

FUNDED SPACE ACT AGREEMENT (PAM 36785)
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ARMSTRONG FLIGHT RESEARCH CENTER
AND THE BOEING COMPANY
FOR SUSTAINABLE FLIGHT DEMONSTRATOR
DEVELOPMENT AND FLIGHT TEST

ARTICLE 1. BACKGROUND

The National Aeronautics and Space Administration (NASA) established the Sustainable Flight Demonstrator (SFD) Project as part of the Integrated Aviation System Program in the Aeronautics Research Mission Directorate (ARMD). The SFD Project's overall goals support the ARMD Sustainable Flight National Partnership to accomplish the aviation community's goal of net-zero carbon emissions by 2050. Concern over climate change has created an opportunity to target new aircraft technologies for the next generation of single-aisle airliners which account for nearly half of worldwide aviation emissions. This Funded Space Act Agreement (FSAA) establishes a partnership between NASA and The Boeing Company to develop and flight test a large-scale flight demonstrator to prepare these new technologies for entry into the next generation single-aisle airliner market, thereby reducing commercial aviation's impact on climate change.

The goals of the SFD Project are to:

- Develop and flight test an advanced airframe configuration and related technologies to dramatically reduce aircraft fuel burn and carbon dioxide (CO₂) emissions.
- Obtain ground and flight data that will be used by the Industry/NASA teams to validate the configuration and associated technologies.
- Inform industry decisions associated with next generation single-aisle seat class product [2030s Entry Into Service (EIS)] to maximize the potential to meet U.S. environmental goals articulated in the U.S. Aviation Climate Action Plan.

The SFD Project objectives are:

- Partner with Industry to design, develop, and integrate an advanced aircraft configuration Demonstrator relevant to a single-aisle transport class Vision System targeting significant improvements in fuel burn and associated CO₂ emissions.
- Conduct ground and flight test of the Demonstrator to advance the technology readiness level of the advanced aircraft configuration and associated technologies, completing flight testing in a timeframe that the technologies can transition to the next generation single-aisle seat-class transport fleet with EIS in the 2030s.
- Collect design, ground, and flight data that will contribute to validating single-aisle transport class Vision System performance and Industry/NASA analytical and predictive models/tools.

ARTICLE 2. 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 Armstrong Flight Research

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Center, located at P.O. Box 273, Edwards, CA 93523 (hereinafter referred to as "NASA") and The Boeing Company, with a place of business at 6200 James S McDonnell Blvd, Berkeley, MO 63134 (hereinafter referred to as "Boeing" or "Partner"). NASA and Partner may be individually referred to as a "Party" and collectively referred to as the "Parties."

ARTICLE 3. PURPOSE

The purpose of this Agreement is to facilitate the Partner's plans for commercialization of a next generation, advanced commercial airframe configuration (Vision System) by conducting technology maturation of the key enabling technologies through design, fabrication, ground test, and flight test of a flight research demonstrator aircraft (Demonstrator) that will validate aspects of the future Vision System's technology and system performance. The Parties' specific responsibilities, schedule, milestones, financial and legal terms are described in the following articles and appendices.

ARTICLE 4. RESPONSIBILITIES

A. NASA will use reasonable efforts to:

1. Participate in quarterly status reviews and provide quarterly status for technical support areas stated in the Technical Implementation Plan (TIP) to include status on schedule, risk, and technical.
2. Appoint a NASA representative(s) to participate in each review boards described in Appendix A.2.
3. Review data provided by Partner.
4. Attend and observe Partner milestones, at NASA's discretion and after coordination with Partner.
5. Provide milestone payments to Partner upon successful completion of each milestone, subject to limitations noted below.
6. As resources permit, provide ongoing NASA technical staffing support as requested by the Partner and documented in the Technical Implementation Plan (TIP) to be developed by the Parties as needed.
7. As resources permit, provide facilities and test support to accomplish the following, recognizing that the timeline required for execution of the SFD, such facilities and test support may not be available, in which case, Boeing would need to identify other testing facilities and support:
 - NASA Ames 11 ft Wind Tunnel – Moffett Field, CA. Full-span and semi-span high-speed wind tunnel tests
 - AFRC Flight Loads Lab (FLL) – Edwards, CA. – Strut Calibration & Flap Component Tests
 - Armstrong Flight Research Center (AFRC) – Edwards, CA. Flight Test/Flight operations, flight simulator, ground vibration testing (GVT), acoustics testing using the NASA microphone arrays.
 - NASA propulsion engineering support for integration of the propulsion system.
 - NASA modeling, simulation, and analysis support at NASA Armstrong.
 - NASA engineering support for the proof load testing.
 - NASA support for the Combined Test Team/Airworthiness effort by providing personnel for test planning, test conduct, test reporting, safety reviews, risk assessments, risk

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mitigation, airworthiness compliance, instrumentation design and installation support, maintenance support and Quality Assurance support.

- NASA chase aircraft (including pilots), local radar tracking, telemetry reception, and data reviews.
 - NASA Engineering Support - Computational Fluid Dynamics (CFD), modeling, simulation and analysis, acoustics analysis, aerodynamics, aeroelastics, structural design, flight controls, and stability and control (S&C) as documented in the TIP to be developed by the parties.
8. At NASA's discretion, on a non-interference basis and as resources permit, provide access to other requested NASA technical data, lessons learned, and short-term subject matter expert support, services, equipment, and/or NASA-developed technologies.

B. Partner will use reasonable efforts to:

1. Conduct technology maturation, design, fabrication, assembly, ground test, and flight test of the Sustainable Flight Demonstrator in accordance with their proposal.
2. Execute project plan according to the milestones identified in Appendix A.2 (Partner Milestones) and provide NASA with data to demonstrate that Milestone entrance and success criteria have been successfully completed.
3. Conduct quarterly status reviews with topics, including but not limited to, programmatic status (performance, plans, project risks and mitigations, issues, cost and schedule performance,), technical status (accomplishments, issues, requirements trends/changes, indicators [Technical Performance Measures (TPMs), Key Performance Parameters (KPPS), Technology Readiness Levels (TRLs)], fabrication status (drawing release trends, fabrication progress, subsystem design/assembly/test, Demonstrator integration/test), and funded milestones status (progress, plans, and open actions) as applicable. Review content will be provided from existing Boeing internal monthly program review materials as applicable.
4. Designate at least one seat for a NASA representative on each review board for major milestones identified in Appendix A.2.
5. Provide technical data and insight to NASA necessary to validate the goals and objectives of the Agreement/project.
6. Provide analyses, physics models, test articles/equipment, and other supporting plans/documentation as needed to support requested NASA facilities/test support, as documented in the TIP. All equipment provided by the Partner to NASA shall include documentation stating build, revision, and traceability information.
7. Provide analyses, documentation, briefings, and other needed content in support of the Airworthiness Process.
8. Acquire NASA airworthiness approval and flight release for all SFD flights.

ARTICLE 5. SCHEDULE AND MILESTONES

The scheduled milestones, acceptance criteria, and payments for each milestone are identified in Appendix A.2 to this Agreement:

ARTICLE 6. FINANCIAL OBLIGATIONS

A. Obligation

NASA's liability to make payments to the Partner is limited to only those funds obligated annually under this Agreement. NASA may obligate funds to the Agreement incrementally at its sole discretion.

B. Acceptance and Payment for Milestones

(1) Partner shall notify the NASA principal points of contact, listed in "POINTS OF CONTACT" 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 5 calendar days to determine whether Milestone 1 meets its corresponding acceptance criteria as described in Appendix A.2 of this Agreement and shall provide written notice to Partner's Principal Points of Contact of NASA's acceptance or non-acceptance within 5 calendar days of that determination. For all other milestones, NASA shall have 30 calendar days to determine whether the milestone event meets its corresponding acceptance criteria as described in Appendix A.2 of this Agreement and shall provide written notice to Partner's Principal Points of Contact of NASA's acceptance or non-acceptance within 10 calendar days of that determination. Acceptance of milestones will be at NASA's sole discretion.

(2) Partner shall submit a written invoice requesting payment from NASA within 5 calendar days of notification of acceptance by NASA of each milestone. The amount of the submitted invoice may not differ from the mutually agreed upon amounts described in Appendix A.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, the 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 in excess of \$5,000,000.00, which the 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 7. 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 8. NONEXCLUSIVITY

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

ARTICLE 9. LIABILITY

A. Partner hereby waives any claims against NASA or one or more of its Related Entities for any injury to, or death of, Partner or one or more of its 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. For purposes of this Agreement, "Related Entities" shall mean contractors and subcontractors of a Party at any tier; grantees, investigators, customers, and users of a Party at any tier and their contractors or subcontractor at any tier; or, employees of the Party or any of the foregoing.

B. 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 and its Related Entities for injury, death, damage, or loss arising from or related to activities conducted under this Agreement. In the event the U.S. Government incurs any liability based upon Partner's failure to provide for the waiver by Partner's Related Entities set out above, Partner agrees to indemnify and hold the U.S. Government harmless against such liability, including costs and expenses incurred by the U.S. Government in defending against any suit or claim for liability by Partner's Related Entities.

