Boeing Commercial Crew Development Round 2 (CCDev2) Space Act Agreement

NNK11MS03S

Boeing CCDev2 Space Act Agreement

Boeing SAA Amendment 01 – Optional Milestones

SPACE ACT AGREEMENT NO. NNK11MS03S
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
THE BOEING COMPANY
FOR
COMMERCIAL CREW DEVELOPMENT ROUND 2 (CCDev 2)

BACKGROUND

In 2009, the National Aeronautics and Space Administration ("NASA") began the Commercial Crew Development ("CCDev") initiatives to stimulate efforts within the private sector to develop system concepts and capabilities that could ultimately lead to the availability of commercial human spaceflight services. NASA is continuing that effort through a second round of CCDev initiatives ("CCDev 2") in order to further foster activity leading to the development of orbital commercial Crew Transportation Systems ("CTS"). Through this CCDev 2 activity, NASA may be able to continue to spur economic growth as capabilities for new space markets are created, and reduce the gap in U.S. human spaceflight capability.

The goals of the CCDev 2 investments are to advance orbital commercial CTS concepts and enable significant progress on maturing the design and development of elements of the system, such as launch vehicles and spacecraft, with the overall objective of accelerating the availability of U.S. CTS capabilities while ensuring crew and passenger safety. This Space Act Agreement (the "Agreement" or "SAA") represents Boeing's and NASA's commitment to encourage innovations and efficiencies in CTS concepts and capabilities to achieve these CCDev 2 goals. Specifically, the Boeing Company's approach to meeting the goals of the CCDev 2 activity is outlined in Appendix 1.

ARTICLE 1. AUTHORITY

This Agreement is entered into by the National Aeronautics and Space Administration, located at 300 E Street, SW, Washington, D.C. (hereinafter referred to as "NASA" or Government), and The Boeing Company, (hereinafter referred to as "Boeing" or "Participant") with a place of business at 13100 Space Center Blvd. Houston, Texas 77059. NASA and Boeing may be individually referred to as a "Party" and collectively referred to as the "Parties". NASA's authority to enter into this Agreement is in accordance with the authority set forth in Sections 203(c)(5) and 203(c)(6) of the National Aeronautics and Space Act of 1958, as amended. This agreement will be implemented by NASA at the John F. Kennedy Space Center in Brevard County, Florida.

ARTICLE 2. PURPOSE

The purpose of this Agreement is to provide financial and limited technical assistance to Boeing's advancement of commercial crew space transportation systems concepts. Boeing's development work must show, within the timeframe of the Agreement, significant progress in maturing the design and development of elements of a commercial CTS while ensuring crew and passenger safety. Boeing will receive payments from NASA upon successful completion of agreed upon milestones as described in Appendix 2 of this Agreement.

ARTICLE 3. RESPONSIBILITIES

A. Boeing shall:

(1) Conduct the CCDev 2 effort according to the milestones identified in Appendix 2 to this Agreement.

(2) Lead a quarterly project status briefing.

(3) Designate at least one seat on each review board described in Appendix 2 for a NASA representative.

B. NASA shall:

(1) Provide milestone payments to Boeing upon successful completion of each CCDev 2 milestone, subject to limitations noted below.

(2) Participate in the quarterly project status briefing.

(3) Appoint a NASA representative to participate in each review board described in Appendix 2, who shall have concurrence authority on aspects of the space transportation system design, engineering and operations which could affect the ISS or NASA crew members.

ARTICLE 4. SCHEDULE AND MILESTONES

The scheduled major milestones and acceptance criteria for each milestone for the CCDev 2 effort are identified in Appendix 2 to this Agreement.

ARTICLE 5. FINANCIAL OBLIGATIONS AND TECHNICAL REPORTS

A. NASA's Payment Obligation

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

B. Acceptance and Payment for Milestones

(1) Boeing shall notify the NASA Principal 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 30 calendar days to determine whether the milestone event meets its corresponding acceptance criteria as described in Appendix 2 of this Agreement and shall notify Boeing of NASA's acceptance or non-acceptance. Disagreement about the successful accomplishment of a milestone shall be deemed a Dispute and resolved in accordance with Article 18 of this Agreement.

(2) Boeing shall be able to submit an invoice requesting payment upon the accomplishment and acceptance by NASA of the milestone as identified and described in Appendix 2 of this Agreement. Boeing shall submit an invoice via e-mail to the NASA Shared Services Center at NSSC-AccountsPayable@nasa.gov. There shall be no more than one (1) invoice per e-mail submission. After receipt and review of the invoice, the NASA Shared Services Center will coordinate with the NASA Administrative Contact to authorize payment. Subject to change only through written Agreement modification, payment shall be made via electronic funds transfer to the address set forth below:

Bank Account of Payee:
Bank: [REDACTED]
Address: [REDACTED]
Routing Transit Number: [REDACTED]
Depositor Account Title: [REDACTED]
Depositor Number: [REDACTED]

(3) The following information shall be included on each invoice:

Agreement Number
Invoice Number
A description of milestone event
Terms of Payment
Payment Office
Agreed Milestone Amount

C. Financial Records and Reports

Except as otherwise provided in this Agreement, Boeing's relevant financial records associated with this Agreement are not subject to examination or audit by NASA.

D. Quarterly Project Status Briefings

Boeing shall conduct quarterly project status briefings with NASA. Progress made shall be estimated and reported in a mutually agreed to quantifiable performance method. The briefings shall describe the progress made since the last report, plans forward, and shall also describe any difficulties encountered and the corrective action necessary to recover. At each quarterly briefing, Boeing will provide NASA with written certification that it has not provided U.S. Government funding to any Russian entity in the previous quarter. "Russian entity," for purposes of this Agreement, is defined in Article 25. The final briefing shall describe not only work completed but also shall document how this activity has reduced the overall risk to Boeing's commercial crew space transportation concept and shall also document the way in which lessons learned as the result of these activities are being incorporated into the design and manufacturing efforts of Boeing commercial crew space transportation concept.

E. Access to Records

The Comptroller General of the United States, at its discretion and subject to applicable laws 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 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 arrangements in excess of $5,000,000.00, which Boeing has entered into for the execution of the milestone events in this Agreement.

ARTICLE 6. DISSEMINATION OF PUBLIC INFORMATION

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

B. Boeing agrees the words "National Aeronautics and Space Administration" or the letters "NASA" will not be used in connection with a product or service in a manner reasonably calculated to convey any impression that such product or service has the authorization, support, sponsorship, or endorsement of NASA, which does not, in fact, exist. In addition, with the exception of release of general information in accordance with paragraph A above, Boeing agrees that any proposed public use of the NASA name or initials shall be submitted by Boeing

in advance to the NASA Administrative Contact, who will submit the proposed use to the NASA Assistant Administrator for Public Affairs or designee ("NASA Public Affairs") for review and approval. NASA approval shall be based on applicable law and policy governing the use of the NASA name and initials. Such approval shall not be unreasonably withheld. Use of NASA emblems/devices (i.e., NASA Seal, NASA Insignia, NASA logotype, NASA Program Identifiers, and the NASA Flag) is governed by 14 C.F.R. Part 1221. Boeing agrees that any proposed use of such emblems/devices shall be submitted in advance to the NASA Administrative Contact, who will submit the proposed use to NASA Public Affairs for review and approval in accordance with such regulations.

C. NASA does not endorse or sponsor any commercial product, service, or activity. NASA's participation in this Agreement does not constitute endorsement by NASA. Boeing agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of Boeing resulting from activities conducted under this Agreement.

ARTICLE 7. NASA FURNISHED INFORMATION AND SERVICES

A. NASA may, at its sole discretion and on terms to be negotiated between the Parties, provide Boeing services, technical expertise, or access to Government Property. Such NASA services, technical expertise, or access to Government Property may be provided on either a reimbursable or non-reimbursable basis. Specific services and property and any terms and conditions applicable to the provision of such services, technical expertise and access to Government property will be identified in appropriate appendices to this Agreement. Unless NASA specifically requires Boeing to use NASA furnished services, technical expertise, or Government Property to fulfill its obligations under this Agreement, any decision by Boeing to use NASA furnished services, technical expertise, or Government Property shall be at Boeing's discretion. Boeing shall remain solely responsible for completion of its milestones under this Agreement regardless of the availability or use of NASA services, technical expertise, or Government Property.

B. Boeing may enter into separate Space Act agreements with NASA Centers to use NASA resources in performance of this Agreement. The terms and conditions of such other Space Act agreements will govern the use of NASA resources not being provided under this Agreement. Boeing will be responsible for ensuring timely, accurate work of its team, including any NASA Centers, and, if necessary, replacing such subcontractors/partners in order to meet milestones.

ARTICLE 8. NONEXCLUSIVITY

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

ARTICLE 9: PARTICIPANT CERTIFICATIONS

Within 10 calendar days of the effective date of this agreement, and within 10 calendar days of any change in status under A. through D. below (including the addition of any new contractor/partner), Boeing shall certify to the best of its knowledge and belief the following to the NASA Administrative Contact:

A. Neither Boeing nor any of its contractors/partners are presently debarred, suspended, proposed for debarment, or otherwise declared ineligible for award of funding by any Federal agency.

B. Neither Boeing nor any of its contractors/partners have been convicted nor had a civil judgment rendered against it within the last three (3) years for fraud in obtaining, attempting to obtain, or performing a Government contract.

C. Boeing or any of its contractors/partners receiving $100,000 or more in NASA funding for work performed under this Agreement must certify that they have not used any such funds for lobbying purposes prohibited by 31 U.S.C. 1352.

D. Boeing is an eligible participant as defined in Section 4.2 of the CCDev 2 Announcement.

ARTICLE 10. LIABILITY AND RISK OF LOSS

A. Boeing hereby waives any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA's related entities for any injury to, or death of, Boeing employees or the employees of Boeing's related entities, or for damage to, or loss of, Boeing'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.

B. Boeing further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA, its related entities, and

employees of NASA and employees of NASA's related entities for injury, death, damage, or loss arising from or related to activities conducted under this Agreement.

