



Human Landing System
NextSTEP-2 Appendix H

BAA DRAFT #2

Virtual Industry Forum
3 September 2019

HLS Broad Agency Announcement (BAA) Draft #2 Industry Forum Agenda



Time (ET)	Topic	Speaker
1:00	Welcome and Introductions	JENA ROWE Office of Communications (NASA MSFC)
1:05	Appendix H Solicitation – Updates, Areas of Requested Feedback	DR. LISA WATSON-MORGAN Program Manager, Human Landing System (NASA MSFC) —and— NANTEL SUZUKI Program Executive, Human Landing System (NASA HQ)
2:15	Q&A	All



- **Provide an update on NASA's Human Lunar Exploration Planning**
- **Provide an overview of NASA's HLS NextSTEP-2 Appendix H BAA Draft #2, released on August 30, 2019**
 - Seeks comments from U.S. industry on the development of an integrated Human Landing System for the Artemis program that will land the first woman and next man on the Moon in 2024.
 - Draft #2 solicitation available at:
<https://www.fbo.gov/notices/cd53a248201b96671d9599dd268fdc47>
 - Additional information available at:
<https://www.nasa.gov/nextstep/humanlander2>
- **Address questions from potential Appendix H respondents on the updates after the first draft**



Forum Ground Rules

- **This forum is being recorded for purposes of capturing questions and answers.**
- **NASA will address questions during this forum to clarify the content of the Announcement.**
- **Participants may submit questions by:**
 - Pressing *1 on the phone
 - Submitting via text to WebEx Chat (to All Participants or to "Host," NASA HQ)
- **Media should direct all questions in writing to:**
 - Gina Anderson, NASA HQ Public Affairs Officer, at gina.n.anderson@nasa.gov AND
 - Jenalene Rowe, NASA MSFC Office of Communications, at jenalane.rowe@nasa.gov
- **NASA will not provide evaluations, opinions, or recommendations regarding any suggested approaches or concepts**
- **Following this forum, NASA will post an Industry Attendance list for partnering purposes.**
 - Send an email to HQ-HLS-BAA@mail.nasa.gov by Wednesday, September 4, 2019 if you do not want to be included on the participant list. NASA will post the attendance list on Thursday, September 5, 2019.



**Appendix H BAA Draft #2 Updates
and Areas of Requested Feedback**

**DR. LISA WATSON-MORGAN and
NANTEL SUZUKI**

Artemis Phase 1: To the Lunar Surface by 2024

Artemis 1: First human spacecraft to the Moon in the 21st century

Artemis 2: First humans to orbit the Moon in the 21st century

Artemis Support Mission: First high power Solar Electric Propulsion (SEP) system

Artemis Support Mission: First pressurized module delivered to Gateway

Artemis Support Mission(s): Human Lander System delivered to Gateway

Artemis 3: Crewed mission to Gateway and lunar surface

Commercial Lunar Payload Services

- CLPS delivered science and technology payloads

Early South Pole Mission(s)

- First robotic landing on eventual human lunar return and ISRU site
- First ground truth of polar crater volatiles

Large-Scale Cargo Lander

- Increased capabilities for science and technology payloads

Humans on the Moon - 21st Century

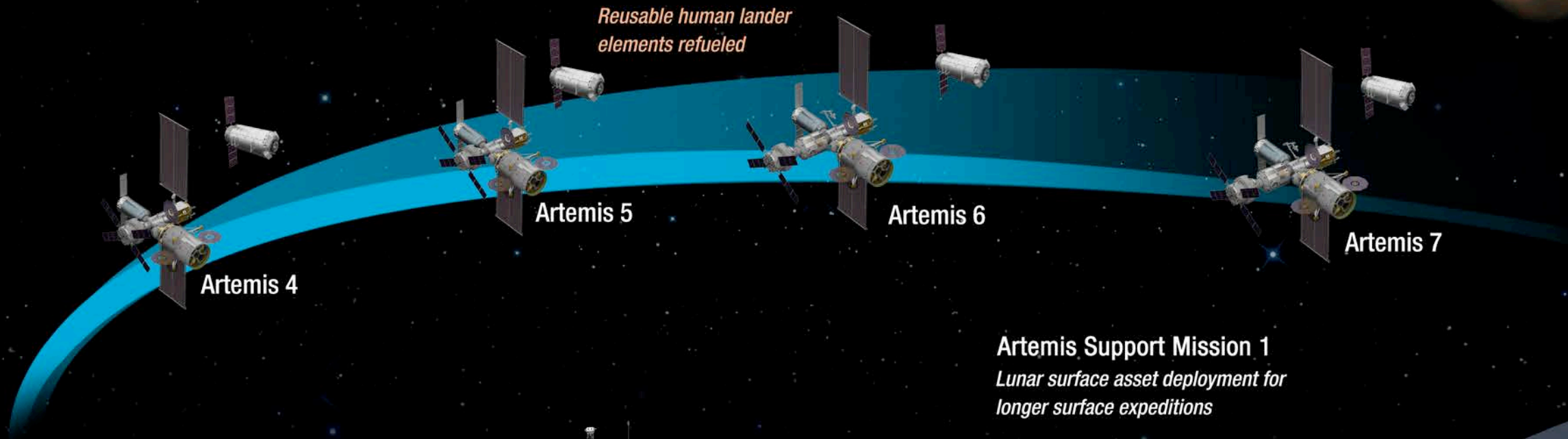
First crew leverages infrastructure left behind by previous missions