C. In the event U.S. Government property is damaged as a result of activities conducted under this Agreement for the primary benefit of Partner, except in the case of gross negligence or willful misconduct by NASA, Partner shall be solely responsible for the repair and restoration of such property subject to NASA direction.

D. Notwithstanding the other provisions of this Article, the waiver of liability set forth in this section shall not be applicable to:

- i. Claims between Partner and its own Related Entity or between its own Related Entities;
- ii. Claims made by a natural person, his/her estate, survivors, or anyone claiming by or through him/her (except when such person or entity is a Party to this Agreement or is otherwise bound by the terms of this waiver) for bodily injury to, or other impairment of health of, or death of, such person;
- iii. Claims for damage caused by willful misconduct;
- iv. Intellectual property claims;
- v. Claims for damage resulting from a failure of Partner to extend the waiver of liability to its Related Entities, pursuant to paragraph B of this Article; or
- vi. Claims by Partner arising out of or relating to NASA's failure to perform its obligations under this Agreement.

E. Partner Provided Property

For all property provided by Partner to NASA under this Agreement, the following provision applies:

1. NASA hereby waives any claims against Partner or one or more of its Related Entities for any injury to, or death of, NASA or one or more of its Related Entities, or for damage to, or loss of, NASA'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. For purposes of this Agreement, "Related Entities" shall mean contractors and subcontractors of a Party at any tier; grantees, investigators, customers, and users of a Party at any tier and their contractors or subcontractor at any tier; or, employees of the Party or any of the foregoing.

ARTICLE 10. LIABILITY - PRODUCT LIABILITY

With respect to products or processes resulting from a Party's participation in an SAA, each Party that markets, distributes, or otherwise provides such product, or a product designed or produced by such a process, directly to the public will be solely responsible for the safety of the product or process.

ARTICLE 11. LIABILITY - PRODUCT LIABILITY INDEMNIFICATION

In the event the U.S. Government incurs any liability based upon Partner's, or Partner's Related Entity's, use or commercialization of products or processes resulting from a Party's participation under this Agreement, Partner agrees to indemnify and hold the U.S. Government harmless against such liability, including costs and expenses incurred by the U.S. Government in defending against any suit or claim for such liability.

ARTICLE 12. 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].

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/updating the goals and objectives of SFD.

(2) Upon a successful completion by Partner of all milestones under this Agreement, NASA shall not assert rights in such Data or use such Data for any purpose except that NASA retains 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 goals and objectives of SFD; and (3) may use or disclose such archived Data by or on behalf of NASA for Government purposes in the event 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 "RIGHT TO TERMINATE" Section B, "Termination for Failure to Perform", NASA may in its sole discretion 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 or meeting the goals and objectives of 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 such Data or use such Data for any purpose during the restricted period except that NASA retains 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 goals and objectives of SFD; and (3) may use or disclose such archived Data by or on behalf of NASA for Government purposes in the event 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 "RIGHT TO TERMINATE" Section B, "Termination for Failure to Perform", NASA may in its sole discretion 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 during any remaining portion of the restricted period, and thereafter for any purpose. 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" 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.

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 13. 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 Armstrong Flight Research Center Patent Counsel. Correspondence with the Patent Representative under this clause will be sent to:

Patent Counsel

NASA Armstrong Flight Research Center

P.O. Box 273 (4800:2016)

Edwards AFB, CA 93523

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 United States sustainable

commercial aircraft technology 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 such inventions Partner may make under this Agreement, and any such properly filed petition will be granted. If no petition is submitted, or if a 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, and such properly filed petition will be granted. 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 this 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 the 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 upon, 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 14. USE OF NASA NAME AND NASA 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 15. 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 16. 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.

ARTICLE 17. 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 18. 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; and suspension and debarment laws and regulations. Access by the 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, including use of Interconnection Security Agreements (ISAs), when applicable.

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 team members, subcontractors, or partners receiving \$100,000 or more in NASA funding for work performed under this Agreement must have not used any appropriated funds for lobbying purposes prohibited by 31 U.S.C. § 1352; and

4. The Partner is an entity organized under the laws of the United States, which is:

A. More than 50 percent owned and controlled by United States nationals; or

B. A subsidiary of a foreign company and 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.

E. NASA conducts research with foreign entities only on a cooperative, no-exchange-of funds basis. Although foreign individuals employed by the Partner in support of this FSAA may receive NASA funds, NASA funding may not support research efforts, including travel, by non-U.S. organizations, including sub-Partners, at any level. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by the Partner is permitted.

F. 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.

G. Regarding INKSNA requirements, Partner shall disclose to NASA if it intends to rely upon Russian entities for its demonstration. 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 https://www.pmdc.state.gov/ddtc_public?id=ddtc_kb_article_page&sys_id=7188dac6db3cd30044f9ff621f961914)

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) 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).

H. With respect to the requirements in Section 889 of the National Defense Authorization Act (NDAA) for Fiscal Year 2019, Public Law 115-232:

1. In performing this Agreement, Partner will not use, integrate with a NASA system, or procure with NASA funds "covered telecommunications equipment or services" (as defined in Section 889(f)(3) of the NDAA).

2. The Partner will ensure that the provisions of this Article apply to its Related Entities.

ARTICLE 19. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below ("effective date") and shall remain in effect until the completion of all obligations of both Parties hereto, or seven years from the effective date, whichever comes first.

ARTICLE 20. 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 failure to meet a scheduled milestone as identified and described in Appendix A.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 "INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS" and "INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS" of this Agreement.

(2) If Partner fails to meet the criteria for successful completion of a milestone contained in Appendix A.2, Partner shall not be entitled to any payment from the Government associated with the failed milestone, nor shall the Partner be entitled to any payments for termination-related expenses. NASA and Partner will negotiate in good faith any other issues unrelated to milestone completion

and payments between the Parties. Partner shall retain all 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 as follows. NASA's obligations under this Agreement may be terminated, in whole or in part, (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; or (d) upon a determination, in writing, by the Administrator of the National Aeronautics and Space Administration (NASA) or duly authorized representative that "Sustainable Flight Demonstrator" no longer aligns with the Agency's strategic objectives such that it is not in NASA's best interests to continue performance of this Agreement. For purposes of Section C.(1)(c) 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 or Congressionally directed changes in Agency priorities), 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 the Partner wishes to pursue these demonstrations exclusively using its own funding. Upon such a termination, NASA and the 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 milestone to which the Partner was performing at the time the termination notice is issued and is subject to the provisions of "Financial Obligations". 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 "DISPUTE RESOLUTION".

D. Limitation on Damages.

In the event of any termination by NASA, neither NASA nor the 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 milestone to which the Partner was performing at the time the termination notice is issued.

E. Rights in Property

Partner will have title to property acquired or developed by the 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 any reason, NASA may purchase such property as provided in "TITLE AND RIGHTS IN REAL AND PERSONAL PROPERTY". Upon any termination under this Article, NASA may immediately exercise all rights identified in "INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS" and "INTELLECTUAL PROPERTY

ARTICLE 21. 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" and "Intellectual Property Rights" related clauses shall survive such expiration or termination of this Agreement.

ARTICLE 22. POINTS OF CONTACT

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

Administrative Point of Contact

NASA Armstrong Flight Research Center
Rosalia Toberman
SFD Agreements Officer
P.O. Box 273
Edwards, CA 93523
Phone: 661-276-3931
rosalia.toberman-1@nasa.gov

Management Points of Contact

NASA Armstrong Flight Research Center
Brent Cobleigh
SFD Project Manager
P.O. Box 273
Edwards, CA 93523
Phone: 661-510-4073
brent.r.cobleigh@nasa.gov

The Boeing Company
Craig Wilsey
Campaign Team Leader
14441 Astronautics Lane
Huntington Beach, CA 92647
Phone 949-842-7135
craig.a.wilsey@boeing.com

Eric Kaduce
Program Manager
14441 Astronautics Lane
Huntington Beach, CA 92647
Phone: 425-367-8584
eric.j.kaduce@boeing.com

ARTICLE 23. 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. In no event shall resolution of issues in Dispute result in liability above or beyond the funding obligated to the Agreement. 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 24. INVESTIGATIONS OF MISHAPS AND CLOSE CALLS

In the case of a close call, mishap or mission failure, 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".

ARTICLE 25. MODIFICATIONS

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

ARTICLE 26. ASSIGNMENT

Neither this Agreement nor any interest arising under it will be assigned by the Partner or NASA 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 27. APPLICABLE LAW

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

ARTICLE 28. 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 29. LOAN OF GOVERNMENT PROPERTY

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

ARTICLE 30. TITLE AND RIGHTS IN REAL AND PERSONAL PROPERTY

Partner will have title to property acquired or developed by Partners under this Agreement. In the event of termination of this Agreement for any reason under "RIGHT TO TERMINATE", NASA will have the right to purchase any such property additional to NASA's immediately exercised rights identified in "INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS" and "INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS". The Parties will negotiate in good

faith purchase prices for specific items of property. The negotiated prices will be based on the 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. ($\$2$ of Government funds v. $\$1$ of Partners funds = $2/3$ = 66.6% discount.).

