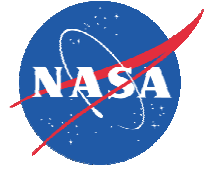


National Aeronautics and Space Administration



Commercial Destinations - Free Flyer

**Space Act Agreement
SAA-UA-22-35805**

Effective Date: December 1, 2021



Nanoracks

AMENDMENTS AND HISTORY LOG

Status	Amend No.	Effective Date	DESCRIPTION
Baseline	N/A	12/1/21	Baseline Space Act Agreement

FUNDED SPACE ACT
AGREEMENT BETWEEN
NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION AND
NANORACKS, LLC
FOR
COMMERCIAL DESTINATIONS-FREE FLYER
PHASE 1

BACKGROUND

A. The National Aeronautics and Space Administration (NASA) has established the Commercial Low Earth Orbit (LEO) Development Program at the Johnson Space Center as part of the Space Operations Mission Directorate. The objectives of the Program are to:

- Develop a robust commercial space economy in LEO, including supporting the development of commercially owned and operated LEO destinations from which various customers, including private entities, public institutions, NASA, and foreign governments, can purchase services; and
- Stimulate the growth of commercial activities in LEO.

B. To achieve the Commercial LEO Development Program’s overall goals, NASA developed and is implementing a five-point plan. The plan, entitled NASA’s Plan for Commercial LEO Development, addresses how NASA participates with industry to develop commercial LEO destinations, stimulates demand for new and emerging markets in LEO, and takes near-term steps to achieve a robust economy in LEO. The third point in this plan is to initiate the process for commercial development of LEO destinations. In order to cost-effectively meet U.S. long-term research and technology development needs in low-Earth orbit (LEO), a robust commercial human spaceflight economy must be established including commercial destinations and new markets such that NASA can be one of many customers of a broad portfolio of commercial products and services. Development and operation of a commercial destination to provide those services will require significant private investment over many years and significant non-NASA demand to ensure long-term financial viability.

C. This SAA represents Nanoracks’ and NASA’s commitment to the Nanoracks Commercial Space Station, known as “Starlab,” concept maturation and initial development phase of a project to develop the vehicles, systems, and operations needed to deploy and operate free-flying LEO destinations that meet potential future needs of various customers including the U.S. Government.

ARTICLE 1. AUTHORITY AND PARTIES

In accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113(e)), this Agreement is entered into by the National Aeronautics and Space Administration, located at 4th and E Streets, SW, Washington, D.C. (hereinafter referred to as "NASA" or Government), and Nanoracks, LLC, located at 503 Forge River Rd., Webster, TX 77598 (hereinafter referred to as "Nanoracks" or "Partner"). NASA and Partner may be individually referred to as a "Party" and collectively referred to as the "Parties." This agreement will be implemented by NASA at the Lyndon B. Johnson Space Center in Houston, Texas.

ARTICLE 2. PURPOSE

The purpose of this Agreement is to facilitate the Partner's concept maturation and initial development phase (Phase 1) of its Commercial Destinations-Free Flyer (CDFF) capabilities.

For purposes of this Agreement, CDFF refers to an independent, free-flying facility operating in an orbit selected by the Partner. The Partner's CDFF System is described in Appendix 1. As part of the work in this Agreement, the Parties may work in collaboration in some areas as may be mutually agreed during implementation of this Agreement and documented in a Technical Implementation Plan (TIP). The Parties anticipate that this may be an evolvable architecture that could include the following general types of capabilities:

- a) Hosting up to four (4) crew members for up to one year at a time with an Initial Operating Capability (IOC) of approximately calendar year Q4 2027.
- b) Sustaining free flying operations autonomously as necessary, maintain orbit (attitude and altitude) for a determined check-out period prior to receiving first crew
- c) Launching on multiple vehicles anticipated for availability by 2027, including SpaceX Starship, Blue Origin New Glenn, with a down-scope option available to ULA Vulcan
- d) A free flying commercial space station architecture consisting of:
 1. An inflatable habitat
 2. A metallic module with at least 1 docking port
 3. A power and propulsion element
 4. A robotic arm
- e) Providing the following scientific equipment for use by NASA and commercial customers
 1. 1m³ of cold stowage up to -80°C to include 1MDLE flash-freeze capability attaining -95°C in under 60 seconds
 2. 1 combustion facility
 3. 1 furnace facility
 4. 1 (or more) glovebox facilities
 5. A minimum of 5m³ of reconfigurable ISPR rack space
 6. In addition to the above, multiple elements are planned for IOC as components of the George Washington Carver (GWC) Science Park architecture
- f) Providing 6 external payload accommodation sites accessible by walking robotic

arm (with precision extension capability) reaching into spacecraft unpressurized trunk and placing payloads where desired. 1 ram, 1 wake, 2 nadir, and 2 zenith accommodation sites are provided.

- g) Hosting commercial and sovereign crews, in scheduled rotations with NASA crews.
- h) Providing the capability to expand to another module to allow crew acoustic isolation and conduct Mars analog missions

ARTICLE 3. RESPONSIBILITIES

A. NASA shall use reasonable efforts to:

- 1. Provide a point of contact for Partner within the Commercial LEO Development Program within thirty (30) days after the effective date of this Agreement.
- 2. Participate in quarterly status reviews.
- 3. Appoint a NASA representative to participate in each review board described in Appendix 2.
- 4. Review data provided by Partner.
- 5. Attend and observe Partner milestones, at NASA's discretion and after coordination with Partner.
- 6. Provide milestone payments to Partner upon successful completion of each milestone, subject to limitations noted below;
- 7. If requested by Partner, and within 30 days of each quarterly meeting, provide Partner a written acknowledgement of milestone completion if NASA ascertains that the milestones of the previous quarter have been accomplished. Nothing in the acknowledgement of milestone completion shall be construed to imply that NASA endorses or sponsors any Partner product or service resulting from activities conducted under this Agreement. NASA's acknowledgement shall not be construed to imply approval or endorsement of the safety, reliability or appropriateness of any Partner design, system, architecture or testing methodology.
- 8. Provide equipment and/or services as identified and described in a Technical Implementation Plan (TIP) to be developed by the Parties as needed.
- 9. Provide access to requested NASA technical data, lessons learned, and expertise support, services, facilities, and NASA-developed technologies, on a non-interference basis as resources permit. NASA furnished services, facilities, and technologies that may be provided are identified in the TIP.

B. Nanoracks shall use reasonable efforts to:

- 1. Conduct concept maturation and initial development of the Starlab CDF System according to the milestones identified in Appendix 2 (Partner Milestones) and provide NASA with data to demonstrate that Milestone entrance and success criteria have been successfully completed.

2. Conduct quarterly status reviews.
3. Designate at least one seat for a NASA representative on each review board for major milestones identified in Appendix 2.
4. Provide equipment as identified and described in the TIP. All equipment provided by Partner to NASA shall include documentation stating build, revision, and traceability information.
5. Fulfill its obligations in the TIP.

ARTICLE 4. SCHEDULE AND MILESTONES

The planned major milestones for the activities defined in the “Responsibilities” Article, including acceptance criteria and payments for each milestone in furtherance of CDFP Phase 1 activities are identified in Appendix 2 to this Agreement.

ARTICLE 5. FINANCIAL OBLIGATIONS

A. Obligation

1. The Government's liability to make payments to Partner is limited to only those funds obligated annually under this Agreement or by amendment to the Agreement. NASA may obligate funds to the Agreement incrementally.

B. Acceptance and Payment for Milestones

1. Partner shall notify the NASA Points of Contact, listed in Article 18, at least 30 calendar days prior to the completion of any milestone to arrange for the NASA Technical Contact or designee to witness the event or accept delivery of documents. NASA shall have 30 calendar days to determine whether the milestone event meets its corresponding acceptance criteria as described in Appendix 2 of this Agreement and shall notify Partner of NASA's acceptance or non-acceptance. NASA shall have 5 calendar days to determine whether Milestone 1 meets its corresponding acceptance criteria as described in Appendix 2 of this Agreement and shall notify Partner of NASA's acceptance or non-acceptance. Any disagreement between NASA and Partner about the successful accomplishment of a milestone shall be deemed a Dispute and resolved in accordance with Article 19 of this Agreement.
2. Partner shall submit a written invoice requesting payment from NASA upon notification of acceptance by NASA of each milestone, as identified and described in Appendix 2 of this Agreement. Partner shall submit all invoices utilizing Treasury's Invoice Processing Platform (IPP). For instructions on submitting invoices through IPP reference: <https://www.nssc.nasa.gov/vendorpayment>. After receipt and review of the invoice, the NASA Administrative Contact will prepare a written determination of milestone completion and authorize payment.

3. The following information shall be included on each Partner invoice to NASA:
 - (a). Agreement Number;
 - (b). Invoice Number;
 - (c). A description of milestone event;
 - (d). Terms of Payment;
 - (e). Payment Office; and
 - (f). Amount of the fixed contribution claimed.
4. Financial Records and Reports: Except as otherwise provided in this Agreement, Partner's relevant financial records associated with this Agreement shall not be subject to examination or audit by NASA.
5. Comptroller General Access to Records: The Comptroller General, at its discretion and pursuant to applicable regulations and policies, shall have access to and the right to examine records of any Party to the Agreement or any entity that participates in the performance of this Agreement that directly pertain to and involve transactions relating to the Agreement for a period of three (3) years after the Government makes the final milestone payment under this Agreement. This paragraph only applies to any record that is created or maintained in the ordinary course of business or pursuant to a provision of law. The terms of this paragraph shall be included in any subcontracts or other arrangements valued in excess of \$5,000,000.00 that Partner has or may enter into related to the execution of the milestone events in this Agreement.
6. Notwithstanding any other provision of this Agreement, all activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

ARTICLE 6. PRIORITY OF USE

Any schedule or milestone in this Agreement is estimated based upon the Parties' current understanding of the projected availability of NASA goods, services, facilities, or equipment. In the event that NASA's projected availability changes, Partner shall be given reasonable notice of that change, so that the schedule and milestones may be adjusted accordingly. The Parties agree that NASA's use of the goods, services, facilities, or equipment shall have priority over the use planned in this Agreement. Should a conflict arise, NASA in its sole discretion shall determine whether to exercise that priority. Likewise, should a conflict arise as between two or more non-NASA Partners, NASA, in its sole discretion, shall determine the priority as between those Partners. This Agreement does not obligate NASA to seek alternative government property or services under the jurisdiction of NASA at other locations.

ARTICLE 7. NONEXCLUSIVITY

This Agreement is not exclusive; accordingly, NASA may enter into similar agreements for the same or similar purpose with other U.S. private or public entities.

ARTICLE 8. LIABILITY AND RISK OF LOSS

A. The objective of this Article is to establish a cross-waiver of liability in the interest of encouraging participation in the exploration, exploitation, and use of outer space. The Parties intend that the cross-waiver of liability be broadly construed to achieve this objective.

B. For purposes of this Article:

1. The term “Damage” means:
 - a. Bodily injury to, or other impairment of health of, or death of, any person;
 - b. Damage to, loss of, or loss of use of any property;
 - c. Loss of revenue or profits; or
 - d. Other direct, indirect, or consequential Damage.
2. The term “Launch Vehicle” means an object, or any part thereof, intended for launch, launched from Earth, or returning to Earth which carries Payloads, persons, or both.
3. The term “Payload” means all property to be flown or used on or in a Launch Vehicle.
4. The term “Protected Space Operations” means all Launch Vehicle or Transfer Vehicle activities and Payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of an agreement for launch services. Protected Space Operations begins at the signature of this Agreement and ends when all activities done in implementation of this Agreement are completed. It includes, but is not limited to:
 - a. Research, design, development, test, manufacture, assembly, integration, operation, or use of Launch Vehicles or Transfer Vehicles, Payloads, or instruments, as well as related support equipment and facilities and services; and
 - b. All activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services.

“Protected Space Operations” excludes activities on Earth that are conducted on return from space to develop further a Payload’s product or process for use other than for the activities within the scope of an agreement for launch services.

5. The term “Related Entity” means:
 - a. A contractor or subcontractor of a Party at any tier;
 - b. A user or customer of a Party at any tier; or
 - c. A contractor or subcontractor of a user or customer of a Party at any tier.
The terms “contractor” and “subcontractor” include suppliers of any

kind.

The term “Related Entity” may also apply to a State, or an agency or institution of a State, having the same relationship to a Party as described in paragraphs B.5.a. through B.5.c. of this Article, or otherwise engaged in the implementation of Protected Space Operations as defined in paragraph B.4. above.

6. The term “Transfer Vehicle” means any vehicle that operates in space and transfers Payloads or persons or both between two different space objects, between two different locations on the same space object, or between a space object and the surface of a celestial body. A Transfer Vehicle also includes a vehicle that departs from and returns to the same location on a space object.

C. Cross-waiver of liability:

1. Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in paragraphs C.1.a. through C.1.d. of this Article based on Damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for Damage, whatever the legal basis for such claims, against:
 - a. The other Party;
 - b. A party to another NASA agreement that includes flight on the same Launch Vehicle;
 - c. A Related Entity of any entity identified in paragraphs C.1.a. or C.1.b. of this Article; or
 - d. The employees of any of the entities identified in paragraphs C.1.a. through C.1.c. of this Article.
2. In addition, each Party shall extend the cross-waiver of liability, as set forth in paragraph C.1. of this Article, to its own Related Entities by requiring them, by contract or otherwise, to:
 - a. Waive all claims against the entities or persons identified in paragraphs C.1.a. through C.1.d. of this Article; and
 - b. Require that their Related Entities waive all claims against the entities or persons identified in paragraphs C.1.a. through C.1.d. of this Article.
3. For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the Convention on International Liability for Damage Caused by Space Objects, which entered into force on September 1, 1972, where the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.
4. Notwithstanding the other provisions of this Article, this cross-waiver of liability

shall not be applicable to:

- a. Claims between a Party and its own Related Entity or between its own Related Entities;
 - b. Claims made by a natural person, his/her estate, survivors, or subrogees (except when a subrogee is a Party to this Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of, such person;
 - c. Claims for Damage caused by willful misconduct;
 - d. Intellectual property claims;
 - e. Claims for Damage resulting from a failure of a Party to extend the cross-waiver of liability to its Related Entities, pursuant to paragraph C.2. of this Article; or
 - f. Claims by a Party arising out of or relating to another Party's failure to perform its obligations under this Agreement.
5. Nothing in this Article shall be construed to create the basis for a claim or suit where none would otherwise exist.

D. To the extent that activities under this Agreement are not within the definition of "Protected Space Operations," defined above, the following unilateral waiver of claims applies to activities under this Agreement.

1. Partner hereby waives any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA's related entities for any injury to, or death of, Partner employees or the employees of Partner's related entities, or for damage to, or loss of, Partner's property or the property of its related entities arising from or related to activities conducted under this Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct.
2. Partner further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA, its related entities, and employees of NASA and employees of NASA's related entities for injury, death, damage, or loss arising from or related to activities conducted under this Agreement.

E. Partner Provided Property

For all property provided by Partner to NASA under this Agreement, the following provisions apply:

1. NASA hereby waives any claims against Partner, its officers, its directors, its employees, its related entities, and its contractors, and subcontractors, and third parties using Partner property, and their employees for any injury to, or death of, NASA employees or the employees of NASA's related entities or contractors

generally, or for damage to, or loss of, NASA property or the property of its related entities or contractors or subcontractors arising from or related to the use of any property provided by Partner under this Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct.

