UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS

PROJECT CALL
Announcement #: TEES/JHTO-RPP-2024-001
AMENDMENT 1 - July 24, 2024
AMENDMENT 2 - August 22, 2024

Project Call Release Date	July 23, 2024
Request for Project Proposal Questions Cutoff	September 13, 2024 (5:00PM EST)
Notice of Intent Deadline	October 11, 2024 (5:00PM EST)
Prototype Proposal Submission Deadline	November 15, 2024 (5:00 PM EST)
Agreement Award Notifications	February 13, 2025
Anticipated Project Start Date	July 1, 2025
Period of Performance	3 Years
Agreement Ceiling (Topics 1-4)	Approximately $1,500,000 over 3-year Period of Performance
Agreement Ceiling (Topic 5)	Approximately $9,000,000 over 3-year Period of Performance
Expected Agreement Classification	Controlled Unclassified Information

TO APPLY TO THIS PROJECT CALL, YOUR UNIVERSITY'S AUTHORIZED ORGANIZATIONAL REPRESENTATIVE WILL NEED TO HAVE AN ACCOUNT AND SUBMIT PROPOSAL DOCUMENTS THROUGH THE UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS WEBSITE: HTTPS://HYPERSONICS.TAMU.EDU

PROPOSALS WILL BE RECEIVED UNTIL THE ABOVE DEADLINE. IF YOU ENCOUNTER ANY ISSUES OR CONCERNS WITH YOUR SUBMISSION, PLEASE EMAIL: UCAH@TAMU.EDU. QUESTIONS REGARDING THE CONTENT OF THE REQUEST FOR PROPOSALS **MUST** BE SUBMITTED THROUGH THE UNIVERSITY CONSORTIUM FOR APPLIED HYPERSONICS WEBSITE.

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1. OVERVIEW

1.1 GENERAL INFORMATION

1.1.1 Request for Project Proposals Title

University Consortium for Applied Hypersonics (UCAH) Project Call, Announcement #: TEES/JHTO-RPP-2024-001.

1.1.2 AUTHORITY

10 U.S.C. § 4022, "Authority of the Department of Defense to Carry Out Certain Prototype Projects"

1.1.3 DESCRIPTION

The Office of the Under Secretary of Defense (OUSD), Research and Engineering (R&E) Joint Hypersonics Transition Office (JHTO), in partnership with Texas A&M Engineering Experiment Station (TEES) and the UCAH, is soliciting for Prototype Project Proposals (PPPs) supporting projects that will accelerate hypersonics technology development, develop the nation's future hypersonics workforce, and facilitate the transition of ready technologies into operational capabilities. The project topic descriptions are listed in Section 2 of this document. The JHTO reserves the right to fund none, some, or all the submissions made in response to this RPP. Furthermore, JHTO may choose to fund a portion of a submission or a combination of submissions. No funding for direct reimbursement of PPP development costs will be provided. Any references within this document to the UCAH website, specific to this RPP Project Call, will utilize the following website: https://hypersonics.tamu.edu/project-call/.

1.1.4 PERIOD OF PERFORMANCE

Three years from the agreement award date with an anticipated start date of July 1, 2025.

1.1.5 ESTIMATED PROJECT CEILING

Each Project Sub-Agreement (PSA) for Topics 1-4 will be approximately $1,500,000 over the 3-year period of performance. Topic 5 will be approximately $9,000,000 over the 3-year period of performance with an expectation of majority resources needed toward the end of Year 2 and Year 3.

1.1.6 CANDIDATE ELIGIBILITY

Candidate must be a University Consortium Member prior to submitting a Notice of Intent (NOI) and all personnel supporting the proposal must be approved prior to award, as described in Section 3.3.1 of this document. All Awardees will maintain their Consortium Membership in good standing for the duration of the PSA.

Affiliate Consortium Members are not eligible to respond to this RPP as the lead institution but may team with an eligible University Consortium Member and be funded accordingly. Affiliate Consortium Members include industry, laboratories, University-Affiliated Research Centers (UARCs), and Federally Funded Research and Development Centers (FFRDCs), U.S. Military Academies, and Universities (on a case-by-case basis) from Australia, Canada, New Zealand, and the United Kingdom. University Consortium
Candidates and team members are generally responsible for determining the extent to which their participation in PPP submissions is appropriate and consistent with their own entities' authorities and applicable laws, regulations, and policies. Submissions including an FFRDC, however, must include a statement from the FFRDC representing (1) that their participation in the competition is consistent with federal law and policy as well as their governing contract(s) (2) the rationale under which they are able participate in the competition given restrictions on FFRDCs competing with the private sector.