ARTICLE 31. NASA FURNISHED INFORMATION AND SERVICES

A. At the request of the Partner, NASA may assign technical staff to work collaboratively with the Partner in support of the Project goals. In addition, NASA may, at its sole discretion and on terms to be negotiated between the Parties, accommodate requests, such as for a document, telecon, or Technical Interchange Meeting (TIM). 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 of use of such optional NASA services, technical expertise, or Government Property, including those identified in Article 4, "Responsibilities" Sections 7 and 8.

B. Partner may enter into separate fully Reimbursable Space Act Agreements (RSAAs) with NASA Centers to use NASA resources in performance of this Agreement. The terms and conditions of those RSAAs 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. Partner shall remain solely responsible for completion of its milestones under this Agreement regardless of the availability or use of reimbursable NASA services, technical expertise, or Government Property provided pursuant to section B. of this Article.

ARTICLE 32. SIGNATORY AUTHORITY

The signatories to this Agreement covenant and warrant that they have authority to execute this Agreement. By signing below, the undersigned agrees to the above terms and conditions.

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

THE BOEING COMPANY

BY: _____
Robert Pearce
NASA Associate Administrator
Aeronautics Research Mission Directorate

BY: _____
Brittany Charlton
Senior Contracts Manager

DATE: _____

DATE: 12 January 2023

APPENDIX A.1. PARTNER EXECUTIVE SUMMARY

Boeing and its industry team will partner with NASA under the Sustainable Flight Demonstrator project to develop and flight test a full scale Transonic Truss-Braced Wing (TTBW) Demonstrator. This prototype represents the demonstration of a significant step-change in commercial airframe architecture. The project will mature technologies supporting the aircraft configuration that enhance overall sustainability and ensure maximum emissions reductions for a future product family. Ground and flight demonstrations will significantly reduce risk on high aspect ratio aerodynamics, thin wing aeroelastics and integration, external/internal loads, stability and control, and propulsion-airframe integration necessary to create a potential path to a new product family in the 2030s and beyond. TTBW can be an important component in meeting the U.S. Aviation Climate Action Plan 2050 goals.

APPENDIX A.2. PARTNER MILESTONES

This appendix describes the Partner’s funded milestones, which total \$425M over the duration of the agreement. NASA representation will be invited to participate in these events to confirm that each milestone is successfully completed according to its defined criteria and to provide input / feedback to the milestone products.

The intent of the milestone reviews is to provide the government with sufficient insight into the development of the SFD system. Milestone review products delivered will include briefing materials, along with pertinent documents, drawings, digital models, analysis, data and supporting information necessary for NASA to assess successful milestone completion. Materials provided three weeks in advance will be marked as draft, and may differ from the final presentation content which will be provided as part of the milestone review on which the NASA determination will be based. Boeing will highlight any changes in final materials that differ from the draft materials provided to NASA. Data to be provided in cost-effective format of the partner. Successful milestone completion is determined at NASA’s discretion.

The definition and evaluation of entrance and success criteria will leverage the Partner processes to the greatest extent possible while still ensuring successful airworthiness review and achievement of the NASA project goals and objectives defined in the announcement. NASA and Boeing leadership will meet a minimum of 4 weeks ahead of the defined milestones to perform any final clarification of entrance or success criteria, establish agenda, identify review participants etc. Within 5 business days after conclusion of the lifecycle reviews (CoDR, SRR, PDRs, CDRs, MRR, SIR), the review board will summarize review findings and determine and document review item discrepancies (RID) or requests for action (RFA).

Milestone 1: Kickoff	
<p>The Project Kickoff Meeting serves to introduce key project partners and team members while reviewing the basic Project Execution Plan (PEP) and required supporting materials. The meeting lays out project plan operations and discusses concerns with the proposed baseline.</p> <p>Entrance Criteria:</p> <ol style="list-style-type: none"> 1) A preliminary agenda agreed to by NASA and Boeing technical leads and project managers prior to the Kickoff Meeting. 2) Boeing Project partners and key team members have been selected by Boeing. Where necessary, Boeing to execute Proprietary Information Agreements or other agreements with Boeing partners and team members. 3) Meeting materials are provided to the NASA project team through the Administrative POC one (1) week prior to the meeting, including summaries/excerpts of key elements of the PEP (e.g., project High Level Flow and high-level resource plans). <p>Success Criteria:</p> <ol style="list-style-type: none"> 1) Project partners and key team members have been assigned project roles. 2) Project High Level Flow and resource plans are in place at the IPT level. 3) Project execution risks have been openly discussed and are captured with mitigation plans. 4) Strategy for communications between NASA, Boeing, and industry partners for the project is defined. 	<p>Amount: \$7.5M Date: February 2023</p>

Milestone 2: Airworthiness Approach

The Airworthiness Approach contains documentation of Boeing’s approach to obtaining Airworthiness certification, including an established Airworthiness review process.

Amount: \$12.50M
Date: April 2023

Entrance Criteria:

- 1) Draft Airworthiness Approach, including a list of airworthiness requirements and associated artifacts, prepared.

Success Criteria:

- 1) Airworthiness Approach follows applicable requirements under NASA AFRC AFOP-7900.3-023 Airworthiness & Flight Safety Review Process and NASA NRP 7900.3D Aircraft Operations Management, as amended or updated, and established Boeing airworthiness and enterprise gated process standard practices and procedures.
- 2) Airworthiness review process defined, and review board established with members from Boeing, NASA, and Boeing’s industry partners.
- 3) Approach contains reviews and checkpoints throughout the full program lifecycle.
- 4) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 5) Presentation materials marked TBD are identified with closure dates and name of person responsible.
- 6) SFD Airworthiness Approach document baselined

Milestone 3: Concept Design Review (CoDR)

The CoDR evaluates whether the conceptual design of the SFD system is clearly defined to ensure it will satisfy the program objectives and requirements.

Amount: \$14.00M
Date: July 2023

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal CoDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) An agenda for the CoDR and instructions to the review board have been agreed to by the technical team, the project manager, and the review chair prior to the review.
- 4) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team’s readiness (based on Entrance Criteria) to conduct the milestone review. CoDR Review Products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 5) The following CoDR content is at an appropriate level of maturity:
 - a) Firm concept design defined.
 - b) Measures of Effectiveness (MOEs) defined.
 - c) Mission/project goals and objectives defined.
 - d) Alternative concepts have been analyzed.
 - e) Initial risk-informed cost and schedule estimates for implementation prepared.
 - f) Preliminary assessment of technical, cost, schedule, and safety risks with associated risk management and mitigation strategies prepared.
 - g) Preliminary verification and validation methods prepared.
 - h) A preliminary Systems Engineering Management Plan (SEMP) prepared.
 - i) Technology Development Plan, including initial technology readiness assessments, identified gaps, and maturation plans prepared.
 - j) Single Point Failure/Fault Tolerance requirements/philosophy prepared.
 - k) Preliminary engineering development assessment and technical plans to achieve what needs to be accomplished in the next phase prepared.
 - l) Software development criteria and preliminary software configuration items are identified and documented.

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- m) Relevant Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal CoDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following CoDR success criteria will be assessed:
 - a) Mission objectives are defined and form the basis for the proposed conceptual design.
 - b) A concept has been identified that satisfies the mission objectives and project requirements.
 - c) The concept evaluation criteria to be used in candidate systems evaluation have been identified and prioritized.
 - d) MOEs, single point failure/fault tolerance approach, and software development requirements are defined in the SEMP.
 - e) The project has demonstrated compliance with applicable Boeing, NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - f) Alternative concepts have considered the use of existing assets or products that could satisfy the mission or parts of the mission.
 - g) Risks and mitigation strategies have been identified and the processes and resources are in place to manage the risks.
- 3) Review Item Discrepancies (RIDs) and Requests for Action (RFAs) identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 4: System Requirements Review (SRR)

The SRR evaluates whether the SFD system is clearly defined to ensure the preliminary plans and requirements will satisfy the project objectives and requirements.

Amount: \$17.75M
Date: October 2023

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal SRR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) A preliminary SRR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the SRR.
- 5) 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 technical authority, or a closure plan exists for those remaining open.
- 6) All system-level performance and functional requirements are ready for review and:
 - a) show traceability to the NASA SFD project goals and objectives defined in the announcement
 - b) are allocated to the applicable sub-systems
 - c) have a preliminary verification/validation method identified
- 7) The following SRR topics are at an appropriate level of maturity:
 - a) Project requirements are ready to be baselined and preliminary allocation to the next lower-level system has been performed.
 - b) The SEMP is baselined.
 - c) Current Concept of Operations (CONOPs) prepared.
 - d) Risk management plan prepared including updated risk assessments and mitigation plans.
 - e) Configuration management plan prepared.
 - f) Initial document/drawing tree or model structure prepared.