2. NASA further agrees to extend this unilateral waiver to its related entities or contractors or subcontractors or third parties using Partner property provided under this Agreement by requiring them, by contract or otherwise, to waive all claims against Partner, its employees, its related entities, and contractors and subcontractors, and their employees for injury, death, damage, or loss arising from or related to the use of any property provided by Partner under this Agreement.

ARTICLE 9. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. General

1. “Related Entity” as used in this Data Rights Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Partner that is assigned, tasked, or contracted with to perform activities under this Agreement.
2. “Data” means recorded information, regardless of form, the media on which it is recorded, or the method of recording.
3. “Proprietary Data” means Data embodying trade secrets or commercial or financial information that is privileged or confidential, and that includes a restrictive notice, unless the Data is:
 - a. known or available from other sources without restriction;
 - b. known, possessed, or developed independently, and without reference to the Proprietary Data;
 - c. made available by the owners to others without restriction; or
 - d. required by law or court order to be disclosed.
4. “Practical Application,” as used in this Data Rights Article, means to:
 - a. manufacture, in the case of a composition or product;
 - b. practice, in the case of a process or method; or
 - c. operate, in case of a machine or system;

and, in each case, under conditions establishing the invention, hardware, software, or service is being used, and its benefits are publicly available on reasonable terms, as permitted by law.

5. Data exchanged between NASA and Partner under this Agreement will be

exchanged without restriction except as otherwise provided herein.

6. Notwithstanding any restrictions provided in this Article, the Parties are not restricted in the use, disclosure, or reproduction of Data provided under this Agreement that meets one of the exceptions in 3., above. If a Party believes that any exceptions apply, it shall notify the other Party before any unrestricted use, disclosure, or reproduction of the Data.
7. The Parties will not exchange preexisting Proprietary Data under this Agreement unless authorized herein or in writing by the owner.
8. If the Parties exchange Data having a notice that the Receiving Party deems is ambiguous or unauthorized, the Receiving Party shall tell the Providing Party. If the notice indicates a restriction, the Receiving Party shall protect the Data under this Article unless otherwise directed in writing by the Providing Party.
9. The Data rights herein apply to the employees and Related Entities of Partner. Partner shall ensure that its employees and Related Entity employees know about and are bound by the obligations under this Article.
10. Disclaimer of Liability: NASA is not restricted in, nor liable for, the use, disclosure, or reproduction of Data without a restrictive notice, or for Data Partner gives, or is required to give, the U.S. Government without restriction.
11. Partner may use the following or a similar restrictive notice:

Proprietary Data Notice

The data herein include Proprietary Data and are restricted under the Data Rights provisions of Space Act Agreement [provide applicable identifying information – N/A until Signed].

Partner should also mark each page containing Proprietary Data with the following or a similar legend: “Proprietary Data – Use And Disclose Only Under the Notice on the Title or Cover Page.”

B. Data First Produced by Partner under this Agreement

1. If Data first produced by Partner or its Related Entities under this Agreement is given to NASA, and the Data is Proprietary Data, and it includes a restrictive notice, NASA will use reasonable efforts to protect it. Partner shall furnish such Data to NASA upon request and NASA may disclose and use such Data (under suitable protective conditions) only for evaluating Partner's performance of its milestones and validating the objectives of CDFP.
2. Upon a successful completion by Partner of all milestones under this Agreement, NASA shall not assert rights in Data first produced by Partner under this Agreement or use such Data for any purpose except that NASA shall retain the right to: (1) maintain a copy of such Data for archival purposes; (2) use or disclose such archived data within the Government for continued validating and updating of the objectives of CDFP; and (3) use or disclose such archived Data by or on behalf of NASA for

Government purposes in the event the NASA determines that:

- a. Such action is necessary because Partner, its assignee, or other successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, software, or service related to such Data;
- b. Such action is necessary because Partner, its assignee, or other successor, having achieved practical application of inventions, hardware, software, or service related to such Data, has failed to maintain practical application;
- c. Such action is necessary because Partner, its assignee, or other successor has discontinued making the benefits of inventions, hardware, software, or service related to such Data available to the public or to the Federal Government;
- d. Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by Partner, its assignee, or other successor; or
- e. Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by Partner, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)-(e) above exists, NASA shall provide written notification to the Partner's Administrative Point of Contact. Upon mailing of such determination, Partner shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that Partner does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

3. In the event NASA terminates this Agreement in accordance with Article 16.B, Termination for Failure to Perform, NASA shall have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by Partner in carrying out Partner's responsibilities under this Agreement by or on behalf of NASA for Government purposes. The parties will negotiate rights in Data in the event of termination for any other reason.

C. Data First Produced by NASA under this Agreement

1. As to Data first produced by NASA in carrying out NASA responsibilities under this Agreement that would be Proprietary Data if it had been obtained from Partner, such Data will be appropriately marked with a restrictive notice and NASA will use reasonable efforts to maintain it in confidence for five years after its development, with the express understanding that during the aforesaid restricted period such marked Data may be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) only for carrying out NASA's responsibilities under this Agreement, and thereafter for any purpose. Partner will use reasonable efforts not to disclose the Data without NASA's written approval during the restricted

period. The restrictions placed on NASA do not apply to Data disclosing a NASA-owned invention for which patent protection is being considered.

2. Upon a successful completion by Partner of all milestones under this Agreement, NASA shall not assert rights in Data first produced by NASA under this Agreement or use such Data for any purpose except that NASA shall retain the right to: (1) maintain a copy of such Data for archival purposes; (2) use or disclose such archived Data within the Government for continued validating and updating of the objectives of CDFF; and (3) use or disclose such archived Data by or on behalf of NASA for Government purposes in the event the NASA determines that:
 - a. Such action is necessary because Partner, its assignee, or other successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, software, or service related to such Data;
 - b. Such action is necessary because Partner, its assignee, or other successor, having achieved practical application of inventions, hardware, software, or service related to such Data, has failed to maintain practical application;
 - c. Such action is necessary because Partner, its assignee, or other successor has discontinued making the benefits of inventions, hardware, software, or service related to such Data available to the public or to the Federal Government;
 - d. Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by Partner, its assignee, or other successor; or
 - e. Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by Partner, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)-(e) above exists, NASA shall provide written notification to the Partner's Administrative Point of Contact. Upon mailing of such determination, Partner shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that Partner does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

3. In the event NASA terminates this Agreement in accordance with Article 16.B, Termination for Failure to Perform, NASA shall have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by NASA in carrying out NASA's responsibilities under this Agreement by or on behalf of NASA for Government purposes. The parties will negotiate rights in Data in the event of termination for any other reason.

D. Publication of Results

The National Aeronautics and Space Act (51 U.S.C. § 20112) requires NASA to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof. As such, NASA may publish unclassified and non-Proprietary Data resulting from work performed under this Agreement. The Parties will coordinate publication of results allowing a reasonable time to review and comment.

E. Data Disclosing an Invention

If the Parties exchange Data disclosing an invention for which patent protection is being considered, and the furnishing Party identifies the Data as such when providing it to the Receiving Party, the Receiving Party shall withhold it from public disclosure for a reasonable time (one (1) year unless otherwise agreed or the Data is restricted for a longer period herein).

F. Copyright

Data exchanged with a copyright notice and with no restrictive notice is presumed to be published. The following royalty-free licenses apply.

1. If indicated on the Data that it was produced outside of this Agreement, it may be reproduced, distributed, and used to prepare derivative works only for carrying out the Receiving Party's responsibilities under this Agreement.
2. Data without the indication of F.1. is presumed to be first produced under this Agreement. Except as otherwise provided in paragraph E. of this Article, and in the Invention and Patent Rights Article of this Agreement for protection of reported inventions, the Data may be reproduced, distributed, and used to prepare derivative works for any purpose.

G. Data Subject to Export Control

Whether or not marked, technical data subject to the export laws and regulations of the United States provided to Partner under this Agreement must not be given to foreign persons or transmitted outside the United States without proper U.S. Government authorization.

H. Handling of Background, Third Party Proprietary, and Controlled Government Data

1. NASA or Partner (as Disclosing Party) may provide the other Party or its Related Entities (as Receiving Party):
 - a. Proprietary Data developed at Disclosing Party's expense outside of this Agreement (referred to as Background Data);
 - b. Proprietary Data of third parties that Disclosing Party has agreed to protect, or is required to protect under the Trade Secrets Act (18 U.S.C. § 1905) (referred to as Third Party Proprietary Data); and
 - c. U.S. Government Data, including software and related Data, Disclosing Party intends to control (referred to as Controlled Government Data).

2. All Background, Third Party Proprietary and Controlled Government Data provided by Disclosing Party to Receiving Party shall be marked by Disclosing Party with a restrictive notice and protected by Receiving Party in accordance with this Article.
3. Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data.

- a. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate document.

- b. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate document.

- c. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate document.

- d. Notwithstanding H.4., NASA software and related Data will be provided to Partner under a separate Software Usage Agreement (SUA). Partner shall use and protect the related Data in accordance with this Article. Unless the SUA authorizes retention, or Partner enters into a license under 37 C.F.R. Part 404, the related Data shall be disposed of as NASA directs:

None.

4. For such Data identified with a restrictive notice pursuant to H.2., Receiving Party shall:
 - a. Use, disclose, or reproduce such Data only as necessary under this Agreement;
 - b. Safeguard such Data from unauthorized use and disclosure;
 - c. Allow access to such Data only to its employees and any Related Entity requiring access under this Agreement;
 - d. Except as otherwise indicated in 4.c., preclude disclosure outside Receiving Party's organization;
 - e. Notify its employees with access about their obligations under this Article and ensure their compliance, and notify any Related Entity with access about their obligations under this Article; and
 - f. Dispose of such Data as Disclosing Party directs.

I. Oral and visual information

If Partner discloses Proprietary Data orally or visually, NASA will have no duty to restrict, or liability for disclosure or use, unless Partner:

1. Orally informs NASA before initial disclosure that the Data is Proprietary Data, and

2. Reduces the Data to tangible form with a restrictive notice and gives it to NASA within ten (10) calendar days after disclosure.

ARTICLE 10. INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS

A. Definitions

1. “Administrator,” means the Administrator of the National Aeronautics and Space Administration (NASA) or duly authorized representative.
2. “Patent Representative” means the NASA Johnson Space Center Patent Counsel. Correspondence with the Patent Representative under this clause will be sent to:

Patent Counsel
NASA Johnson
Space Center Mail Code
AL
2101 NASA Parkway
Houston, TX 77058
E-mail: JSCLegal@nasa.gov

3. “Invention,” means any invention or discovery that is or may be patentable or otherwise protectable under title 35 of the U.S.C.
4. “Made,” in relation to any invention, means the conception or first actual reduction to practice.
5. “Practical Application,” means to:
 - a. manufacture, in the case of a composition or product;
 - b. practice, in the case of a process or method; or
 - c. operate, in case of a machine or system;and, in each case, under conditions establishing the invention is being used, and its benefits are publicly available on reasonable terms, as permitted by law.
6. “Related Entity” as used in this Invention and Patent Rights Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Partner assigned, tasked, or contracted with to perform activities under this Agreement.
7. “Manufactured substantially in the United States” means over fifty percent (50%) of a product’s components are manufactured in the United States. This requirement is met if the cost to Partner of the components mined, produced, or manufactured in the

United States exceeds fifty percent (50%) percent of the cost of all components (considering only the product and its components). This includes transportation costs to the place of incorporation into the product and any applicable duty (whether or not a duty-free entry certificate is issued). Components of foreign origin of the same class or kind for which determinations under Federal Acquisition Regulation 25.103(a) and (b) exist, are treated as domestic. Scrap generated, collected, and prepared for processing in the United States is considered domestic.

B. Allocation of principal rights

1. *Presumption of NASA title in Partner inventions*

- a. Partner inventions under this Agreement are presumed made as specified in subparagraphs (A) or (B) of 51 U.S.C. § 20135(b)(1). The above presumption is conclusive unless Partner's invention disclosure to the Patent Representative includes a written statement with supporting details, demonstrating that the invention was not made as specified above.
- b. Regardless of whether title to such an invention is subject to an advance waiver or a petition for individual waiver, Partner may still file the statement in B.1.a. The Administrator (or Administrator's designee) will review the information from Partner and any other related information and will notify Partner of his or her determination.

2. *NASA Property rights in Partner inventions* Inventions made under this Agreement where the presumption of paragraph B.1.a. of this Article is conclusive or when a determination exists that it was made under subparagraphs (A) or (B) of 51 U.S.C. § 20135(b)(1) are the exclusive property of the United States as represented by NASA. The Administrator may waive all or any part of the United States' rights to Partner, as provided in paragraph B.3. of this Article.

3. *Waiver of property rights by NASA*

- a. NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, use Presidential Memorandum on Government Patent Policy of February 18, 1983 as guidance in processing petitions for waiver of rights under 51 U.S.C. § 20135(g) for any invention or class of inventions made or that may be made under subparagraphs (A) or (B) of 51 U.S.C. § 20135(b)(1).
- b. NASA has determined that to stimulate and support the capability of a United States Commercial LEO Destination services to the public and the Federal Government, the interest of the United States would be served by waiving to Partner, in accordance with 51 U.S.C. § 20135(g) and the provisions of 14 C.F.R. Part 1245, Subpart 1, rights to any inventions or class of inventions made by Partner in the performance of work under this Agreement. Therefore, as provided in 14 C.F.R. Part 1245, Subpart 1, Partner may petition, prior to execution of the Agreement or within thirty (30) days after execution, for advance waiver of any inventions Partner may make under this Agreement. If no petition is submitted, or

if petition is denied, Partner (or an employee inventor of Partner) may still petition for waiver of rights to an identified subject invention within eight (8) months after disclosure under paragraph E.2. of this Article, or within such longer period if authorized under 14 C.F.R. § 1245.105. See paragraph J. of this Article for procedures.

4. *NASA inventions*

- a. No invention or patent rights in NASA or its Related Entity's inventions are exchanged or granted under this Agreement except as provided herein.
- b. Upon request, NASA will use reasonable efforts to grant Partner a negotiated license, under 37 C.F.R. Part 404, to any NASA invention made under this Agreement.
- c. Upon request, NASA will use reasonable efforts to grant Partner a negotiated license, under 37 C.F.R. Part 404, to any invention made under this Agreement by employees of a NASA Related Entity, or jointly between NASA and NASA Related Entity employees, where NASA has title.

C. Minimum rights reserved by the Government

1. For Partner inventions subject to a NASA waiver of rights under 14 C.F.R. Part 1245, Subpart 1, the Government reserves:
 - a. an irrevocable, royalty-free license to practice the invention throughout the world by or on behalf of the United States or any foreign government under any treaty or agreement with the United States; and
 - b. other rights as stated in 14 C.F.R. § 1245.107.
2. Nothing in this paragraph grants to the Government any rights in inventions not made under this Agreement.
3. Upon a successful completion by Partner of all milestones under this Agreement, NASA will refrain from exercising its Government Purpose License reserved in paragraph C.1.a. above for a period of five years following the expiration of this Agreement.
4. Nothing contained in this paragraph shall be considered to grant to the Government any rights with respect to any invention other than an invention made under this Agreement.