Candidates and teaming partners must be capable of safeguarding information and complying with export controls consistent with federal law and policy. Awarded PSAs are expected to include controlled unclassified information (CUI); export-controlled items or information subject to Arms Export Control Act, the

International Traffic in Arms Regulations, the Export Administration Act of 1979, as amended, and the Export Administration Regulations; and/or Distribution Statement C information.

As a general matter, all participants must be United States citizens. Participation of foreign member universities and individuals may be permitted on a case-by-case basis. However, a candidate and its teaming partners must be capable of complying with all safeguarding requirements and export controls associated with any such entities/individual's participation.

Candidates must disclose any actual or potential conflicts of interest. Failure to disclose a conflict of interest or conflicts of interest that cannot be satisfactorily mitigated may result in removal from the competition.

1.1.7 ADMINISTRATIVE AND EVALUATION SUPPORT

All submissions will be treated as "source selection information" as defined by 41 U.S.C. § 2101(7), and contents will be disclosed only in accordance with 41 U.S.C. § 2102. During the evaluation process, submissions may be handled by Government support contractors, TEES' personnel, and other Consortium Members for both administrative purposes and to support technical evaluations. Consortium Members that are proposing under this RPP will not be reviewers within the topic area that they proposed in. All persons performing these roles are expressly prohibited from performing sponsored technical research and are bound by appropriate nondisclosure agreements (NDAs).

1.1.8 KICK-OFF MEETING

Following the issuance of a PSA award, the Government will conduct a post-award orientation, or kick-off meeting, with the Awardee. The goal of this meeting is to ensure all parties fully understand the PSA terms and conditions, security requirements, inspection, acceptance, and invoicing procedures, and any other topics or requirements, as appropriate. NOTE: The kick-off meeting is not a substitute for Awardees to fully understand the requirements, nor is it to be used to alter the PSA.

1.1.9 ANNUAL TECHNOLOGY REVIEW

Each year, JHTO will hold an Annual Technology Review. The purpose of this event is to conduct a peer review of the current PSAs in an open technical environment. Attendance for current PSA Awardees is required. Attendees may come from current and former PSAs, academia, Government, and/or industry. JHTO will also hold an Annual Forum. Attendance at this event, although not required, is strongly encouraged.

1.1.10 DELIVERABLES

Each PSA, topic notwithstanding, shall submit the following:

a. Quarterly updates.
b. Annual reports for year 1 and year 2 of performance.
c. A final report covering all three years at project completion.
d. A Technical Data Package (TDP) to include, but not be limited to, the following items:
    i. All raw and filtered test data.
    ii. Algorithms, simulations, and models, including description documents and code for Government use.

Project Technology Areas may have additional deliverables included in their description.

2. TECHNOLOGY AREA DESCRIPTIONS

2.1 TOPIC 1: Rotating Detonation Engine Advancement

Introduction: The Joint Hypersonics Transition Office (JHTO) is soliciting innovative proposals in the topic area of scalable approaches for future propulsion systems. The specific area of interest is the development of manufacturing approaches, materials, and designs for future rotating detonation engines (RDEs) with a focus on scaling to commercially viable quantities. Proposals should identify end-to-end manufacturing approaches

of specific RDE designs and a detailed path to demonstrate the scalability of those approaches in a production environment.

Background: Airbreathing rotating detonation engines (RDEs) operate via detonation rather than deflagration, where the shock-flame combustion via detonation periodically increases the local fluid pressure and temperature, converting a greater fraction of the propellant chemical energy to thrust [1,2]. Fuel and air are continuously injected into a chamber. This mixture supplies a detonation wave that travels azimuthally around an annulus, which is formed between two components colloquially called the inner and outer body. The inner and outer bodies are subject to extreme temperatures and pressures, with elevated localizations in temperature and pressure stemming from the detonation waves [3]. Current designs incorporate active cooling for the inner and outer body components at the expense of significant weight and complexity. Additionally, the manufacturing approaches of the current components inhibit these systems from reaching production levels due to manufacturing processes that are limited in number of components that can be produced and the high cost. Novel materials, manufacturing approaches, and designs that could satisfy the system requirements without, for instance, requiring active cooling would be a major technological advancement.

Description and Scope: The objective of this work is to evaluate high-temperature, oxidation-resistant materials, manufacturing process, and design to produce components or full systems that are subsequently tested under relevant conditions (i.e. elevated temperature, fluid pressure, stress). Materials of interest include, but are not limited to, refractory metals, ceramics, composites, and coatings. Additionally, the manufacturing processes used to create these materials are also of interest. Due to the complex geometries and small high precision channels common in RDE designs, the manufacturing approaches will be a major consideration in the successful integration of a solution. Additionally, manufacturing approaches should be scalable to fabricate components (approximately 2-inch x 2-inch) in reasonable times and should be scalable for the production of many systems. It is expected that selected materials and manufacturing solutions will be used to fabricate a relevant subcomponent that will be produced and tested at a government testing facility. Additionally, a plan to demonstrate the feasibility of scaling the materials, process, and design to relevant quantities should be an integral part of the proposed approach.