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- g) Preliminary verification and validation method identified for each requirement.
- h) Preliminary Safety and Mission Assurance (S&MA) plan, including system safety analysis prepared.
- i) Product airworthiness plan prepared that addresses applicable NASA and Implementing Center (AFRC) airworthiness requirements and established Boeing airworthiness and enterprise gated process standard practices and procedures.
- j) Interfaces with external systems are identified (e.g., Interface Control Documents).
- k) Preliminary Measures of Performance (MOPs) and Technical Performance Measures (TPMs) defined.
- l) Updated Technology Development Plan prepared.
- m) Logistics Plan prepared.
- n) Relevant NASA and Implementing Center requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal SRR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The system-level functional and performance requirements are reviewed and are determined to meet NASA SFD project goals and objectives defined in the announcement.
- 3) The following SRR success criteria will be assessed during the review:
 - a) System requirements reflect the system's intended operational use and align with mission objectives.
 - b) The project utilizes a standards-based process for the allocation and control of requirements, and a plan is in place to complete the requirements definition at lower levels within schedule constraints.
 - c) System Interfaces with external entities and between major internal elements have been identified.
 - d) Preliminary requirements verification and validation approach defined.
 - e) Major risks have been identified and technically assessed, and mitigation strategies have been defined.
 - f) The project has demonstrated compliance with applicable Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures.
 - g) Lessons Learned from other relevant demonstrator projects have been identified with a plan to address prepared.
 - h) Single Point Failure/Fault Tolerance philosophy is reflected in requirements.
- 4) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 5) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 5: Aircraft Reactivation

The MD-90 aircraft is removed from storage, reactivated, and authorized for ferry flight to the modification site.

Amount: \$17.75M
Date: February 2024

Entrance Criteria:

N/A

Success Criteria:

- 1) Maintenance logs and required airworthiness inspections for type certification are compliant with applicable FAA requirements.
- 2) Aircraft is compliant with applicable Airworthiness Directives.
- 3) FAA inspection of aircraft and maintenance logs complete.
- 4) Pilot proficiency and currency compliant with applicable FAA requirements.

Milestone 6: Fuselage / Mod Preliminary Design Review (PDR)

The Fuselage / Mod PDR demonstrates that the preliminary design of the fuselage and definition of the modification meets system requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design.

Amount: \$17.75M**Date: May 2024****Entrance Criteria:**

- 1) All entrance criteria for a Partner-internal PDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The Project has successfully completed the previous planned life-cycle reviews, and RFAs and RIDs have been addressed, or a closure plan exists for those remaining open.
- 5) A preliminary PDR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the PDR.
- 6) The following PDR topics (tailored to be relevant to the Fuselage / Mod PDR) are at an appropriate level of maturity:
 - a) Preliminary subsystem design specifications (hardware and software), with supporting trade-off analyses and data prepared, as required.
 - b) Subsystem level requirements prepared.
 - c) Status of technical performance to technical and safety margins and TPMs prepared.
 - d) Updated Technology Development Plan with technology readiness assessment prepared.
 - e) Updated risk assessment and mitigation plans prepared.
 - f) Updated Project Execution Plan (PEP) and Integrated Master Schedule (IMS) prepared.
 - g) Updated Logistics Plan prepared.
 - h) Applicable draft technical and programmatic plans prepared. Such plans, as applicable, may include: subsystem requirements specifications, software development plan, quality assurance plan, Test and Evaluation Master Plan (TEMP), Configuration Management Plan, IT plan, System Security Plan.
 - i) Applicable design standards identified.
 - j) Baseline S&MA plan and updated system safety analyses prepared.
 - k) Preliminary engineering drawing tree and master parts list prepared.
 - l) Interface control documents drafted and included in engineering drawing tree.
 - m) Requirements verification and validation plan or matrix baselined.
 - n) Plans to respond to regulatory requirements (e.g., Environmental Impact Statement) prepared.
 - o) Updated Human Systems Integration Plan (HSIP) prepared.
 - p) List of long lead items defined.
 - q) Procurement status including Supply Chain Risk Management (SCRM) activities prepared.
 - r) Summary of subsystem analysis results, reliability analyses, failure modes and effects analysis, and list of potential single point failures prepared.
 - s) Preliminary weight budget with allocations prepared.
 - t) Relevant Boeing NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal PDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following PDR success criteria (tailored to be relevant to the Fuselage / Mod PDR) will be assessed during the review:
 - a) The top-level requirements, including mission Review Content and TPMs, are finalized, stated, and consistent with the preliminary design.
 - b) The flow down of requirements is complete, or, if not, a plan exists for resolution of open items.

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- c) Requirements are traceable to parent technical requirements and to mission goals and objectives.
 - d) The preliminary design is expected to meet the requirements at an acceptable level of risk, as defined in the project Risk Management Plan.
 - e) Definition of the system interfaces (both external entities and between internal elements) is consistent with the overall technical maturity and has an acceptable level of risk, as defined in the project Risk Management Plan.
 - f) Required new technology has been developed and meets relevant criteria within an acceptable level of risk, as defined in the applicable Risk Management Plan, or backup options identified.
 - g) Project risks have been actively sought and identified. Known and identified risks are understood and assessed, and plans, processes, and resources exist to manage them.
 - h) Safety and mission assurance requirements have been addressed in preliminary designs.
 - i) Technical and programmatic margins exist with respect to resources and TPMs to complete the development within budget, schedule, and risks.
 - j) The operational concept includes (where appropriate) human systems and the flow down of requirements for execution.
 - k) Technical trade studies are complete, and if not, plans exist for their closure and potential impacts are understood.
 - l) The project demonstrates compliance with applicable NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - m) Preliminary analysis of the primary subsystems has been completed and summarized, highlighting performance and design margin challenges.
 - n) Manufacturability has been considered in the preliminary design.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 7: Wing / Strut PDR

The Wing/Strut PDR demonstrates that the preliminary design of the wing and strut meets system requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design.

Amount: \$18.75M
Date: September 2024

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal PDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The Project has successfully completed the previous planned life-cycle reviews, and RFAs and RIDs have been addressed, or a closure plan exists for those remaining open.
- 5) A preliminary PDR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the PDR.
- 6) The following PDR topics (tailored to be relevant to the Wing / Strut PDR) are at an appropriate level of maturity:
 - a) Preliminary subsystem design specifications (hardware and software), with supporting trade-off analyses and data prepared, as required.
 - b) Subsystem level requirements prepared.
 - c) Status of technical performance to technical and safety margins and TPMs prepared.
 - d) Updated Technology Development Plan with technology readiness assessment prepared.
 - e) Updated risk assessment and mitigation plans prepared.
 - f) Updated Project Execution Plan (PEP) and Integrated Master Schedule (IMS) prepared.
 - g) Updated Logistics Plan prepared.

- h) Applicable draft technical and programmatic plans prepared. Such plans, as applicable, may include: subsystem requirements specifications, software development plan, quality assurance plan, Test and Evaluation Master Plan (TEMP), Configuration Management Plan, IT plan, System Security Plan.
- i) Applicable design standards identified.
- j) Baselined S&MA plan and updated system safety analyses prepared.
- k) Preliminary engineering drawing tree and master parts list prepared.
- l) Interface control documents drafted and included in engineering drawing tree.
- m) Requirements verification and validation plan or matrix baselined.
- n) Plans to respond to regulatory requirements (e.g., Environmental Impact Statement) prepared.
- o) Updated Human Systems Integration Plan (HSIP) prepared.
- p) Updated Human Rating Plan prepared.
- q) List of long lead items defined.
- r) Procurement status including Supply Chain Risk Management (SCRM) activities prepared.
- s) Summary of subsystem analysis results, reliability analyses, failure modes and effects analysis, and list of potential single point failures prepared.
- t) Preliminary weight budget with allocations prepared.
- u) Relevant Boeing NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal PDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following PDR success criteria (tailored to be relevant to the Wing / Strut PDR) will be assessed during the review:
 - a) The top-level requirements, including mission Review Content and TPMs, are finalized, stated, and consistent with the preliminary design.
 - b) The flow down of requirements is complete, or, if not, a plan exists for resolution of open items.
 - c) Requirements are traceable to parent technical requirements and to mission goals and objectives.
 - d) The preliminary design is expected to meet the requirements at an acceptable level of risk, as defined in the project Risk Management Plan.
 - e) Definition of the system interfaces (both external entities and between internal elements) is consistent with the overall technical maturity and has an acceptable level of risk, as defined in the project Risk Management Plan.
 - f) Required new technology has been developed and meets relevant criteria within an acceptable level of risk, as defined in the applicable Risk Management Plan, or backup options identified.
 - g) Project risks have been actively sought and identified. Known and identified risks are understood and assessed, and plans, processes, and resources exist to manage them.
 - h) Safety and mission assurance requirements have been addressed in preliminary designs.
 - i) Technical and programmatic margins exist with respect to resources and TPMs to complete the development within budget, schedule, and risks.
 - j) The operational concept includes (where appropriate) human systems and the flow down of requirements for execution.
 - k) Technical trade studies are complete, and if not, plans exist for their closure and potential impacts are understood.
 - l) The project demonstrates compliance with applicable NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - m) Preliminary analysis of the primary subsystems has been completed and summarized, highlighting performance and design margin challenges.
 - n) Manufacturability has been considered in the preliminary design.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 8: Preliminary Design Review (PDR)

The PDR demonstrates that the preliminary design meets system requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design.