ARTICLE 11. LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS

Boeing or its contractors/partners shall not use any funds provided under this Agreement to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.

ARTICLE 12. INTELLECTUAL PROPERTY AND DATA RIGHTS - RIGHTS IN DATA

A. General

(1) "Related Entity" as used in this Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Boeing that is assigned, tasked, or contracted with to perform specified NASA or Boeing activities under this Agreement.

(2) "Data," as used in this Agreement, means recorded information, regardless of form, the media on which it may be recorded, or the method of recording. The term includes, but is not limited to, data of a scientific or technical nature, software and documentation thereof, and data comprising commercial and financial information.

(3) "Proprietary Data," as used in this Article, means Data embodying trade secrets or comprising commercial or financial information that is privileged or confidential.

(4) The Data rights set forth herein are applicable to employees of Boeing and employees of any Related Entity of Boeing. Boeing shall ensure that its employees and employees of any Related Entity that perform Boeing activities under this Agreement are aware of the obligations under this Article and that all such employees are bound to such obligations.

(5) Data exchanged between NASA and Boeing under this Agreement will be exchanged without restriction as to its disclosure, use, or duplication except as otherwise provided in this Article.

(6) No preexisting Proprietary Data will be exchanged between the Parties under this Agreement unless specifically authorized in this Article or in writing by the owner of the Proprietary Data.

(7) In the event that Data exchanged between NASA and Boeing include a restrictive notice that NASA or Boeing deems to be ambiguous or unauthorized, NASA or Boeing may inform the other Party of such condition. Notwithstanding such a notice, as long as such notice provides an indication that a restriction on use or disclosure was intended, the Party receiving such Data will treat the Data pursuant to the requirements of this clause unless otherwise directed in writing by the party providing such Data.

(8) Notwithstanding any restriction on use, disclosure, or reproduction of Data provided in this clause, the Parties will not be restricted in the use, disclosure, or reproduction of Data provided under this Agreement that: (a) is publicly available at the time of disclosure or thereafter becomes publicly available without breach of this Agreement; (b) is known to, in the possession of, or developed by the receiving Party independent of carrying out the receiving Party's responsibilities under this Agreement and independent of any disclosure of, or without reference to, Proprietary Data or otherwise protectable Data hereunder; (c) is received from a third party having the right to disclose such information without restriction; or (d) is required to be produced or released by the receiving Party pursuant to a court order or other legal requirement.

(9) If either NASA or Boeing believes that any of the events or conditions that remove restriction on the use, disclosure, or reproduction of the Data apply, NASA or Boeing will promptly notify the other Party of such belief prior to acting on such belief, and, in any event, will notify the other Party prior to an unrestricted use, disclosure, or reproduction of such Data.

(10) Disclaimer of Liability: Notwithstanding any restriction on use, disclosure, or reproduction of Data provided in this Article, NASA will not be restricted in, nor incur any liability for, the use, disclosure, or reproduction of any Data not identified with a suitable restrictive notice in accordance with paragraphs B and G of this Article or of any Data included in Data which Boeing has furnished, or is required to furnish to the U.S. Government without restriction on disclosure and use.

(11) Boeing may use the following, or a similar, restrictive notice as required by paragraphs B and G of this Article. In addition to identifying Proprietary Data with such a restrictive notice, Boeing should mark each page containing Proprietary Data with the following, or a similar, legend: "Boeing Proprietary, Confidential and/or Trade Secret – use and disclose only in accordance with notice on title or cover page."

Proprietary Data Notice

Boeing Proprietary, Confidential and/or Trade Secret; Copyright © Boeing; Unpublished Works. All Rights Reserved. See paragraphs 12B and 12G of the Space Act Agreement Dated (effective date) between Boeing and NASA.

B. Data First Produced by Boeing under this Agreement

(1) Data first produced by Boeing in carrying out Boeing's responsibilities under this Agreement, including but not limited to technical data related to inventions made under this Agreement, will be furnished to NASA upon request and such Data will be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) during the term of this Agreement only for evaluating Boeing's performance under this Agreement. If Boeing considers any such Data to be Proprietary Data, and such Data is identified with a suitable restrictive notice, NASA will use reasonable efforts to maintain the Data in confidence.

(2) Upon a successful completion by Boeing of all milestones under this Agreement, NASA shall not assert rights in such Data or use such Data for any purpose except that NASA shall retain the right to: (1) maintain a copy of such Data for archival purposes; and (2) use or

disclose such archived Data by or on behalf of NASA for Government purposes in the event the NASA determines that

(a) Such action is necessary because Boeing, 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, or software related to such Data;

(b) Such action is necessary because Boeing, its assignee, or other successor, having achieved practical application of inventions, hardware, or software related to such Data, has failed to maintain practical application;

(c) Such action is necessary because Boeing, its assignee, or other successor has discontinued making the benefits of inventions, hardware, or software 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 Boeing, 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 Boeing, 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 Boeing Administrative Point of Contact. Upon mailing of such determination, Boeing 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 Boeing does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

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

(4) 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 (or any Related Entity of NASA) in carrying out NASA responsibilities under this Agreement that would be Proprietary Data if it had been obtained from Boeing, such Data will be appropriately marked with a restrictive notice and maintained in confidence for the duration of this Agreement, 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 responsibilities under this Agreement.

(2) Upon a successful completion by Boeing of all milestones under this Agreement, NASA shall not use such Data for any purpose except that NASA shall retain the right to: (1) maintain and reproduce copies of such Data for archival purposes; and (2) use or disclose such archived

Data by or behalf of the NASA for Government purposes in the event the NASA determines that

(a) Such action is necessary because Boeing, 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, or software related to such Data;

(b) Such action is necessary because Boeing, its assignee, or other successor, having achieved practical application of inventions, hardware, or software related to such Data, has failed to maintain practical application;

(c) Such action is necessary because Boeing, its assignee, or other successor has discontinued making the benefits of inventions, hardware, or software 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 Boeing, 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 Boeing, 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 Boeing Administrative Point of Contact. Upon mailing of such determination, Boeing 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 Boeing does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

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

(4) The parties will negotiate rights in Data in the event of termination for any other reason.

D. Publication of Results

(1) Recognizing that section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. § 2473), as amended, requires NASA to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof, and that the dissemination of the results of NASA activities is one of the considerations for this Agreement, NASA will coordinate proposed publication of results with Boeing in a manner that allows Boeing a reasonable amount of time to review and comment on proposed publications.

(2) Consistent with other obligations in this Article, NASA agrees that it will not publish any results without first receiving permission from Boeing.

E. Data Disclosing an Invention

In the event Data exchanged between NASA and Boeing discloses an invention for which patent protection is being considered, the furnishing party specifically identifies such Data, and the disclosure and use of such Data is not otherwise limited or restricted herein, the receiving party agrees to withhold such Data from public disclosure for a reasonable time (presumed to be 1 year unless mutually agreed otherwise) in order for patent protection to be obtained.

F. Data Subject to Export Control

Technical data, whether or not specifically identified or marked, that is subject to the export laws and regulations of the United States and that is provided to Boeing under this Agreement will be treated as such, and will not be further provided to any foreign persons or transmitted outside the United States without proper U.S. Government authorization, where required.

G. Background Data

(1) In the event Boeing furnishes NASA with Data developed at private expense that existed prior to, or was produced outside of, this Agreement, and such Data embody Proprietary Data, and such Data is so identified with a suitable restrictive notice, NASA will use reasonable efforts to maintain the Data in confidence and such Data will be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) only for evaluating Boeing's performance under this Agreement. Upon completion of activities under this Agreement, such Data will be disposed of as requested by Boeing.

(2) At the time of execution of this Agreement, the Parties agree that the Background Data identified in Appendix 3 embodies Proprietary Data that will be provided to NASA.

H. Handling of Data

(1) In the performance of this Agreement, Boeing and any Related Entity of Boeing may have access to, be furnished with, or use the following categories of Data:

(a) Proprietary Data of third parties that the U.S. Government has agreed to handle under protective arrangements; and/or

(b) U.S. Government Data, the use and dissemination of which, the U.S. Government intends to control.

(2) Data provided by the U.S. Government under the Agreement

(a) The Parties agree that, during the term of this Agreement, Boeing may request from NASA, and NASA may provide, Proprietary Data of third parties, with the express understanding that Boeing will use and protect such Data in accordance with this Article.

(b) The Parties agree that, during the term of this Agreement, Boeing may request from NASA, and NASA may provide, U.S. Government Data, with the express understanding that Boeing will use and protect such U.S. Government Data in accordance with this Article.

(c) At the time of execution of this Agreement, the Parties agree that the following software and related Data will be provided to Boeing, to the extent NASA has determined it

has the right to distribute, under a separate Software Usage Agreement with the express understanding that Boeing will use and protect such related Data in accordance with this Article: [REDACTED]
Unless Boeing has entered into a license, consistent with 37 C.F.R. Part 404, for software provided under this Agreement, upon completion of activities under this Agreement, such related Data will be disposed of as instructed by NASA. Note: From time to time during the term of this Agreement, Boeing may request from NASA, and NASA may provide, such software and related data.

(3) With respect to such Data specifically identified in this Agreement or specifically marked with a restrictive notice, Boeing agrees to:

(a) Use, disclose, or reproduce such Data only to the extent necessary to perform the work required 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 that require access for their performance under this Agreement;

(d) Except as otherwise indicated in (3)(c) above, preclude access and disclosure of such Data outside Boeing's organization;

(e) Notify its employees who may require access to such Data about the obligations under this Article, and ensure any Related Entity performs the same functions with respect to its employees; and

(f) Return or dispose of such Data, as NASA may direct, when the Data is no longer needed for performance under this Agreement.

I. Oral and visual information

If information that Boeing considers to be Proprietary Data is disclosed orally or visually to NASA, NASA will have no duty to limit or restrict, and will not incur any liability for, any disclosure or use of such information unless (1) Boeing orally informs NASA before initial disclosure that such information is considered to be Proprietary Data, and (2) Boeing reduces such information to tangible, recorded form that is identified and marked with a suitable restrictive notice as required by paragraphs B and G above and furnishes the resulting Data to NASA within 10 calendar days after such oral or visual disclosure.