D. Minimum rights to Partner

1. Partner is granted a revocable, nonexclusive, royalty-free license in each patent application or patent in any country on an invention made by Partner under this Agreement where the Government has title, unless Partner fails to disclose the invention within the time limits in paragraph E.2. of this Article. Partner's license extends to its domestic subsidiaries and affiliates within its corporate structure. It includes the right to grant sublicenses of the same scope if Partner was legally obligated to do so at the time of this Agreement. The license is transferable only with approval of the Administrator except to a successor of that part of Partner's business to which the invention pertains.

2. Partner's domestic license may be revoked or modified by the Administrator but only if necessary to achieve expeditious practical application of the invention where a third party applies for an exclusive license under 37 C.F.R. Part 404. The license will not be revoked in any field of use or geographic area where Partner has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. A license in any foreign country may be revoked or modified at the discretion of the Administrator if Partner, its licensees, or its domestic subsidiaries or affiliates fail to achieve practical application in that country.
3. Before revocation or modification, Partner will receive written notice of the Administrator's intentions. Partner has thirty (30) days (or such other time as authorized by the Administrator) to show cause why the license should not be revoked or modified. Partner may appeal under 14 C.F.R. § 1245.112.

E. Invention disclosures and reports

1. Partner shall establish procedures assuring that inventions made under this Agreement are internally reported within six (6) months of conception or first actual reduction to practice, whichever occurs first. These procedures shall include the maintenance of laboratory notebooks or equivalent records, other records reasonably necessary to document the conception or the first actual reduction to practice of inventions, and records showing that the procedures were followed. Upon request, Partner shall give the Patent Representative a description of such procedures for evaluation.
2. Partner shall disclose an invention to the Patent Representative within two (2) months after the inventor discloses it in writing internally or, if earlier, within six (6) months after Partner becomes aware of the invention. In any event, disclosure must be before any sale, or public use, or publication known to Partner. Partner shall use the NASA New Technology Reporting system at <http://ntr.ndc.nasa.gov/>. Invention disclosures shall identify this Agreement and be sufficiently complete in technical detail to convey a clear understanding of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, or sale, or public use of the invention, and whether a manuscript describing the invention was submitted or accepted for publication. After disclosure, Partner shall promptly notify NASA of the acceptance for publication of any manuscript describing an invention, or of any sale or public use planned by Partner.
3. Partner shall give NASA Patent Representative:
 - a. Interim reports every twelve (12) months (or longer period if specified by Patent Representative) from the date of this Agreement, listing inventions made under this Agreement during that period, and certifying that all inventions were disclosed (or there were no such inventions) and that the procedures of paragraph E.1. of this Article were followed.

- b. A final report, within three (3) months after completion of this Agreement, listing all inventions made or certifying there were none, and listing all subcontracts or other agreements with a Related Entity containing a Patent and Invention Rights Article (as required under paragraph G of this Article) or certifying there were none.
 - c. Interim and final reports shall be submitted at <http://ntr.ndc.nasa.gov/>.
 4. Partner shall provide available additional technical and other information to the NASA Patent Representative for the preparation and prosecution of a patent application on any invention made under this Agreement where the Government retains title. Partner shall execute all papers necessary to file patent applications and establish the Government's rights.
 5. Protection of reported inventions. NASA will withhold disclosures under this Article from public access for a reasonable time (1 year unless otherwise agreed or unless restricted longer herein) to facilitate establishment of patent rights.
 6. The contact information for the NASA Patent Representatives is provided at http://prod.nais.nasa.gov/portals/pl/new_tech_pocs.html.
 - F. Examination of records relating to inventions
 1. The Patent Representative or designee may examine any books (including laboratory notebooks), records, and documents of Partner relating to the conception or first actual reduction to practice of inventions in the same field of technology as the work under this Agreement to determine whether:
 - a. Any inventions were made under this Agreement;
 - b. Partner established the procedures in paragraph E.1. of this Article; and
 - c. Partner and its inventors complied with the procedures.
 2. If the Patent Representative learns of an unreported Partner invention he or she believes was made under this Agreement, he or she may require disclosure to determine ownership rights.
 3. Examinations under this paragraph are subject to appropriate conditions to protect the confidentiality of information.
 - G. Subcontracts or Other Agreements
 1.
 - a. Unless otherwise directed by Patent Representative, Partner shall include this Invention and Patent Rights Article (modified to identify the parties) in any subcontract or other agreement with a Related Entity (regardless of tier) for the performance of experimental, developmental, or research work.
 - b. For subcontracts or other agreements at any tier, NASA, the Related Entity, and Partner agree that the mutual obligations created herein constitute privity of contract between the Related Entity and NASA with respect to matters covered by this Article.
 2. If a prospective Related Entity refuses to accept the Article, Partner:

- a. shall promptly notify Patent Representative in writing of the prospective Related Entity’s reasons for refusal and other information supporting disposition of the matter; and
 - b. shall not proceed without Patent Representative’s written authorization.
3. Partner shall promptly notify Patent Representative in writing of any subcontract or other agreement with a Related Entity (at any tier) containing an Invention and Patent Rights Article. The notice shall identify:
- a. the Related Entity;
 - b. the applicable Invention and Patent Rights Article;
 - c. the work to be performed; and
 - d. the dates of award and estimated completion.

Upon request, Partner shall give a copy of the subcontract or other agreement to Patent Representative.

4. In any subcontract or other agreement with Partner, a Related Entity retains the same rights provided Partner in this Article. Partner shall not require any Related Entity to assign its rights in inventions made under this Agreement to Partner as consideration for awarding a subcontract or other agreement.
5. Notwithstanding paragraph G.4., in recognition of Partner’s substantial contribution of funds, facilities or equipment under this Agreement, Partner may, subject to the NASA’s rights in this Article:
 - a. acquire by negotiation rights to inventions made under this Agreement by a Related Entity that Partner deems necessary to obtaining and maintaining private support; and
 - b. if unable to reach agreement under paragraph G.5.a. of this Article, request from Patent Representative that NASA provide Partner such rights as an additional reservation in any waiver NASA grants the Related Entity under NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1. Partner should advise the Related Entity that unless it requests a waiver, NASA acquires title to all inventions made under this Agreement. If a waiver is not requested, or is not granted, Partner may then request a license from NASA under 37 C.F.R. Part 404. A Related Entity requesting waiver must follow the procedures in paragraph J. of this Article.

H. Preference for United States manufacture

Products embodying inventions made under this Agreement or produced using the inventions shall be manufactured substantially in the United States. Patent Representative may waive this requirement if domestic manufacture is not commercially feasible.

I. March-in rights

For inventions made under this Agreement where Partner has acquired title, NASA has the right under 37 C.F.R. § 401.6, to require Partner, or an assignee or exclusive licensee of the invention, to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to responsible applicant(s), upon reasonable terms. If Partner, assignee or exclusive licensee refuses, NASA may grant the license itself, if necessary:

1. because Partner, assignee, or exclusive licensee has not, or is not expected within a reasonable time, to achieve practical application in the field of use;
2. to alleviate health or safety needs not being reasonably satisfied by Partner, assignee, or exclusive licensee;
3. to meet requirements for public use specified by Federal regulations being not reasonably satisfied by Partner, assignee, or exclusive licensee; or
4. because the requirement in paragraph H of this Article was not waived, and Partner, assignee, or exclusive licensee of the invention in the United States is in breach of the requirement.

J. Requests for Waiver of Rights

1. Under NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, an advance waiver may be requested prior to execution of this Agreement, or within thirty (30) days afterwards. Waiver of an identified invention made and reported under this Agreement may still be requested, even if a request for an advance waiver was not made or was not granted.
2. Each request for waiver is by petition to the Administrator and shall include:
 - a. an identification of the petitioner, its place of business and address;
 - b. if petitioner is represented by counsel, the name, address, and telephone number of counsel;
 - c. the signature of the petitioner or authorized representative; and
 - d. the date of signature.
3. No specific form is required, but the petition should also contain:
 - a. a statement that waiver of rights is requested under the NASA Patent Waiver Regulations;
 - b. a clear indication of whether the petition is an advance waiver or a waiver of an individual identified invention;
 - c. whether foreign rights are also requested and for which countries;
 - d. a citation of the specific section(s) of the regulations under which are requested;
 - e. whether the petitioner is an entity of or under the control of a foreign government; and
 - f. the name, address, and telephone number of the petitioner's point-of-contact.
4. Submit petitions for waiver to the Patent Representative for forwarding to the

Inventions and Contributions Board. If the Board makes findings to support the waiver, it recommends to the Administrator that waiver be granted. The Board also informs Patent Representative if there is insufficient time or information to process a petition for an advance waiver without unduly delaying the execution of the Agreement. Patent Representative will notify petitioner of this information. Once a petition is acted on, the Board notifies petitioner. If waiver is granted, any conditions, reservations, and obligations are included in the Instrument of Waiver. Petitioner may request reconsideration of Board recommendations adverse to its request.

ARTICLE 11. USE OF NASA NAME AND EMBLEMS

A. NASA Name and Initials

Partner shall not use “National Aeronautics and Space Administration” or “NASA” in a way that creates the impression that a product or service has the authorization, support, sponsorship, or endorsement of NASA, which does not, in fact, exist. Except for releases under the “Release of General Information to the Public and Media” Article, Partner must submit any proposed public use of the NASA name or initials (including press releases and all promotional and advertising use) to the NASA Associate Administrator for the Office of Communications or designee (“NASA Communications”) for review and approval. Approval by NASA Office of Communications shall be based on applicable law and policy governing the use of the NASA name and initials.

B. NASA Emblems

Use of NASA emblems (i.e., NASA Seal, NASA Insignia, NASA logotype, NASA Program Identifiers, and the NASA Flag) is governed by 14 C.F.R. Part 1221. Partner must submit any proposed use of the emblems to NASA Communications for review and approval.

ARTICLE 12. RELEASE OF GENERAL INFORMATION TO THE PUBLIC AND MEDIA

NASA or Partner may, consistent with Federal law and this Agreement, release general information regarding its own participation in this Agreement as desired.

Pursuant to Section 841(d) of the NASA Transition Authorization Act of 2017, Public Law 115- 10 (the “NTAA”), NASA is obligated to publicly disclose copies of all agreements conducted pursuant to NASA’s 51 U.S.C. §20113(e) authority in a searchable format on the NASA website within 60 days after the agreement is signed by the Parties. The Parties acknowledge that a copy of this Agreement will be disclosed, without redactions, in accordance with the NTAA.

ARTICLE 13. DISCLAIMERS

A. Disclaimer of Warranty

Goods, services, facilities, or equipment provided by NASA under this Agreement are provided “as is.” NASA makes no express or implied warranty as to the condition of any such goods, services, facilities, or equipment, or as to the condition of any research or information generated under this Agreement, or as to any products made or developed under or as a result of this Agreement including as a result of the use of information generated hereunder, or as to the merchantability or fitness for a particular purpose of such research, information, or resulting product, or that the goods, services, facilities or equipment provided will accomplish the intended results or are safe for any purpose including the intended purpose, or that any of the above will not interfere with privately-owned rights of others. Neither the government nor its contractors shall be liable for special, consequential or incidental damages attributed to such equipment, facilities, technical information, or services provided under this Agreement or such research, information, or resulting products made or developed under or as a result of this Agreement.

B. Disclaimer of Endorsement

NASA does not endorse or sponsor any commercial product, service, or activity. NASA’s participation in this Agreement or provision of goods, services, facilities or equipment under this Agreement does not constitute endorsement by NASA. Partner agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of Partner resulting from activities conducted under this Agreement, regardless of the fact that such product or service may employ NASA-developed technology.

ARTICLE 14. COMPLIANCE WITH LAWS AND REGULATIONS

A. The Parties shall comply with all applicable laws and regulations including, but not limited to, safety; security; export control; environmental; suspension and debarment laws and regulations; and establishing an Interconnection Security Agreement when applicable. Access by a Partner to NASA facilities or property, or to a NASA Information Technology (IT) system or application, is contingent upon compliance with NASA security and safety policies and guidelines including, but not limited to, standards on badging, credentials, and facility and IT system/application access.

B. With respect to any export control requirements:

1. The Parties will comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 C.F.R. Parts 120 through 130, and the Export Administration Regulations (EAR), 15 C.F.R. Parts 730 through 799, in performing work under this Agreement. In the absence of available license exemptions or exceptions, the Partner shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware,

technical data and software, or for the provision of technical assistance.

2. The Partner shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of work under this Agreement, including instances where the work is to be performed on-site at NASA and where the foreign person will have access to export-controlled technical data or software.
3. The Partner will be responsible for all regulatory record-keeping requirements associated with the use of licenses and license exemptions or exceptions.
4. The Partner will be responsible for ensuring that the provisions of this Article apply to its Related Entities.

C. With respect to suspension and debarment requirements:

1. The Partner hereby certifies, to the best of its knowledge and belief, that it has complied, and shall comply, with 2 C.F.R. Part 180, Subpart C, as supplemented by 2 C.F.R. Part 1880, Subpart C.
2. The Partner shall include language and requirements equivalent to those set forth in subparagraph C.1., above, in any lower-tier covered transaction entered into under this Agreement.

D. Partner shall annually certify the following to the NASA Administrative Contact to this Agreement:

1. Neither Partner nor any of its subcontractors nor partners are presently debarred, suspended, proposed for debarment, or otherwise declared ineligible for award of funding by any Federal agency;
2. Neither Partner nor any of its subcontractors nor partners have been convicted or had a civil judgment rendered against them within the last three (3) years for fraud in obtaining, attempting to obtain, or performing a Government contract;
3. Partner and any of its subcontractors or partners receiving \$100,000 or more in NASA funding for work performed under this Agreement have not used any appropriated funds for lobbying purposes prohibited by 31 U.S.C. § 1352; and
4. Partner is an eligible Partner as defined as follows:
 - An entity organized under the laws of the United States or of a State, which is:
 - A. More than 50 percent owned by United States nationals; or
 - B. A subsidiary of a foreign company and the Secretary of Transportation finds that

- (i) Such subsidiary has in the past evidenced a substantial commitment to the United States market through –
 - a. Investments in the United States in long-term research, development, and manufacturing (including the manufacture of major components and subassemblies); and
 - b. Significant contributions to employment in the United States; and
- (ii) The country or countries in which such foreign company is incorporated or organized, and, if appropriate, in which it principally conducts its business, affords reciprocal treatment to companies described in subparagraph A comparable to that afforded to such foreign company's subsidiary in the United States, as evidenced by –
 - a. Providing comparable opportunities for companies described in subparagraph A. to participate in Government sponsored research and development similar to that authorized under Title 51 U.S.C. Chapter 501 (Space Commerce);
 - b. Providing no barriers, to companies described in subparagraph A. with respect to local investment opportunities, that are not provided to foreign companies in the United States; and
 - c. Providing adequate and effective protection for the intellectual property rights of companies described in subparagraph A.