LUNAR SOUTH POLE TARGET SITE

2019

2024

Artemis Phase 2: Building Capabilities for Mars Missions



SUSTAINABLE LUNAR ORBIT STAGING CAPABILITY AND SURFACE EXPLORATION

MULTIPLE SCIENCE AND CARGO PAYLOADS

INTERNATIONAL PARTNERSHIP OPPORTUNITES

TECHNOLOGY AND OPERATIONS DEMONSTRATIONS FOR MARS

2025

2029

HLS Appendix H BAA Draft #2 Intent



- Industry feedback on BAA Draft #1 received Aug 2, 2019 (over 800 comments)
- BAA Draft #2 is also being issued as a Request for Information (RFI)
- NASA is close to finalizing this procurement
- The draft BAA provides opportunity for industry to identify areas of ambiguity, inconsistency, or other material concerns
- NASA intends to issue the final BAA with a final model contract and award HLS contracts without conducting post-selection negotiations. Furthermore, while NASA reserves the right to conduct exchanges with offerors during the HLS BAA procurement, and may decide to do so on limited technical areas, it is the Agency's intention not to conduct such exchanges and to award contracts on initial proposals.
- NASA encourages offerors to take advantage of the unique opportunity presented through this draft BAA to give all necessary feedback to NASA before the terms and conditions of the HLS solicitation are finalized.
- It is critical that all questions are raised during this draft BAA phase of the procurement
- Industry responses due by 5pm CT on September 6, 2019
- Follow-on schedule depends on the nature and extent of industry responses, but NASA intends to release the actual Appendix H BAA solicitation by early autumn 2019

Appendix H BAA Draft #2 Documents

(as issued 8-30-2019 and updated 9-4-2019)



Appendix H BAA Main Body

Omnibus BAA

Cover Letter

Cover Letter Attachment - Requirement Feedback template

Attachment A - Reference Library

Attachment B - NASA Centers Points of Contact

Attachment C - Quad Chart Template

Attachment D - Corporate Contribution Worksheet

Attachment E - Model Contract

Attachment F - HLS Requirements

Attachment G - Statement of Work (SOW)

Attachment H - Data Procurement Document (List of DRDs)

Attachment I - GFE/GFP List

Attachment J - Design and Performance Metrics Tables

Attachment K - Reserved

Attachment L - Reserved

Attachment M - Reserved

Attachment N - Reserved

Attachment O - Milestone Acceptance Criteria and Payment Schedule

Attachment P - Pricing Template

Attachment Q - Government Task Agreement Template

A1 – HLS Concept of Operations

A2 – Referenced Standards & Documents

A3 – Interoperability Standards

A4 – NASA Capabilities

A5 – Orion Parameters for HLS Mission Design

A6 – Physical Capabilities and Characteristics

A7 – Gateway, ESD (SLS/Orion), Suit Info

A8 – HLS Communications Info (Gateway, Freq. Allocations)