Amount: \$23.5M
Date: November 2024

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal PDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The Project has successfully completed the previous planned life-cycle reviews, including lower-level PDRs, and RFAs and RIDs have been addressed, or a closure plan exists for those remaining open.
- 5) A preliminary PDR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the PDR.
- 6) The following PDR topics are at an appropriate level of maturity:
 - a) Preliminary subsystem design specifications (hardware and software), with supporting trade-off analyses and data prepared, as required.
 - b) Subsystem level requirements prepared.
 - c) Status of technical performance to technical and safety margins and TPMs prepared.
 - d) Updated Technology Development Plan with technology readiness assessment prepared.
 - e) Updated risk assessment and mitigation plans prepared.
 - f) Updated Project Execution Plan (PEP) and Integrated Master Schedule (IMS) prepared.
 - g) Updated Logistics Plan prepared.
 - h) Applicable draft technical and programmatic plans prepared. Such plans, as applicable, may include subsystem requirements specifications, software development plan, quality assurance plan, Test and Evaluation Master Plan (TEMP), Configuration Management Plan, IT plan, System Security Plan.
 - i) Applicable design standards identified.
 - j) Baseline S&MA plan and updated system safety analyses prepared.
 - k) Preliminary engineering drawing tree and master parts list prepared.
 - l) Interface control documents drafted and included in engineering drawing tree.
 - m) Requirements verification and validation plan or matrix baselined.
 - n) Plans to respond to regulatory requirements (e.g., Environmental Impact Statement) prepared.
 - o) Updated Human Systems Integration Plan (HSIP) prepared.
 - p) List of long lead items defined.
 - q) Procurement status including Supply Chain Risk Management (SCRM) activities prepared.
 - r) Summary of subsystem analysis results, reliability analyses, failure modes and effects analysis, and list of potential single point failures prepared.
 - s) Preliminary weight budget with allocations prepared.
 - t) Relevant Boeing NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal PDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following PDR success criteria will be assessed during the review:
 - a) The top-level requirements, including mission Review Content and TPMs, are finalized, stated, and consistent with the preliminary design.
 - b) The flow down of requirements is complete, or, if not, a plan exists for resolution of open items.
 - c) Requirements are traceable to parent technical requirements and to mission goals and objectives.

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- d) The preliminary design is expected to meet the requirements at an acceptable level of risk, as defined in the project Risk Management Plan.
 - e) Definition of the system interfaces (both external entities and between internal elements) is consistent with the overall technical maturity and has an acceptable level of risk, as defined in the project Risk Management Plan.
 - f) Required new technology has been developed and meets relevant criteria within an acceptable level of risk, as defined in the applicable Risk Management Plan, or backup options identified.
 - g) Project risks have been actively sought and identified. Known and identified risks are understood and assessed, and plans, processes, and resources exist to manage them.
 - h) Safety and mission assurance requirements have been addressed in preliminary designs.
 - i) Technical and programmatic margins exist with respect to resources and TPMs to complete the development within budget, schedule, and risks.
 - j) The operational concept includes (where appropriate) human systems and the flow down of requirements for execution.
 - k) Technical trade studies are complete, and if not, plans exist for their closure and potential impacts are understood.
 - l) The project demonstrates compliance with applicable NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - m) Preliminary analysis of the primary subsystems has been completed and summarized, highlighting performance and design margin challenges.
 - n) Manufacturability has been considered in the preliminary design.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 9: Begin Aircraft Systems Bench (ASB) Simulator Design & Build

Defining requirements for and beginning design and build of the ASB is a key milestone in the overall SFD systems integration and test plan.

Amount: \$23.5M
Date: February 2025

Entrance Criteria:

- 1) Airplane System architecture is mapped to the test system architecture.
- 2) Test System Requirements and Objectives defined by Boeing.
- 3) Modeling and Simulation requirements defined by Boeing.
- 4) Drawing system and configuration management plan established by Boeing.
- 5) ASB preliminary design review is complete.

Success Criteria:

- 1) ASB design and build work authorized by Boeing.
- 2) ASB drawing release curves planned.
- 3) Facilities modifications are planned or already underway on an identified schedule corresponding to the overall project schedule.
- 4) Part procurement is planned; long-lead procurements have been initiated.

Milestone 10: Wing / Strut Critical Design Review (CDR)

The Wing / Strut CDR demonstrates that the maturity of the wing and strut designs are appropriate to support proceeding with full-scale fabrication, assembly, integration, and test. The CDR determines that the technical effort is on track to complete the system development, meeting functional and performance requirements within the identified cost and schedule constraints at an acceptable risk.

Amount: \$25.00M
Date: May 2025

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The project has successfully completed the previous planned life-cycle reviews, and RFAs and RIDs have been addressed or a closure plan exists for those remaining open.
- 5) A preliminary CDR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the CDR.
- 6) The following CDR topics (tailored to be relevant to the Wing / Strut CDR) are at an appropriate level of maturity:
 - a) Detailed subsystem design specifications (hardware and software), with supporting trade-off analyses and data prepared, as required.
 - b) Fracture critical and primary structural drawings/models complete with supporting analysis.
 - c) Detailed engineering drawing tree and master parts list baselined.
 - d) Interface control documents baselined and included in engineering drawing tree.
 - e) Initial fabrication, assembly, integration, and test plans prepared.
 - f) Status of technical performance to margins and TPMs prepared and address resolution of the previous RIDs.
 - g) Operational limits and constraints defined.
 - h) Requirements verification and validation plan updated.
 - i) Preliminary test site and flight operations plans prepared.
 - j) Updated Technology Development Plan prepared, including technology readiness assessment.
 - k) Risk assessment updated, including status of mitigation plans.
 - l) Applicable updated technical and programmatic plans prepared. Such plan, as applicable, may include subsystem requirements specifications, software development plan, quality assurance plan, Test and Evaluation Master Plan (TEMP), Configuration Management Plan, IT plan, System Security Plan, Logistics Plan, Human Systems Integration Plan, Human Rating Plan.
 - m) PEP and IMS updated.
 - n) Subsystem-level and preliminary operations safety analyses baselined.
 - o) Systems and subsystem certification plan and requirements (as needed) baselined.
 - p) System safety analysis with associated verifications baselined.
 - q) Procurement status including Supply Chain Risk Management (SCRM) activities updated.
 - r) Summary of subsystem analysis results, reliability analyses, failure modes and effects analysis, and list of potential single point failures, including their effects and rationale for acceptance updated.
 - s) Relevant Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following CDR success criteria (tailored to be relevant to the Wing / Strut CDR) will be assessed during the review:
 - a) The detailed design, including interface definitions, is expected to meet requirements.

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- b) Build-to and buy-to packages are in development and on track for completion to proceed on schedule with fabrication, assembly, integration, and test.
 - c) Requirements verification and validation plans are complete.
 - d) Draft test plans are in place for system assembly, integration, and test site and mission operations.
 - e) Technical and programmatic margins exist with respect to resources and TPMs to complete the development within budget, schedule, and risks.
 - f) Risks to safety and mission success have been sought and identified. Identified risks are understood and assessed, and plans and resources exist to manage them.
 - g) Safety and mission assurance have been addressed in system and operational designs, and applicable S&MA artifacts meet requirements and indicate that the project safety/reliability residual risks are acceptable, as defined in the project Risk Management Plan.
 - h) The project demonstrates compliance with applicable Boeing, NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - i) Material properties tests are completed along with analyses of loads, stress, fracture control, contamination generation, and other analyses, as applicable.
 - j) Electrical, Electronic, and Electromechanical parts have been selected, and planned testing and delivery will support build schedules.
 - k) The operational concept has been updated and has been considered in test planning.
 - l) Manufacturability has been considered in the detailed design.
 - m) Procurement and supply chain risk management execution is consistent with the technical development schedule.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 11: Fuselage / Mod CDR

The Fuselage / Mod CDR demonstrates that the maturity of the fuselage design and modification plan are appropriate to support proceeding with full-scale fabrication, assembly, integration, and test. The CDR determines that the technical effort is on track to complete the system development, meeting functional and performance requirements within the identified cost and schedule constraints at an acceptable risk.

Amount: \$25.00M
Date: August 2025

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The project has successfully completed the previous planned life-cycle reviews, and RFAs and RIDs have been addressed or a closure plan exists for those remaining open.
- 5) A preliminary CDR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the CDR.
- 6) The following CDR topics (tailored to be relevant to the Fuselage / Mod CDR) are at an appropriate level of maturity:
 - a) Detailed subsystem design specifications (hardware and software), with supporting trade-off analyses and data prepared, as required.
 - b) Fracture critical and primary structural drawings/models complete with supporting analysis.
 - c) Detailed engineering drawing tree and master parts list baselined.
 - d) Interface control documents baselined and included in engineering drawing tree.
 - e) Initial fabrication, assembly, integration, and test plans prepared.
 - f) Status of technical performance to margins and TPMs prepared and address resolution of the previous RIDs.