E. Pursuant to The Department of Defense and Full-Year Appropriation Act, Public Law 112-10, Section 1340(a); The Consolidated and Further Continuing Appropriation Act of 2012, Public Law 112-55, Section 539; and future-year appropriations (hereinafter, "the Acts"), NASA is restricted from using funds appropriated in the Acts to enter into or fund any agreement of any kind to participate, collaborate, or coordinate bilaterally with China or any Chinese-owned company, at the prime recipient level or at any subrecipient level, whether the bilateral involvement is funded or performed under a no-exchange of funds arrangement. Partner hereby certifies that it is not China or a Chinese-owned company, and that the Partner will not participate, collaborate, or coordinate bilaterally with China or any Chinese-owned company, at the prime recipient level or at any subrecipient level, whether the bilateral involvement is funded or performed under a no-exchange of funds arrangement.

- (a) Definition: "China or Chinese-owned Company" means the People's Republic of China, any company owned by the People's Republic of China, or any company incorporated under the laws of the People's Republic of China.
- (b) The restrictions in the Acts do not apply to commercial items of supply needed to perform this agreement. However, Partner shall disclose to NASA if it anticipates making any award, including those for the procurement of commercial items, to China or a Chinese-owned entity.

- (c) Subawards – The Partner shall include the substance of this provision in all subawards made hereunder.

In addition to the above certification, Partner shall immediately disclose to the NASA Administrative Contact, for any individual involved in this NASA-funded activity, any current or pending professional and educational affiliations or commitments to China or a Chinese-owned company, including Chinese universities.

F. Regarding INKSNA requirements, Partner shall disclose to NASA if it intends to rely upon Russian entities for development of its CDFE system. Partner shall not subcontract to Russian entities without first receiving written approval from NASA.

- (a) Definitions: In this provision:

- (1) The term “Russian entities” means:

(A) Russian persons, or

(B) Entities created under Russian law or owned, in whole or in part, by Russian persons or companies including, but not limited to, the following:

(i) The Russian Federal Space Agency (Roscosmos),

(ii) Any organization or entity under the jurisdiction or control of Roscosmos, or

(iii) Any other organization, entity or element of the Government of the Russian Federation.

- (2) The term “extraordinary payments” means payments in cash or in kind made or to be made by the United States Government prior to December 31, 2025, for work to be performed or services to be rendered prior to that date necessary to meet United States obligations under the Agreement Concerning Cooperation on the Civil International Space Station, with annex, signed at Washington January 29, 1998, and entered into force March 27, 2001, or any protocol, agreement, memorandum of understanding, or contract related thereto.

- (b) This clause implements the reporting requirement in section 6(i) of the Iran, North Korea, and Syria Nonproliferation Act. The provisions of this clause are without prejudice to the question of whether the Partner or its subcontractor(s) are making extraordinary payments under section 6(a) or fall within the exceptions in section 7(1)(B) of the Act. NASA has applied the restrictions in the Act to include funding of Russian entities via U.S. Contractors (Awardees).

- (c) (1) The Partner shall not subcontract with Russian entities without first receiving written approval from the NASA Administrative Contact. In order to obtain this written approval to subcontract with any Russian entity as defined in paragraphs (a), the Partner shall provide the NASA Administrative Contact with the following

information related to each planned new subcontract and any change to an existing subcontract with entities that fit the description in paragraph (a):

- (A) A detailed description of the subcontracting entity, including its name, address, and a point of contact, as well as a detailed description of the proposed subcontract including the specific purpose of payments that will be made under the subcontract.
- (B) The Partner shall provide certification that the subcontracting entity is not, at the date of the subcontract approval request, on any of the lists of proscribed denied parties, specially designated nationals and entities of concern found at:

BIS's Listing of Entities of Concern (see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/entity-list>)

BIS's List of Denied Parties (see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/denied-persons-list>)

OFAC's List of Specially Designated Nationals (see <http://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx>)

List of Unverified Persons in Foreign Countries (see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/unverified-list>)

State Department's List of Parties Statutorily Debarred for Arms Export Control Act Convictions (see http://pmdtc.state.gov/compliance/debar_intro.html)

State Department's Lists of Proliferating Entities (see <http://www.state.gov/t/isn/c15231.htm>)

- (2) Unless relief is granted by the NASA Administrative Contact, the information necessary to obtain approval to subcontract shall be provided to the NASA Administrative Contact 30 business days prior to executing any planned subcontract with entities defined in paragraph (a).
- (d) After receiving approval to subcontract, the Partner shall provide the NASA Administrative Contact with a report every six months that documents the individual payments made to an entity in paragraph (a). The reports are due on July 15th and January 15th. The July 15th report shall document all of the individual payments made from the previous January through June. The January 15th report shall document all of the individual payments made from the previous July through

December. The content of the report shall provide the following information for each time a payment is made to an entity in paragraph (a):

- (1) The name of the entity
 - (2) The subcontract number
 - (3) The amount of the payment
 - (4) The date of the payment
- (e) The NASA Administrative Contact may direct the Partner to provide additional information for any other prospective or existing subcontract at any tier. The NASA Administrative Contact may direct the Partner to terminate for the convenience of the Government any subcontract at any tier with an entity described in paragraph (a), subject to an equitable adjustment.
- (f) Notwithstanding FAR 52.216-7, “Allowable Cost and Payments,” on or after December 31, 2025, the Partner shall be responsible to make payments to entities defined in paragraph (a) of this provision. Any subcontract with entities defined in paragraph (a), therefore, shall be completed in sufficient time to permit the U.S. Government to make extraordinary payments on subcontracts with Russian entities on or before December 31, 2025.
- (g) The Partner shall include the substance of this clause in all its subcontracts, and shall require such inclusion in all other subcontracts of any tier. The Partner shall be responsible to obtain written approval from the NASA Administrative Contact to enter into any tier subcontract that involves entities defined in paragraph (a).

G. During Agreement performance, Partner shall identify any “covered telecommunications equipment or services” as defined in Section 889(f)(3) of the National Defense Authorization Act of 2019, used as a substantial or essential component of any system, or as critical technology as part of any system, or if Partner is notified of such by a subcontractor at any tier or by any other source, the Partner shall report this in writing to the NASA Administrative Contact in the Agreement, within one business day from the date of such identification or notification.

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below (“Effective Date”) and shall remain in effect for five years from the Effective Date.

ARTICLE 16. RIGHT TO TERMINATE

A. Termination by Mutual Consent

This Agreement may be terminated at any time upon mutual written consent of both Parties.

B. Termination for Failure to Perform

1. At its discretion, NASA may terminate this Agreement 30 days after issuance of a written notification that Partner has failed to perform under this Agreement by failing to meet a scheduled milestone, as identified and described in Appendix 2. Before making such a notification, NASA shall consult with Partner to ascertain the cause of the failure and determine whether additional efforts are in the best interest of the Parties. Upon such a notification and determination, NASA will take all rights identified in Articles 9 and 10 of this Agreement.
2. Partner shall not be entitled to any additional payments from the Government due to a termination for failure to meet a milestone. NASA and Partner will negotiate in good faith any other outstanding issues between the Parties. Failure of the Parties to agree will be resolved pursuant to Article 19, Dispute Resolution. Partner shall retain without liability or obligation of repayment all NASA payments made and received as of the date of termination.

C. Unilateral Termination by NASA

1. NASA may unilaterally terminate this Agreement upon written notice in the following circumstances: (a) upon a declaration of war by the Congress of the United States; or (b) upon a declaration of a national emergency by the President of the United States; or (c) upon a NASA determination, in writing, that NASA is required to terminate for reasons beyond its control. For purposes of this Article, reasons beyond NASA's control include, but are not limited to, acts of God or of the public enemy, acts of the U.S. Government other than NASA, in either its sovereign or contractual capacity (to include failure of Congress to appropriate sufficient funding), fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or unusually severe weather.
2. Upon receipt of written notification that the Government is unilaterally terminating this Agreement, Partner shall immediately stop work under this Agreement and shall immediately cause any and all of its partners and suppliers to cease work, except to the extent that Partner wishes to pursue this development, or similar projects, exclusively using its own funding. Upon such a termination, NASA and Partner agree to negotiate in good faith a final settlement payment to be made by NASA. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone of this Agreement and is subject to the provisions of Article 5. Partner shall retain without liability or obligation of repayment all NASA payments made and received as of the date of termination. Failure of the parties to agree will be resolved pursuant to Article 19, Dispute Resolution.

D. Limitation on Damages

In the event of any termination by NASA, neither NASA nor Partner shall be liable for any loss of profits, revenue, or any indirect or consequential damages incurred by the other Party,

its contractors, subcontractors, or customers as a result of any termination of this Agreement. A Party's liability for any damages under this Agreement is limited solely to direct damages, incurred by the other Party, as a result of any termination of this Agreement subject to mitigation of such damages by the complaining party. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone under this Agreement.

E. Rights in Property

Partner will have title to property acquired or developed by Partner and its contractors/partners with government funding, in whole or in part to conduct the work specified under this Agreement. In the event of termination of this Agreement for Failure to Perform, NASA may purchase such property as provided in Article 26 below.

ARTICLE 17. CONTINUING OBLIGATIONS

The rights and obligations of the Parties that, by their nature, would continue beyond the expiration or termination of this Agreement, e.g., "Liability and Risk of Loss", "Intellectual Property Rights" related clauses, and "Financial Obligations" shall survive such expiration or termination of this Agreement.

ARTICLE 18. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Agreement.

Administrative Points of Contact:

NASA

Kelly L. Rubio
Contracting Officer
kelly.l.rubio@nasa.gov
281-244-7890
NASA JSC, Mail Code BG
2101 NASA Parkway
Houston, TX 77058

Partner

Christopher Cummins
Chief Commerce Officer
ckcummins@nanoracks.com
(832) 632-7754
Nanoracks
503 Forge River Road
Webster, TX 77598

Technical Points of Contact:

NASA

Stephanie Duchesne
Project Executive (Acting)
stephanie.m.duchesne@nasa.gov

Partner

Adrian Mangiuca
Vice President, Infrastructure
adrian.mangiuca@voyagerspace.com

281-244-1393
NASA JSC, Mail Code UA
2101 NASA Parkway
Houston, TX 77058

(248) 495-7939
Voyager Space
1424 K St. NW
Washington, DC 20005

ARTICLE 19. DISPUTE RESOLUTION

Except as otherwise provided in the Article entitled “Intellectual Property Rights – Invention and Patent Rights” (for those activities governed by 37 C.F.R. Part 404), and those situations where a pre-existing statutory or regulatory system exists (e.g., under the Freedom of Information Act, 5 U.S.C. § 552), all disputes concerning questions of fact or law arising under this Agreement shall be referred by the claimant in writing to the appropriate person identified in this Agreement as the “Points of Contact.” The persons identified as the “Points of Contact” for NASA and the Partner will consult and attempt to resolve all issues arising from the implementation of this Agreement. If they are unable to come to agreement on any issue, the dispute will be referred to the signatories to this Agreement, or their designees, for joint resolution. If the Parties remain unable to resolve the dispute, then the NASA signatory or that person’s designee, as applicable, will issue a written decision that will be the final agency decision for the purpose of judicial review. Nothing in this Article limits or prevents either Party from pursuing any other right or remedy available by law upon the issuance of the final agency decision.

ARTICLE 20. INVESTIGATIONS OF MISHAPS AND CLOSE CALLS

In the case of a close call, mishap or mission failure under this Agreement, the Parties agree to provide assistance to each other in the conduct of any investigation. For all NASA mishaps or close calls, Partner agrees to comply with NPR 8621.1, “NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping” and JPR 8621.1, “Johnson Space Center Mishap Response Plan.”

ARTICLE 21. MODIFICATIONS

Any modification to this Agreement shall be executed, in writing, and signed by an authorized representative of NASA and the Partner.

ARTICLE 22. ASSIGNMENT

Neither this Agreement nor any interest arising under it will be assigned by either Party without the express written consent of the officials executing, or successors, or higher-level officials possessing original or delegated authority to execute this Agreement.

ARTICLE 23. APPLICABLE LAW

U.S. Federal law governs this Agreement for all purposes, including, but not limited to, determining the validity of this Agreement, the meaning of its provisions, and the rights, obligations and remedies of the Parties.

ARTICLE 24. INDEPENDENT RELATIONSHIP

This Agreement is not intended to constitute, create, give effect to or otherwise recognize a joint venture, partnership, or formal business organization, or agency agreement of any kind, and the rights and obligations of the Parties shall be only those expressly set forth herein.

ARTICLE 25. LOAN OF GOVERNMENT PROPERTY

The parties shall enter into a NASA Form 893, *Loan of NASA Equipment*, for NASA equipment loaned to Partner.

ARTICLE 26. TITLE AND RIGHTS IN REAL AND PERSONAL PROPERTY

Partner will have title to property acquired or developed by Partner under this Agreement, including acquired or developed by Partner for the CDFE effort. In the event of Termination for Failure to Perform under Article 16.B, NASA will have the right to purchase any such property. The Parties will negotiate in good faith purchase prices for specific items of property. The negotiated prices will be based on Partner's actual costs for purchase or development of the specific item(s), or fair market value, whichever is less. This price will then be discounted by a percentage that reflects the ratio of government funding provided under the Agreement versus the amount of Partner funding used to develop the specific item(s) of property. However, NASA shall have no rights in property acquired or purchased by Partner that does not directly derive from NASA funding under this Agreement.

ARTICLE 27. NASA FURNISHED INFORMATION AND SERVICES

A. NASA may, at its sole discretion and on terms to be negotiated between the Parties, provide Partner additional NASA services, technical expertise, or Government Property. Low-level requests, such as for a document, telecon, or Technical Interchange Meeting (TIM) of one day or less duration, may be fulfilled during performance of the SAA. Additional NASA services, technical expertise, or Government Property may be provided on a fully reimbursable basis. Specific services and property will be identified in modifications to this Agreement. Unless NASA specifically requires Partner to use NASA furnished services, technical expertise or Government Property to fulfill its obligations under this Agreement, any decision by Partner to use NASA furnished services, technical expertise or Government

Property shall be at Partner's option and sole discretion. Partner shall remain solely responsible for completion of its milestones under this Agreement regardless of the availability or use of such optional NASA services, technical expertise, or Government Property.

B. There is no Government Furnished Property or Services furnished under this Agreement except for those that may be provided in Article 27.A. However, Partner has the ability to enter into separate Space Act agreements with NASA Centers to use NASA resources in performance of this Agreement. The terms and conditions of other Space Act agreements will govern the use of NASA resources not being provided under this Agreement. With each of its subcontractors or partners, including NASA Centers, Partner will be responsible for ensuring timely, accurate work, and replacing such subcontractors or partners, where necessary and appropriate and at the discretion of Partner, in order to meet milestones.


ARTICLE 28. OPTIONS TO EXERCISE ADDITIONAL MATURATION EFFORT


Appendix 2, Milestones and Success Criteria, may include optional milestones regarding Nanoracks' further maturing of its CDFE System. These milestones would be included only as a priced Option to this Agreement and create no obligation for either Party to perform unless NASA decides to extend an offer to exercise the Option and the Parties mutually agree. Should NASA decide to extend such offer, it will provide to Nanoracks written notification of such an intention from the Associate Administrator of Space Operations Mission Directorate (SOMD) or his/her designee no later than 60 days prior to the end of this Agreement.