Milestones / Deliverables: The following milestones are examples of desired technical progress in this research area:

- Evaluate, compare, and select relevant material, design, and manufacturing options to satisfy system operating conditions including temperature, pressure, and oxidation resistance requirements.
- Evaluate relevant manufacturing processes for the fabrication of components with the selected materials and it's scaling to relevant quantities.
- Fabricate a representative RDE component geometry for subsequent performance testing.

Milestones should be established that are commensurate with proposed schedule of deliverables. A successful technical outcome may lead to the opportunity to seek follow-on funding.

References:

[1] B. A. Rankin et al., "Overview of performance, application, and analysis of rotating detonation engine technologies," J. Propuls. Power, vol. 33, no. 1, pp. 131–143, 2017.
[2] I. J. Shaw et al., "A theoretical review of rotating detonation engines," Direct Numer. Simulations-An Introd. Appl., 2019.
[3] J. W. Bennewitz et al., "Experimental validation of rotating detonation for rocket propulsion," Sci. Rep., vol. 13, no. 1, p. 14204, 2023.

2.2 TOPIC 2: Durable seals for extreme environments

Introduction: The Joint Hypersonics Transition Office (JHTO) is soliciting innovative proposals in the topic area of high temperature seals. Rope seals are the most ubiquitous of high temperature seals available for the 1000 to 1500 °F environment applications. Their low cost, compact size, and low mass make their use ubiquitous in joint applications. Unfortunately, the fibers and filaments presently available have temperature and life limitations that are insufficient for application in future reusable systems.

Background: Seals capable of surviving exposure up to the ≥3000°F for the extended periods of time and thermal cycles are needed for propulsion systems in future reusable hypersonics. Hypersonic propulsion systems will require durable resilient seals that can operate in high heat flux, oxidizing environments and restrict the flow of hot gases at extreme temperatures. The first step in solving this challenge is to identify fiber or filament systems that are able to meet these thermal and environmental requirements and be fabricated into the appropriate geometries.

Description and Scope: The topic requests that prospective proposers develop and demonstrate either a new resultant fiber or filament, a surface treatment of a commercial fiber or filament, a coating on a commercial fiber or filament, or other approach to create a resultant fiber or filament that is capable of surviving the following conditions:

- Exposure to hot combustion gas temperatures of at least 3000°F without exhibiting unacceptable property degradation.
- Exposure to the above hot gases for at least 30 min without undue usable property degradation.
- Multiple exposures (≥5) to the above hot gases for the 30 min durations without undue usable property degradation.

The resulting fiber or filament system must strive to meet the above requirements while also being shown to be able to be fabricated into a relevant seal geometry, such as a rope seal with a circular cross-section (o-ring) with a diameter of at least 2 inches. Other seal geometries are of interest as long as they are relevant for the sealing of hypersonic systems and their components.

Milestones / Deliverables: The following milestones are examples of desired technical progress in this research area:

- Laboratory demonstration of rope or equivalent seal fabrication and material property characterization.
- Prediction of seal temperature dependent properties and lifetime predictions.

Milestones should be established that are commensurate with proposed schedule of deliverables. A successful technical outcome may lead to the opportunity to seek follow-on funding.

References:

Rajakkannu Mutharasan, Bruce Steinetz, Xiaoming Tao, Guang-Wu Du and Frank Ku, “Development Of Braided Rope Seals For Hypersonic Engine Applications: Flow Modeling.”, NASA Technical Memorandum 105942, pages 1-26, December 1992

2.3 TOPIC 3: Seeing through high-speed turbulence for EO seekers

Introduction: The Joint Hypersonics Transition Office (JHTO) is soliciting innovative proposals in the topic area of imaging through high-speed turbulence. The specific area of interest is developing approaches that mitigate the optical distortion of targets caused by the high speed, high temperature turbulent environment present near the surface of a hypersonic vehicle through hardware, software, or combined approaches. The size, weight, and power requirements for these systems should also be a significant consideration for system development and integration. Ideally, approaches should be broadly applicable across different hypersonic platforms including interceptor, boost-glide, and air-breathing cruise vehicles.