- g) Operational limits and constraints defined.
- h) Requirements verification and validation plan updated.
- i) Preliminary test site and flight operations plans prepared.
- j) Updated Technology Development Plan prepared, including technology readiness assessment.
- k) Risk assessment updated, including status of mitigation plans.
- l) Applicable updated technical and programmatic plans prepared. Such plan, as applicable, may include subsystem requirements specifications, software development plan, quality assurance plan, Test and Evaluation Master Plan (TEMP), Configuration Management Plan, IT plan, System Security Plan, Logistics Plan, Human Systems Integration Plan, Human Rating Plan.
- m) PEP and IMS updated.
- n) Subsystem-level and preliminary operations safety analyses baselined.
- o) Systems and subsystem certification plan and requirements (as needed) baselined.
- p) System safety analysis with associated verifications baselined.
- q) Procurement status including Supply Chain Risk Management (SCRM) activities updated.
- r) Summary of subsystem analysis results, reliability analyses, failure modes and effects analysis, and list of potential single point failures, including their effects and rationale for acceptance updated.
- s) Relevant Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following CDR success criteria (tailored to be relevant to the Fuselage / Mod CDR) will be assessed during the review:
 - a) The detailed design, including interface definitions, is expected to meet requirements.
 - b) Build-to and buy-to packages are in development and on track for completion to proceed on schedule with fabrication, assembly, integration, and test.
 - c) Requirements verification and validation plans are complete.
 - d) Draft test plans are in place for system assembly, integration, and test site and mission operations.
 - e) Technical and programmatic margins exist with respect to resources and TPMs to complete the development within budget, schedule, and risks.
 - f) Risks to safety and mission success have been sought and identified. Identified risks are understood and assessed, and plans and resources exist to manage them.
 - g) Safety and mission assurance have been addressed in system and operational designs, and applicable S&MA artifacts meet requirements and indicate that the project safety/reliability residual risks are acceptable, as defined in the project Risk Management Plan.
 - h) The project demonstrates compliance with applicable Boeing, NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - i) Material properties tests are completed along with analyses of loads, stress, fracture control, contamination generation, and other analyses, as applicable.
 - j) Electrical, Electronic, and Electromechanical parts have been selected, and planned testing and delivery will support build schedules.
 - k) The operational concept has been updated and has been considered in test planning.
 - l) Manufacturability has been considered in the detailed design.
 - m) Procurement and supply chain risk management execution is consistent with the technical development schedule.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 12: Propulsion CDR

The Propulsion System CDR demonstrates that the maturity of the propulsion design is appropriate to support proceeding with full-scale fabrication, assembly, integration, and test. The CDR determines that the technical effort is on track to complete the system development, meeting functional and performance requirements within the identified cost and schedule constraints at an acceptable risk.

Amount: \$25.75M
Date: November 2025

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The project has successfully completed the previous planned life-cycle reviews, and RFAs and RIDs have been addressed or a closure plan exists for those remaining open.
- 5) A preliminary CDR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the CDR.
- 6) The following CDR topics (tailored to be relevant to the Propulsion CDR) are at an appropriate level of maturity:
 - a) Detailed subsystem design specifications (hardware and software), with supporting trade-off analyses and data prepared, as required.
 - b) Fracture critical and primary structural drawings/models complete with supporting analysis.
 - c) Detailed engineering drawing tree and master parts list baselined.
 - d) Interface control documents baselined and included in engineering drawing tree.
 - e) Initial fabrication, assembly, integration, and test plans prepared.
 - f) Status of technical performance to margins and TPMs prepared and address resolution of the previous RIDs.
 - g) Operational limits and constraints defined.
 - h) Requirements verification and validation plan updated.
 - i) Preliminary test site and flight operations plans prepared.
 - j) Updated Technology Development Plan prepared, including technology readiness assessment.
 - k) Risk assessment updated, including status of mitigation plans.
 - l) Applicable updated technical and programmatic plans prepared. Such plan, as applicable, may include subsystem requirements specifications, software development plan, quality assurance plan, Test and Evaluation Master Plan (TEMP), Configuration Management Plan, IT plan, System Security Plan, Logistics Plan, Human Systems Integration Plan.
 - m) PEP and IMS updated.
 - n) Subsystem-level and preliminary operations safety analyses baselined.
 - o) Systems and subsystem certification plan and requirements (as needed) baselined.
 - p) System safety analysis with associated verifications baselined.
 - q) Procurement status including Supply Chain Risk Management (SCRM) activities updated.
 - r) Summary of subsystem analysis results, reliability analyses, failure modes and effects analysis, and list of potential single point failures, including their effects and rationale for acceptance updated.
 - s) Relevant Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.

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- 2) The following CDR success criteria (tailored to be relevant to the Propulsion CDR) will be assessed during the review:
 - a) The detailed design, including interface definitions, is expected to meet requirements.
 - b) Build-to and buy-to packages are in development and on track for completion to proceed on schedule with fabrication, assembly, integration, and test.
 - c) Requirements verification and validation plans are complete.
 - d) Draft test plans are in place for system assembly, integration, and test site and mission operations.
 - e) Technical and programmatic margins exist with respect to resources and TPMs to complete the development within budget, schedule, and risks.
 - f) Risks to safety and mission success have been sought and identified. Identified risks are understood and assessed, and plans and resources exist to manage them.
 - g) Safety and mission assurance have been addressed in system and operational designs, and applicable S&MA artifacts meet requirements and indicate that the project safety/reliability residual risks are acceptable, as defined in the project Risk Management Plan.
 - h) The project demonstrates compliance with applicable Boeing, NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - i) Material properties tests are completed along with analyses of loads, stress, fracture control, contamination generation, and other analyses, as applicable.
 - j) Electrical, Electronic, and Electromechanical parts have been selected, and planned testing and delivery will support build schedules.
 - k) The operational concept has been updated and has been considered in test planning.
 - l) Manufacturability has been considered in the detailed design.
 - m) Procurement and supply chain risk management execution is consistent with the technical development schedule.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 13: Critical Design Review (CDR)

The CDR demonstrates that the maturity of the design is appropriate to support proceeding with full-scale fabrication, assembly, integration, and test. The CDR determines that the technical effort is on track to complete the system development, meeting functional and performance requirements within the identified cost and schedule constraints at an acceptable risk.

Amount: \$27.25M
Date: February 2026

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team’s readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The project has successfully completed the previous planned life-cycle reviews, including lower-level CDRs, and RFAs and RIDs have been addressed or a closure plan exists for those remaining open.
- 5) A preliminary CDR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the CDR.
- 6) The following CDR topics are at an appropriate level of maturity:
 - a) Detailed subsystem design specifications (hardware and software), with supporting trade-off analyses and data prepared, as required.
 - b) Fracture critical and primary structural drawings/models complete with supporting analysis.
 - c) Detailed engineering drawing tree and master parts list baselined.
 - d) Interface control documents baselined and included in engineering drawing tree.
 - e) Initial fabrication, assembly, integration, and test plans prepared.

- f) Status of technical performance to margins and TPMs prepared and address resolution of the previous RIDs.
- g) Operational limits and constraints defined.
- h) Requirements verification and validation plan updated.
- i) Preliminary test site and flight operations plans prepared.
- j) Updated Technology Development Plan prepared, including technology readiness assessment.
- k) Risk assessment updated, including status of mitigation plans.
- l) Applicable updated technical and programmatic plans prepared. Such plan, as applicable, may include subsystem requirements specifications, software development plan, quality assurance plan, Test and Evaluation Master Plan (TEMP), Configuration Management Plan, IT plan, System Security Plan, Logistics Plan, Human Systems Integration Plan.
- m) PEP and IMS updated.
- n) Subsystem-level and preliminary operations safety analyses baselined.
- o) Systems and subsystem certification plan and requirements (as needed) baselined.
- p) System safety analysis with associated verifications baselined.
- q) Procurement status including Supply Chain Risk Management (SCRM) activities updated.
- r) Summary of subsystem analysis results, reliability analyses, failure modes and effects analysis, and list of potential single point failures, including their effects and rationale for acceptance updated.
- s) Relevant Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal CDR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following CDR success criteria will be assessed during the review:
 - a) The detailed design, including interface definitions, is expected to meet requirements.
 - b) Build-to and buy-to packages are in development and on track for completion to proceed on schedule with fabrication, assembly, integration, and test.
 - c) Requirements verification and validation plans are complete.
 - d) Draft test plans are in place for system assembly, integration, and test site and mission operations.
 - e) Technical and programmatic margins exist with respect to resources and TPMs to complete the development within budget, schedule, and risks.
 - f) Risks to safety and mission success have been sought and identified. Identified risks are understood and assessed, and plans and resources exist to manage them.
 - g) Safety and mission assurance have been addressed in system and operational designs, and applicable S&MA artifacts meet requirements and indicate that the project safety/reliability residual risks are acceptable, as defined in the project Risk Management Plan.
 - h) The project demonstrates compliance with applicable Boeing, NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - i) Material properties tests are completed along with analyses of loads, stress, fracture control, contamination generation, and other analyses, as applicable.
 - j) Electrical, Electronic, and Electromechanical parts have been selected, and planned testing and delivery will support build schedules.
 - k) The operational concept has been updated and has been considered in test planning.
 - l) Manufacturability has been considered in the detailed design.
 - m) Procurement and supply chain risk management execution is consistent with the technical development schedule.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 14: Mod Manufacturing Readiness Review (MRR)

The Mod MRR ensures that the production plans, fabrication, assembly, integration enabling products, operational support, and personnel are in place and ready to begin manufacturing and assembly of the fuselage modification.