ARTICLE 29. SIGNATORY AUTHORITY

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

NANORACKS

BY: 
Kathryn Lueders
Associate Administrator
Space Operations Mission Directorate

BY: 
Christopher Cummins
Chief Commerce Officer

DATE: 12/1/2021

DATE: November 24, 2021

SAA APPENDIX 1 - PARTICIPANT EXECUTIVE SUMMARY

The United States is poised in the next decade to reap the benefits of a vibrant, robust commercial space transportation industry by ushering in an era of private space stations to further stimulate the space economy. As part of this long-desired evolution in space utilization, Nanoracks (NR) will deploy by 2027 a Commercial Low Earth Orbit (LEO) Destination (CLD) called “Starlab,” an independent, next generation free-flying commercial outpost to conduct critical research, foster space commerce expansion, and ensure continued U.S. space presence and leadership. Starlab leverages NR’s decade of leadership and pathfinding in International Space Station (ISS) commercial module development and payload operations. NR provides turnkey products and services for its customers, focusing on the success of their science, research, or other missions, from conception to completion. NR and its majority shareholder and key Starlab Partner, Voyager Space Holdings (VSH), will be responsible for building and obtaining financing, and attracting customers for Starlab, thereby enabling NASA to focus its resources on the next phases of space exploration.

NR proposes a 2027 Initial Operating Capability (IOC) that consists of a fully functional commercial facility that meets and, in many cases, exceeds of NASA’s CLD goals. IOC will be achieved with one launch. NR is teaming with Lockheed Martin (LM), which serves as the technical lead and integrator for Starlab. Among other things, LM is developing a large inflatable habitat based on extensive experience and recent internal investments in inflatable technologies. This habitat, along with a metallic docking node and power & propulsion element, will more than triple NASA’s stretch goal for habitable volume, allowing continuous presence of four astronauts. Starlab also exceeds NASA’s payload and science goals by adding substantial laboratory equipment for scientific investigation and commercial activity. To manipulate external payloads, Starlab includes a large robotic arm at IOC.

After assessing LEO technical needs and financial opportunities, NR has determined that ample market opportunity exists to justify a CSS. Market analysis suggests the CSS business will serve a rapidly growing market over the next decade. VSH has worked with Nanoracks to develop a financial plan based on current market expectations that allows cashflow positive status in 2028 and profitability by 2029. NR serves as prime for this effort after having determined, during its NASA-funded LEO Commercialization Study, that full ownership and control of commercial space station hardware ensures ability to drive business and conduct sustainable operations to meet commercial needs. NR is therefore empowered, in close collaboration with NASA, to prioritize customer activity to achieve returns on investment.

NR leverages private funding for Starlab through all development phases. VSH is financing the initial program study period and arranging for other financing thereafter. NR recognizes challenges in the phasing of government funding and will manage its business and financing accordingly. The Starlab enterprise is sustainable because NASA is one among many customers, with NASA demand averaging 30% of total Starlab revenues over 10 years starting in early FY26. With this strategic investment across multiple reputable organizations, NR provides a significant portion of ISS capability to NASA for a small fraction of what otherwise would be NASA’s development and operational costs for a government-owned station.

If the past is an indication, private industry and NASA collaboration on in-space destinations will ensure that a growing base of customers, both domestic and international, will open a new chapter in America’s leadership of the high frontier. Nanoracks and our team of proven leaders are ready for the privilege of helping to write it.

SAA APPENDIX 2 - PROPOSED MILESTONES AND PAYMENTS

Below are the key milestones for this program. These dates and criteria (see Appendix 3 for further detail on Programmatic milestones) may be further tailored in conjunction with NASA as the program requires. The planned major milestones for the activities defined in the “Responsibilities” Article are as follows:

Milestone Description	NASA Payment & Date (FY)
<p>Milestone #1: Kickoff Meeting Following execution of the proposed Space Act Agreement, Nanoracks shall host a joint kickoff meeting for all lab and platform team members, to describe the plan for program implementation.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> N/A <p>Success Criteria:</p> <ul style="list-style-type: none"> Completion of kickoff meeting documentation made available. Program manager approves plan. 	<p>Amount: \$3,000,000 Date: 01 / 2022 (FY Q2 22)</p>
<p>Milestone #2: Spacecraft System Requirements Review (SRR) The Nanoracks team will conduct an SRR to ensure that the program’s functional and performance requirements are properly formulated (excluding lab).</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> Entrance criteria satisfied that shows readiness to conduct SRR per Appendix 3. <p>Success Criteria:</p> <ul style="list-style-type: none"> Successful completion of the SRR per Appendix 3. 	<p>Amount: \$2,000,000 Date: 06 / 2022 (FY Q3 22)</p>
<p>Milestone #3: Spacecraft System Design Review (SDR) The Nanoracks team will evaluate Starlab’s credibility and responsiveness of the proposed program requirements/architecture to meet CLD requirements (excluding lab). Nanoracks will ensure the requirements and the allocation of subsystem requirements are sufficient.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> Entrance criteria satisfied that shows readiness to conduct SDR per Appendix 3. <p>Success Criteria:</p> <ul style="list-style-type: none"> Successful completion of the SDR per Appendix 3. 	<p>Amount: \$5,000,000 Date: 09 / 2022 (FY Q4 22)</p>
<p>Milestone #4: Softgoods Test #1 See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Entrance Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Success Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p>	<p>Amount: \$15,000,000 Date: 12 / 2022 (FY Q1 23)</p>
<p>Milestone #5: Mock-up Complete & Softgoods Test Article #2 Design Complete See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Entrance Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Success Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p>	<p>Amount: \$15,000,000 Date: 03 / 2023 (FY Q2 23)</p>
<p>Milestone #6: Softgoods Test Articles Complete See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Entrance Criteria:</p>	<p>Amount: \$2,000,000 Date: 04 / 2023 (FY Q3 23)</p>

Commercial Destinations – Free Flyer

Milestone Description	NASA Payment & Date (FY)
<p>See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Success Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p>	
<p>Milestone #7: Spacecraft Preliminary Design Review (PDR) The Nanoracks team will demonstrate that the preliminary design meets all major system requirements with acceptable risk and within the cost and schedule constraints and will establish the basis for proceeding with detailed design (excluding lab).</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> Entrance criteria satisfied that shows readiness to conduct PDR per Appendix 3. <p>Success Criteria:</p> <ul style="list-style-type: none"> Successful completion of the PDR per Appendix 3. 	<p>Amount: \$10,000,000 Date: 09 / 2023 (FY Q4 23)</p>
<p>Milestone #8: Softgoods Test #2 See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Entrance Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Success Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p>	<p>Amount: \$25,000,000 Date: 12 / 2023 (FY Q1 24)</p>
<p>Milestone #9: Softgoods Test #3 See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Entrance Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p> <p>Success Criteria: See document NR-STARLAB-D00001, <i>Development Test Plan for Starlab</i></p>	<p>Amount: \$20,000,000 Date: 02 / 2024 (FY Q2 24)</p>
<p>Milestone #10: Phase II Safety Review Nanoracks will conduct a Phase II Safety Review which summarizes the current design and general safety approach.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> Updated overview description of the design and operations is available. Updated technical documentation and drawings reflecting detailed safety features, inhibits and associated controls is available. Phase II hazard reports and appropriate supporting data is available. Updated overview of the software design, including state and mode diagrams and updated list of safety critical software requirements is available. <p>Success Criteria: Hazard analysis is at a Phase II level of maturity:</p> <ul style="list-style-type: none"> Any additional hazard causes either through design changes or analysis maturity have been identified. All controls for the hazard causes, including controls related to OFT exemptions, are acceptable as documented in the hazard reports and as implemented in the hardware or software design and there is a direct link between the causes and their associated controls in the hazard report. Independence of hazard controls will be confirmed. All operational controls have been documented. All verification methods for the hazard controls are acceptable as documented in the hazard reports. A crew survivability analysis for all mission phases has been completed and approved. All critical failure modes are traced to their corresponding hazard cause(s). 	<p>Amount: \$15,000,000 Date: 05 / 2024 (FY Q3 24)</p>
<p>Milestone #11: Spacecraft Critical Design Review (CDR) The Nanoracks team will demonstrate that the maturity of the design is appropriate to support proceeding with full-scale fabrication, assembly, integration, and test (excluding lab).</p> <p>Entrance Criteria:</p>	<p>Amount: \$15,500,000 Date: 09 / 2024 (FY Q4 24)</p>

Commercial Destinations – Free Flyer

Milestone Description	NASA Payment & Date (FY)
<ul style="list-style-type: none"> Entrance criteria satisfied that shows readiness to conduct CDR per Appendix 3. <p>Success Criteria:</p> <ul style="list-style-type: none"> Successful completion of the CDR per Appendix 3. 	
<p>Milestone #12: Services Contract Signed The Nanoracks team will demonstrate signature of agreement toward, and begin performance on accommodation, services, or astronautics contracts with one or multiple commercial customers.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> N/A <p>Success Criteria:</p> <ul style="list-style-type: none"> At least \$10,000,000 in contracts signed by December 01, 2024. 	<p>Amount: \$7,500,000 Date: 12 / 2024 (FY Q1 25)</p>
<p>Milestone #13: Analog Lab Complete An analog lab will officially begin operations to work with PIs, opening facilities to customers.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> Facility completed. <p>Success Criteria:</p> <ul style="list-style-type: none"> Contract signed for researcher, institutional, or government use of ground facility for training, analog, or other purposes. 	<p>Amount: \$7,500,000 Date: 03 / 2025 (FY Q2 25)</p>
<p>Milestone #14: Lab CDR The Nanoracks team will demonstrate that the maturity of the lab design is appropriate to support proceeding with full-scale fabrication, assembly, integration, and test. The lab includes all scientific equipment to be installed in the Starlab vehicle.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> Completion of lab PDR per application of Appendix 3 criteria to lab elements. <p>Success Criteria:</p> <ul style="list-style-type: none"> Successful completion of the CDR per application of Appendix 3 criteria to lab elements. 	<p>Amount: \$7,500,000 Date: 06 / 2025 (FY Q3 25)</p>
<p>Milestone #15: Launch Vehicle Contract Signed Nanoracks will sign the launch vehicle provider contract for Starlab’s initial launch.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> N/A <p>Success Criteria:</p> <ul style="list-style-type: none"> Launch vehicle provider contract signed. 	<p>Amount: \$10,000,000 Date: 09 / 2025 (FY Q4 25)</p>

SAA APPENDIX 3 - TAILORED SUCCESS CRITERIA FOR MILESTONE REVIEWS

The Starlab Team provides NASA with insight into all programmatic, financial, and team reviews. A “seat at the table” is expected, and the Starlab team welcomes NASA’s inputs and anticipates an open conversation of mutual learning over the course of the study and program execution periods.

1.1.1 SRR Entrance and Success Criteria

Table A1.3-1 below defines the proposed SRR entrance criteria for CLD with a summary of applicable tailoring in Table A1.3-2.

Table A1.3-1 SRR Entrance and Success Criteria

SRR Entrance Criteria	SRR Success Criteria
<ol style="list-style-type: none"> 1. The project has successfully completed the previously planned life-cycle reviews and responses have been made to all RFAs and RIDs, or a timely closure plan exists for those items remaining open. 2. A preliminary SRR agenda, success criteria, and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the SRR. 3. All planned higher level SRR and peer reviews have been successfully conducted and RID/RFA/Action Items have been addressed and resolved with the originator or designated TA, or a timely closure plan exists for those remaining open. 4. Programmatic products are ready for review at the maturity levels stated in the governing program/project management NPR. 5. The following primary technical products for hardware, software and human system elements are available to the cognizant participants prior to the review: <ol style="list-style-type: none"> a. Requirements for system being reviewed are ready to be baselined after the review and preliminary allocation to the next lower level system has been performed. b. SEMP (or equivalent program/project documentation) is ready to be baselined after review comments are incorporated. 6. Other SRR work products (as applicable) for hardware, software, and human system elements have been made available to the cognizant participants. <ol style="list-style-type: none"> a. Preliminary concept definition. b. Preliminary concept of operations. c. Updated parent requirements. 	<ol style="list-style-type: none"> 1. The functional and performance requirements defined for the system are responsive to the stakeholder needs and parent requirements, reflect the systems intended operational use, and represent capabilities likely to be achieved within the scope of the project. 2. The maturity of the requirements definition and associated plans is sufficient to begin Phase B. 3. The project utilizes a sound process for the allocation and control of requirements throughout all levels, and a plan has been defined to complete the requirements definition at lower levels within schedule constraints. 4. System Interfaces with external entities and between major internal elements have been identified. 5. Preliminary approaches have been determined for how requirements will be verified and validated. 6. Major risks have been identified and technically assessed, and viable mitigation strategies have been defined. 7. The program/project has demonstrated compliance with applicable NASA and implementing Center requirements, standards, processes, and procedures. 8. TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition. 9. Software components meet the success criteria defined in NASA-HDBK-2203. 10. Concurrence by the responsible Center spectrum manager that the

SRR Entrance Criteria	SRR Success Criteria
<ul style="list-style-type: none"> d. Risk management plan ready to be baselined after review comments are incorporated. e. Updated risk assessment and mitigations. f. Configuration management plan ready to be baselined after review comments are incorporated. g. Initial document tree or model structure. h. Preliminary verification and validation method identified for each requirement. i. Preliminary system safety analysis. j. Product certification or product acceptance data requirements. k. Interfaces with external systems are identified and preliminary definitions are ready to be baselined (e.g., Interface Control Documents). l. Preliminary MOPS and TPM and other key driving requirements. m. Other specialty discipline analyses, as required. n. Updated cost and schedule estimates for the project implementation. o. N/A p. N/A q. N/A r. Logistics documentation (e.g., preliminary maintenance plan). s. Initial Human Rating Certification Package. t. System safety and mission assurance plan ready to be baselined after review comments are incorporated. u. Preliminary operations concept. v. Preliminary engineering development assessment and technical plans to achieve what needs to be accomplished in the next phase. w. Software criteria and products, per the NASA-HDBK-2203. x. RF spectrum requirements have been addressed including preparing requisite data for the responsible Center Spectrum Manager for possible Stage 1 Certification. y. Preliminary IT Plan. z. Product certification or product acceptance data requirements. 	<p>program/project has provided requisite RF system data.</p> <ul style="list-style-type: none"> 11. Proposed tailoring is appropriate and consistent with applicable Agency and Center guidance. 12. Lessons Learned from other projects and programs have been identified and addressed. 13. Single Point Failure/Fault Tolerance philosophy is reflected in requirements.

A summary of entrance and success criteria items which were tailored from NPR 7123.1 is provided below as applicable.

Table A1.3-2 SRR Entrance Criteria Tailoring Summary

NPR 7123.1 Language	Tailored Language	Rationale
6.o. Preliminary documentation of Basis of Estimate (cost and schedule) for uncoupled, loosely coupled, and tightly coupled programs.	Not Applicable	It is assumed formal BOEs are not required under a funded SAA to meet the intent of a design review. Any cost and schedule estimates may include justification as applicable to assess the reasonableness of the schedule or any cost estimates provided.
6.p. Updated Technology Development Plan.	Not Applicable	It is assumed a formal technology development plan is not required. Intent is met by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.
6.q. Updated technology readiness assessment that has been reviewed and documented that includes technology assets, heritage products, and capability gaps identified.	Not Applicable	Intent is met by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.