Background: Electro-optical seekers have proved challenging to integrate on hypersonic platforms, but they are needed to improve targeting accuracy and make critical course corrections. One of the key challenges facing electro-optical seekers is the extreme turbulence in the immediate region surrounding the hypersonic platform. The optical distortions produced by hypersonic turbulence often cannot be completely corrected due to a different character and temporal behavior than traditional atmospheric turbulence. In short, hypersonic aero effects exceed the bandwidth restrictions of traditional approaches. Recently, emerging adaptive optical techniques, high-speed wavefront sensing, high-quality, deep learning-based reconstruction techniques, and other computational imaging techniques have opened a path for guidestar-free imaging at frame rates faster than previously possible.

Description and Scope: Efforts that are responsive to this topic will conduct development and experimentation to produce a working prototype that can sense the turbulence between the sensor and the target and compensate for this rapidly evolving distortion at frame rates faster than can be accomplished with state-of-the-art optical techniques. Solutions will likely take the form of closed loop compensation of hypersonic aero effects in the 100 kHz regime or at lower frequencies combined with selective filtering. All visible or infrared wave bands are appropriate for use by the prototype system and it can be assumed the target is a bright, distant point object whose spectral character may be described by a blackbody of an appropriate temperature. Approaches will need to generate scenes of the distant point target distorted by simulated turbulence with the appropriate spatio-temporal character to test the proposed solution.

Milestones / Deliverables: The following milestones are examples of desired technical progress in this research area:

- Laboratory benchtop demonstration of the visible or infrared optical turbulence compensating system.
- Laboratory benchtop demonstration of the scene generator capable of presenting point targets distorted by simulated turbulence with the appropriate spatio-temporal characteristics of hypersonic flight.
- Analytical and experimental demonstration of potential system performance, size, weight and temperature operational limitations.

Milestones should be established that are commensurate with proposed schedule of deliverables. A successful technical outcome may lead to the opportunity to seek follow-on funding.

2.4 TOPIC 4: Directed Energy - Non-kinetic methods for integrated air and missile defense (IAMD)

Introduction: The Joint Hypersonics Transition Office (JHTO) is soliciting innovative proposals in the topic area of non-kinetic energy methods for the disruption of hypersonic missile systems. The specific area of interest is the application of compact, lightweight electromagnetic and particle sources that could be used to disrupt hypersonic systems and developing an understanding of the underlying physics of how various non kinetics interact with missile system electronics, penetrate seals and seams, and any other pertinent phenomenon.

Background: Modern integrated air and missile defense (IAMD) systems are capable of detecting, tracking, and potential interception of hypersonic and other missiles and aircraft despite their high speed and detection and tracking are typically done at long ranges with radio frequency (RF) radars. While kinetic approaches may be effective at providing defense solutions against these systems, the long standoff distances may also enable the use on non-kinetics approaches to achieve the same end goal. EM/particle radiation diminishes inversely proportional to the range squared from the aperture emitting the radiation so efficient application of EM/particle tools at the target are needed to provide sufficient standoff while achieving the desired effect.

Description and Scope: The objective of this topic is to develop innovative non-kinetic methods to potentially disrupt critical parts of the adversary hypersonic systems at sufficiently long ranges to enhance the probability of defeat. Of primary interest are approaches which first focus on developing an understanding of the interactions of non-kinetic systems with low average power levels of EM and/or particle radiation. Investigations should consider how best to couple the EM/particle radiation through a target's external structure, to enable efficient disruption, damage, and/or destruction of a vulnerable component. Investigations should utilize theoretical models, simulations, and experiments to find these vulnerabilities. Strong investigations would accommodate finding vulnerabilities in general classes of components found commonly in hypersonic systems and consider relevant common geometries and architectures experimentally. Of particular interest are approaches which have redundancy by interacting with multiple components or aspects of a hypersonic system to enhance the probability of desired effects.

Milestones / Deliverables: The following milestones are examples of desired technical progress in this research area:

- Demonstration of coupling, disruption, damage, and/or kill of critical components in a representative missile, sensor, and/or communication system in a laboratory or simulation environment.
- Analytical and experimental demonstration of effects and impact on potential effector system performance, size, weight, and temperature operational limitations.

Milestones should be established that are commensurate with proposed schedule of deliverables. A successful technical outcome may lead to the opportunity to seek follow-on funding.

2.5 TOPIC 5: UCAH 2024 Grand Challenge - Jet Interaction in Hypersonic Flight

Introduction: The Joint Hypersonics Transition Office (JHTO) is soliciting proposals for the design and delivery of a student-centric hypersonic jet interaction flight test experiment. This experiment seeks to expand the existing knowledge base regarding jet interaction phenomena and the correlation parameters relevant to Divert and Attitude Control Systems (DACS) performance. An important aspect of the experiment design is to enable improved correlation to computational and ground test methods. This grand challenge project must include teams of students and young professionals responsible for modeling, design, integration planning, and testing activities across multiple organizations, with mentoring from faculty, government, and industry partners.

