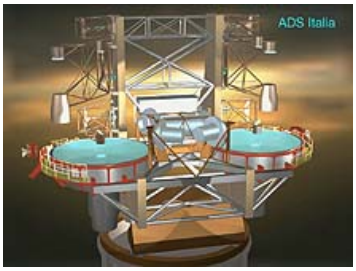

LBT PROJECT
2x8,4m TELESCOPE

Doc.No. : 562s007
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Date : 16 August 2004

LBT PROJECT

2 X 8,4m OPTICAL TELESCOPE

Bid Specifications

Telescope cooling system fabrication and installation.

	Signature	Date
Prepared	Shawn Callahan	28 July 2004
Reviewed	Joar Brynnel, Butch Vaughn, Jim Slagle, John Hill	30 July 2004
Approved	Joar Brynnel	30 July 2004
Approved	John Hill	2 August 2004

1. Revision History

Issue	Date	Changes	Responsible
a	28July 2004	First draft	Shawn Callahan
b	29July 2004	Add sections 6.3, 7.3, 7.4, 8.1, 8.2	Shawn Callahan
c	30July 2004	Revise sections 7.3, 10.1, 10.2	Shawn Callahan
d	2August 2004	General revisions	Shawn Callahan
e	3August 2004	Final Draft	Shawn Callahan
f	16August 2004	Add section 5.9	Shawn Callahan
g	25August 2004	Release for procurement	Shawn Callahan

2. Table Of Contents

3. About this document

3.1. Purpose

This document describes the scope of work for the installation of the Cooling Water distribution system on the Large Binocular Telescope located on Mt. Graham, AZ.

The purpose of the Telescope cooling system is to cool equipment located on the telescope. Equipment with a surface temperature significantly warmer than ambient (defined as more than one degree C above ambient) causes local air turbulence, which degrades telescope image quality.

The system must be extremely reliable to prevent damage to expensive optics and instruments.

3.2. Reference Documents

[RD1] LBT drawing 562s001f Cooling system schematics
http://abell.as.arizona.edu/~hill/rfp/chill/562s001f.pdf

[RD2] LBT drawing 562s003b Cooling system installation title page and index
http://abell.as.arizona.edu/~hill/rfp/chill/562s003b.pdf

[RD3] LBT drawing 562s004b Cooling system general routing
http://abell.as.arizona.edu/~hill/rfp/chill/562s004b.pdf

[RD4] LBT drawing 562s005b Cooling system schedules and details
http://abell.as.arizona.edu/~hill/rfp/chill/562s005b.pdf

[RD5] LBT drawing 562s006b Cooling system parts list
http://abell.as.arizona.edu/~hill/rfp/chill/562s006b.pdf

[RD6] LBT drawing 303s005e Hydronic schematics
http://abell.as.arizona.edu/~hill/rfp/chill/303s005e.pdf

[RD7] LBT drawing 562s002b Scope of work – Telescope cooling system installation (Awarded to Stantec Consulting)
http://abell.as.arizona.edu/~hill/rfp/chill/562s002b.pdf

[RD8] LBT document 562s007g
Bid specifications
http://abell.as.arizona.edu/~hill/rfp/chill/562s007g.pdf

[RD9] LBT document 562s008a: Telescope Cooling System Design Narrative by Stantec Consulting
http://abell.as.arizona.edu/~hill/rfp/chill/562s008a.pdf

4. Scope of Work

The scope of work is specified in the reference documents above. A natural delineation of tasks is the installation on the telescope and off the telescope. Depending on schedule, resources, and part procurement, these tasks may be completed simultaneously or sequentially.

Installation activity on site at Mt. Graham shall be supervised and coordinated by Stantec Consulting. Installation activities must be scheduled in cooperation with LBT Engineering.

Contractor will supply all parts and installation material including spares as called out in reference documents.

It shall be noted that the telescope is symmetrical left to right. Two independent cooling circuits are required for the left and right side of the telescope.