1.1.2 SRR Project Milestone Products Maturity Matrix

The overall approach is to follow the recommendations for Program Products and Plans per NPR 7120.5F. However, since overall CLD Program and procurement approach is under a funded SAA some tailoring to NPR 7120.5F needed. The Program Product and Plan maturity level for SRR along with any expectations with rationale are documented in Table A1.3-4. For simplicity, Headquarters Products as identified in NPR 7120.5F table I-6 have been omitted. Any assumed tailoring or exceptions are explicitly address in the SRR Maturity and Assumptions if applicable.

Table A1.3-4 SRR Milestone Product Maturity Definition

Products	SRR Maturity and Assumptions
Program Technical Products	
1. Concept Documentation	Approve
2. Mission, Spacecraft, Ground, and Payload Architectures	Baseline mission and spacecraft architecture, preliminary ground and payload architectures.
3. Project-Level, System, and Subsystem Requirements	Baseline project-level and system-level requirements
4. Design Documentation	Not due for SRR per NPR 7120.5F Table I-6
5. Operations Concept	Preliminary
6. Technology Readiness Assessment Documentation	N/A—CLD will identify and document any low Technology Readiness items that pose a cost, schedule or technical risk per the Risk Management Plan.

Products	SRR Maturity and Assumptions
7. Engineering Development Assessment Documentation	N/A—Will not be a formal assessment or standalone document. CLD will document risks, key trades and architecture for SDR to sufficient detail such that feasibility can be judged at the review.
8. Heritage Assessment Documentation	N/A—Heritage assessment documentation may be provided to support justification of risk and/or feasibility of program element but is assumed to not be required.
9. Systems Safety Analyses (e.g., safety data packages)	Not due for SRR per NPR 7120.5F Table I-6
10. Payload Safety Process Deliverables	Preliminary
11. Verification and Validation Report	Not due for SRR per NPR 7120.5F Table I-6
12. Operations Handbook	N/A - The intent of this line is not applicable to CLD as a Program however, documentation regarding overall Operations and User Guide will be developed in coordination with NASA
13. Orbital Debris Assessment per NPR 8715.6	Proposed Exception: Considered N/A for SRR/SDR. Preliminary Design ODAR will be considered first formal assessment. It's assumed that best practices and CONOPs will sufficiently document risk associated with orbital debris.
14. End of Mission Plans per NPR 8715.6/NASA-STD 8719.14, App B	Not due for SRR per NPR 7120.5F Table I-6
15. Final Mission Report	Not due for SRR per NPR 7120.5F Table I-6
16. Decommissioning/Disposal Plan	Not due for SRR per NPR 7120.5F Table I-6
17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status	Tailored—A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR.
18. Criticality Identification Method for Hardware	Tailored – A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR.
19. Hardware Quality Data Management Analytics	Tailored—A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR.
Project Management, Planning, and Control Products	
1. Formulation Agreement	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
2. Program Plan	Not due for SRR per NPR 7120.5F Table I-6 but overall program schedule will be developed
3. Project Plan	N/A—Assume Program Plan only
4. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase (see #3 above), including performance against baselines and status/closure of formal actions from previous KDP	Summary - Assume met by Program Schedule status, review of TPMs and actions during the design review.
5. Project Baselines	
a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources	Initial

Products	SRR Maturity and Assumptions
b. Staffing requirements and plans	Initial
c.i. Infrastructure requirements and plans Business case analysis for infrastructure c.ii Capitalization Determination Form (CDF)	Update - Tailored: Infrastructure requirements and plans only. Rationale: Business case analysis and CDF is assumed to be for NASA only and commercial companies will analyze, propose and manage any infrastructure updates or additions internally.
d. Schedule	Tailored: Risk informed at program level with preliminary Phase D completion ranges
e. Cost Estimate	Preliminary Range Estimate
f. Basis of Estimate (cost and schedule)	N/A—It is assumed formal BOEs are not required under a funded SAA to meet the intent of a design review. Any cost and schedule estimates may include justification as applicable to assess the reasonableness of the schedule or any cost estimates provided.
g. Confidence Level(s) and supporting documentation	Not due for SRR per NPR 7120.5F Table I-6
h. External Cost and Schedule Commitments	Not due for SRR per NPR 7120.5F Table I-6
i. CADRe	N/A for Phase 1. Since Phase 1 is under a funded SAA and NASA will be formulating requirements for Phase 2 in parallel with Phase 1, a Cost Risk Assessment would be too preliminary without formal technical and Program requirements.
j. PMB	NA—Assume Phase 1 under SAA does not required PMB. Assume intent met by other Plans, Milestone Review status and documentation until Phase 2.

Table A1.3-5 SRR Project Plan Control Plans Maturity Exceptions with Rationale

Project Plan Control Plans	SRR Project Plan Control Plans Maturity with Rationale
1. Technical, Schedule, and Cost Control Plan	N/A—it is assumed that the combination of SEMP, Risk Management Plan and Configuration Management Plan sufficiently describe CLD Program controls and process to meet technical, schedule and cost baselines so a separate plan is unneeded.
2. Safety and Mission Assurance Plan	Baseline
3. Risk Management Plan	Baseline
4. Acquisition Strategy	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
5. Technology Development Plan	N/A—It is assumed a formal technology development plan is not required. Intent is met by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.
6. Systems Engineering Management Plan	Baseline
7. System Security Plan	Not due for SRR per NPR 7120.5F Table I-7
8. Software Management Plan(s)	Preliminary
9. Verification and Validation Plan	Preliminary Approach documented

Project Plan Control Plans	SRR Project Plan Control Plans Maturity with Rationale
10. Review Plan	Baseline
11. Mission Operations Plan	Preliminary Approach—Tailored: Due to the nature of the CLD Program, an overarching Mission Operations Plan is required much earlier than is typical. It’s proposed that a Mission Operations Plan (either standalone or combined with other User Guide documentation) be developed concurrently with the design.
12. Environmental Management Plan	Not due for SRR per NPR 7120.5F Table I-7
13. Integrated Logistics Support Plan	Preliminary
14. Science Data Management Plan	Not due for SRR per NPR 7120.5F Table I-7
15. Integration Plan	Preliminary Approach documented
16. Configuration Management Plan	Baseline
17. Security Plan	Not due for SRR per NPR 7120.5F Table I-7
18. Project Protection Plan	Not due for SRR per NPR 7120.5F Table I-7
19. Technology Transfer (formerly Export) Control Plan	Corporate policies will satisfy this criteria
20. Knowledge Management Plan	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required and a formal Knowledge Management Plan is not needed for work under SAA.
21. Human Rating Certification Package	Preliminary Approach (Tailored: since there is no MCR, only the preliminary approach is assumed.)
22. Planetary Protection Plan	Assume N/A for CLD Program.
23. Nuclear Safety Launch Approval Plan	Not due for SRR per NPR 7120.5F Table I-7
24. Range Safety Risk Management Process Documentation	Not due for SRR per NPR 7120.5F Table I-7
25. Communications Plan	N/A - Assume formal plan is NA under SAA.
26. Quality Assurance Surveillance Plan	Tailored—A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR
27. Orbital Collision Avoidance Plan	Not due for SRR per NPR 7120.5F Table I-7
28. Human Systems Integration Plan	Baseline

1.1.3.1

1.1.3 System Definition Review (SDR)

1.1.3.2

SDR Overview

The SDR examines the proposed system architecture and design and the flow down to all functional elements of the system.

SDR Entrance and Success Criteria

Table A1.3-6 below defines the proposed SDR entrance criteria for CLD with a summary of applicable tailoring in Table A1.3-7.

Table A1.3-6 SDR Entrance and Success Criteria

SDR Entrance Criteria	SDR Success Criteria
1. The project has successfully completed the previously planned life-cycle reviews and all RFAs and RIDs have been addressed and resolved, or a timely closure plan exists for those items remaining open.	1. The proposed mission/system architecture is credible and responsive to program requirements and constraints, including resources.

SDR Entrance Criteria	SDR Success Criteria
<ol style="list-style-type: none"> 2. A preliminary MDR/SDR agenda, success criteria, and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the MDR/SDR. 3. All planned higher level MDR/SDR and peer reviews have been successfully conducted and RID/RFA/Action Items have been addressed with the originator or designated TA. 4. Programmatic products are ready for review at the maturity levels stated in the governing program/project management NPR. 5. The following primary technical products for hardware, software, and human system elements are available to the cognizant participants prior to the review: <ol style="list-style-type: none"> a. Defined architecture, including major tradeoffs and options ready to be baselined after review comments are incorporated. b. Allocation of requirements to next lower level is ready to be baselined after review comments are incorporated. c. MOPs, TPM, and other key driving requirement ready to be approved. d. Approval and status of technical performance related to leading indicators, margins, TPMs, and resolution of the previous review discrepancies addressing effectiveness of technical achievement and communicating the overall risk to the project. 6. Other MDR/SDR technical products listed below for both hardware and software system elements have been made available to the cognizant participants prior to the review: <ol style="list-style-type: none"> a. Supporting analyses, functional/timing descriptions, and allocations of functions to architecture elements. b. Updated SEMP (or equivalent program/project documentation). c. Updated risk management plan. d. Updated risk assessment and mitigations (if required by the governing PM NPR, including PRA). e. N/A. f. N/A g. Updated cost and schedule data with ranges. (tailored) 	<ol style="list-style-type: none"> 2. The program/project cost and schedule estimates are credible to meet program/project requirements within available resources with acceptable risk. 3. The project’s mission/system definition and associated plans are sufficiently mature to begin Phase B. 4. All technical requirements are allocated to the architectural elements. 5. The architecture tradeoffs are completed, and those planned for Phase B adequately address the option space. 6. Significant development, mission, and health and medical safety risks are identified and technically assessed, and a process and resources exist to manage the risks. 7. Adequate planning exists for the development, insertion, or deployment of any enabling new technology. 8. The operations concept is consistent with proposed design concept(s) and is in alignment with the mission requirements. 9. The program/project has demonstrated compliance with applicable NASA and implementing Center requirements, standards, processes, and procedures. 10. TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition. 11. Software components meet the success criteria defined in NASA-HDBK-2203. 12. Concurrence by the responsible Center spectrum manager that RF spectrum considerations have been addressed. 13. Procurement and supply chain risk management execution is complementary with the technical development schedule. 14. Architecture supports the Single Point Failure/Fault Tolerance requirements.

SDR Entrance Criteria	SDR Success Criteria
<ul style="list-style-type: none"> h. Preliminary Integrated Logistics Support Plan (ILSP). i. Human Systems Integration Plan (HSIP) ready to be baselined after review comments are incorporated. j. Updated Human Rating Certification Package. k. Preliminary system interface definitions. l. Initial technical resource utilization estimates and margins. m. Updated safety and mission assurance (S&MA) plan. n. Preliminary operations concept. o. Preliminary system safety analysis. p. Software criteria and products, per NASA-HDBK-2203. q. RF spectrum considerations assessment. r. Baseline IT Plan. s. Preliminary IT System Security Plan 	

A summary of entrance and success criteria items which were tailored from NPR 7123.1 is provided below as applicable.

Table A1.3-7 SDR Entrance Criteria Tailoring Summary

NPR 7123.1 Language	Tailored Language	Rationale
6.e. Updated Technology Development Plan.	Not Applicable	It is assumed a formal technology development plan is not required. Intent is met by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.
6.f. Updated technology readiness assessment that has been reviewed and documented that includes technology assets, heritage products, and capability gaps identified.	Not Applicable	Intent is met by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.
1.1.3.3 6.g. Updated cost and schedule data with ranges and a basis of the estimates.	Updated cost and schedule data with ranges.	Formal BOEs not included.

SDR Project Milestone Products Maturity Matrix

The overall approach is to follow the recommendations for Program Products and Plans per NPR 7120.5F. However, since overall CLD Program and procurement approach is under a funded SAA some tailoring to NPR 7120.5F needed. The Program Product and Plan maturity level for SDR along with any expectations with rationale are documented in Table A1.3-9. For simplicity,

Headquarters Products as identified in NPR 7120.5F table I-6 have been omitted. Any assumed tailoring or exceptions are explicitly address in the SRR Maturity and Assumptions if applicable.

Table A1.3-9 SDR Milestone Product Maturity Definition

Products	SDR Maturity and Assumptions
Program Technical Products	
1. Concept Documentation	Update
2. Mission, Spacecraft, Ground, and Payload Architectures	Update mission and spacecraft architecture, baseline ground and payload architectures.
3. Project-Level, System, and Subsystem Requirements	Update Project-level and system-level requirements, Preliminary subsystem requirements
4. Design Documentation	Not due for SDR per NPR 7120.5F Table I-6
5. Operations Concept	Preliminary
6. Technology Readiness Assessment Documentation	N/A—CLD will identify and document any low Technology Readiness items that pose a cost, schedule or technical risk per Risk Management Plan.
7. Engineering Development Assessment Documentation	N/A—Will not be a formal assessment or standalone document. CLD will document risks, key trades and architecture for SDR to sufficient detail such that feasibility can be judged at the review.
8. Heritage Assessment Documentation	N/A - Heritage assessment documentation may be provided to support justification of risk and/or feasibility of program elements but should not be required unless applicable.
9. Systems Safety Analyses (e.g., safety data packages)	Not due for SDR per NPR 7120.5F Table I-6
10. Payload Safety Process Deliverables	Baseline
11. Verification and Validation Report	Not due for SDR per NPR 7120.5F Table I-6
12. Operations Handbook	N/A - The intent of this line is not applicable to CLD as a Program however, documentation regarding overall Operations and User Guide will be developed in coordination with NASA
13. Orbital Debris Assessment per NPR 8715.6	Proposed Exception: Considered N/A for SRR/SDR. Preliminary Design ODAR will be considered first formal assessment. It's assumed that best practices and CONOPs will sufficiently document risk associated with orbital debris.
14. End of Mission Plans per NPR 8715.6/NASA-STD 8719.14, App B	Not due for SDR per NPR 7120.5F Table I-6
15. Final Mission Report	Not due for SDR per NPR 7120.5F Table I-6
16. Decommissioning/Disposal Plan	Not due for SDR per NPR 7120.5F Table I-6
17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status	NA—A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR.
18. Criticality Identification Method for Hardware	NA—A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR.
19. Hardware Quality Data Management Analytics	NA—A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR.

Products	SDR Maturity and Assumptions
Project Management, Planning, and Control Products	
1. Formulation Agreement	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
2. Program Plan	Preliminary
3. Project Plan	N/A—Assume Program Plan only
4. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase (see #3 above), including performance against baselines and status/closure of formal actions from previous KDP	Summary Assume met by Program Schedule status, review of TPMs and actions during the design review.
5. Project Baselines	
a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources	Update
b. Staffing requirements and plans	Update
c.i. Infrastructure requirements and plans Business case analysis for infrastructure c.ii Capitalization Determination Form (CDF)	Update - Tailored: Infrastructure requirements and plans only. Rationale: Business case analysis and CDF is assumed to be for NASA only and commercial companies will analyze, propose and manage any infrastructure updates or additions internally.
d. Schedule	Tailored: Risk informed at subsystem level with preliminary Phase D completion ranges and Preliminary Integrated Master Schedule only
e. Cost Estimate	Risk-informed schedule-adjusted range estimate
f. Basis of Estimate (cost and schedule)	N/A—It is assumed formal BOEs are not required under a funded SAA to meet the intent of a design review. Any cost and schedule estimates may include justification as applicable to assess the reasonableness of the schedule or any cost estimates provided.
g. Confidence Level(s) and supporting documentation	N/A for SDR. Since Phase 1 is under a funded SAA and NASA will be formulating requirements for Phase 2 in parallel with Phase 1, a Cost Risk Assessment would be too preliminary without formal technical and Program requirements.
h. External Cost and Schedule Commitments	Tailored: Preliminary (if applicable), no JCL assumed.
i. CADRe	N/A for Phase 1. Since Phase 1 is under a funded SAA and NASA will be formulating requirements for Phase 2 in parallel with Phase 1, a Cost Risk Assessment would be too preliminary without formal technical and Program requirements.
j. PMB	NA—Assume Phase 1 under SAA does not required PMB. Assume intent met by other Plans, Milestone Review status and documentation until Phase 2.