Background: With the use of lateral thrusters for high-speed systems, jet interaction phenomena occur due to the interaction of the shock wave, boundary layer flow, and vortex flow. In hypersonic flight, flow separation and reactive exhaust can lead to divert force amplification or dampening and affect the accurate prediction of control forces. Computational analysis and testing in various wind tunnel facilities have shown that understanding jet interaction behavior requires more information on scaling parameters to accurately predict force amplification in flight.

Description and Scope: The output of this three-year effort will be the design, fabrication, preliminary testing, and delivery of a test article for integration with a launch vehicle. The test article may be an experiment for integration on a sounding rocket, a full representative front end, or another novel solution. Performers will work with an appropriate flight test launch provider to align requirements for flight regime, hardware and software integration, instrumentation, and data transmission. The integration requirements provided by the flight test launch provider will drive design, preliminary testing, and flight test planning. This effort is not required to include the execution of the flight test, or the following data analysis. However, the performers must present a clear methodology on how data collected during the flight test will be correlated to both existing and potential future computational and ground test data to enhance future predictive capabilities.

Efforts that are responsive to this topic will include a thorough explanation of how students will be deeply integrated into critical-path activities, the data to be gathered, and how it will positively impact future design and testing efforts. Final deliverables must include a thorough flight test plan, data analysis plan, and a methodology for correlating data to past and future ground test and computational results. Strong submissions will show the ability to manage a complex project and demonstrate impactful experiential workforce development.

Cost and Schedule: The schedule for delivery of the flight test article should not exceed three years. The total cost for this effort, to include delivery of the flight test article, should be appropriate for the scale of experiment being proposed, and must not exceed nine million dollars. The proposed payment schedule should align with major expenditures, such as preliminary testing and procurement. Performers should include a presentation of the proposed path to flight testing during a preliminary design review at month 20 and a critical design review of the flight test article at the end of the proposed period of performance. Long-lead items should be identified as part of the proposed payment schedule. The proposed cost and schedule are not required to include the physical integration of the test article onto the launch platform, the execution of the flight test, or the following data analysis.

Geometry Resources: Proposals may include experimental designs at any relevant scale and complexity. Proposers can request access to UCAH reference vehicles/geometries or select another geometry of interest.

Testbed Resources Available: Proposals may include integration with any relevant hypersonic test bed that meets the intent of the experiments. However, selected proposals will have access to the portfolio of

hypersonic testbeds operated by the Multi-service Advanced Capabilities for Hypersonic Test Beds (MACH-TB). Additional information provided below.

Mentorship: The selected team(s) will be provided access to mentorship resources and independent analysis from government appointed Subject Matter Experts to achieve the goals of this project, and proposals are encouraged to identify technical areas in which mentorship would especially be valued.

Milestones and Deliverables: The following milestones are examples of desired technical progress in this research area:

- Discovery of critical correlation parameters with a sensitivity analysis.
- Experiment design and reviews.
- Preliminary testing and reviews.
- Preliminary design review.
- Critical design review.
- Delivery of a flight test article.
- Flight test plan.
- Flight test data analysis plan.
- Ground test and modeling correlation methodology for future work.

MACH-TB Program: The MACH-TB testbeds are intended to cover the spectrum of envelopes that are deemed technically relevant by the community. A top-level summary of current testbeds can be seen in Attachment 1, "MACH-TB Portfolio". Architected to emulate services at the nations wind-tunnels, the intent is for the payload providers to deliver their test requirements, hardware, and integration funding - in return they will receive the data from an executed flight test at a fraction of the full flight test cost.

The planning and test design process requires several meetings between the payload providers and MACH-TB team to ensure that unique considerations in both safety and technical efficacy are being met. Of note, the payload is defined by the performer and can include science and technology experiments, critical subsystems, or entire front ends. Proposers are expected to budget for the integration costs of the experiment; not to exceed 1.0M. Proposers should justify the budgeted amount based on the experiment objectives and complexity. A detailed justification must be included in Volume I: Performance Work Statement or Volume VI: Pricing.

Selected proposals will receive a MACH-TB payload users guide, which will include interface definitions for the test beds, all of which are compliant with a Test Open Systems Architecture.

Attachment(s):
1. MACH-TB Portfolio

3. GENERAL SUBMISSION REQUIREMENTS

3.1 QUESTIONS

Questions regarding the Project Call may be emailed to UCAH@tamu.edu through **September 13, 2024 at 5:00 PM EST.** Answers to the questions will be posted on the UCAH website for this RPP Project Call. All questions and answers will be made available to all proposers unless they involve proprietary or CUI material.