Amount: \$27.25M**Date: June 2026****Entrance Criteria:**

- 1) All entrance criteria for a Partner-internal MRR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The following MRR topics are at an appropriate level of maturity:
 - a) Engineering drawings and build-to packages are completed and signed by Boeing approver(s).
 - b) Manufacturing plans (including critical process controls, control limits, and procedures) are developed.
 - c) Producibility analyses are complete.
 - d) Raw materials are approved and certified.
 - e) Resources have been allocated or procured and are available to support manufacturing.
 - f) Qualification plan for suppliers prepared.
 - g) Qualification plan for support staff prepared.
 - h) Updated IMS.
 - i) Project risks have been sought and identified. Known and identified risks have been assessed and characterized, with mitigation plans prepared.
 - j) Manufacturing Bill of Materials (MBOM) is available, with critical and long lead parts identified.
 - k) Delivery schedules are prepared.
 - l) In-process and end-item inspections and tests are defined and planned.
 - m) Relevant Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal MRR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following MRR success criteria will be assessed during the review:
 - a) System requirements will be met in the final build configuration.
 - b) Adequate resources are in place to support manufacturing.
 - c) Design-for-manufacturing considerations have been incorporated in the design.
 - d) Producibility analyses, as applicable, are complete and demonstrate that the product is manufacturable with an acceptable level of risk, as defined in the project Risk Management Plan.
 - e) The project is compliant with applicable Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes, and procedures.
 - f) Adequate spares for critical parts have been planned or ordered.
 - g) Facility, equipment, and tool requirements are met.
 - h) Special tools and equipment are available in specified quantities as needed.
 - i) Production and support staff are qualified to applicable standards.
 - j) Manufacturing processes and methods are consistent with quality requirements and compliant with occupational health and medical, safety, environmental, and energy conservation regulations, as applicable.
 - k) Qualified suppliers are selected for materials that are to be procured.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 15: 90% Engineering Drawings Complete

90% of Boeing-defined airframe, propulsion system, vehicle subsystem, and avionics hardware/software engineering drawings completed and signed.

Amount: \$25.75M
Date: August 2026

Entrance Criteria:

- 1) The project has successfully completed CDR.

Success Criteria:

- 1) 90% of Boeing-defined airframe, propulsion system, vehicle subsystem, and avionics hardware/software engineering drawings complete and signed by applicable Boeing signature authorities.

Milestone 16: System Integration Review (SIR)

The SIR ensures the delivered test article is on schedule to be integrated into the system of interest, and integration facilities, support personnel, and integration plans and procedures are on schedule to support integration.

Amount: \$24.0M
Date: October 2026

Entrance Criteria:

- 1) All entrance criteria for a Partner-internal SIR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 3) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 4) The project has successfully completed the previous planned life-cycle reviews, and RFAs and RIDs have been addressed or a closure plan exists for those remaining open.
- 5) A preliminary SIR agenda and instructions to the review board have been agreed to by the technical team, project manager, and review chair prior to the SIR.
- 6) The following SIR topics are at an appropriate level of maturity:
 - a) Status of technical performance related to margins, TPMs, and resolution of the previous review discrepancies addressing effectiveness of technical achievement and communicating overall risk to the project prepared.
 - b) Integration procedures have been identified with scheduled completion dates prior to the corresponding need dates.
 - c) Component build, procurement, test, and qualification activities are on schedule for integration.
 - d) Mechanical and electrical interface requirements for hardware necessary to start system integration have been verified in accordance with the interface control documentation and plans for verification of remaining hardware exist.
 - e) Integration facilities, including clean rooms, ground support equipment, handling fixtures, overhead cranes, and electrical test equipment, and their associated quality controls will be available on schedule.
 - f) Support personnel have been trained and qualified as needed.
 - g) Handling, safety, and quality requirements have been documented.
 - h) System discrepancies have been identified, dispositioned, and are on schedule for closure.
 - i) Integration plans baselined at PDR have been updated.
 - j) Initial V&V results from lower tier products have been verified.
 - k) Updated IMS.
 - l) Verification and validation plans updated.
 - m) Final transportation criteria and instructions prepared.
 - n) Preliminary mission operations plan prepared, as applicable.
 - o) Preliminary decommissioning plans prepared, as applicable.
 - p) Preliminary disposal plans prepared, as applicable.
 - q) Software requirements updated.
 - r) Procurement status including Supply Chain Risk Management (SCRM) activities (e.g., audits and assessments, GIDEP, counterfeit avoidance) updated.

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- s) Relevant Boeing, NASA and Implementing Center (AFRC) requirements, standards, processes and procedures identified.

Success Criteria:

- 1) All success criteria for a Partner-internal SIR have been met per Partner processes, and major supporting products are in place and ready for review.
- 2) The following SIR success criteria will be assessed during the review:
 - a) Integration plans and procedures are on track for completion on schedule to support system integration.
 - b) Previous component, subsystem, and system test results have been analyzed, risks identified, and mitigation plans prepared.
 - c) The project has demonstrated compliance with applicable NASA and implementing Center (AFRC) requirements, standards, processes, and procedures.
 - d) This includes applicable airworthiness requirements under NASA AFRC AFOP-7900.3-023 Airworthiness & Flight Safety Review Process and NASA NPR 7900.3D Aircraft Operations Management, as may be amended or updated, and established Boeing airworthiness and enterprise gated process standard practices and procedures.
 - e) The integration procedures and workflow have been defined and documented or are on schedule.
 - f) Integration plans, procedures, environment, and configuration of items to be integrated meet requirements and have an acceptable level of risk, as defined in the project Risk Management Plan.
 - g) Training necessary to properly integrate the system has been performed.
 - h) Software components meet requirements.
- 3) RIDs and RFAs identified during the review have closure dates and name of person responsible.
- 4) Presentation materials marked TBD are identified with closure dates and name of person responsible.

Milestone 17: MD-90 Fuselage High Blow Test

Boeing has performed the MD-90 Structural High Blow Test for Loads and Stress Analysis model correlation.

Amount: \$24.0M
Date: February 2027

Entrance Criteria:

- 1) Necessary MD-90 Fuselage Modifications have been performed.

Success Criteria:

- 1) Boeing performs the Structures High Blow Test.
- 2) High Blow Test data generated and provided to Engineering for processing.
- 3) A Coordination Sheet will be created, signaling the High Blow test has been performed, the associated data has been generated, and said data has been released to Engineering.
- 4) Coordination Sheet and any applicable data generated from the test will be provided to NASA.
- 5) Discrepancies identified during the test have closure dates and name of person responsible.

Milestone 18: Final Aircraft Structural Assembly Complete

Final Assembly of the primary aircraft structure is complete.

Amount: \$24.0M
Date: April 2027

Entrance Criteria:

- 1) N/A

Success Criteria:

- 1) Fuselage structural assembly and visual inspection complete.
- 2) Wing and strut structural assemblies are assembled to fuselage and visual inspection of assembly is complete.
- 3) Landing gear installed on aircraft and visual inspection of installation is complete.
- 4) Aircraft ready to accept engine and pylon installation.

Milestone 19: Final Ground Test Plan

The Final Ground Test Plan describes ground test requirements including the test facility, support personnel, and test procedures. This plan covers phases of SFD ground testing.

Amount: \$24.0M
Date: August 2027

Entrance Criteria:

- 1) The objectives of ground tests have been defined and documented.
- 2) Test plans, test environment, and configuration of the test item(s) that support test objectives are complete.
- 3) Test interfaces have been placed under configuration control or have been defined in accordance with an agreed-to plan.
- 4) Plan established to identify and disposition ground test discrepancies.
- 5) Required test resources, including people (including a designated test director), facilities, test articles, test instrumentation, and other test-enabling products, have been identified and are available to support required tests.
- 6) Roles and responsibilities of test participants are defined and agreed to.
- 7) Relevant and applicable NASA & Implementing Center requirements, standards, processes, & procedures are to be provided by NASA 120 calendar days in advance of completing the final ground test plan.

Success Criteria:

- 1) Test plans are completed for the system(s) under test.
- 2) Identification and coordination of required test resources are completed.
- 3) The project has demonstrated compliance with applicable NASA and implementing Center requirements, standards, processes, and procedures, as applicable.
- 4) Critical risks have been sought and identified. Known and identified risks have been assessed, and mitigation plans are in place.
- 5) Test plans, environment, and configuration of the test item(s) meet Boeing SFD test objectives.
- 6) Test objectives cover ground test data demands of Airworthiness requirements.
- 7) Test personnel training requirements are defined, and a training plan is being executed.