Table A1.3-10 SDR Project Plan Control Plans Maturity Exceptions with Rationale

Project Plan Control Plans	SDR Project Plan Control Plans Maturity with Rationale
1. Technical, Schedule, and Cost Control Plan	N/A—it is assumed that the combination of SEMP, Risk Management Plan and Configuration Management Plan sufficiently describe CLD Program controls and process to meet technical, schedule and cost baselines so a separate plan is unneeded.
2. Safety and Mission Assurance Plan	Update
3. Risk Management Plan	Update
4. Acquisition Strategy	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
5. Technology Development Plan	N/A—It is assumed a formal technology development plan is not required. Intent is my by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.
6. Systems Engineering Management Plan	Update
7. System Security Plan	Preliminary
8. Software Management Plan(s)	Baseline
9. Verification and Validation Plan	Preliminary
10. Review Plan	Update
11. Mission Operations Plan	Update—Tailored: Due to the nature of the CLD Program, an overarching Mission Operations Plan is required much earlier than is typical. It’s proposed that a Mission Operations Plan (either standalone or combined with other User Guide documentation) be developed concurrently with the design.
12. NEPA Compliance Documentation	Tailored—Update: Since efforts under Phase 1 are executed under an SAA it’s assumed baseline this documentation is premature. A preliminary approach will be provided at SDR with updates at PDR and CDR if applicable or until Phase 2 begins or other circumstances/agreements are made which require it.
13.Integrated Logistics Support Plan	Preliminary
14.Science Data Management Plan	Not due for SRR/SDR per NPR 7120.5F Table I-7
15.Integration Plan	Preliminary
16.Configuration Management Plan	Update
17.Security Plan	Preliminary
18.Project Protection Plan	Preliminary
19.Technology Transfer (formerly Export) Control Plan	Corporate policies will satisfy this criteria
20. Knowledge Management Plan	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required and a formal Knowledge Management Plan is not needed for work under SAA.
21.Human Rating Certification Package	Initial—Tailored: SRR was preliminary approach so SDR is proposed as Initial.
22.Planetary Protection Plan	Assume N/A for CLD Program.

Project Plan Control Plans	SDR Project Plan Control Plans Maturity with Rationale
23.Nuclear Safety Launch Approval Plan	Baseline (if applicable)
24.Range Safety Risk Management Process Documentation	Not due for SDR per NPR 7120.5F Table I-7
25.Communications Plan	N/A - Assume formal plan is NA under SAA.
26.Quality Assurance Surveillance Plan	Baseline—Tailored: A Preliminary, commercially tailored, Quality Control Plan will be provided at SRR
27.Orbital Collision Avoidance Plan	Not due for SDR per NPR 7120.5F Table I-7
28.YHuman Systems Integration Plan	Update

1.1.4 Preliminary Design Review Milestone (PDR)

PDR Overview

The Program Preliminary Design Review (PDR) demonstrates the design meets the system requirements, including human spaceflight verification, with acceptable risk. It will show that the correct design options have been selected, interfaces have been identified, and verification methods have been described. It will clearly define all testing, including checkout, required for human spaceflight certification.

PDR Entrance and Success Criteria

The following tables define the proposed Entrance and Success Criteria for PDR.

Table A1.3-11 PDR Entrance and Success Criteria

PDR Entrance Criteria	PDR Success Criteria
<ol style="list-style-type: none"> 1. The Project has successfully completed the previous planned life-cycle reviews, and all RFAs and RIDs have been addressed and resolved, or a timely closure plan exists for those remaining open. 2. A preliminary PDR agenda, success criteria, and instructions to the review board have been agreed to by the technical team, project manager, and review chair before the PDR. 3. All planned lower level PDRs and peer reviews have been successfully conducted, and RID/RFA/Action Items have been addressed with the originator or designated TA. 4. Programmatic products are ready for review at the maturity levels stated in the governing program/project management NPR. 5. The following primary products are ready for review: <ol style="list-style-type: none"> a. A preliminary design that can be shown to meet all technical requirements and performance measures or has waivers. 	<ol style="list-style-type: none"> 1. The top-level requirements—including mission success criteria, TPMs, and any sponsor-imposed constraints—are agreed upon, finalized, stated clearly, and consistent with the preliminary design. 2. The flow down of verifiable requirements is complete and proper, or, if not, an adequate plan exists for timely resolution of open items. Requirements are traceable to parent technical requirements and to mission goals and objectives. 3. The program/project cost, schedule, and JCL analysis (when required) are credible and within program/project constraints; are ready for NASA commitment; and are ready for the Management Agreement (for projects governed by NPR 7120.5). 4. The preliminary design is expected to meet the requirements at an acceptable level of risk. 5. Definition of the system interfaces (both external entities and between internal elements) is consistent with the overall technical maturity, associated risks have been

PDR Entrance Criteria	PDR Success Criteria
<p>6. Other PDR technical work products (as applicable) for hardware, software, and human system elements have been made available to the cognizant participants before the review:</p> <ul style="list-style-type: none"> a. Subsystem design specifications (hardware and software), with supporting trade-off analyses and data, as required, that are ready to be baselined after review comments are incorporated. b. Status of technical performance related to margins, TPMs, and resolution of the previous review discrepancies addressing effectiveness of technical achievement and communicating the overall risk to the project. c. Updated technology readiness assessment (tailored per PDR Milestone Product Maturity Definition Table) d. NA—See PDR Project Plan Control Plans Maturity Exceptions with Rationale Table e. Updated risk assessment and mitigation. f. Life-Cycle Cost and Integrated Master Schedule (IMS) that are ready to be baselined after review comments are incorporated. Joint Confidence Level (JCL) analysis is not required (tailored). g. Baselined Integrated Logistics Support Plan (ILSP). h. NA - See PDR Project Plan Control Plans Maturity Exceptions with Rationale Table i. Applicable technical plans that are ready to be baselined after review comments are incorporated (e.g., technical performance measurement plan, contamination control plan, parts management plan, environments control plan, Electromagnetic Interference/ Electromagnetic Compatibility (EMI/EMC) control plan, payload-to-carrier integration plan, producibility/manufacturability program plan, reliability program plan, quality assurance plan). j. Applicable design standards that have been identified and incorporated. k. Updated safety analyses and plans. l. Preliminary engineering drawing tree. 	<p>identified and represents an acceptable level of risk.</p> <ul style="list-style-type: none"> 6. Any required new technology has been developed to an adequate state of readiness, or backup options exist and are supported to make them viable alternatives. 7. The project risks are understood and have been credibly assessed, and plans, a process, and resources exist to effectively manage them. 8. Safety and mission assurance (e.g., safety, reliability, maintainability, quality controls, quality verifications, supplier risk management, and Electrical, Electronic, and Electromechanical (EEE) parts) have been adequately addressed in preliminary designs and any applicable S&MA products (e.g., PRA, system safety analysis, and failure modes and effects analysis) meet requirements, are at the appropriate maturity level for this phase of the program/project life-cycle, and indicate that the program/project safety/reliability residual risks will be at an acceptable level. 9. Adequate technical and programmatic margins (e.g., mass, power, memory) and resources exist to complete the development within budget, schedule, and known risks. 10. The operational concept is technically sound, includes (where appropriate) human systems, and includes the flow down of requirements for its execution. 11. Technical trade studies are mostly complete to sufficient detail and remaining trade studies are identified, plans exist for their closure, and potential impacts are understood. 12. The program/project has demonstrated compliance with applicable NASA and implementing Center requirements, standards, processes, and procedures. 13. TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition. 14. Preliminary analysis of the primary subsystems has been completed and summarized, highlighting performance and design margin challenges. 15. Appropriate modeling and analytical results are available and have been considered in the design.

PDR Entrance Criteria	PDR Success Criteria
m. Interface control documents that are ready to be baselined after review comments are incorporated. n. Verification/validation plan that is ready to be baselined after review comments are incorporated. o. Plans to respond to regulatory requirements (e.g., Environmental Impact Statement), as required, that are ready to be baselined after review comments are incorporated. p. NA - Preliminary Disposal Plan. q. Updated technical resource utilization estimates and margins. r. Baseline operations concept. s. Updated Human Systems Integration Plan (HSIP). t. Updated Human Rating Certification Package. u. Software criteria and products, per NASA-HDBK-2203. v. Design and requisite data submitted to Center/facility spectrum manager for preparation of request for certification of Stage 2 spectrum support by at least 60 days before PDR. w. NA—not part of NPR 7120.5 x. Baseline IT System Security Plan. y. Procurement status including Supply Chain Risk Management (SCRM) activities (e.g., audits and assessments, GIDEP, counterfeit avoidance) z. List of potential single point failures.	16. Heritage designs have been suitably assessed for applicability and appropriateness. 17. Manufacturability has been adequately included in design. 18. Software components meet the success criteria defined in NASA-HDBK-2203. 19. Concurrence by the responsible Center spectrum manager that the program/project has provided requisite RF system data. 20. Procurement and supply chain risk management execution is complementary with the technical development schedule.

1.1.4.3

PDR Project Milestone Products Maturity Matrix Exceptions for CLD

The overall approach is to follow the recommendations for Program Products and Plans per NPR 7120.5F. However, the overall CLD Program and procurement approach under a funded SAA some exceptions/adjustments to NPR 7120.5F are proposed. The recommended Program Product and Plan maturity level for PDR as well as expectations with rationale are documented in Table A1.3-12.

Table A1.3-12 Program Product Plans

Products	PDR Maturity and Assumptions
Program Technical Products	
1. Concept Documentation	Update
2. Mission, Spacecraft, Ground, and Payload Architectures	Update mission, spacecraft, ground, and payload architectures
3. Project-Level, System, and Subsystem Requirements	Update project-level and system-level requirements. Baseline subsystem requirements
4. Design Documentation	Preliminary

Products	PDR Maturity and Assumptions
5. Operations Concept	Baseline
6. Technology Readiness Assessment Documentation	N/A—CLD will identify and document any low Technology Readiness items that pose a cost, schedule or technical risk per Risk Management Plan.
7. Engineering Development Assessment Documentation	N/A—Will not be a formal assessment or standalone document. CLD will document risks, key trades and architecture for SDR to sufficient detail such that feasibility can be judged at the review.
8. Heritage Assessment Documentation	N/A - Heritage assessment documentation may be provided to support justification of risk and/or feasibility of program elements but should not be required unless applicable.
9. Systems Safety Analyses (e.g., safety data packages)	Preliminary
10. Payload Safety Process Deliverables	Update
11. Verification and Validation Report	Not due for PDR per NPR 7120.5F Table I-6
12. Operations Handbook	N/A - The intent of this line is not applicable to CLD as a Program however, documentation regarding overall Operations and User Guide will be developed in coordination with NASA
13. Orbital Debris Assessment per NPR 8715.6	Preliminary Design ODAR
14. End of Mission Plans per NPR 8715.6/NASA-STD 8719.14, App B	Not due for PDR per NPR 7120.5F Table I-6
15. Final Mission Report	Not due for PDR per NPR 7120.5F Table I-6
16. Decommissioning/Disposal Plan	Not due for PDR per NPR 7120.5F Table I-6
17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status	Tailored: A Baseline, commercially tailored, Quality Control Plan will be provided at PDR.
18. Criticality Identification Method for Hardware	Tailored: A Baseline, commercially tailored, Quality Control Plan will be provided at PDR.
19. Hardware Quality Data Management Analytics	Tailored: A Baseline, commercially tailored, Quality Control Plan will be provided at PDR.
Project Management, Planning, and Control Products	
1. Formulation Agreement	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
2. Program Plan	Baseline
3. Project Plan	N/A—Assume Program Plan only
4. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase (see #3 above), including performance against baselines and status/closure of formal actions from previous KDP	Summary Assume met by Program Schedule status, review of TPMs and actions during the design review.
5. Project Baselines	
a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources	Update

Products	PDR Maturity and Assumptions
b. Staffing requirements and plans	Update
c.i. Infrastructure requirements and plans Business case analysis for infrastructure c.ii Capitalization Determination Form (CDF)	Update - Tailored: Infrastructure requirements and plans only. Rationale: Business case analysis and CDF is assumed to be for NASA only and commercial companies will analyze, propose and manage any infrastructure updates or additions internally.
d. Schedule	Tailored: Update - Risk informed at subsystem level with Phase D completion ranges and Update Integrated Master Schedule only. Assume cost-loaded schedule is not required under SAA. Until Phase 2 procurement requirements are in place, a baseline is premature.
e. Cost Estimate	Tailored: Update - Risk-informed schedule-adjusted range estimate Rationale: Until Phase 2 procurement requirements are in place, a baseline is premature.
f. Basis of Estimate (cost and schedule)	N/A—It is assumed formal BOEs are not required under a funded SAA to meet the intent of a design review. Any cost and schedule estimates may include justification as applicable to assess the reasonableness of the schedule or any cost estimates provided.
g. Confidence Level(s) and supporting documentation	N/A for PDR. Since Phase 1 is under a funded SAA and NASA will be formulating requirements for Phase 2 in parallel with Phase 1, a Cost Risk Assessment would be too preliminary without formal technical and Program requirements.
h. External Cost and Schedule Commitments	Tailored: Preliminary (if applicable), no JCL assumed. Rationale: Until Phase 2 procurement requirements are in place, a baseline is premature.
i. CADRe	N/A for Phase 1. Since Phase 1 is under a funded SAA and NASA will be formulating requirements for Phase 2 in parallel with Phase 1, a Cost Risk Assessment would be too preliminary without formal technical and Program requirements.
j. PMB	NA—Assume Phase 1 under SAA does not required PMB. Assume intent met by other Plans, Milestone Review status and documentation until Phase 2.

