

ID #	Bidder's Question	Gemini's Answer
01	Can we change the structure of the Contractors list during Phase B, for instance, to integrate new competencies?	It is possible for the Contractor to add or remove subcontractors during Phase B. Gemini would expect advance notification and justification to any major changes once the Phase B contract had been awarded to assess the impact on cost, schedule, requirements and risk and to demonstrate the change would be in the best interest of the project. Final authorization would be granted by an amendment from the AURA Contracts Officer.
02	RTC: Can we have an idea of the degree of freedom to change or adapt the RTC proposed?	Gemini has subcontracted the design and build of the Real Time Controller. It is being built to the specification contained within "GNAO-RTC-RFP-002 - RTC Specifications Requirements v4.0". If possible, proposers should submit bids compliant with the provided RTC specifications. However, alternative provisions may be proposed for Gemini to consider. It should be noted that any proposed changes to the RTC specification would require acceptance by the RTC subcontractor.
03	Does the proposed budget also include the spare part budget?	The bid contained in the proposal will be for Phase A. The proposal should also contain an estimated cost to completion (Phase A+B) and would ideally include an estimated cost of spares.
04	The proposed budget also includes a maintenance contract after the transition phase?	No, the maintenance contract is outside the scope of the procurement (beyond Phase B).

05	Why does the spec REC-L3AOB 30 specify 1Khz value? Can we propose a different value?	1kHz is the requirement from the RTC specification document "GNAO-RTC-RFP-002 - RTC Specifications Requirements v4.0" (with a goal of 2 kHz). It is possible to propose alternatives. (See answer to question ID#02).
06	How is the confidentiality between Contractors during Phase A guaranteed?	Gemini will have a small team engaging with each Contractor during Phase A. The Gemini team will not share information or documentation between Contractors and will not provide technical direction to the contractor. We have experience of overseeing contracts during competitive processes. Should there be any concerns, these may be brought to the attention of the AURA Contracts Officer.
07	<p><i>Referring to (1) "IDD 1.15.2.1_1.15.2.3 - GNAO AOB to AOS Controller Interface Definition Document_v1.0.pdf" and (2) "IDD 1.15.2.1_1.15.2.2 - GNAO AOB to RTC Interface Definition Document_v1.0.pdf"</i></p> <p><i>In (1), section 6 all devices are expected to be ethernet devices and later in the same section, those with existing EPICS device support are clearly preferred.</i></p> <p><i>In (1), section 8, all wavefront sensors have two data paths, a control path for communicating with the AOS Controller, and a readout path for sending raw pixels directly to the RTC;</i></p> <p><i>In (2), section 5 By design, the GNAO Adaptive Optics System assumes that all interfaces between the Real Time Controller and the Adaptive Optics Bench are via an Ethernet connection using either UDP or GigE Vision protocols for reading and writing data.</i></p> <p><i>Figures 2 and 3 below show the RTC input and output interface concepts and how they integrate into the RTC software framework, which is based on the HAA Extensible Real Time controller (HEART) code base.</i></p> <p>It is not clear if the AOS is running on the sample computer as the RTC - the block diagram suggests it is meant to be able to be run separately.</p> <p>Summarising : the requirement is to use ethernet sensors (cameras), using UDP or GigE, have a control path from the AOS and a pixel path to the RTC which may be running on different computers and certainly are different processes. This is not necessarily easy to arrange without adding extra computers.</p> <p>The use of UDP protocol within GigE would allow flexibility for a different implementation but I am not aware of this.</p>	

	<p>Document (2), section 5 does suggest that the HAA HEART interface (may have been written for Gemini) may implement something to allow this to be implemented using the " GigE Vision Stream Protocol "</p>	
07a	<p>Can Gemini confirm that HEART does support this scheme?</p>	<p>First - to confirm: in the current GNAO architecture, the RTC and the AOS controller are implemented on different machines, and have independent communication paths. This greatly reduces the complexity of the RTC by encapsulating all AOB-specific knowledge within the AOB controller. This architecture, for example, allows the NGS WFS to be implemented as a focal plane array, where positioning of the guide windows requires knowledge of AOB flexure, distortion, TCS tracking corrections, etc. that are outside the scope and responsibility of the RTC.</p> <p>The RTC provides a generic input and output interface API and expects that a custom handler will be developed for each type of camera, as shown in (2) Figure 2 and (2) Figure 3. Using this API it will be possible to implement whatever scheme is required independently of the HEART core code.</p>
07b	<p>What cameras might HEART have been confirmed to support (E.g. GigE cameras can differ in important ways and concerns above about the performance of GigE in this case.) ?</p>	<p>The GNAO RTC is still under development and has not been confirmed with any physical hardware, it is being developed using the reference interfaces described in (2) §6.1, §6.2. §6.3. These reference interface definitions are for illustration only, they are in no way prescriptive or intended to influence a solution. The actual interface definitions will be developed in collaboration with the AOB vendor during the preliminary design phase. Camera interface performance issues will have to be considered when specifying related terms, such as latency and jitter, in the vendor's performance budgets.</p>