A9 – NASA Space Comm & Nav (SCaN) Services

A10 – Elliptical Polar Orbit White Paper

A11 – Global Access White Paper

A12 – HLS DAC2 Architecture Analyses of Alternatives

A13 – Net Habitable Volume and Internal Layout Considerations

A14 – Surface Mission Duration Sensitivity White Paper

A15 – HLS Required Reviews

A16 – NRHO Reference Trajectory White Paper

A17 – HLS Manual Control and Windows White Paper



- **With this BAA, NASA seeks firm fixed-price, milestone-based proposal(s) to enable rapid development and 2024 crewed flight demonstrations of the HLS**
- **NASA anticipates funding the DDT&E necessary to evolve one or more contractors' initial HLS designs for a 2026 flight demonstration of a sustainable HLS**
 - Sustainable capabilities include: Operations and survival in periods of darkness (e.g. eclipse periods); Longer duration EVAs; Increased cargo transportation mass, both from and to Gateway; 4-crewmember missions; Global access (access to polar and equatorial regions); Long-term affordability.
- **NASA will not take ownership of the Integrated Lander**
 - NASA will take ownership of an active-active docking adapter to enable HLS docking with the Gateway
- **NASA has structured this solicitation for award of contracts with the following CLINs:**
 - Base CLIN: Contract award (anticipated to be approximately Dec 2019) through 9 months
 - Note: the scope of 2026 work allowed in Base period is limited to Design, and NOT long lead procurement for 2026.
 - Only long-lead items supporting the 2024 demonstration mission are allowed during Base period (long-lead for 2024 or 2026 can be proposed during Option A or Option B).
 - Option A CLIN: October 2020 through 2024 flight demonstration
 - Option B CLIN: Approximately 2024 HLS CDR through 2026 flight demonstration
- **Initial proposals shall include a firm-fixed-price (FFP) for the Base period and Option A period, and no price for the Option B period (to be priced at a later date).**



The overarching goals of the Base CLIN period include:

- Completion of a Certification Baseline Review (ATP+ 3 months):
Verification statements for NASA provided system requirements are baselined; Decomposition of lower-level requirements from the system requirements is assessed. Agreement is reached on alternate standards that meet or exceed NASA-provided standards
- Completion of a Continuation Review (ATP+ 6 months):
Presentation of matured Offeror design concepts. In support of the Continuation Review, NASA will provide guidance on delivery of these matured design concepts and development approaches, as well as guidance on delivery of an adjusted FFP if an adjustment is required to reflect the Offeror's updated design and approach.
- Acquisition of long-lead items supporting the 2024 demonstration mission during the Base period will be permitted. Similarly, risk-reduction design work in direct support of a potential 2026 HLS performed during the Base period will be permitted.

Notional Acquisition Timeline



HLS Requirements Document Restructure



- **New Structure:**
 - **Section 3: HLS Program Objectives**
 - **Section 4: HLS Functional and Performance Requirements**
 - **Appendix A: Interfaces (HLS to Gateway, Mission Systems, Suits, Active Docking Adaptor)**
 - **Appendix B: Safety, Reliability, and Maintainability**
 - **Appendix C: Crewed Systems**
 - **Appendix D: Standards**
- Offerors shall develop unique, innovative, and cost-effective HLS solutions that achieve NASA's overarching objectives while meeting its required performance objectives.
- Appendix A through D set forth a potential approach for how NASA would normally design, build, certify, and operate an HLS. These are offered as a starting point for the Offeror's proposal, which will be evaluated on technical approach to design, build, certify, and operate an HLS. The Offeror's proposal shall:
 - Demonstrate that the proposal meets or exceeds the NASA standards;
 - Employ an alternative approach which the Offeror asserts is equivalent (i.e., a "meets the intent of" NASA approach); and/or
 - On a case-by-case basis, provide an approach that does not meet a particular NASA standard or its intent, but results in a demonstrably better approach that is more likely to achieve one or more of NASA's overarching objectives and functional performance requirements.
- NASA will work with each HLS Contractor during the contract's base period to arrive at a unique, final set of agreed-to HLS specifications and standards that each Contractor will be required to meet if the Contractor is awarded an Option A CLIN. If these revisions support an increase or decrease to the Offeror's originally-proposed firm fixed price for the Option A CLIN, NASA will permit the Contractor to submit an updated firm fixed price for Option A before NASA evaluates whether to award Option A to the Contractor.