3.2 SUBMISSION INSTRUCTIONS

Proposals shall be submitted through the UCAH website for this RPP Project Call. Proposals cannot be submitted before an organization is fully registered on the UCAH website. **The UCAH website is the single point for submission.**

3.3 ELIGIBILITY

3.3.1 NOTICE OF INTENT

In order to be eligible to submit a PPP for consideration, a PPP Notice of Intent (NOI) shall be submitted no later than **October 11, 2024 at 5:00 PM EST,** through the UCAH website for this RPP Project Call. The submitted NOI shall include, on a cover page, the Topic Number and a full list of participants to include: 1) each person anticipated to support the proposed project (listed with their name and current institutions/organization), and 2) all institutions, organizations, laboratories, etc. anticipated to support the proposed project.

3.3.2 PROTOTYPE PROJECT PROPOSALS

PPPs shall be submitted through the UCAH website for this RPP Project Call and shall be received no later than **November 15, 2024 at 5:00 PM EST**. Submissions received after the deadline will not be considered. Topics 1-4 PPP is limited to a maximum of four PIs and no university may exceed leading two PPPs. No university may submit more than one PPP for Topic 5, Grand Challenge.

The PPPs shall follow the format described in Section 3.4 of this document and will be evaluated based on the criteria described in Section 4 of this document.

3.4 FORMATTING

PPPs shall be submitted in accordance with the instructions described in this document. All submissions shall be in English.

- A page is defined as one 8.5" x 11" electronic page with 1" margins.
- The font shall be Times New Roman single-spaced and no smaller than 11-point font size. NOTE: Smaller font size may be used in figures and tables but must be legible.
- Pages shall be in portrait orientation, except for figures, graphs, images, and pictures.
- Figures and tables shall be numbered and, when referenced in the text, shall be referenced by that number. Figures and tables shall be of a size that is easily readable and may be in landscape orientation.
- Pages shall be numbered sequentially, and all major sections must begin on a new page.
- All PPP documents, to include a PDF version of the budget spreadsheets, shall be submitted as one PDF file.

For PPPs, the budget spreadsheet shall also be submitted as an excel document with formulas left available for evaluation purposes.

No classified information shall be submitted with the proposal. All information that is a trade secret or proprietary information must be marked as such. NOTE: Government support contractors, TEES' personnel, and other Consortium Members may have access to this information for the purposes of administrative support and/or evaluation(s). Each evaluator will be required to complete an NDA and certify they have no Conflict of Interest (COI) that might impact the review process.

3.5 DOCUMENTS CONTENT

The purpose of these instructions is to prescribe the structure of PPPs and describe the approach for the development and presentation of PPP information.

3.5.1 PROTOTYPE PROJECT PROPOSAL SUBMISSIONS

Use of the Proposal Template and RPP Budget Template provided on the UCAH website for this RPP Project Call is required. In accordance with the PPP templates, each PPP shall contain the following:

Cover Page (1 page maximum)

Participant List (1 page maximum)

The Participants List shall include the University Consortium Member Institution, Topic Number and a full list of participants to include: 1) each person included in the PPP (listed with their name and current institutions/organization) and 2) all institutions, organizations, laboratories, etc. included in the PPP. This is to help us screen for conflicts of interest in evaluations.

Table of Contents (1 page maximum)
The Table of Contents shall include all documents requested below in Volumes I-X below.

Volume I: Performance Work Statement (12 pages maximum)

a. Abstract
b. Objectives Statement
c. Research Narrative
    i. Background and Overview of Proposed Project
    ii. Technical approach, including clearly defined prototype solution
    iii. Schedule and Deliverables
d. Place(s) of Performance
e. Government Furnished Property/Equipment/Materials/High Performance Computing Requirements

Volume II: Bibliography and References (No page limit)

Volume III: Facilities (3 pages maximum)
The Facilities Volume shall address the following:

a. Identify any facilities required for the proposed solution and whether those facilities are organic to project participants' organization(s) or must be leased or purchased.
b. Indicate whether facility availability is likely to impact the project's cost/schedule/performance.

Volume IV: Key Participants (No page limit)
The Key Participants Volume shall address the following:

a. A resume for all listed Key Participants.
    i. Each resume shall be no more than two pages in length.
b. Description of significant contribution(s) to the proposed solution and what makes each significant.
c. The total level of effort, as a percentage of a 40-hour workweek, each participant will devote to this project.
d. Include all current and pending sponsored research projects for each PI.
e. A plan on how the candidate has addressed any potential or actual Conflicts of Interest.