ARTICLE 13. INTELLECTUAL PROPERTY AND DATA RIGHTS - INVENTION AND PATENT RIGHTS

A. Definitions

(1) "Administrator," as used in this Article, means the Administrator of the National Aeronautics and Space Administration (NASA) or duly authorized representative.

(2) "Patent Representative" as used in this Article means the NASA Kennedy Space Center Patent Counsel. Correspondence with the Patent Representative under this clause will be sent to the address below:

Patent Counsel
Mail Code CC-A
Office of the Chief Counsel
NASA John F. Kennedy Space Center, FL 32899

(3) "Invention," as used in this Agreement, means any innovation or discovery that is or may be patentable or otherwise protectable under title 35 of the U.S.C.

(4) "Made," as used in relation to any invention, means the conception or first actual reduction to practice of such invention.

(5) "Practical application," as used in this Agreement, means to manufacture, in the case of a composition or product; to practice, in the case of a process or method; or to operate, in case of a machine or system; and, in each case, under such conditions as to establish that the invention, hardware, software, or related Data is being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public or to the Federal Government on reasonable terms.

(6) "Related Entity" as used in this Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Boeing that is assigned, tasked, or contracted with to perform specified NASA or Boeing activities under this Agreement.

B. Allocation of principal rights

(1) Presumption of title

(a) Any invention made under this Agreement shall be presumed to have been made in the manner specified in paragraph (1) or (2) of section 305(a) (42 U.S.C. § 2457(a)) of the National Aeronautics and Space Act of 1958 (hereinafter called "the Act"), and the above presumption shall be conclusive unless at the time of reporting such invention Boeing submits to the Patent Representative a written statement, containing supporting details, demonstrating that the invention was not made in the manner specified in paragraph (1) or (2) of section 305(a) of the Act.

(b) Regardless of whether title to such an invention would otherwise be subject to an advance waiver or is the subject of a petition for waiver as described in paragraph B.(3) and paragraph I, Boeing may nevertheless file the statement described in paragraph B.(1)(a) of this Article. The Administrator (or his designee) will review the information furnished by Boeing in any such statement and any other available information relating to the circumstances

surrounding the making of the invention and will notify Boeing whether the Administrator has determined that the invention was made in the manner specified in paragraph (1) or (2) of section 305(a) of the Act.

(2) Property rights in inventions. Each invention made under this Agreement for which the presumption of paragraph B.(1)(a) of this clause is conclusive or for which there has been a determination that it was made in the manner specified in paragraph (1) or (2) of section 305(a) of the Act shall be the exclusive property of the United States as represented by the Administrator of NASA unless the Administrator waives all or any part of the rights of the United States to Boeing's invention, as provided in paragraph B.(3) of this clause.

(3) Waiver of rights.

(a) The NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, have adopted the Presidential Memorandum on Government Patent Policy of February 18, 1983, as a guide in acting on petitions (requests) for waiver of rights to any invention or class of inventions made or that may be made in the manner specified in paragraph (1) or (2) of Section 305(a) of the Act.

(b) NASA has determined that to stimulate and support the capability of a United States commercial provider to provide commercial crew space transportation services to the public and the Federal Government, the interest of the United States would be served by waiving to Boeing, in accordance with provisions of 14 C.F.R. Part 1245, Subpart 1, rights to inventions made by Boeing in the performance of work under this Agreement. Therefore, upon petition submitted by Boeing, as provided in 14 C.F.R. Part 1245, Subpart 1, either prior to execution of the Agreement or within 30 calendar days after execution of the Agreement, for advance waiver of rights to any or all of the inventions that may be made under this Agreement, NASA will waive such rights to Boeing. If such a petition is not submitted, Boeing may petition for waiver of rights to an identified invention within eight months of first disclosure of invention in accordance with paragraph E.(2) of this clause or within such longer period as may be authorized in accordance with 14 CFR 1245.105. Further procedures are provided in paragraph I of this clause.

C. Minimum rights reserved by the Government

(1) With respect to each Boeing invention made under this Agreement for which a waiver of rights is applicable in accordance with 14 C.F.R. Part 1245, Subpart 1, the Government reserves:

(a) An irrevocable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government in accordance with any treaty or agreement with the United States; and

(b) Such other March-in rights as given in Paragraph H below.

(2) NASA will not exercise the government purpose license reserved in paragraph C.(1)(a) during the term of this Agreement.

(3) Upon a successful completion by Boeing of all milestones under this Agreement, NASA will refrain from exercising the government purpose license reserved in paragraph C.(1)(a) for a period of five (5) years following the expiration of this Agreement or until December 31, 2015, whichever is later.

(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 Boeing

(1) Boeing is hereby granted a revocable, nonexclusive, royalty-free license in each patent application filed in any country on an invention made by Boeing under this Agreement and any resulting patent in which the Government acquires title, unless Boeing fails to disclose such invention within the times specified in paragraph E.(2) of this clause. Boeing's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which Boeing is a party and includes the right to grant sublicenses of the same scope to the extent Boeing was legally obligated to do so at the time the Agreement was awarded. The license is transferable only with the approval of the Administrator except when transferred to the successor of that part of Boeing's business to which the invention pertains.

(2) Boeing's domestic license may be revoked or modified by the Administrator to the extent necessary to achieve expeditious practical application of such invention pursuant to an application for an exclusive license submitted in accordance with 37 C.F.R. Part 404, Licensing of Government Owned Inventions. This license will not be revoked in that field of use or the geographical areas in which Boeing has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the Administrator to the extent Boeing, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, Boeing will be provided a written notice of the Administrator's intention to revoke or modify the license, and Boeing will be allowed 30 calendar days (or such other time as may be authorized by the Administrator for good cause shown by Boeing) after the notice to show cause why the license should not be revoked or modified. Boeing has the right to appeal, in accordance with 14 C.F.R. 1245.112, any decision concerning the revocation or modification of its license.

E. Invention identification, disclosures, and reports

(1) Boeing shall establish and maintain active and effective procedures to assure that inventions made under this Agreement are promptly identified and disclosed to Boeing personnel responsible for the administration of this clause within six months of conception and/or first actual reduction to practice, whichever occurs first in the performance of work under this Agreement. These procedures shall include the maintenance of laboratory notebooks or equivalent records and other records as are reasonably necessary to document the conception and/or the first actual reduction to practice of such inventions, and records that show that the procedures for identifying and disclosing such inventions are followed. Upon request, Boeing shall furnish the Patent Representative a description of such procedures for evaluation and for determination as to their effectiveness.

(2) Boeing will disclose each such invention to the Patent Representative within two months after the inventor discloses it in writing to Boeing personnel responsible for the

administration of this clause or, if earlier, within six months after Boeing becomes aware that such an invention has been made, but in any event before any on sale, public use, or publication of such invention known to Boeing. Boeing shall use the NASA electronic New Technology Reporting system (eNTRe), accessible at http://invention.nasa.gov, to disclose inventions. The invention disclosure shall identify this Agreement and shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale, or public use of any such invention and whether a manuscript describing such invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to NASA, Boeing will promptly notify NASA of the acceptance of any manuscript describing such an invention for publication or of any on sale or public use planned by Boeing for such invention.

(3) Boeing shall furnish the Patent Representative the following:

(a) Interim reports every 12 months (or such longer period as may be specified by the Patent Representative) from the date of the Agreement, listing inventions made under this Agreement during that period, and certifying that all such inventions have been disclosed (or that there are no such inventions) and that the procedures required by paragraph E.(2) of this clause have been followed.

(b) A final report, within three months after completion of the work, listing all inventions made under this Agreement or certifying that there were no such inventions, and listing all subcontracts or other agreements with a Related Entity containing a patent and invention rights clause (as required under paragraph G of this clause) or certifying that there were no such subcontracts or other agreements.

(c) Interim and final reports shall be submitted electronically at the eNTRe Web-site http://invention.nasa.gov.

(4) Boeing agrees, upon written request of the Patent Representative, to furnish additional technical and other information available to Boeing as is necessary for the preparation of a patent application on an invention made under this Agreement in which the Government retains title and for the prosecution of the patent application, and to execute all papers necessary to file patent applications on such inventions and to establish the Government's rights in the inventions.

(5) Protection of reported inventions. When inventions made under this Agreement are reported and disclosed to NASA in accordance with the provisions of this Article, NASA agrees to withhold such reports or disclosures from public access for a reasonable time (presumed to be 1 year unless otherwise mutually agreed) in order to facilitate the allocation and establishment of the invention and patent rights under these provisions.

F. Examination of records relating to inventions

(1) The Patent Representative or designee shall have the right to examine any books (including laboratory notebooks), records, and documents of Boeing 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 such inventions were made in performance of this Agreement;

(b) Boeing has established and maintained the procedures required by paragraph E.(1) of this clause; and

(c) Boeing and its inventors have complied with the procedures.

(2) If the Patent Representative learns of an unreported Boeing invention that the Patent Representative believes may have been made under this Agreement, Boeing may be required to disclose the invention to NASA for a determination of ownership rights.

(3) Any examination of records under this paragraph will be subject to appropriate conditions to protect the confidentiality of the information involved.

G. Subcontracts or Other Agreements

(1)(a) Unless otherwise authorized or directed by the Patent Representative, Boeing shall include this *Invention and Patent Rights* Article (suitably modified to identify the parties) in any subcontract or other agreement with a Related Entity hereunder (regardless of tier) for the performance of experimental, developmental, or research work.

(b) In the *Invention and Patent Rights* Article included in any such subcontract or other agreement, the following (suitably modified to identify the parties) shall be substituted for paragraph B(3)(b):

> As provided in 14 C.F.R. Part 1245, Subpart 1, [insert name of Related Entity] may petition, either prior to execution of the Agreement or within 30 calendar days after execution of the Agreement, for advance waiver of rights to any or all of the inventions that may be made under this Agreement. If such a petition is not submitted, or if after submission it is denied, [insert name of Related Entity] may petition for waiver of rights to an identified invention within eight months of first disclosure of invention in accordance with paragraph E.(2) of this Article or within such longer period as may be authorized in accordance with 14 CFR 1245.105. Further procedures are provided in paragraph H of this Article.