HLS Program Objectives for 2024



Identifier	Title	Statement
HLS- obj-001	HLS Crew Size - Initial	The initial HLS shall support a minimum of 2 crew (1,000 kg includes 2 suits, Crew & Equip)
HLS-obj-002	HLS Habitation Capability	The HLS shall provide a habitable environment for 2 crew for 8 days in duration w/out pre-emplaced surface infrastructure
HLS-obj-003	Crew Transfer	The HLS shall accommodate the transfer of crew between HLS and Gateway for lunar surface missions
HLS-obj-004	HLS Automated Docking	The HLS shall provide automated rendezvous and dock with Gateway
HLS-obj-005	HLS Sustainability	Beyond the initial HLS missions, the HLS shall support sustainable presence on the Moon by providing a regular cadence of reliable transportation services for humans and cargo.
HLS-obj-006	Surface Access-Initial	The HLS shall provide transfer of crew between the Gateway and the South Pole and from the South Pole to the Gateway
HLS-obj-007	HLS Operations – Initial	The HLS shall operate in daylight conditions
HLS-obj-008	HLS Automated Operations	The HLS shall provide the capability to perform automated transfers btwn Gateway and the lunar surface
HLS-Obj-009	Surface Experiment and Technology Demonstration	The HLS shall accommodate at least 100kg of return mass to Gateway
HLS-obj-0010	EVA Capability	The HLS shall provide the capability for EVA operations on the lunar surface
HLS-obj-0011	HLS Human Performance Capability (New)	The HLS shall provide vehicle design and capabilities to enable effective and efficient crew performance throughout the mission

HLS Appendix H Draft BAA: Payment Milestones Approach: (Base CLIN)



Base CLIN Milestones								
Milestone Type	Milestone	Objective	Acceptance Criteria	Completion Due Date		Proposed Completion Date	Payment Limits	Payment Amount (\$K)
				Relative	Calendar			
Proposed Interim				N/A	N/A		N/A	
Mandatory Interim	Certification Baseline Review (CBR)	Ref. SOW Section 4.3 (Milestone Reviews)	TBD. To be incorporated into Review Plan (DRD 1665MA-002). Suggested criteria included in BAA Reference Library, Attachment A15 (HLS Required Reviews).	ATP+3 months	Mar 2020 (approximate, assuming ATP Dec 2019)		None	
Delivery	Continuation Review	Ref. SOW Section 4.3 (Milestone Reviews)	TBD. To be incorporated into Review Plan (DRD 1665MA-002). Suggested criteria included in BAA Reference Library, Attachment A15 (HLS Required Reviews).	ATP+6 months	Jun 2020 (approximate, assuming ATP Dec 2019)		At least 10% of the total Base CLIN price (per FAR Requirement)	

HLS App. H Draft BAA: Payment Milestones Approach: (Option A CLIN)



Option A CLIN Milestones								
Milestone Type	Milestone	Objective	Acceptance Criteria	Completion Due Date		Proposed Completion Date	Payment Limits	Payment Amount (\$K)
				Relative	Calendar			
Proposed Interim				N/A	N/A		N/A	
Mandatory Interim	Critical Design Review (CDR)	Ref. SOW Section 4.3 (Milestone Reviews)	TBD. To be incorporated into Review Plan (DRD 1665MA-002). Suggested criteria included in BAA Reference Library, Attachment A15 (HLS Required Reviews).	Coincident with Continuation Review or between Continuation Review and DCR/MIR	TBD		None	
Mandatory Interim	Design Certification Review (DCR) and Mission Integration Review (MIR)	Ref. SOW Section 4.3 (Milestone Reviews)	TBD. To be incorporated into Review Plan (DRD 1665MA-002). Suggested criteria included in BAA Reference Library, Attachment A15 (HLS Required Reviews).	9 months before first HLS element launch (L-9)	TBD		None	
Mandatory Interim	Checkout in Lunar Near Rectilinear Halo Orbit	Verify the HLS systems health for all separately launched HLS elements. Ref. SOW Section 4.3 (Milestone Reviews) and Section 5.6 (Assembly, Integration, and Test).	TBD. To be incorporated into Assembly, Integration, and Test (AI&T) Plan (DRD 1665SE-004).	Prior to HLS operation within Gateway vicinity (approach ellipsoid)	TBD		None	
Delivery	Post-Mission Assessment Review	Ref. SOW Section 4.3 (Milestone Reviews)	TBD	HLS Demo Mission Completion + 1 month	Jan 2025		At least 10% of the total Option A CLIN price (per FAR Requirement)	

BAA Evaluation Criteria



- **3 evaluation factors in descending order of importance:**
 - Technical Approach
 - Management Approach
 - Price
- **Technical Approach is more important than Management Approach which is more important than Price**
- **Evaluation for Exercise of Options**