Milestone 20: Aircraft Power On

Powering on the aircraft for the first time marks the end of assembly and integration and the beginning of functional and systems checks.

Amount: \$3.75M
Date: October 2027

Entrance Criteria:

- 1) Electrical components and systems installation on the aircraft is complete.
- 2) Job cards and planning documents have been QA stamped.

Success Criteria:

- 1) Power on complete.

Milestone 21: Aircraft Build Gauntlet Test

Boeing will perform a Gauntlet test at the completion of the aircraft build, leveraging a common Boeing Commercial Airplanes practice, tailored to the SFD Program, to validate Systems functionality and inter-functional integration.

Amount: \$3.75M
Date: March 2028

Entrance Criteria:

- 1) The aircraft systems are ready to be energized prior to roll-out to the Flight Line.

Success Criteria:

- 1) A check of functional operation and system integration checks using normal and failure scenarios in an integrated test environment.
- 2) Validating systems are functioning per design, monitoring for unexpected effects.
- 3) Data for Flight Test Operations and Analysis test notes from the flight deck during test conditions prepared.
- 4) Discrepancies from Gauntlet testing are identified and a determination by the CPE and IPT Leaders is made regarding what mitigation is required prior before first flight. Discrepancies identified during the test have closure dates and name of person responsible.
 - a) Test Review meeting will be held to review all testing notes, review discrepancies with associated mitigation plans, and identify additional actions required. Plans will be updated appropriately, consistent with Test Review meeting recommendations.
 - b) NASA will have technical representation in the Test Review Meeting.
- 5) A Coordination Sheet sent to the SFD Program Manager will be created, confirming that Gauntlet testing has been performed and that any discrepancies identified have mitigation plans established or are determined to be acceptable to proceed to the flight line.
- 6) The Coordination Sheet and Test Review materials will be provided to NASA.

Milestone 22: First Flight Readiness Review (FFRR)

FFRR assesses Airworthiness and recommends to the AFSRB whether the Demonstrator program may proceed to flight. Within one (1) week after conclusion of the review, the review board will summarize review findings and determine and document review item discrepancies (RID) or requests for action (RFA) from the First Flight Readiness Review (FFRR).

Amount: \$3.75M
Date: June 2028

Entrance Criteria:

- 1) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 2) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned First Flight Readiness Review and assess the team's readiness (based on Entrance Criteria) to conduct the review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 3) Final Flight Test Plans and Flight Ops Audit completed, with RFAs and RIDs dispositioned
- 4) Preliminary review agenda and Review Content are agreed to by the technical team, project manager, and review chair.
- 5) Review agenda and content follow Boeing processes and comply with the SFD Airworthiness Approach document detailing applicable requirements under NASA AFRC AFOP-7900.3-023 *Airworthiness & Flight Safety Review Process* and NASA NPR 7900.3D *Aircraft Operations Management*.

Success Criteria:

- 1) Review content assessed by FFRRB, findings and recommendations documented, RIDs and RFAs documented with plans for disposition.
- 2) Flight crew logbooks compliant with applicable requirements and current.
- 3) Ground test and inspection data and analysis included in FFRRB briefing material.
- 4) Normal and emergency procedures defined.
- 5) Documentation of work planned to be performed between FFRR and first flight, aside from routine maintenance.

Milestone 23: Flight Line Gauntlet Test

Boeing will perform a Flight Line Gauntlet Test, which is the final check of airplane readiness prior to First Flight and demonstrates that the airplane is robust enough for continued safe flight and landing. The airplane will be subjected to a system integration check in an integrated test environment

Amount: \$3.75M
Date: August 2028

Entrance Criteria:

- 1) The aircraft is in first flight configuration, with all prior testing issues mitigated or accepted.

Success Criteria:

- 1) A check of functional operation and system integration using normal and failure scenarios in an integrated test environment.
- 2) Validating systems are functioning per design, and monitoring for unexpected effects.
- 3) Fuel Dock check activities (Fuel Tank Checks, FQIS Checks, Fuel manifold Checks, Fuel Volume/Refuel/Venting Checks) performed
- 4) VMS / EEC Interface functionals performed
- 5) Engine Fire / Overheat System functionals performed
- 6) Primary data for Flight Test Operations and Analysis test notes from the flight deck during test conditions prepared.
- 7) Discrepancies from Flight Line Gauntlet testing are identified and a determination by the CPE and IPT Leaders is made regarding what mitigation is required prior before first flight. Discrepancies identified during the test have closure dates and name of person responsible.
 - a) Test Review meeting will be held to review all testing notes, review discrepancies with associated mitigation plans, and identify additional actions required. Plans will be updated appropriately, consistent with Test Review meeting recommendations.
 - b) NASA will have technical representation in the Test Review Meeting.
- 8) A Coordination Sheet sent to the SFD Program Manager will be created, confirming that Gauntlet testing has been performed and that any discrepancies identified have mitigation plans established or are determined to be acceptable to proceed to the flight line.
- 9) The Coordination Sheet and Test Review materials will be provided to NASA.

Milestone 24: First Flight

First Flight of the Demonstrator aircraft is defined as the first successful takeoff and landing during the flight test phase of the SFD program.

Amount: \$1.5M
Date: September 2028

Entrance Criteria:

- 1) FRRB, AFSRB, and Tech Brief Board have established Airworthiness of the Demonstrator aircraft and issued flight authorization for the aircraft First Flight, and a certificate of Airworthiness has been issued for the Demonstrator Aircraft.
- 2) Flight Test procedure complies with Boeing and NASA processes and has been documented, reviewed, and approved by Boeing.

Success Criteria:

- 1) Demonstrator aircraft achieves its first successful takeoff and landing at the defined flight test site.
- 2) Successful execution of first flight test requirements and objectives.
- 3) Flight test summary report complete, including date and duration of test, conditions flow, qualitative assessment of results, and discussion of anomalies encountered.

Milestone 25: Envelope Expansion Testing Complete

Marks the end of envelope expansion testing defined in the SFD program Flight Test Plan and CONOPs.

Amount: \$1.5M
Date: February 2029

Entrance Criteria:

- 1) First flight, full-scale proof loads testing, and Ground Vibration Test (GVT) complete with data reduction initiated.
- 2) Envelope expansion test plan completed.

Success Criteria:

- 1) Envelope expansion tests defined in the program Flight Test Plan and CONOPs are complete.
- 2) Flight test summary report complete, including date and duration of test, conditions flown, qualitative assessment of results, and discussion of anomalies encountered.

Milestone 26: Flight Test Complete

Flight Test Complete marks the end of flight tests defined in the SFD project Flight Test Plan.

Amount: \$1.5M
Date: June 2029

Entrance Criteria:

- 1) Flight Tests required by Flight Test Plan are completed.

Success Criteria:

- 1) Flight test summary reports complete, including date and duration of test, conditions flown, qualitative assessment of results, and discussion of anomalies encountered.

Milestone 27: Closeout Review

The Closeout Review verifies the completeness of the specific end products in relation to their expected maturity level, requirement verification, compliance to stakeholder expectations, and ensures that the system of interest has sufficient technical maturity to authorize its acceptance for operational use in the operational environment.

Amount: \$0.5M
Date: August 2029

Entrance Criteria:

- 1) A joint review board has been selected and approved by NASA and Boeing, including representation from NASA.
- 2) Boeing SFD Program Leadership shall meet with their NASA counterparts on a mutually agreeable date at least four (4) weeks prior to the planned milestone review and assess the team's readiness (based on Entrance Criteria) to conduct the milestone review. Milestone review products will be provided with a minimum of three (3) weeks allocated for review of major products.
- 3) The project has successfully completed the previous planned life-cycle reviews, RFAs/RIDs have been addressed, and plans to complete open work are defined.
- 4) A preliminary review agenda and instructions to the review team have been agreed to by the technical team, project manager, and review chair prior to the review.
- 5) The following Closeout Review topics will be included:
 - a) Summary of key product verification and validation results prepared.
 - b) Technical data package has been updated to include relevant test results and analyses.
 - c) Baselined as-built hardware and software documentation prepared.
 - d) Risk assessment and mitigation plan updated.
 - e) Required safety, shipping, handling, checkout, and operational plans and procedures prepared.
 - f) Completed planning for dispositioning the system for future use, storage, or disposal.

Success Criteria:

- 1) The following Closeout Review success criteria will be assessed:
 - a) Required tests and analyses are complete.
 - b) Demonstrator development and test learnings are traceable to the vision system.
 - c) Risks to the vision system have been identified, assessed, and addressed.
 - d) Lessons learned for organizational improvement and system operations are identified and captured.
- 2) RIDs and RFAs identified during the review relevant to the SFD project are resolved.
- 3) Presentation materials marked TBD are identified with closure dates and name of person responsible.