07c	<p>Can we have access to the documentation and source code/object libraries for HEART, so we can validate cameras against it and maybe implement the engineering interfaces using it? (The document "HEART External Interfaces" was referenced as RD01 in document (2) but was not provided, and it seems there should be more documentation to support that document)</p>	<p>No, GNAO is not at liberty to share the HEART code in any form. All of the relevant information from the HEART External Interfaces document has been extracted in (2), which is why it was not included in the RFP package.</p> <p>GNAO is responsible for delivering the RTC side custom driver to the interface specification. It may be possible to share the API definition between the HEART input block and custom handler if the vendor wishes to develop an engineering interface.</p>
08	<p>Ground layer deformable mirror is the requirement for the future AO unit. The same mirror was considered in the early version of the current Altair AO. Later on, it was abandoned and only the high-altitude mirror left. What was the reason for that?</p>	<p>Based on studies done on the MK turbulence profile at the time, it was thought to be a good idea to increase the altitude conjugation of the DM to increase the isoplanatic patch diameter.</p>
09	<p>MCAO has been working with Gemini South and Altair has been working with Gemini North for years. They are Offner relay and OAP style, respectively. Does any system have obvious advantages in terms of stability, operation etc.?</p>	<p>Both systems are good but none is preferable. We do request the vendor to propose a viable solution, but we do not impose any constraints. From our studies, a modified Offner relay presents the advantage of having much lower optical distortions, but it is more complicated to align. Considering the level of performance we are aiming for, we now know that both systems can provide the solution and the importance will be put in the calibration strategy. Additional information is presented in the trade study document <b>GEMMA-TPL-001</b> provided on the AURA Bid Page</p>

		<a href="https://auracas.aura-astronomy.org/procurement/aura-bid-opportunities/">(https://auracas.aura-astronomy.org/procurement/aura-bid-opportunities/)</a>
10	<p>Is it possible to get the presentations and results (e.g., minutes or Q&amp;A) from the meeting? Do you also have a list of meeting attendees?</p>	<p>Yes, the recording of the Zoom meeting is posted on the AURA Bid page <a href="https://auracas.aura-astronomy.org/procurement/aura-bid-opportunities/">(https://auracas.aura-astronomy.org/procurement/aura-bid-opportunities/)</a> under the “Zoom Meeting” section (bottom of the entries for “Documents” of RFB #N00006593C).</p>
11	<p>We noticed that the Real Time Controller was put out to bid in 2019 <a href="https://www.gemini.edu/news/request-proposal-gemini-north-adaptive-optics-real-time-controller"> (https://www.gemini.edu/news/request-proposal-gemini-north-adaptive-optics-real-time-controller)</a>. If the RTC part of the GNAO Bench is out of scope, is the <b>AOS System Controller</b> (see <a href="#">Figure 1. Ref for question ID#11</a> presented below this table) also out of scope of the project?</p> <p>In other words, is the scope of the project only the GOLD elements in the figure below, or does it also include the software and electronics to control them?</p>	<p>Yes, the AOB System Controller will be provided by Gemini, it is outside the scope of the AOB contract. The AOB vendor is responsible for delivering control electronics for each device (including DMs and WFSs) that will allow the device to be controlled via an ethernet interface and linux device drivers. All control software above this device control layer will be the responsibility of Gemini.</p> <p>It is envisioned that most devices will be controlled using commercial off-the-shelf (COTS) components (i.e. commercial motor controllers). If a COTS controller is not available for any chosen device, the electronics and software required for ethernet control of that device will be the responsibility of the vendor.</p> <p>Note that the GOLD elements and optical path shown in the diagram are for illustration only, they are not intended to influence the AOB design.</p>
12	<p>We noticed that an alternative Opportunities link shows that the GNAO Bench tender has been CANCELLED <a href="https://auracas.aura-astronomy.org/procurement-opportunities/">(https://auracas.aura-astronomy.org/procurement-opportunities/)</a>. Can you confirm that the tender is still open?</p>	<p>Yes, we confirm that this tender is currently <b>open</b>. We apologize for the confusion. The link you found is a ghost on AURA Bid page from the 2020 GNAO Bench tender (that was cancelled).</p>