Volume V: Security Requirements (No page limit)
The Security Requirement Volume shall address the following:

a. All participating universities and institutions shall be fully compliant with the following requirements:
    i. Capable of protecting CUI in accordance with the following DFARS clauses:
        1. DFARS 252.204-7012
        2. DFARS 252.204-7019
        3. DFARS 252.204-7020
        4. DFARS 252.204-7021
    ii. Registered with the Directorate of Defense Trade Controls (DDTC).
b. The PPP shall address any special security and classification requirements, as necessary. Awardees will have 90 days from the time the PSA is awarded to be fully compliant with applicable DFARS clauses.
c. Provide a CUI/export control data management plan to include how the lead university will collaborate with all sub awardees.

Volume VI: Pricing (No page limit)

The Pricing Volume shall address the following:

a. The proposed prices shall provide sufficient detail to substantiate that the prices presented in the proposal are reasonable and complete for the work proposed.
    i. The burden of demonstrating price reasonableness rests with the proposer.
    ii. An assessment that the proposal price is not reasonable may result in the proposal being non-selectable for award.
b. The Pricing section shall also include a narrative to provide justification and formulae used in establishing the pricing.
c. At least 51% of the estimated price shall directly fund Consortium Member(s).
d. For all team members that do not have Government-approved rates, their proposed rates shall represent fair market value rates.
    i. Labor Rates: Provide the basis for which the estimated total labor hours were calculated, including generic labor categories, estimated rates, and hours for those individuals.
    ii. Fringe Benefits: Provide the rates and calculation of the costs.
    iii. Annual Technology Review and Annual Forum: Provide the estimated costs for team travel for the Annual Technology Review and the Annual Forum.
    iv. Travel: All travel, including the Annual Technology Review and the Annual Forum, shall align with the Joint Travel Regulation (JTR). The proposed travel cost shall include the following for each anticipated trip:
        1. The purpose of the trip.
        2. Trip origin and destination (if known).
        3. Approximate duration of the trip.
        4. The number of travelers.
        5. The estimated cost per trip (including mileage, parking, baggage costs, etc.).
    v. Materials and Supplies: Provide a list of the materials/equipment required to meet the technical approach and the estimated cost.
    vi. Sub-Agreements/Subcontracts: Provide a description of the work to be performed by the subrecipient/subcontractor and associated costs. For each PSA, a detailed cost proposal is required to be submitted by the subrecipient(s).
    vii. Recipient Acquired Equipment or Facilities: Equipment and/or facilities are normally furnished by the Recipient. If acquisition of equipment and/or facilities is proposed, a justification for the purchase of the items shall be provided. Provide an itemized list of all equipment and/ or facilities costs and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists). Allowable items normally would be limited to research equipment not already available for the project. General purpose equipment (i.e., equipment not used exclusively for research, scientific or other technical activities, such as personal computers, laptops, office equipment) shall not be requested unless they will be used primarily or exclusively for the project. For computer/laptop purchases and other general-purpose equipment, if proposed, include a statement indicating how each item of equipment will be integrated into the program or used as an integral part of the proposed project.
    viii. Other Direct Costs – Provide an itemized list of all remaining proposed other direct costs, such as laboratory fees, report and publication costs, and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).
    ix. Indirect Costs: Provide an estimate of the total indirect costs and provide data supporting how the estimate was calculated, including any estimated costs other than the labor and material equipment, i.e., overhead, G&A, etc.
e. Government partners/subawards: Indicate if the government partner will be funded as a subaward by the university or government to government funding process (e.g.: MIPR, IAA, etc…). If funding is provided via government to government, indirect costs are not allowed.

Volume VII: Milestone Payment Schedule (1 page maximum)

The Milestone Payment Schedule Volume shall address the following:

a. Each PPP shall have a defined project schedule.
b. The Milestone Payment Schedule shall include the payable events for the prototype project.
c. Each event shall include a description and proposed price for the event.

Volume VIII: Affirmation of Business Status Certification (No page limit)

The Affirmation of Business Status Certification Volume shall address the following:

a. A certification for each institution shall be included in the PPP.
    i. Name of Business Entity
    ii. Proposed NAICS Code
    iii. Cage Code
    iv. SAM Expiration Date
    v. Address
    vi. Business POC Name, Title, Phone and Email

Volume IX: Data Rights Assertions (No page limit)