Evaluation Factor	Area of Focus
Factor 1: Technical Approach	Technical Design Concept
	Development and Schedule
	Verification, Validation, and Certification
	Insight
	Launch and Mission Operations
	Sustainability
Factor 2: Management Approach	Organization and Management
	Schedule Management
	Risk Reduction
	Commercial Approach
	Past Performance
	Small Business Subcontracting Plan
	Data Rights
Factor 3: Total Evaluated Price	No focus areas

- NASA is currently planning to award Option A period CLINs to up to two of the Base period contractors
For option A evaluation, NASA will evaluate the following:
 - The Offeror’s proposal, updated from the base period proposal as needed to respond to final, agreed-upon standards as established with NASA during the Base period;
 - The Offeror’s FFP for Option A, updated from the Option A FFP initially offered as needed to reflect the final, agreed-upon specifications, interfaces, and standards as established with NASA during the Base period; and
 - The Offeror’s performance during the base period (“past performance”).
- NASA is currently planning to award Option B period CLINs to up to two of the Option A period contractors.

HLS Appendix H Deliverables (1 of 2)

Count Reduced from 116 to 31



DRD Number	Data Type	Title	Proposal	BASE CLIN		OPTION A		
				CBR	CR	CDR	DCR/ MIR	FRR/ ORR
1665CD-001	3	Technology Reports	Immediately or within 3 months of identification of reportable items; Interim NTSR at ATP+12 months; Final NTSR Within 3 months after completion of work					
1665CM-001	3	Integrated Lander Final Design Data Package	Delivery of Design Data Package at Post Mission Assessment Review					
1665DE-001	3	Design Data Book		Initial	Update	Update	Update	Update
1665DE-002	3	Integrated Systems Performance Analysis		Draft	Update	Initial	Baseline	
1665HS-001	2/3	Human Error Analysis (HEA) Plan		Draft 45 days prior	Update 45 days prior	Baseline 45 days prior	Update 45 days prior	Update 45 days prior
1665LV-001	3	Launch Vehicle/ Spacecraft Interface Control Document (ICD) and Verification Matrix	Contractor Proposed					
1665LV-002	3	Mission Specific Drawings	Contractor Proposed					
1665LV-003	3	Launch Vehicle/ Spacecraft Integrated Procedures	Contractor Proposed					
1665LV-004	3	Performance and Guidance Accuracy Analysis (PGAA)	Contractor Proposed					
1665LV-005	2	Technical and Readiness Reviews	Contractor Proposed					
1665MA-001	1	Insight Implementation Plan	Preliminary	Baseline ATP+60 days				
1665MA-002	1	Review Plan	Initial Baseline ATP+30 days	CBR Plan 45 days Prior	Update 45 days prior	Update 45 days prior	Update 45 days prior	
1665MA-003	1	Integrated Master Schedule	Summary Schedule	Initial ATP+30 days	Update	Update	Update	Update
1665MA-004	1	Risk Management Plan and Risk Reports	Initial	Baseline	Risk Reports	Risk Reports	Risk Reports	Risk Reports
1665MA-005	3	Final Scientific and Technical Report	30 days completion of contract; one time submittal					
1665MP-001	1	Orbital Debris Assessment Reports (ODARs) and End of Mission Plan (EOMP)	Initial		90 days prior	90 days prior		Final: 90 days prior to SMSR Prelaunch: 30 days prior to SMSR
1665OP-001	2	Flight Software Simulator			Initial	Final	Update	

HLS Appendix H Deliverables (2 of 2)