		The ghost has been removed and any link you are using should now point only to the 2021 AOB RfP (appearing as <b>open</b> ).
13	Is a Phase-B ROM Price required as part of the Phase-A Offer?	Yes, we expect a Phase-B ROM price estimate as part of the Phase-A Offer.
14	So far we have not found clear guidance on this point in the tender documents. We thought this was indicated in the earlier Q&A document [Q: <i>The proposed budget includes also the spare part budget? A: The bid contained in the proposal will be for Phase A. The proposal should also contain an estimated cost to completion (Phase A+B) and would ideally include an estimated cost of spares</i> ], but this text is no longer in the Q&A document.	<p>Apologies for the confusion, something happened when the webpage was updated to add the latest questions, this question can now be found in this table, please see question ID#03 above.</p> <p>We do request a list of what is considered to be procured as spares, but not intended to be part of this contract.</p>
15	<p>There is also an indication a Phase-B ROM is needed, as the Phase-A deliverables will include an “<u>updated</u> Cost-Plus incentive proposal for the Contract Phase B” (see SoW page 14, under “Contract Phase A”) which implies that there should be a previous version.</p> <p>Similarly, SoW page 15 again implies an earlier Phase-B ROM in the heading: 7 GNAO Deliverables... <u>Updated</u> Proposal for the Contract Phase B).</p>	An initial Phase B ROM is to be sent with the Phase A proposal (on January 7th), but an updated and more accurate version is required by the end of Phase A.
16	Does Gemini North already have estimates, assumptions or assessments regarding the Deformable Mirror and Wave Front Sensors?	Yes, we do have a concept, but it is not given because we do request the bidders to perform their complete flow down requirements to the components level in order not to constrain any design and leave open all possibilities to the bidder.
17	To the extent that these subsystems are expected to be major cost drivers, it	We do not have any preference, as we would like bidders to offer an AO design.

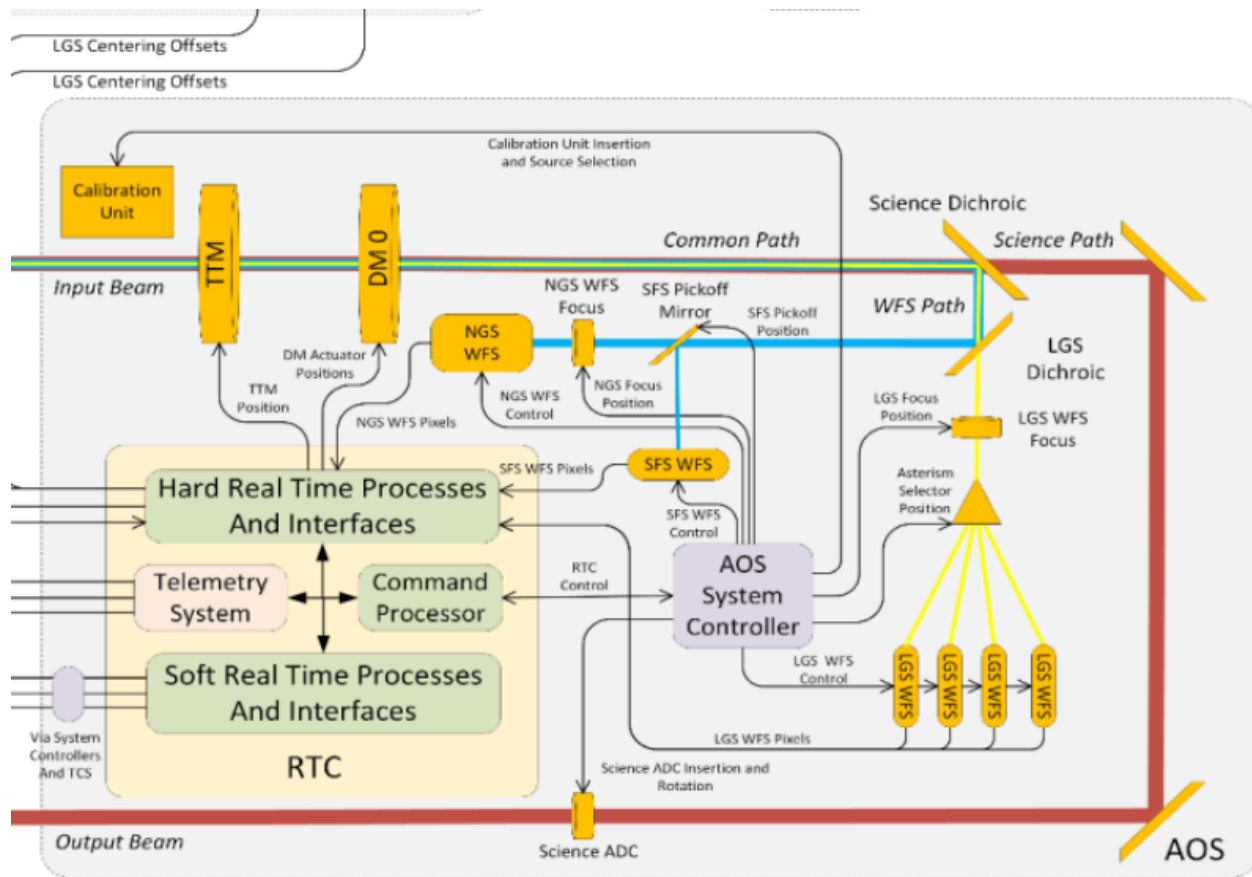
	would be helpful to know if Gemini North has indicative DM specifications (such as diameter, pitch, actuator count, stroke, etc.) and WFS type (Shack-Hartmann, Pyramid, other) in consideration.	But the simulation report provided under the “Applicable and Reference Documents” section on the AURA Bid Page ( <a href="https://auracas.aura-astronomy.org/procurement/aura-bid-opportunities/">https://auracas.aura-astronomy.org/procurement/aura-bid-opportunities/</a> ) gives insights into which AO dimensioning we have been considering.
18	Does the incentive fee for the Phase-B Contract necessarily include telescope time?	No.
19	The tender documents indicate the following: (see <a href="#">Figure 2. Ref for question ID#19 below</a> )  It would be helpful to know if this has any impact on scoring for the award, and to what extent this factor is important to GNAO.	No, the exclusion of telescope time will not impact the scoring.
20	Is it possible to provide a version of the Instructions to Bidders in either Word format or a PDF with Optical Character Recognition? The current version only allows images to be taken, which is inconvenient to provide the required responses from the bidders, with the details added.	Yes, this has been uploaded to the AURA Bid Page.
21	Will the national origin of partners/subcontractors, i.e. whether or not Gemini member states are included, have any impact in the proposal evaluation at either stage?	No, national origin is not part of the evaluation criteria for this procurement.
22	Would a wholesale rejection of AURA standard contract and use instead of our institution standard contract template be acceptable to AURA?	No, per the terms and conditions of AURA’s Cooperative Agreement with the NSF, AURA cannot accept an institute’s standard contract template. To remain compliant with