Note: All temperatures in this document are expressed in degrees C.

5. Installation requirements

5.1. Telescope installation

The installation on the telescope is called out on [RD1 – RD4]. The parts list for the installation is called out in [RD5].

5.2. Modifications to hydronics

All modifications on the 4th floor are called out on [RD6].

5.3. Component requirement

Our goal is to start with as clean a system as possible to prevent particulate and bacterial contamination. All components must be clean before installation.

5.4. Piping insulation

Thermal insulation for coolant distribution pipes, manifold, and fittings is required to reduce risk of condensation and to reduce thermal load. All insulation will be 2” thick neoprene pipe insulation with aluminum pipe wrap.

5.5. Ductwork insulation

Thermal insulation for ductwork and fittings within telescope enclosure is required to reduce thermal load to telescope enclosure. All insulation will be 1" thick external neoprene insulation with aluminum jacket.

5.6. Equipment insulation

Thermal insulation for equipment within telescope enclosure is required to reduce thermal load to telescope enclosure. Provide insulating box fabricated from 18 gauge galvanized sheet steel with 1" thick neoprene insulation cemented to interior. Housing shall be split-case type with clasps on each side of all panel sections to permit disassembly for maintenance. Joints between removable panels shall be metal-to-metal with flange to allow vapor barrier sealing with bedding compound.

5.7. Vibration isolation

The fan coil unit will be mounted on vibration isolators. LBT engineering must pre-approve isolators before installation.

5.8. Cooling medium

After completion and testing, the Contractor will provide and fill system with a mixture of 50% ethylene glycol / 50% de-ionized water with rust and bacterial inhibitors. The LBT will provide anti-foaming agents (we have a large stockpile).

5.9. Pipe thread sealant

The cooling system will be exposed to steady winds up to 40 MPH. Wind excitation and extreme temperature variations require high quality pipe sealants. A vibration resistant thread sealant such as Rectorseal Tru-blu or equivalent will be used.

6. System verification and tests

6.1. Ultra-sonic air pressure test

Contractor will leak check system with air pressure at 120 psi. Air from a clean compressor will be provided by the LBT. Contractor will provide an air fitting to pressurize the system.

Contractor will provide a new ultra-sonic leak checker for test. This instrument will become the property of the LBT upon successful completion of leak testing.

6.2. 24-hour water pressure test

The system will be flushed and filled with facility water for a 24-hour pressure test at 100 psi measured at the LTCS connection from the elevation cable drape.

6.3. Circulation test

The system will circulate water throughout each circuit for a minimum of one hour.

After successful completion of test the contractor will clean all strainers and filters before filling system with the cooling medium called out above in section 5.5.

6.4. Connection point flow test

Contractor will provide at least two lengths of flexible tubing with Swagelok quick-connect fittings to allow bypass testing of all flow circuits. All bypass will become property of the LBT after completion of test.

6.5. Valve test

All valves will be shown to be operational.

6.6. Flow Balance function test.

All circuit setters will be set to specified flow rates as called out on [RD1] and verified with in-line flow meters.

6.7. Instrumentation test

All pressure gages, flow meters, and thermometers will be calibrated to an accuracy of 10% or better prior to installation on the telescope. Any instruments that fail this test will be recalibrated or replaced by contractor.

6.8. Connection points

Stantec Consulting will provide a drawing to contractor with all numbering and labeling information. Contractor will provide labeling plates or tags on pumps, heat exchangers and valves.

6.9. Spares

All spares will be labeled and verified to be in working condition. The number of required spares is called out in the parts list 562s006.

7. Bid requirements.

7.1. LBT responsibilities.

As with any large project nearing completion, several activities will be occurring simultaneously at the observatory during the cooling water installation.

LBT engineering (Joar Brynnel and Shawn Callahan) will approve all schedules and coordinate all telescope activities and 4th floor modifications. LBT engineering understands the complexities of undertaking such large projects and will take every measure to support all contractors and support staff during completion of projects.