(c) In the case of subcontracts or other agreements at any tier, NASA, the Related Entity, and Boeing agree that the mutual obligations of the parties created by this Article constitute privity of contract between the Related Entity and NASA with respect to those matters covered by this Article.

(2) In the event of a refusal by a prospective Related Entity to accept such a clause, Boeing:

(a) Shall promptly submit a written notice to the Patent Representative setting forth the prospective Related Entity's reasons for such refusal and other pertinent information that may expedite disposition of the matter; and

(b) Shall not proceed with such subcontract or other agreement without the written authorization of the Patent Representative.

(3) Boeing shall promptly notify the Patent Representative in writing upon the award of any subcontract or other agreement with a Related Entity (at any tier) containing an invention and patent rights clause by identifying the Related Entity, the applicable invention and patent rights clause, the work to be performed under the subcontract or other agreement, and the dates of award and estimated completion. Upon request of the Patent Representative, Boeing

shall furnish a copy of such subcontract or other agreement, and, no more frequently than annually, a listing of the subcontracts or other agreements that have been awarded.

(4) In recognition of Boeing's substantial contribution of funds, facilities and/or equipment to the work performed under this Agreement, Boeing is authorized, subject to the rights of NASA set forth elsewhere in this Article, to:

(a) Acquire by negotiation and mutual agreement rights to an invention made under this Agreement by a Related Entity as Boeing may deem necessary to obtaining and maintaining of private support; and

(b) Request, in the event of an inability to reach agreement pursuant to paragraph G.(4)(a) of this Article, that NASA request that such rights for Boeing be included as an additional reservation in a waiver granted pursuant to 14 CFR Part 1245, Subpart 1. Any such requests to NASA should be prepared in consideration of the following guidance and submitted to the Patent Representative. Notwithstanding paragraph B.(3)(b) of this Article, the Related Entity should be advised that unless it requests a waiver of title pursuant to the NASA Patent Waiver Regulations (14 C.F.R. Part 1245, Subpart 1), NASA will acquire title to inventions made under this Agreement. If a waiver is not requested or granted, Boeing may request a license from NASA consistent with the requirements of 37 CFR Part 404. A Related Entity requesting a waiver must follow the procedures set forth in paragraph I of this Article.

H. March-in rights

(1) Boeing agrees that, with respect to any invention made under this Agreement in which it has acquired title, NASA has the right in accordance with the procedures in 37 CFR 401.6 and any supplemental regulations of the agency to require Boeing, or an assignee or exclusive licensee of such an invention, to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if Boeing, its assignee, or exclusive licensee refuses such a request NASA has the right to grant such a license itself if the Federal agency determines that

(a) Such action is necessary because Boeing, assignee, or exclusive licensee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of such invention in such field of use;

(b) Such action is necessary because Boeing, assignee, or exclusive licensee, having achieved practical application of such invention, has failed to maintain practical application of such invention in such field of use;

(c) Such action is necessary because Boeing, assignee, or exclusive licensee has discontinued making the benefits of such invention 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 Boeing, assignee, or exclusive licensee; or

(e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by Boeing, assignee, or exclusive licensee.

I. Requests for Waiver of Rights

(1) In accordance with the NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, waiver of rights to any or all inventions made or that may be made under this Agreement may be requested at different time periods. Advance waiver of rights to any or all such inventions may be requested prior to the execution of the Agreement, or within 30 calendar days after execution thereof. In addition, waiver of rights to an identified invention made and reported under this Agreement may be requested, even though a request for an advance waiver was not previously requested or, if previously requested, was not granted.

(2) Each request for waiver of rights shall be by petition to the Administrator and shall include an identification of the petitioner; place of business and address; if petitioner is represented by counsel, the name, address, and telephone number of the counsel; the signature of the petitioner or authorized representative; and the date of signature. No specific forms need be used, but the request should contain a positive statement that waiver of rights is being requested under the NASA Patent Waiver Regulations; a clear indication of whether the request is for an advance waiver or for a waiver of rights for an individual identified invention; whether foreign rights are also requested and, if so, for which countries, and a citation of the specific section(s) of the regulations under which such rights are requested; and the name, address, and telephone number of the party with whom to communicate when the request is acted upon.

(3) All petitions for waiver, whether advanced or individual petitions, will be submitted to the Patent Representative designated in this Article.

(4) A Petition submitted in advance of this Agreement will be forwarded by the Patent Representative to the Inventions and Contributions Board. The Board will consider the petition and where the Board makes the findings to support the waiver, the Board will recommend to the Administrator that waiver be granted, and will notify the petitioner and the Patent Representative of the Administrator's determination. The Patent Representative will be informed by the Board whenever there is insufficient time or information to permit a decision to be made on an advance waiver without unduly delaying the execution of the Agreement. In the event a request for an advance waiver is not granted or is not decided upon before execution of the Agreement, the petitioner will be so notified by the Patent Representative. All other petitions will be processed by the Patent Representative and forwarded to the Board. The Board shall notify the petitioner of its action and if waiver is granted, the conditions, reservations, and obligations thereof will be included in the Instrument of Waiver. Whenever the Board notifies a petitioner of a recommendation adverse to, or different from, the waiver requested, the petitioner may request reconsideration under procedures set forth in the NASA Patent Waiver Regulations.

ARTICLE 14. DISCLAIMER OF WARRANTY

Goods (e.g., equipment, facilities, technical information, data, and prototypes) and services, if provided by NASA under this Agreement, are provided "as is" and no warranty related to availability, title, or suitability for any particular use, nor any implied warranty of

merchantability or fitness for a particular purpose, is provided under this Agreement. NASA makes no express or implied warranty as to any intellectual property, generated information, or product made or developed under this Agreement, or that the goods, services, materials, products, processes, information, or data to be furnished hereunder will accomplish intended results or are safe for any purpose including the intended purpose. Neither NASA nor its contractors shall be liable for any direct, general, special, consequential, indirect, or incidental damages attributed to such goods, services, materials, products, processes, information, or data furnished under this Agreement.

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or two (2) years from the date of the last signature, whichever comes first.

ARTICLE 16. TERMINATION

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 calendar days after issuance of a written notification that Boeing has failed to perform under this Agreement, including failure to meet a scheduled milestone as identified and described in Appendix 2. Before making such a notification, NASA will consult with Boeing to ascertain the cause of the failure and determine whether additional efforts are in the best interest of the Parties. Upon such a notification and determination, NASA will take all rights identified in Articles 12 and 13 of this Agreement.

(2) Boeing will not be entitled to any additional payments from the Government due to a termination for failure to meet a milestone. NASA and Boeing will negotiate in good faith any other outstanding issues between the Parties. Failure of the Parties to agree will be resolved pursuant to Article 18, Dispute Resolution.

C. Unilateral Termination by NASA

(1) NASA may unilaterally terminate this Agreement upon written notice in the following circumstances: (a) upon a declaration of war by the Congress of the United States; or (b) upon a declaration of a national emergency by the President of the United States; or (c) upon a NASA

determination, in writing, that NASA is required to terminate for reasons beyond its control. For purposes of this Article, reasons beyond NASA's control include, but are not limited to, acts of God or of the public enemy, acts of the U.S. Government other than NASA, in either its sovereign or contractual capacity (to include failure of Congress to appropriate sufficient funding), fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or unusually severe weather.

(2) Upon receipt of written notification that the Government is unilaterally terminating this Agreement, Boeing 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 Boeing wishes to pursue the activities defined in Appendix 2 exclusively using its own funding. Upon such a termination, NASA and Boeing agree to negotiate in good faith a final settlement payment to be made by NASA. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone of this Agreement and any payment is subject to the provisions of Article 5.

D. Limitation on Damages.

In the event of any termination by NASA, neither NASA nor Boeing shall be liable for any loss of profits, revenue, or any indirect or consequential damages incurred by the other Party, its contractors, subcontractors, or customers as a result of any termination of this Agreement. A Party's liability for any damages under this Agreement is limited solely to direct damages, incurred by the other Party, as a result of any termination of this Agreement subject to mitigation of such damages by the complaining party. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone under this Agreement.

E. Rights in Property.

Boeing will have title to property acquired or developed by Boeing and its contractors/partners with funding provided under this Agreement, in whole or in part to conduct the activities defined in Appendix 2. In the event of termination of this Agreement for Failure to Perform, NASA may purchase such property as provided in Article 26 below.

ARTICLE 17. CONTINUING OBLIGATIONS

The obligations of the Parties set forth in the provisions of Article 10 (Liability and Risk of Loss) and Articles 12-13 (Intellectual Property and Data Rights) of this Agreement, and such other rights and obligations which by their terms continue past the expiration or termination of this Agreement, shall so continue to apply.

ARTICLE 18. DISPUTE RESOLUTION

All disputes concerning questions of fact or law arising under this Agreement shall be referred by the claimant in writing to the Boeing Administrative Contact and the NASA Administrative Contact, who shall seek to resolve such disputes by mutual agreement. If they are unable to resolve the dispute, then the dispute will be referred to the KSC Commercial Crew Development Program Manager and the CCDev 2 Program Manager, Boeing Defense, Space & Security, Network and Space Systems, Space Exploration for joint resolution. If the Parties are still unable to resolve the dispute, the Associate Administrator for Exploration Systems Mission Directorate, or the Deputy of the Directorate, will seek to resolve the dispute, and if necessary issue a written decision that shall be a final Agency decision for all purposes including judicial review.

Pending resolution of any disputes pursuant to this Article, the Parties agree that performance of all obligations shall be pursued diligently in accordance with the direction of the KSC Commercial Crew Development Program Manager.

The Parties agree that this Disputes Resolution procedure shall be the exclusive procedure followed by the Parties in resolving any dispute arising under, or based on, an express or implied provision of this Agreement, including an alleged breach.

ARTICLE 19. PRINCIPAL POINTS OF CONTACT

The following personnel are designated as the Administrative and Technical Contacts between the Parties in the performance of this Agreement.