		<p>its Cooperative Agreement and ensuing procurement policies per 2 CFR 200 UNIFORM ADMINISTRATIVE REQUIREMENTS, COST PRINCIPLES, AND AUDIT REQUIREMENTS FOR FEDERAL AWARDS this request cannot be accepted. AURA's own Terms and Conditions are to be used in these procurements. There are some Terms and Conditions in AURA's contract template that might be negotiable. Requesting to use your own template in your submission would be deemed non-responsive.</p>
23	<p>Can you confirm there is no ceiling or guidance on price for the phase A work to be quoted and that the price for the construction is expected at the end of the phase A work from both selected vendors?</p>	<p>Yes, there is no ceiling or guidance on price for the phase A work.</p>
24	<p>Can you confirm the contract types for Phase A and Phase B</p>	<p>Phase A is a Cost Plus Fixed Fee Contract and Phase B is a Cost Plus Incentive Fee.</p> <p>Please see the Draft Contract.</p>
25	<p>Is it possible to switch primes between the NOI deadline and the proposal deadline?</p>	<p>Yes, it's possible.</p> <p>The Prime manages all subcontractors and is responsible for ensuring that the work is completed as defined in the contract.</p> <p>Gemini will evaluate the contractual relationship in the proposal rather than in the Notice of Intent (NoI). Therefore a team may change the prime between submitting the NoI and submitting the proposal.</p>
26	<p>We understand that we must include a Phase-B ROM with our Phase-A Offer. The Instructions to Tenderers, Section II. Proposal Form, subsection 1. (what to include), does not indicate that/where a Phase-B ROM should be included. Should that go in subsection 1.D. Other relevant information?</p>	<p>Yes, the Phase B ROM can be placed in subsection "1.D Other Relevant Information"</p>



27	Is it possible to add additional team members to a proposal who were not referenced in the Letter of Intent?	Yes, it is possible to add additional team members or consultants to your proposal that were not named in your letter of intent.
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Note: Components in Gold are on the Adaptive Optics Bench (AOB)

Note: Optical path and components on the AOB are shown for illustration only, the actual optical path and components will depend on AOB design

Figure 1. Ref for question ID#11.

- **Contract Phase B:** following a down-select, one team will continue with their design. The selected contractor, based on a **Cost-Plus Incentive**<sup>1</sup> contract, will progress to the Preliminary Design Stage followed by the Critical Design stage, before building, testing and integrating the AOB with the rest of the GNAO facility on the Gemini North Telescope. The Contract Phase B will include an Architectural Design Review (ADR), Preliminary Design Review (PDR), a Critical Design Review (CDR), the Factory Acceptance Test (FAT) review and On Site Acceptance Test (OAT) review.

<sup>1</sup> It is anticipated that incentive will include telescope time.

*Figure 2. Ref for question ID#19.*