Table A1.3-13 PDR Project Plan Control Plans Maturity Exceptions with Rationale

Project Plan Control Plans	PDR Project Plan Control Plans Maturity with Rationale
1. Technical, Schedule, and Cost Control Plan	N/A—it is assumed that the combination of SEMP, Risk Management Plan and Configuration Management Plan sufficiently describe CLD Program controls and process to meet technical, schedule and cost baselines so a separate plan is unneeded.
2. Safety and Mission Assurance Plan	Update
3. Risk Management Plan	Update
4. Acquisition Strategy	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
5. Technology Development Plan	N/A—It is assumed a formal technology development plan is not required. Intent is my by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.
6. Systems Engineering Management Plan	Update
7. System Security Plan	Update
8. Software Management Plan(s)	Update
9. Verification and Validation Plan	Baseline
10. Review Plan	Update
11. Mission Operations Plan	Update—Tailored: Due to the nature of the CLD Program, an overarching Mission Operations Plan is required much earlier than is typical. It’s proposed that a Mission Operations Plan (either standalone or combined with other User Guide documentation) be developed concurrently with the design.
12. NEPA Compliance Documentation	Tailored—Update: Since efforts under Phase 1 are executed under an SAA it’s assumed baseline this documentation is premature. A preliminary approach will be provided at SDR with updates at PDR and CDR if applicable or until Phase 2 begins or other circumstances/agreements are made which require it.
13.Integrated Logistics Support Plan	Baseline
14.Science Data Management Plan	Preliminary
15.Integration Plan	Baseline
16.Configuration Management Plan	Update
17.Security Plan	Baseline
18.Project Protection Plan	Baseline
19.Technology Transfer (formerly Export) Control Plan	Corporate policies will satisfy this criteria
20. Knowledge Management Plan	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required and a formal Knowledge Management Plan is not needed for work under SAA.
21.Human Rating Certification Package	Update
22.Planetary Protection Plan	Assume N/A for CLD Program.

Project Plan Control Plans	PDR Project Plan Control Plans Maturity with Rationale
23. Nuclear Safety Launch Approval Plan	Not due for PDR per NPR 7120.5F Table I-7 (previously baselined, only update if applicable)
24. Range Safety Risk Management Process Documentation	Preliminary
25. Communications Plan	N/A - Assume formal plan is NA under SAA.
26. Quality Assurance Surveillance Plan	Update—Tailored: A commercially tailored, Quality Control Plan will be provided.
27. Orbital Collision Avoidance Plan	Baseline
28. Human Systems Integration Plan	Update

1.1.5 Critical Design Review Milestone (CDR)

CDR Overview

1.1.5 The Program CDR demonstrates that the maturity of the design is appropriate to support proceeding with full-scale fabrication, assembly, integration, and test. CDR determines that the technical effort is on track to complete the flight and ground system development and mission operations to meet mission performance requirements within the identified schedule constraints.

CDR Entrance and Success Criteria

1.1.5 The following tables define the proposed Entrance and Success Criteria for CDR.

Table A1.3-14 Entrance and Success Criteria for CDR

CDR Entrance Criteria	CDR Success Criteria
<ol style="list-style-type: none"> The project has successfully completed the previous planned life-cycle reviews, and all RFAs and RIDs have been addressed and resolved or a timely closure plan exists for those remaining open. A preliminary CDR agenda, success criteria, and instructions to the review board have been agreed to by the technical team, project manager, and review chair before the CDR. All planned lower level CDRs and peer reviews have been successfully conducted, and RID/RFA/Action Items have been addressed with the originator or designated TA. Programmatic products are ready for review at the maturity levels stated in the governing program/project management NPR. A baselined detailed design that can be shown to meet all technical requirements and performance measures or has waivers. Other CDR technical work products (as applicable) for hardware, software, and human system elements have been made available to the cognizant participants before the review: 	<ol style="list-style-type: none"> The detailed design is expected to meet the requirements with adequate margins. Interface control documents are sufficiently mature to proceed with fabrication, assembly, integration, and test, and plans are in place to manage any open items. The program/project cost and schedule estimates are credible and within program/project constraints. High confidence exists in the product baseline, and adequate documentation exists or will exist in a timely manner to allow proceeding with fabrication, assembly, integration, and test. The product verification and product validation requirements and plans are complete. The testing approach is comprehensive, and the planning for system assembly, integration, test, and launch site and mission operations is sufficient to progress into the next phase. Adequate technical and programmatic margins (e.g., mass, power, memory) and resources exist to complete the development within budget, schedule, and known risks.

CDR Entrance Criteria	CDR Success Criteria
<ul style="list-style-type: none"> a. Product build-to specifications along with supporting trade-off analyses and data that are ready to be baselined after review comments are incorporated. b. Fabrication, assembly, integration, and test plans and procedures are being developed and are ready to be baselined after review comments are incorporated. c. Technical data package (e.g., integrated schematics, spares provisioning list, interface control documents, engineering analyses, and specifications). d. Status of technical performance related to margins, TPMs and resolution of the previous review discrepancies addressing effectiveness of technical achievement and communicating the overall risk to the project. e. Defined operational limits and constraints. f. Updated technical resource utilization estimates and margins. g. Acceptance plans that are ready to be baselined after review comments are incorporated. h. Command and telemetry list. i. Updated verification plan. j. Updated validation plan. k. Preliminary launch site operations plan. l. Preliminary checkout and activation plan. m. Preliminary disposal plan (including decommissioning or termination). n. Updated technology readiness assessment is N/A - See CDR Project Plan Control Plans Maturity Exceptions with Rationale) o. Updated Technology Development Plan is N/A - See CDR Project Plan Control Plans Maturity Exceptions with Rationale p. *Updated risk assessment and mitigation. q. Updated Human Systems Integration Plan (HSIP). r. Updated Human Rating Certification Package. s. Updated reliability analyses and assessments. t. Updated Life-Cycle Costs and IMS. u. Updated ILSP. v. Updated Project Protection Plan w. Subsystem-level and preliminary operations safety analyses that are ready 	<ul style="list-style-type: none"> 8. Risks to safety and mission success are understood and credibly assessed and plans and resources exist to effectively manage them. 9. Safety and mission assurance (e.g., safety, reliability, maintainability, quality controls, SCRM, QA, and EEE parts) have been adequately addressed in system and operational designs, and any applicable S&MA products (e.g., PRA, system safety analysis, and failure modes and effects analysis) meet requirements, are at the appropriate maturity level for this phase of the program/project life-cycle, and indicate that the program/project safety/reliability residual risks will be at an acceptable level. 10. The program/project has demonstrated compliance with applicable NASA and implementing Center requirements, standards, processes, and procedures. 11. TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition. 12. Engineering test units, life test units, and/or modeling and simulations have been developed and tested per plan. 13. Material properties tests are completed along with analyses of loads, stress, fracture control, contamination generation, and other analyses. 14. EEE parts have been selected, and planned testing and delivery will support build schedules. 15. The operational concept has matured, is at a CDR level of detail, and has been considered in test planning. 16. Manufacturability has been adequately included in design. 17. Software components meet the success criteria defined in NASA-HDBK-2203. 18. Concurrence by the responsible Center spectrum manager that the program/project has provided requisite RF system data (if applicable) 19. Procurement and supply chain risk management execution is complementary with the technical development schedule

CDR Entrance Criteria	CDR Success Criteria
<p>to be baselined after review comments are incorporated.</p> <ul style="list-style-type: none"> x. Systems and subsystem certification plans and requirements (as needed) that are ready to be baselined after review comments are incorporated. y. System safety analysis with associated verifications that is ready to be baselined after review comments are incorporated. z. Software criteria and products, per NASA-HDBK-2203. aa. Received Stage 2 (Experimental) RF system certification signed by NTIA (if applicable) bb. Provided measured/as-designed parameter updates to Center/facility spectrum manager for request for certification of Stage 4 (Operational) spectrum support no later than 60 days before CDR.(if applicable) cc. Updated IT Plan. dd. Updated IT System Security Plan. ee. Procurement status including Supply Chain Risk Management (SCRM) activities (e.g., audits and assessments, GIDEP, counterfeit avoidance, surveillance tailoring). ff. List of all single point failures and their effects as well as rationale for acceptance. 	

1.1.5.3

CDR Project Milestone Products Maturity Matrix Exceptions for CLD

The overall approach is to follow the recommendations for Program Products and Plans per NPR 7120.5F. However, the overall CLD Program and procurement approach under a funded SAA some exceptions/adjustments to NPR 7120.5F are proposed. The recommended Program Product and Plan maturity level for PDR as well as expectations with rationale are documented in Table A1.3-15.

TableA1.3-15 Program Products and Plans

Products	CDR Maturity and Assumptions
Program Technical Products	
1. Concept Documentation	No updates assumed per NPR 7120.5F Table I-6
2. Mission, Spacecraft, Ground, and Payload Architectures	No updates assumed per NPR 7120.5F Table I-6
3. Project-Level, System, and Subsystem Requirements	No updates assumed per NPR 7120.5F Table I-6
4. Design Documentation	Baseline
5. Operations Concept	Update
6. Technology Readiness Assessment Documentation	N/A—CLD will identify and document any low Technology Readiness items that pose a cost, schedule or technical risk per Risk Management Plan.
7. Engineering Development Assessment Documentation	N/A—Will not be a formal assessment or standalone document. CLD will document risks, key trades and architecture for SDR to sufficient detail such that feasibility can be judged at the review.
8. Heritage Assessment Documentation	N/A - Heritage assessment documentation may be provided to support justification of risk and/or feasibility of program elements but should not be required unless applicable.
9. Systems Safety Analyses (e.g., safety data packages)	Baseline
10. Payload Safety Process Deliverables	Update
11. Verification and Validation Report	Not due for CDR per NPR 7120.5F Table I-6
12. Operations Handbook	N/A - The intent of this line is not applicable to CLD as a Program however, documentation regarding overall Operations and User Guide will be developed in coordination with NASA
13. Orbital Debris Assessment per NPR 8715.6	Detailed Design ODAR
14. End of Mission Plans per NPR 8715.6/NASA-STD 8719.14, App B	Not due for CDR per NPR 7120.5F Table I-6
15. Final Mission Report	Not due for CDR per NPR 7120.5F Table I-6
16. Decommissioning/Disposal Plan	Not due for CDR per NPR 7120.5F Table I-6
17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status	Tailored: An Updated, commercially tailored, Quality Control Plan will be provided at CDR.
18. Criticality Identification Method for Hardware	Tailored: An Updated, commercially tailored, Quality Control Plan will be provided at CDR.
19. Hardware Quality Data Management Analytics	Tailored: An Updated, commercially tailored, Quality Control Plan will be provided at CDR.
Project Management, Planning, and Control Products	
1. Formulation Agreement	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
2. Program Plan	No updates assumed per NPR 7120.5F Table I-6
3. Project Plan	N/A—Assume Program Plan only
4. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished	Summary Assume met by Program Schedule status, review of TPMs and actions during the design review.

Products	CDR Maturity and Assumptions
during Implementation life-cycle phase (see #3 above), including performance against baselines and status/closure of formal actions from previous KDP	
5. Project Baselines	
a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources	Update
b. Staffing requirements and plans	Update
c.i. Infrastructure requirements and plans Business case analysis for infrastructure c.ii Capitalization Determination Form (CDF)	Update - Tailored: Infrastructure requirements and plans only. Rationale: Business case analysis and CDF is assumed to be for NASA only and commercial companies will analyze, propose and manage any infrastructure updates or additions internally.
d. Schedule	Tailored: Update - Risk informed at subsystem level with Phase D completion ranges and Update Integrated Master Schedule only. Assume cost-loaded schedule is not required under SAA. Until Phase 2 procurement requirements are in place, a baseline is premature.
e. Cost Estimate	Tailored: Update - Risk-informed schedule-adjusted range estimate Rationale: Until Phase 2 procurement requirements are in place, a baseline is premature.
f. Basis of Estimate (cost and schedule)	N/A—It is assumed formal BOEs are not required under a funded SAA to meet the intent of a design review. Any cost and schedule estimates may include justification as applicable to assess the reasonableness of the schedule or any cost estimates provided.
g. Confidence Level(s) and supporting documentation	N/A for CDR. Since Phase 1 is under a funded SAA and NASA will be formulating requirements for Phase 2 in parallel with Phase 1, a Cost Risk Assessment would be too preliminary without formal technical and Program requirements.
h. External Cost and Schedule Commitments	Tailored: Preliminary (if applicable), no JCL assumed. Rationale: Until Phase 2 procurement requirements are in place, a baseline is premature.
i. CADRe	N/A for Phase 1. Since Phase 1 is under a funded SAA and NASA will be formulating requirements for Phase 2 in parallel with Phase 1, a Cost Risk Assessment would be too preliminary without formal technical and Program requirements.
j. PMB	NA—Assume Phase 1 under SAA does not require PMB. Assume intent met by other Plans, Milestone Review status and documentation until Phase 2.

Table A1.3-16 CDR Project Plan Control Plans Maturity Exceptions with Rationale

Project Plan Control Plans	CDR Project Plan Control Plans Maturity with Rationale
1. Technical, Schedule, and Cost Control Plan	N/A—it is assumed that the combination of SEMP, Risk Management Plan and Configuration Management Plan sufficiently describe CLD Program controls and process to meet technical, schedule and cost baselines so a separate plan is unneeded.
2. Safety and Mission Assurance Plan	Update
3. Risk Management Plan	No updates assumed per NPR 7120.5F Table I-7
4. Acquisition Strategy	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required.
5. Technology Development Plan	N/A—It is assumed a formal technology development plan is not required. Intent is my by identifying low Technology Readiness items that pose a cost, schedule or technical risk and these risks are documented and mitigated per the Risk Management Plan.
6. Systems Engineering Management Plan	No updates assumed per NPR 7120.5F Table I-7
7. System Security Plan	Baseline
8. Software Management Plan(s)	No updates assumed per NPR 7120.5F Table I-7
9. Verification and Validation Plan	Update
10. Review Plan	No updates assumed per NPR 7120.5F Table I-7
11. Mission Operations Plan	Update—Tailored: Due to the nature of the CLD Program, an overarching Mission Operations Plan is required much earlier than is typical. It’s proposed that a Mission Operations Plan (either standalone or combined with other User Guide documentation) be developed concurrently with the design.
12. NEPA Compliance Documentation	Tailored—Update: Since efforts under Phase 1 are executed under an SAA it’s assumed baseline this documentation is premature. A preliminary approach will be provided at SDR with updates at PDR and CDR if applicable or until Phase 2 begins or other circumstances/agreements are made which require it.
13. Integrated Logistics Support Plan	Update
14. Science Data Management Plan	No updates assumed per NPR 7120.5F Table I-7 but may be provided as part of overall CLD Operations plans
15. Integration Plan	Update
16. Configuration Management Plan	No updates assumed per NPR 7120.5F Table I-7
17. Security Plan	No updates assumed per NPR 7120.5F Table I-7
18. Project Protection Plan	Update
19. Technology Transfer (formerly Export) Control Plan	Corporate policies will satisfy this criteria
20. Knowledge Management Plan	N/A—CLD Program is not responsible for this document. Assume this is developed by NASA if required and a formal Knowledge Management Plan is not needed for work under SAA.

Project Plan Control Plans	CDR Project Plan Control Plans Maturity with Rationale
21. Human Rating Certification Package	Update
22. Planetary Protection Plan	Assume NA for CLD Program.
23. Nuclear Safety Launch Approval Plan	Not due for CDR per NPR 7120.5F Table I-6 (previously baselined, only update if applicable)
24. Range Safety Risk Management Process Documentation	Preliminary
25. Communications Plan	N/A - Assume formal plan is NA under SAA.
26. Quality Assurance Surveillance Plan	Tailored: An Updated, commercially tailored, Quality Control Plan will be provided at CDR.
27. Orbital Collision Avoidance Plan	Update
28. Human Systems Integration Plan	Update