NASA Administrative Contact

David Shreve
Agreements Officer
John F. Kennedy Space Center
Mail Code: OP
NASA Kennedy Space Center, FL 32899

Phone: 321-867-3456
Fax: 321-867-1166
E-mail: david.shreve@nasa.gov

Boeing Administrative Contact

Debora D. Davis
Contracts Administrator
The Boeing Company
13100 Space Center Blvd. (M/C HB6-10)
Houston, TX 77059-3556

Phone: 281-226-5583
Fax: 281-226-6584
E-mail: debora.d.davis@boeing.com

NASA Technical Contact

Scott B. Thurston
Commercial Crew
John F. Kennedy Space Center
Mail Code: FA
NASA Kennedy Space Center, FL 32899

Phone: 321-861-9102
Fax: 321-867-9344
E-mail: scott.b.thurston@nasa.gov

Boeing Technical Contact

Keith Reiley
Deputy Program Manager for Development
The Boeing Company
13100 Space Center Blvd. (M/C HB4-11)
Houston, TX 77059-3556

Phone: 281-226-6463
Fax: 281-226-6584
E-mail: keith.a.reiley@boeing.com

ARTICLE 20. MODIFICATION/AMENDMENTS

All modifications and amendments to this Agreement shall be by mutual agreement of the Parties and shall be executed, in writing, and signed by the signatories to this Agreement, or their respective successor or designee.

ARTICLE 21. ASSIGNMENT OF RIGHTS

Neither this Agreement nor any interest arising under it will be assigned by either Party without the express written consent of the other Party.

ARTICLE 22. ANTI-DEFICIENCY ACT

All activities under or pursuant to this Agreement are subject to the availability of appropriated funds, and no provision shall be interpreted to require obligation or provision of funds in violation of the Anti-Deficiency Act, 31 U.S.C. 1341.

ARTICLE 23. APPLICABLE LAW AND SEVERABILITY

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

B. If any portion of this Agreement is held invalid by a court of competent jurisdiction, the Parties agree that such invalidity shall not affect the validity of the remaining portions of this Agreement, unless applying such remaining portions would frustrate the purpose of this Agreement.

ARTICLE 24. EXPORT LICENSES

Boeing will be responsible for:

A. Compliance with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this Agreement. In the absence of available license exemptions/exceptions, Boeing will 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.

B. Obtaining export licenses, if required, before utilizing foreign persons in the performance of this Agreement, including instances where CCDev 2 efforts are to be performed on-site at NASA Centers, where the foreign person will have access to export-controlled technical data or software.

C. All regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

D. Ensuring that the provisions of this Article apply to its contractors/partners.

In the event that either Party intends to utilize a foreign person (as defined in the ITAR and the EAR) in the performance of this Agreement, such Party shall be responsible for obtaining the required export licenses in advance of the foreign person's participation.

ARTICLE 25. LIMITATIONS ON ACTIVITIES WITH RUSSIAN ENTITIES FOR GOODS OR SERVICES

A. Boeing shall not provide funding received under this Agreement in connection with any transaction to purchase goods or services with Russian entities without first receiving written approval from the NASA Administrative Contact. In order to obtain this written approval to engage in such transactions with any Russian entity, Boeing shall provide the NASA Administrative Contact with the following information related to each planned transaction:

(1) A detailed description of the Russian entity, including its name, address, and a point of contact, as well as a detailed description of the proposed transaction including the specific purpose of payments that will made under the transaction.

(2) Boeing shall provide certification that the Russian entity is not on any of the denied parties, specially designated nationals and entities of concern, lists found at:

BIS's Listing of Entities of Concern: http://www.access.gpo.gov/bis/ear/pdf/744spir.pdf

BIS's List of Denied Parties: http://www.bis.doc.gov/dpl/default.shtm

OFAC's List of Specially Designated Nationals:
http://www.ustreas.gov/offices/enforcement/ofac/sdn/

List of Unverified Persons in Foreign Countries:
http://www.bis.doc.gov/enforcement/unverifiedlist/unverified_parties.html

State Department's List of Parties Statutorily Debarred for Arm Export Control Act Convictions: http://www.pmddtc.state.gov/compliance/debar.html

State Department's List of Proliferating Entities:
http://www.state.gov/t/isn/c15231.htm

B. Unless otherwise agreed by the NASA Administrative Contact, the information necessary to seek approval to enter into any transaction shall be provided to the NASA Administrative Contact 30 calendar days prior to entering into such transaction with any Russian entities.

C. After receiving approval to enter into a requested transaction, Boeing shall provide the NASA Administrative Contact with a report not later than 10 calendar days after the end of each calendar quarter which documents the individual payments made to such Russian entity.

D. For the purpose of this Article 25, the term "Russian entities" includes the following:

(1) Russian persons, or

(2) Entities created under Russian law (including any organization, entity, or element of the Government of the Russian Federation) or owned, in whole or in part, by Russian persons or companies.

ARTICLE 26. TITLE AND RIGHTS IN PROPERTY

Boeing will have title to tangible personal property acquired or developed under this Agreement, including developed or acquired by Boeing for CCDev 2 efforts. In the event of termination of this Agreement for Failure to Perform under Article 16.B, NASA will have the right to purchase any such property. The Parties will negotiate in good faith purchase prices for specific items of property.

ARTICLE 27. OPTIONAL MILESTONE AUTHORIZATION

Milestones listed in Appendix 2(a), Performance Milestones and Success Criteria, form the initial negotiated and awarded effort under this Agreement. Milestones in Appendix 2(b) are optional Performance Milestones related to Boeing's crew transportation development effort. These optional milestones include notional funding amounts and create no obligation for either party to perform unless specific separate investment and authorization is provided by the Government. If, during the period of performance of this SAA, the Government wishes to add any of the identified optional Performance Milestones, NASA will provide written notification of this intention to Boeing. This notification will be provided by the Associate Administrator for Exploration Systems or his designee. The parties will negotiate in good faith a milestone funding amount based on overall scope of work and schedule for those milestones in Appendix 2(b). Final awarded milestone amounts will be based on and are subject to the availability of funds.

ARTICLE 28. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

BY: Philip R. McAlister

Phillip McAlister,
Special Assistant to the Associate Administrator
for Exploration Systems

DATE: 4/18/2011

THE BOEING COMPANY

BY: Debora D. Davis

Debora D. Davis
Contracts Administrator

DATE: 3/30/11

APPENDIX 1a:
1.0 EXECUTIVE SUMMARY [Redacted]

The NASA CCDev investment in commercial crew transportation yielded significant returns, as Boeing achieved System Definition Review (SDR) maturity and worked with NASA in a commercial relationship to verify our Boeing Commercial Crew Transportation System (CCTS) meets NASA needs and ensures crew and system safety.

The accelerated capability development plan we propose for CCDev Round 2 (CCDev2) offers NASA the opportunity to reduce the gap and stay on track for crew transportation capability in 2015. Our plan for system development and risk reduction demonstrations continues the program we started in CCDev to System Preliminary Design Review (PDR) and provides options for system maturation beyond PDR and to 80% of Critical Design Review (CDR).

Boeing offers meaningful "skin in the game" – with financial investment, participation in a "fixed price" environment, commitment of significant human capital, and established relationships with strong suppliers. Boeing history with NASA on every human space flight program and our experience in bringing commercial flight systems to market provide a unique experience base and corporate capability to service NASA crew transportation requirements.

The Boeing CCTS is a "full-service" system offering NASA and commercial customers safe, reliable, and affordable crew transportation to low earth orbit (LEO) destinations. Our proposed plan accelerates availability of a U.S. capability, achieving a first crewed flight in 2015, and it stimulates growth of space commerce in LEO (Figure 1.0-1). CCDev2 is the next integral step in our plan. We perform development tasks across all segments of the service, as well as subsystem- and CCTS-level PDRs, and provide options for maturing the system to 80% of CDR during the CCDev2 period of performance.

Features	Benefits
Safe	• Proven safety approaches applied with commercial aviation and human space experience • Effective working relationships with NASA ensure NASA know-how is part of our system design • Simple flight-proven systems provide safety with low development risk and low recurring cost
Reliable	• Repeatable, sustainable mission success using proven engineering standards and processes • Simple flight-proven systems; Lower complexity that results in higher reliability
Affordable	• Fixed investment for development results in NASA price certainty • Reduced per seat services price to NASA as additional customers participate • Reduced cost to LEO frees resources for deep space exploration
Timely	• Deep bench to apply resources as needed to enable success; Robust plan for capability development in 2015 • Very high confidence, based on results achieved on CCDev, in capability maturation to help reduce the gap

Figure 1.0-1. Our CCTS provides key benefits to NASA.

Safety is fundamental to our CCDev2 approach; to our range of human-rated commercial, civil, and defense systems; and to Boeing business success. Millions of passengers trust their lives daily to Boeing human transportation platforms (Figure 1.0-2). With expertise and lessons learned in the Boeing commercial and NASA human space flight arenas and experience with the Federal Aviation Administration (FAA), Boeing is uniquely qualified to make safe commercial space transportation a reality. NASA embedded insight and focused oversight enable us to tap NASA expertise in a commercial development model.

We apply lessons learned from past development programs and transition them into guiding principles that reduce program risk. These principles include requirements maturity at program start; simple, flight-proven designs using mature technology; established standards and processes; disciplined change management; leadership experience; tapping Boeing resource depth early to mitigate risk; a well-defined baseline; rigorous supplier oversight; an established experienced team; and existing infrastructure. Our relationship with Bigelow Aerospace (BA) infuses innovation, and is an important stepping stone to establishing a robust commercial space industry.

Figure 1.1-1. Our CCTS comprises a turnkey commercial solution for LEO transportation.

1.1 Technical Approach

Turnkey System Solution. Our CCTS comprises the CST-100 spacecraft, launch services, and ground systems – all integrated in our operations concept. Our system provides a complete end-to-end capability to support NASA crew transportation to International Space Station (ISS) and delivery/return of ISS cargo (Figure 1.1-1).

System Performance. The CST-100 spacecraft is configurable to carry up to 7 crew/passengers or an equivalent combination of passengers and pressurized cargo to LEO destinations, including ISS and the BA Sundancer space complex. It is compatible with multiple launch vehicles. Following nominal land landings, the capsule can be reused for up to ten missions.