The Data Rights Assertions Volume shall address the following:

a. Identify any intellectual property, patents and inventions in the proposed solution and associated restrictions on JHTO/the Government's use of that intellectual property, patents and inventions. If the offeror intends to provide IP without restriction and has no assertions, state no restrictions are being asserted for IP/Data Rights.
b. The following information shall be presented for all assertions:
    i. Technical data, computer software, or patents to be furnished with restriction (If the assertion is applicable to items, components, or processes developed at private expense, identify both the data and each such item, component, or process).
    ii. Basis for assertion (Generally, the development of an item, component, or process at private expense, either exclusively or partially is the only basis for asserting restrictions on the Government's rights to use, release, or disclose Technical Data pertaining to such items, components, or processes. Indicate whether development was exclusively or partially at private expense. If development was not at private expense, enter the specific reason for asserting that the Government's rights shall be restricted).
    iii. Asserted rights category (limited rights, restricted rights, Government purpose rights, special license, commercial license, or unlimited rights). For "special license" rights, please elaborate.
    iv. Name of entity asserting restrictions (corporation, individual, or other person, as appropriate).

Volume X: Appendices (4 pages maximum)

The Appendices Volume shall address the following:

a. Include any supplementary material that may be helpful in providing a more comprehensive understanding of the proposal. Information included in the appendices will not be used for evaluation purposes.

4. AWARD

4.1 EVALUATION CRITERIA

4.1.1 Prototype Project Proposal Criteria

4.1.2 PPPs will be evaluated using the criteria listed below.

1. **Contribution to workforce development**. The plan maximizes student involvement using numerous students from various degree levels and fields of study, assignment of students to meaningful work, and exposure and integration of students with partnering organizations.

2. **Soundness of the proposed approach**. A detailed and achievable technical plan is proposed which provides new or novel contributions toward the topic or subtopic solution. Appropriate analysis, design, and testing under relevant conditions is specified. Technical risks are well-defined and realistic mitigations are provided. Deliverables and milestones are outlined and clearly presented in a project plan.
3. **Potential for the solution to transition**. The proposal outline an achievable pathway for adoption into operational Government or private sector application. Thoughtful technology maturation and transition planning is bolstered by active coordination with transition stakeholder organizations to ensure buy-in.
4. **Qualifications of the investigators**. The proposed principal/key investigators, supporting staff, and consultants have relevant past performance and expertise in all relevant disciplines of the technical solution. The team is qualified to manage a project of this scale and complexity, perform the stated research and development, and transition the results.
5. **Reasonableness of the Cost Proposal.** Proposed price and cost elements are realistic for the work to be performed, reflect a clear understanding of the requirements, and are consistent with the unique methods of performance and materials described in the technical proposal. Cost elements shall include travel, materials, supplies, equipment, facilities, and other direct costs, if applicable. Distribution of funding to consortium members (i.e. at least 51% of the total proposed price)

4.2 BASIS FOR AWARD

4.2.1 Prototype Project Proposal Evaluation Process

PPPs will be evaluated independently, based on the evaluation criteria in Section 4.1.2 of this document, not against any other PPPs. The Government reserves the right to award all, some or none of the PPPs submitted. All submissions will be fairly evaluated; however, the Government reserves the right to limit the number of PPPs selected for PSA awards. Additionally, after evaluation, the Government may request and recommend a partnership between two or more submitted PPPs, which may include all elements or selected elements of those PPPs. Should the Government choose to do this, JHTO will provide direction that will enable the PPP leads to pursue a PSA that will meet the requirements of the technology area.

All PPP submissions will be valid for 365 calendar days. Upon completion of evaluations, the JHTO will notify the PPP lead that: (1) the proposed solution has been selected to pursue the award of a PSA, (2) the proposed solution is not of interest or (3) the proposed solution is of interest but has not been selected to pursue the award of a PSA and will be held for 365 days.

In the event additional funding becomes available, a PPP lead may be contacted within 365 calendar days from the PPP submission date with the possibility of a PSA. If after 365 calendar days from the PPP submission date (or earlier if notified by JHTO), the PPP lead has not been contacted to formally move to a PSA award, the PPP will no longer be eligible for an award under this RPP Project Call.

MACH-TB Program Scope

Novel Flight Experiments (NFE)		Sub-Scale Testing (SST)	Full-Scale Testing (FST)		
Mach 3-7	Mach 15-30+	Mach 5 – Mach 15+	Mach 5 – Mach 15+		
Air-Launched Recoverable	**Re-Entry Vehicle Recoverable**	**Sounding Rockets**	**RocketLab Electron Launch Vehicle**		
Stratolaunch Talon-A • WDL • Materials • Inlet Flow	**Varda** TPS	**Sandia Peraton Corvid Kratos XBow** • Sensors • Materials • Communications • Controls	**Dynetics Experimental Glide Body (EGB)**	**Experimental Cruiser (EC)**	**Stakeholder Defined Front-End Experiments**
					

Experiments and Data Collects will be Integrated Across the Portfolio