7.2. Contractor responsibilities.

The contractor will provide LBT Engineering a proposed schedule(s) for completion of each part of the installation. Any changes in schedule including extensions must be pre-approved by LBT engineering. The contractor understands that they will be working with other contractors and support staff during installation and will take every measure to coordinate activities with others during installation.

The contractor is responsible for transport of material and personnel to and from site.

The contractor is responsible for supplying all tooling and support equipment needed to complete the job.

7.3. Value engineering

The installation of the cooling system will have a significant impact on scheduling the development of the telescope. For this reason, the selection process for awarding the bid will consider the ability of the contractor to provide adequate resources for rapid installation of the system.

We also realize the importance of allowing the contractor to suggest modifications to the installation that may reduce costs, installation time, or improve functionality. All design changes must be pre-approved by LBT engineering and Stantec Consulting.

All pipe has been specified as 304 stainless. Contractor will also supply a quote for installation with carbon steel pipe and fittings as well as any impact on schedule. LBT engineering and Stantec will then select the material based on cost versus benefits.

7.4. Change orders

All change orders must be pre-approved by LBT engineering and Stantec Consulting. These include changes that effect costs, schedule, or system performance.

8. Bid format

8.1. Cost break downs

Contractor will provide expenses for parts, labor, per diem and travel expenses, and any additional expenses.

8.2. Contractor will indicate work shift(s) in schedule

Due to travel time, elevation, LBT manpower resources, and the remote location our program manager, Jim Slagle, recommends considering four ten-hour shifts for all work on the mountain.

The LBT is flexible on shifts if it can accelerate the installation.

Contractors will indicate their preference on bid.

9. Points of contact

For issues concerning project management, contracts, engineering, telescope, or telescope related issues contact Shawn Callahan, LBT Principal Mechanical Engineer, LBT 520-621-7649 or Joar Brynnel, LBT System Engineer 520-626-0431.

For questions concerning safety concerns on the mountain, facility issues, procedures for working in the building, and facility resources contact Butch Vaughn at 520-626-1466.

A representative from Stantec consulting shall be on site to observe installation of the telescope cooling system and to aid in field coordination of installation. Stantec will answer questions concerning interpretation of all reference documents.

Stantec shall also be on site to observe commissioning of the telescope cooling system. Contacts will be Patrick McKenna 520 750-7474 and Alfonso Figueroa, 602-438-2200.

For contract resolution issues contact Jim Slagle, Program Manager 520-621-6506.

10. General requirements

10.1. Safety

Every effort will be made to make the LBT a safe working environment. All personnel at the facility will adhere to state and federal safety procedures. The contractor is responsible to the LBT Operations Manager for daily safety.

Butch Vaughn is the safety officer overseeing this contract. As the safety officer, Butch Vaughn has the authority to suspend any unsafe activity or to expel from the site anyone failing to adhere to these procedures. Address any safety issues or concerns to Butch Vaughn.

Installation must be performed in a way that safety of telescope optical components (in particular the primary mirror) is guaranteed. Coolant spillage shall be avoided as far as possible to reduce risk of contamination of the telescope critical opto-mechanical components.

10.2. Use of facility

The site is located in a National Endangered Species Refugium Area. All individuals and vehicles must have proper credentials to enter. Permits will be obtained at the Mount Graham International Observatory Base Camp.

The job site is designated as a University of Arizona educational site and is thereby considered drug and alcohol free. Be warned that this policy is strictly enforced. All vehicles having business at the site are subject to search by law enforcement at any time. The area is daily patrolled by the University of Arizona Police.

The LBT has a new kitchen and dining area available for use by contractor.

No sleeping accommodations are available on site.

11. Milestones

Payment of contract will be based on the following milestones. The payment will be based on the percent completion as specified in the following sections.

11.1. Completion of installation on telescope

See section 5.1. (60% project completion)

11.2. Completion of 4th floor modifications

See section 5.2 (20% project completion)

11.3. Successful completion of all system tests

See section 6. (20% project completion)

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