CCDev2 System Maturation and Milestones. During CCDev we matured our system requirements and design through SDR and performed demonstrations focused on reducing risks in key technologies. We plan a similar

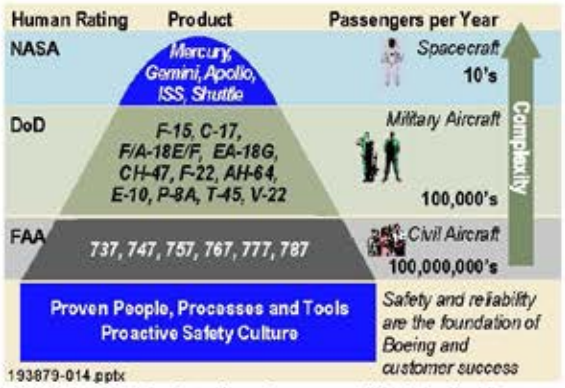

Figure 1.0-2. Boeing human flight platforms have proven safe for millions of passengers.

approach for CCDev2. We build on a strong record of CCDev success with options to further mature our design beyond PDR level and to 80% of CDR level. This includes design products, development testing, safety analysis, and program management activities required to properly execute a development program. In addition, we have highlighted significant development tests as special demonstrations with payment milestones, giving NASA additional visibility into our progress (Figure 1.1-2). The referenced figure represents our plan as initially proposed; work activities and related milestones will be finalized during due diligence discussions with NASA.

Our CCDev2 milestones provide early opportunity to confirm we are consistent with NASA requirements and to understand and address open requirements as we proceed with design. Conducting an early delta SDR and CCDev2 safety review helps ensure our integrated safety efforts result in a safe system that meets NASA requirements and the stringent requirements used for Boeing commercial flight systems. Regular safety reviews support our efforts to achieve human rating certification of our design.

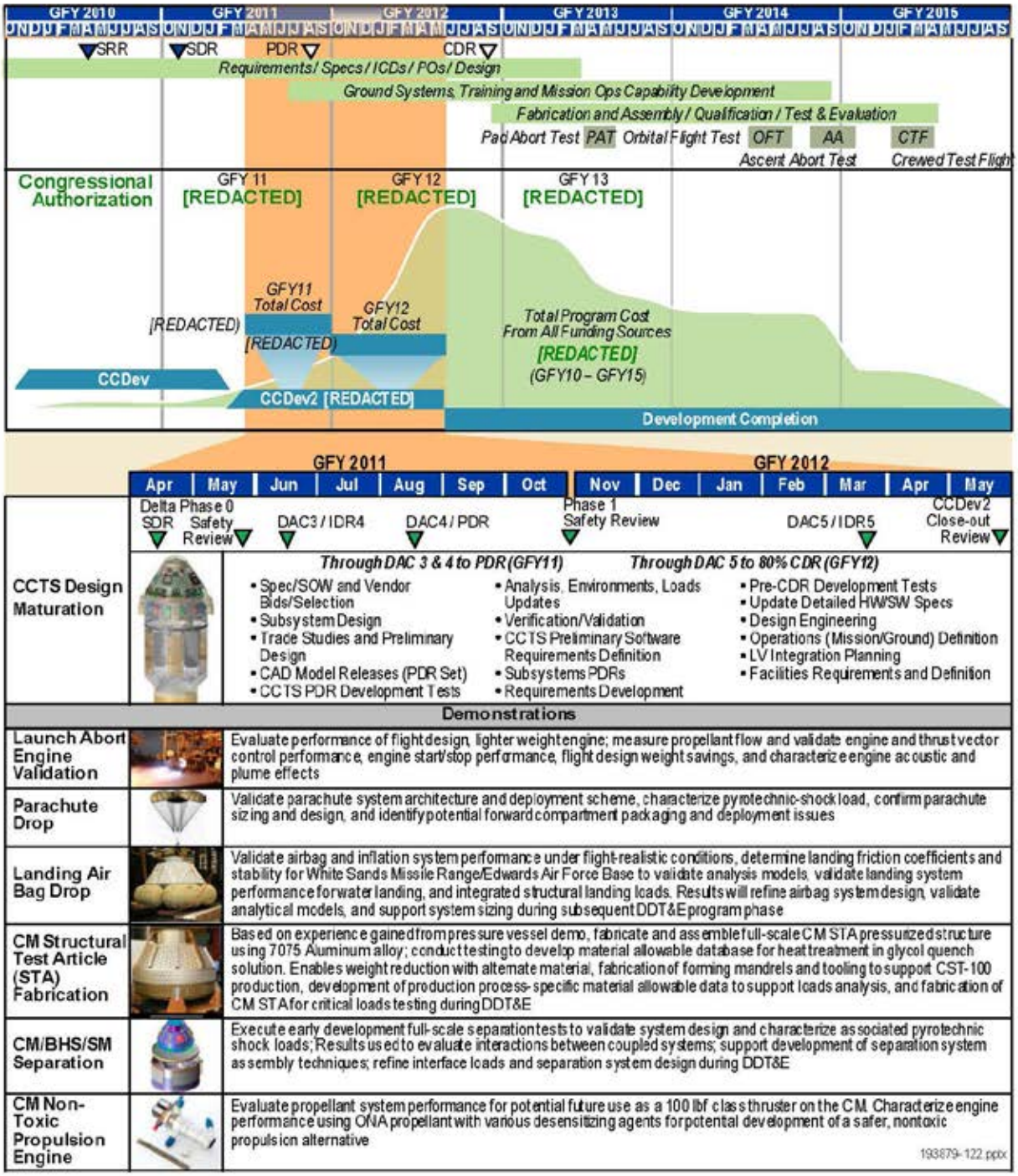

Figure 1.1-2. Our CCDev2 milestones are part of our accelerated CCTS plan that provides NASA with crew transportation to LEO in 2015.

Prior CCDev Results. NASA/Boeing/Bigelow investment in CCDev enabled significant progress in maturing our CST-100 design and operations concept (Figure 1.1-3). Key advances were made to achieve SDR-level maturity during CCDev, providing NASA very high confidence that CCDev2 results will enable further system maturation and resolution of design challenges.

CCDev Demos	Accomplishments/Risks Retired	CCDev Demos	Accomplishments/Risks Retired
 Pressure Vessel Fab & Test Demonstration	• Designed and fabricated weld-less Crew Module (CM) pressure vessel and seals, confirming performance to design expectations • Executed cyclic pneumatic pressurization and limited loads testing with linear strains and no permanent distortion • Performed mass spectrometer helium leak testing of girth and tunnel seals at inner & outer surfaces of seal joints	 Landing System Demonstration	• Capsule boilerplate outfitted with landing airbags in a variety of configurations verified performance of landing system during both land and water landings • Water post-landing stability and up-righting capability demonstrated with inverted boilerplate capsule from Stable II position for nominal 3-bag and 1-bag out configurations
 Base Heat Shield Fabrication Demo	• Fabricated near full-scale heat shield, including carrier structure filled with monolithic honeycomb reinforced Boeing Lightweight Ablator (BLA) • Observed significant cracking in BLA/honeycomb system after machining, which was not experienced with smaller size applications • Identified BLA material shrinkage issues leading to development of new application approach to mitigate BLA installation and curing issues	 Life Support Demonstration	• Bigelow-fabricated LiOH and desiccant canisters integrated and performance tested in a closed-loop environment • System pressure drops and heat of adsorption/reaction measured, comparing well to analytical predictions • Two and seven-person 12-hour human-in-the-loop stress-wake-sleep cycles verified peak performance predictions and design scalability
 Avionics System Integration Facility Demonstration	• Employed a physical mockup of the CM with simulated window views and crew displays to identify human factors and ergonomics issues • Vehicle dynamics demonstrated by Orbital Express-derived Guidance, Navigation, and Control (GN&C) prototype flight software interfacing with simulated sensors and effectors in a distributed simulation • Demonstrated automated approach trajectory from altitude of 180 km to the instant before contact with ISS	 Autonomous Rendezvous & Docking (AR&D) Integrated GN&C Demonstration	• Updated VisSTAR feature algorithms demonstrated detection of desired target artifacts • Integrated Vision-based Electro-optical Sensor Tracking Assembly (VESTA) sensor math model in Avionics System Integration Facility (ASIF), proving Vision Computer Software Configuration Item (CSCI) to GN&C CSCI interface compatibility • Completed ASIF/VESTA Environment, Network and Utilities for Simulation (VENUS) facility integration simulating ISS approach trajectories with motion control eqpt. & scaled visualization
 Abort System Engine Demonstration	• Pratt & Whitney Rocketdyne (PWR) preparing Bantam engines for test stand fit checks and hot fire testing with Nitrogen Tetroxide (NTO)/Mono-methyl Hydrazine (MMH) propellants • Investigated weight reduction candidates for BANTAM engine while assessing line routing and sizing to ensure uniform start up of all 4 engines within 85 ms goal	 CM Mock-up Demonstration	• Bigelow full-scale CM mockup outfitted with representative crew displays and controls, lighting, crew seats, windows, lockers, and cargo containers for human factors assessments conducted with NASA Crew Office representatives • Assessment areas included ingress and egress, cargo integration, reach, view, and general crew operations

Figure 1.1-3. CCDev demonstration results support very high confidence in our CCDev2 plan.

A. 1.2 Business Information

Business Plan. The burgeoning commercial space transportation market depends on investment velocity to support capability development in a time frame to reduce the gap and establish commercial crew as the logical choice for NASA LEO access. Our business plan relies on NASA investment in addition to our own, augmented with significant Boeing human space flight experience and corporate marketing strength.

Our accelerated system maturation plan achieves operational readiness in 2015. As described in our CCT RFI response, the total program cost is in a range of [REDACTED]. The portion of the work plan that we initially proposed to accomplish during the CCDev2 period of performance has an estimated cost of [REDACTED] and [REDACTED] in GFY2012). We have updated our proposed set of CCDev2 basic milestones that will enable us to achieve Systems PDR while remaining aligned with the available NASA funding stated in the CCDev2 Announcement. We have updated our milestones as a result of discussions. We are hopeful NASA will include remaining milestones as a bi-lateral option to take advantage of additional

GFY2011 appropriations and GFY2012 appropriations should they become available in order to maintain progress toward 2015 operational readiness.