Count Reduced from 116 to 31



DRD Number	Data Type	Title	Proposal	BASE CLIN		OPTION A		
				CBR	CR	CDR	DCR/ MIR	FRR/ ORR
1665OP-002	2	Integrated Operations Training	Draft	Initial	Baseline	Update	Update	
1665OP-003	3	Mission Operations and Mission Systems Plan	Draft	Baseline	Update	Update	Update	
1665SA-001	1	System Safety Assessment Reports (SSAR)		PHL 30 days prior	Draft PHR 30 days prior	Update PHR 30 days prior	Baseline HR 30 days prior	Final HR 30 days prior
1665SA-002	2	Safety and Mission Assurance (SMA) Plan	Initial	Baseline CBR +30 days				
1665SA-003	2	Mishap Preparedness and Contingency Plan (MPCP)			Draft	Baseline CDR +30 days		
1665SA-004	3	Micrometeoroid Orbital Debris (MMOD) Report		Initial 30 days prior		Update 30 days prior	Final 30 days prior	
1665SE-001	1	HLS Integrated Lander System Requirements Document		Baseline	Update	Update		
1665SE-002	1	Verification, Validation, and Certification Plan	Draft	Baseline	Update	Update	Update	
1665SE-003	1	Detailed Verification Objectives and Verification Closure Notices	Draft DVOs		Initial DVOs Draft VCNs	Baseline DVOs Update VCNs	VCNs NLT 45 days prior	
1665SE-004	2	Assembly, Integration and Test Plan		Initial	Baseline	Update		
1665SE-005	2	Human Lander System (HLS) GNC Simulator Specification		Initial	Baseline	Final		
1665SE-006	3	Avionics Emulator and Acceptance Data Package			Initial	Baseline	Update	
1665SW-001	2	Software Verification, Validation, and Certification Plan		Initial	Baseline			
1665SW-002	2	Software Plan (SP)	Initial ATP +30 days	Baseline				



HLS Appendix H Draft BAA: Corporate Contributions

- **Offerors may demonstrate a commitment to the public-private partnership formed under this BAA by providing a Corporate Resource Contribution, with supporting documentation.**
- **Corporate contributions are not an eligibility requirement**

HLS Appendix H Draft BAA: Significant Changes to Model Contract (1 of 2)



Clauses Affected	Nature of Change
MSFC 52.216-90 IDIQ CONTRACT VALUE BY PERIOD OF PERFORMANCE	Revised IDIQ values; removed Option B reference
GOVERNMENT INSIGHT	Revised to clarify rights in data; edited for organization and clarity
USE OF GOVERNMENT RESOURCES	Changed from two types of GTAs to one; changed the definition of collaboration
DOMESTIC SOURCE REQUIREMENTS	Removed references to major and minor subcontractors. Clarified that domestic end product requirements apply to all space transportation vehicles.
MARKING REQUIREMENTS FOR TECHNICAL DATA AND COMPUTER SOFTWARE	Moved this content from the first draft of the 52.227-14 (Deviated) clause
CONTRACTOR WARRANTY OF DATA	New clause
CONTRACTOR DISCLOSURE OF INFORMATION	New clause
LIMITATIONS ON THE USE OR DISCLOSURE OF GOVERNMENT-FURNISHED INFORMATION MARKED WITH RESTRICTIVE LEGENDS	New clause
VALIDATION AND CHALLENGE PROCEDURES FOR TECHNICAL DATA AND COMPUTER SOFTWARE	Moved this content from the first draft of the 52.227-14 (Deviated) clause
52.227-14 RIGHTS IN DATA—GENERAL (MAY 2014) (DEVIATED)	Moved “technical data that are necessary for installation, operation, maintenance, or training purposes (other than detailed manufacturing or process data)” from GPR to unlimited rights; added (b)(3)(iii) to establish that the Contractor has the exclusive right, including the right to license others, to use for any commercial purpose computer software..

HLS Appendix H Draft BAA: Significant Changes to Model Contract (2 of 2)



Clauses Affected	Nature of Change
1852.228-76 CROSS-WAIVER OF LIABILITY FOR INTERNATIONAL SPACE STATION ACTIVITIES (OCT 2012) (DEVIATED)	Revised clause to address and clarify applicability to Gateway activities and insurance requirements
1852.228-78 CROSS-WAIVER OF LIABILITY FOR SCIENCE OR SPACE EXPLORATION ACTIVITIES UNRELATED TO THE INTERNATIONAL SPACE STATION (OCT 2012)	NASA is currently revisiting the inclusion of a Government-Contractor reciprocal waiver provision identical to the provision set forth in Section (d) of the Cross-Waiver of Liability for International Space Station Activities.
PERFORMANCE-BASED PAYMENTS	Revised
SMALL BUSINESS SUBCONTRACTING PLAN (AUG 2018) ALT II (NOV 2016) (DEVIATION)	Removed deviation version; incorporated standard FAR clause
TECHNICAL DATA DECLARATION, REVISION, AND WITHHOLDING OF PAYMENT-MAJOR SYSTEMS	New clause
PATENT RIGHTS CLAUSES	New clause
REQUEST FOR WAIVER OF RIGHTS TO INVENTIONS	New clause



*Concept image