.

III. Delivery

Erection of the antenna, testing, and painting, shall be completed by August 31, 1982.

IV. Acceptance

Final acceptance of the antenna shall be made by AUI at the erection site.

V. Compensation

In consideration of the Subcontractor's undertakings hereunder, the Subcontractor shall receive the fixed sum of \$33,726 for all work required under the terms of this subcontract.

VI. Payment Schedule

The Subcontractor shall be paid \$20,000 upon completion of the antenna

assembly and the balance of \$13,726, which includes the West Virginia business tax, upon completion of final acceptance testing, including painting.