Assuming we are awarded a SAA, we will evaluate the agreed to set of milestones and the likelihood of additional funding and make a determination as to the appropriate execution velocity to maximize effectiveness and efficiency. This approach allows NASA to invest in increasing the velocity of commercial development and maintain an option to reduce the gap using CCTS within currently available funding. We believe this will become increasingly important once the Shuttle missions are complete, if commercial crew transportation is to remain a viable program.

Public Advocacy. We will continue public advocacy supporting NASA commercial space transportation objectives, as we believe our efforts have been and continue to be important in maintaining national momentum toward these important objectives. As the Shuttle program is completed and national attention focuses on reducing the gap for U.S.-provided transportation to ISS, we see strong benefit to our aggressive CCDev2 schedule and proposed funding profile. We believe dedicated commitment to commercial transportation as NASA's preferred transportation mode to ISS lays groundwork for additional Government and industry resourcing of this initiative in following years. NASA commitment will be a key enabler for initiation of the commercial space transportation market, enhancing NASA success and spawning a new industry.

Marketing and Sales. Our marketing and sales plan focuses on market growth beyond NASA and combines the brand recognition, marketing expertise, and established international relationships of Boeing with the entrepreneurial passion and contacts of BA and Space Adventures (SA), the organization that has brokered all flights of private space flight participants to date. The marketing team is led by Boeing Space Exploration (SE) division vice president for Business Development, [REDACTED], who brings a background in marketing commercial launch vehicles and has access to marketing expertise and Boeing offices worldwide. Joined by [REDACTED] of BA and [REDACTED] of SA, [REDACTED] leads efforts for market development.

Program Management. The Boeing CCDev2 program manager (PM), [REDACTED], provides overall leadership for CCDev2 as he leads all aspects of commercial crew capability development, marketing, and services planning and management. The CCDev deputy PM for development, [REDACTED], builds upon the significant results achieved on CCDev to continue system design maturation. [REDACTED] and [REDACTED], along with key leaders [REDACTED], [REDACTED], and [REDACTED], will manage the program to enable technical decision velocity and ensure accelerated development of a safe, reliable, affordable, and timely transportation capability. Our program management team also includes [REDACTED], who leads Safety, Quality, and Mission Assurance in an independent reporting structure to ensure a healthy tension with the program so that safety concerns are always heard above the sometimes competing demands of project cost and schedule performance.

Partners/Suppliers. Since we announced our intention to fully engage in commercial crew transportation, there has been significant interest in our approach. We added teammates and investors including BA and Pratt & Whitney Rocketdyne (PWR), as well as Airborne Systems, ILC Dover, Spincraft, XCOR Aerospace, and United Space Alliance (USA), and ARES Corporation. We have signed agreements with BA, SA, and [REDACTED] to increase market growth. Engaging additional customers augments NASA investment and reduces per-seat pricing

for services, e.g. when SA engages customers for excess seating capacity on an ISS mission, this increases the total payment Boeing receives for the mission and we return a portion of the increased total payment as a per-seat price break to NASA. Emphasizing market growth ensures NASA early investment pays off and a sustainable enterprise emerges to provide a reliable low-cost CTS.

Conclusion. Boeing meets eligibility requirements defined in Announcement paragraph 4.2. The NASA Commercial CTS enables NASA to partner with industry to reduce the crew transportation capability gap. Boeing experience on NASA human space programs from Project Mercury to ISS, and our willingness to participate in the SAA procurement environment, qualifies us as a low-risk effective NASA partner ready to satisfy near-term ISS transportation needs in 2015 and able to achieve the vision we share for a robust space economy in LEO.

APPENDIX 2a: Performance Milestones and Success Criteria
[REDACTED]

The values reflected in milestones 1-11 represent milestone values consistent with Boeing's Program Plan work scope through Systems PDR.

Milestone 1: NASA Kick-off Description of milestone: Boeing shall conduct a review with NASA to define the Point of Departure baseline for execution of CCDev2 to support subsequent system design activities, development tests and demonstrations. Success Criteria: Completion of CCDev-2 kick-off meeting to review Boeing CCTS Concept of Operations (CONOps), Vehicle point of departure configuration and CCDev-2 plan in accordance with Table A. Provide copy of kick-off review presentations and CCDev-1 milestone design review materials (SRR and SDR).	AMOUNT: $10M Date: April/2011
Milestone 2: Delta SDR Complete Description of milestone: Boeing shall prepare and conduct a delta-Systems Definition Review (SDR) to evaluate system and segment requirements and CONOPS documents along with CCTS architecture compared to proposed NASA requirements published since the CCDev SDR. Boeing shall identify disconnects between the Boeing design and NASA human-rating requirements and associated resolutions. Success Criteria: Completion of delta-SDR, in accordance with Table B. Provide copy of delta-SDR data products, identification of issues with draft NASA requirements (CTS-REQ-1130, CTS-STD-1140, and ESMD-CCTSCR-12.10). Review Item Dispositions (RID)/Actions shall be recorded [REDACTED] Action plans shall be provided [REDACTED]	AMOUNT: $10M Date: May/2011
Milestone 3: Phase 0 Safety Review Complete* Description of milestone: Boeing shall prepare and conduct a Phase 0 Safety Review of the CCTS SDR level requirements, vehicle architecture, and associated safety products to assess conformance with NASA human-rating process (SDR-level products). Success Criteria: Completion of phase 0 Safety review with single responsible NASA Safety Review Panel (SRP) in accordance with table C. Provide NASA with a copy of the SRP products and resulting actions from the review.	AMOUNT: $15M Date: June/2011

Milestone 4: Launch Abort Engine (LAE) Fabrication & Hot Fire Test Demonstration Description of milestone: Boeing shall design, fabricate and hot fire test a LAE. The goal is to demonstrate design changes to the engine [REDACTED] Success Criteria: Completion of LAE engine fabrication and performance of hot fire tests in accordance with Table D. Provide NASA with a copy of the test project plan and a quick look summary test briefing to document results.	AMOUNT: $10M Date: March/2012
Milestone 5: Landing Air Bag Drop Demonstration #1 Description of milestone: Boeing shall perform drop tests [REDACTED], demonstrating landing performance at various horizontal velocities onto a representative landing surface. Success Criteria: Completion of landing air bag drop test demonstration #1 in accordance with Table D. Provide NASA with a copy of the test project plan and a quick look summary test briefing to document results.	AMOUNT: $7.5M Date: August/2011
Milestone 6: Phase I Wind Tunnel Tests Description of milestone: Boeing shall [REDACTED] perform ascent wind tunnel tests [REDACTED] on integrated CM/Service Module (SM)/Launch Vehicle (LV) stack for ascent. Success Criteria: Completion of phase I wind tunnel tests in accordance with Table D. Provide NASA with a copy of the Boeing approved test project plan and a quick look summary test briefing to document results.	AMOUNT: $5.0M Date: December/2011
Milestone 7: Interim Design Review (IDR) – 4 Description of milestone: Boeing shall conduct IDR-4 [REDACTED] Success Criteria: Conduct IDR-4 [REDACTED] in accordance with Table E. Provide a copy of IDR-4 data products to NASA..	AMOUNT: $10M Date: October/2011
Milestone 8: Parachute Drop Tests Demonstration Description of milestone: Boeing shall [REDACTED] perform drop [REDACTED] development test of parachute deployment and CM deceleration. Success Criteria: Completion of parachute drop tests in accordance with Table D. Provide NASA with a copy of the Boeing approved test project plan and a quick look summary test briefing to document test results.	AMOUNT: $4.8M Date: April/2012

Milestone 9: SM Propellant Tank Development Test Description of milestone: Boeing shall [REDACTED] perform [REDACTED] testing of a [REDACTED] propellant tank. Success Criteria: Completion of SM propellant tank [REDACTED] tests in accordance with Table D. Provide NASA with a copy of the test project plan and a quick look summary test briefing to document results.	AMOUNT: $2.5M Date: March/2012
Milestone 10: LV EDS/ASIF Interface Simulation Test Description of milestone: Boeing shall perform tests simulating spacecraft responses to a LV initiated aborts in the CST-100 Avionics System Integration Facility (ASIF) for a variety of failure conditions. Success Criteria: Completion of LV EDS/ASIF Interface Simulation tests in accordance with Table D. Provide NASA with a copy of the test project plan and a quick look summary test briefing to document results.	AMOUNT: $15.0M Date: February/2012
Milestone 11: Preliminary Design Review (PDR) Complete * Description of milestone: Boeing shall conduct a PDR to evaluate the data package materials submitted against the established program requirements. Success Criteria: Completion of PDR in accordance with Table F. Provide NASA a copy of PDR review materials, final board presentation, closed RID summary, and open RIDs with preliminary closure plans for major issues.	AMOUNT: $2.5M Date: April/2012

**NASA concurrence per Article 3.B.(3)*

APPENDIX 2b: Optional Performance Milestones
[REDACTED]

Milestones 12-25 remain as options that could be authorized in accordance with Article 27. These values represent the cost of that activity (scope values). When NASA authorizes the level of investment, these tasks will be converted into milestones consistent with the Boeing Program Plan, NASA and Boeing's investment level, and associated cash flow requirements.

Milestone 12[REDACTED]	Amount: [REDACTED] Date:
Milestone 13[REDACTED]	Amount: [REDACTED] Date:
Milestone 14[REDACTED]	Amount: [REDACTED] Date:
Milestone 15: [REDACTED]	Amount: [REDACTED] Date:
Milestone 16: [REDACTED]	Amount: [REDACTED] Date:
Milestone 17[REDACTED]	Amount: [REDACTED] Date:
Milestone 18[REDACTED]	Amount: [REDACTED] Date:
Milestone 19[REDACTED]	Amount: [REDACTED] Date:
Milestone 20: [REDACTED]	Amount: [REDACTED] Date:

Milestone 21: [REDACTED]	Amount: [REDACTED] Date:
Milestone 22: [REDACTED]	Amount: [REDACTED] Date:
Milestone 23[REDACTED]	Amount: [REDACTED] Date:
Milestone 24[REDACTED]	Amount: [REDACTED] Date:
Milestone 25: [REDACTED]	Amount: [REDACTED] Date:

[REDACTED]

APPENDIX 2c: Entrance and Exit Criteria

[REDACTED]

Table A: NASA Kick-off Entrance & Exit Criteria

NASA Kick-off Briefing	
Entrance Criteria	**Exit Criteria**
1. Preliminary review agenda approved by the Boeing project management. 2. Provide electronic copies of CCTS baseline documentation from CCDev-1 [REDACTED]	1. Conduct CCDev2 Kick-off meeting with NASA participants. 2. Present overview of Boeing CCDev2 organization and summary of overall CCDev2 Program plan. 3. Present CCTS Concept of Operations summary. 4. Present CCTS point-of-departure for flight vehicle and ground systems. 5. Provide a copy of any actions taken during the meeting.

Table B: Delta SDR Entrance and Exit Criteria

Delta SDR Complete	
Entrance Criteria	**Exit Criteria**
1. A preliminary Delta SDR agenda and objectives have been agreed to by the Boeing project manager, and review chair prior to the review. 2. The following technical products are available to the cognizant participants prior to the review: a. CCTS CONOPS document b. CCTS Systems Requirements document c. CCTS Ground Segment Requirements document d. CCTS Launch Vehicle Requirements document e. CCTS Spacecraft Segment Requirements document f. CTS-REQ-1130 requirements trace to CCTS requirements g. CTS-STD-1140 requirements trace to CCTS requirements h. CTSSCR requirements trace to CCTS requirements i. System Architecture summary j. CCDev-1 SDR data package	1. Technical requirements are allocated and flowed down to segments and subsystems 2. The requirements process can reasonably be expected to continue to identify and flow detailed requirements in a manner timely for development 3. CONOPS is consistent with the proposed design concept(s) 4. RIDs have been recorded, with RIDs reviewed and dispositioned by the SDR Review Board 5. Actions identifying requirement disconnects where contractor is proposing an alternative requirement to existing or draft NASA requirements shall be recorded with assigned actionees and preliminary action plans 6. Resources other than budget are adequate and available.

Table C: Phase 0 Safety Review Entrance & Exit Criteria

Phase 0 Safety Review	
Entrance Criteria	**Exit Criteria**
1. A preliminary Phase 0 Safety Review agenda and objectives have been agreed to by the Boeing project manager, and review chair prior to the Phase 0 Safety Review 2. The following technical products are available to the cognizant participants prior to the review: a. System Safety Plan; b. Preliminary Hazard Titles & Causes c. Fault Tree d. Preliminary system safety analysis; and e. Other SDR items available for review, as required.	1. Project uses an integrated design and safety analysis process to identify and mitigate potential catastrophic hazards, and a plan has been defined to complete the safety analysis activity within the schedule constraints 2. Preliminary approaches have been determined for how hazard analysis will be conducted and documented 3. Phased safety reviews are integrated with the design review process 4. The safety analysis process can reasonably be expected to continue to identify and mitigate hazards [REDACTED] 5. System safety plans have been updated, as necessary. 6. Significant safety risks are identified and technically assessed, and a risk process and resources exist to manage the risks.

Table D: CCDev-2 Demonstration and Test Milestone Entrance and Exit Criteria

CCDev-2 Test Milestones	
Entrance Criteria	**Exit Criteria**
1. A Test Project plan has been developed and approved by Boeing CCDev Program Management 2. Completion of a Test Readiness Review (TRR) a. Closure or disposition as non-constraint to test of open TRR actions	1. Completion of test per approved Test project plan. 2. Preparation of a quick-look summary test briefing to document test results

Table E: IDR-4 Entrance and Exit Criteria

IDR-4	
Entrance Criteria	**Exit Criteria**
1. Preliminary review agenda approved by the Boeing project management. 2. The following technical products will be provided for the review: a. [REDACTED]Point-of-Departure summary b. [REDACTED]analysis results summary c. Results of performed trade studies and recommended updates to the vehicle baseline d. Recommended trades studies [REDACTED] e. Summary of new Risks, Issues and Opportunities [REDACTED] f. Updates to [REDACTED]execution plan	1. Conduct IDR-4 [REDACTED] 2. The design is expected to meet requirements or plans have been initiated to develop alternatives that will meet requirements. 3. Actions from the review have been recorded and assigned to a responsible team. a. Provide a copy of any actions taken during the meeting.

Table F: System Preliminary Design Review Entrance and Exit Criteria

Preliminary Design Review	
Entrance Criteria	**Exit Criteria**
1. A preliminary PDR agenda, and charge to the board have been agreed to by Boeing project management, and review chair prior to the PDR 2. Successful completion of the SDR and responses made to all SDR RIDs, or a timely closure plan exists for those remaining open. 3. The following PDR products are available to the cognizant participants prior to the review: a. Updated baseline documents, as required. b. Preliminary module requirements and draft major component hardware specifications c. Draft Common Parts Plan d. Draft Contamination Control Plan e. Draft Manufacturing and assembly plan f. Draft Flight Crew Training plan g. Initial Interface Requirements Documents (IRDs) h. Current System Architecture i. Current Model (Drawing) Tree j. PDR baseline design documentation – [REDACTED] k. System Performance analysis l. Initial Crew Survivability Assessment m. Updated System Safety Assessment n. Initial FMEA o. Initial LOC/LOM Analysis p. Initial Failure Tolerance analysis q. Initial Crew Workload analysis r. Functional/Operational Architecture s. Preliminary Human Error Analysis t. Preliminary Human-System performance test planning (and any results to date) u. Current development tests status and results v. Current Technical Performance Measurements (TPMs)	1. Top-level requirements (including mission success criteria, TPMs) are agreed upon, finalized, stated clearly and consistent with the preliminary design. 2. The flow down of verifiable requirements is complete and proper or, if not, an adequate plan exists for timely resolution of open items. Requirements are traceable to mission goals and objectives. 3. The preliminary design is expected to meet the requirements at an acceptable level of risk. 4. Definition of technical interfaces are consistent with the overall technical maturity and provides an acceptable level of risk. 5. Adequate technical margins exist with respect to the TPMs or, if not, an adequate plan exists for timely resolution of open items. 6. Project risks are understood and have been assessed, and plans, [REDACTED] exist to effectively manage them. 7. SMA [REDACTED] has been addressed in preliminary designs and any applicable SMA products [REDACTED] have been reviewed. 8. The operational concept is technically sound, includes (where appropriate) human factors, and includes flow down of requirements for its execution. 9. Resources other than budget are adequate and available.

Table G: [REDACTED]
Table H: [REDACTED]
Table I: [REDACTED]
Table J: [REDACTED]

APPENDIX 3: Article 12. Intellectual Property & Data Rights - Rights In Data, Subparagraph G.(2) – Background Data

[REDACTED]

APPENDIX 4: Article 7. Government Furnished Information and Services

[REDACTED]

SPACE ACT AGREEMENT – NNK11MS03S, AMENDMENT ONE (01)
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
THE BOEING COMPANY
FOR
COMMERCIAL CREW DEVELOPMENT ROUND 2 (CCDev 2)

PURPOSE AND AGENCY COMMITMENT

The purpose of this Amendment is to modify Space Act Agreement NNK11MS03S to update Appendix 2(a): Performance Milestones and Success Criteria with the addition of Performance Milestones listed as Optional Performance Milestones and Success Criteria in Appendix 2(b) of the initial Agreement. The addition of these milestones (Optional Milestones 14, 16, and 20) is to accelerate maturation of the CST-100 Spacecraft and retire significant risk by enabling performance of PDR for software of flight and ground software, hot fire testing of the Orbital Maneuvering and Abort Control (OMAC) engine and Service Module (SM) Propulsion Cold Flow tests.

Availability of Funds:

Funds are not presently available for milestones 13 and 14 of this Agreement. The Government's obligation under this Agreement is contingent upon the availability of appropriated funds from which payment for Agreement purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the Agreement Officer for this Agreement and until the Partner receives notice of such availability, to be confirmed in writing by the Agreement Officer.

Appendix 2(a) is amended to add the following:

Milestone 12: Software PDR* *(Previously identified as Milestone #16 in Appendix 2(b))* **Description of Milestone:** Boeing shall perform a PDR of Flight and Ground Software. **Success Criteria:** Completion of PDR in accordance with Table G. Provide NASA a copy of review materials, final board presentation, closed RID summary, and open RIDs with preliminary closure plans for major issues.	Amount: $15.2M Date: June 2012

Milestone 13: OMAC Hot Fire Test Complete *(Previously identified as Milestone #20 in Appendix 2(b))* **Description of Milestone:** Boeing shall conduct hot fire testing of the Orbital Maneuvering and Abort Control (OMAC) engine to characterize performance per approved test plan. **Success Criteria:** Completion of OMAC engine hot fire tests in accordance with Table D. Provide NASA with a copy of the test project plan and a quick look summary test briefing to document results.	Amount: $4.2 million Date: July 2012
Milestone 14: SM Propulsion Cold Flow Tests Complete *(Previously identified as Milestone #14 in Appendix 2(b))* **Description of Milestone:** Boeing shall fabricate an SM propulsion test stand that simulates SM line runs and components to conduct dynamic flow testing to validate proper line size and routing of SM propulsion system. **Success Criteria:** Complete SM propulsion system cold flow tests in accordance with Table D. Provide NASA a copy of the Boeing approved test project plan and a quick look summary briefing of test results.	Amount: $1.2 million Date: July 2012

ARTICLE 28. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

BY: Philip R. McAlister
Philip McAlister
Special Assistant to the Associate Administrator
For Exploration Systems

DATE: 9/14/2011

THE BOEING COMPANY

BY: Leon Beard
Leon Beard
Contracts Manager

DATE: 8/12/2011