

NONREIMBURSABLE MEMORANDUM OF
AGREEMENT
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
AND
UNITES STATES AIR FORCE
CIVIL ENGINEER CENTER
FOR
ADDITIVE CONSTRUCTION RESEARCH

ARTICLE 1. AUTHORITY AND PARTIES

The National Aeronautics and Space Administration George C. Marshall Space Flight Center, located at Marshall Space Flight Center, AL 35812 (hereinafter referred to as "NASA" or "NASA MSFC") enters into this Memo of Agreement (hereinafter referred to as "MOA") in accordance with 51 U.S.C. § 20113(e). Unites States Air Force, Air Force Civil Engineering Center, located at 139 Barnes Dr., Suite 2, Tyndall Air Force Base, FL 32403-5323 (hereinafter referred to as "USAF") enters this agreement having authority to execute MOAs. NASA and USAF may be individually referred to as a "Party" and collectively referred to as the "Parties."

ARTICLE 2. PURPOSE

NASA and USAF will explore the dual use benefits of additive construction with the hope that the lessons learned on Earth may be beneficial to NASA's exploration and habitation efforts on the Moon and Mars as well as USAF development of expeditionary infrastructure elements.

ARTICLE 3. RESPONSIBILITIES

A. NASA MSFC will use reasonable efforts to:

1. Deliver the Digital Construction Platform (DCP) to USAF.
2. Train USAF personnel on the use of the DCP for foam printing.
3. Provide consultation on the composition of the print materials to be used.
4. Participate in the utilization of the DCP for foam printing.
5. Participate in the evaluation of the experiments as needed.
6. Procure required hardware to convert the DCP from foam to concrete printing.
7. Modify the DCP at Tyndall AFB to allow for concrete construction at USAF. These are expected to be fairly minor modifications.
8. Train USAF personnel on the use of the DCP for concrete printing.
9. Provide consultation on the composition of the print materials to be used.
10. Participate in the utilization of the DCP for concrete printing.
11. MSFC will provide input on designs of structures (to evaluate printability of specific design features) to the USAF to conduct the print. Printing will be

scheduled/coordinated by USAF.

12. Participate in the evaluation of the experiments. This evaluation will consist of both USAF and NASA/MSFC personnel reviewing completed prints, as-built print files (including mix compositions), data from any instrumentation installed in printed structures during printing, and/or mechanical property data obtained from test coupons. All data shall be shared and consolidated into a final report for each experiment.

B. USAF will use reasonable efforts to:

1. Provide the print materials to be used.
2. Utilize the DCP for printing of various structures.
3. If required, support MSFC as they convert the DCP from foam to concrete. MSFC will have responsibility to modify DCP itself to print concrete, including procurement of required hardware on the unit. Additional hardware required to use the DCP, including pumps, mixers, etc, will be the responsibility of USAF to procure.
4. Notify NASA of planned experiments.
5. Participate in the evaluation of the experiments. This evaluation will consist of both USAF and NASA/MSFC personnel reviewing completed prints, as-built print files (including mix compositions), data from any instrumentation installed in printed structures during printing, and/or mechanical property data obtained from test coupons. All data shall be shared and consolidated into a final report for each experiment.

ARTICLE 4. SCHEDULE AND MILESTONES

The planned major milestones for the activities defined in the "Responsibilities" Article are as follows:

	<u>Milestone Goals</u>
1. NASA will deliver the DCP to USAF	Effective Date + 2 weeks
2. NASA will train USAF on use of DCP	Effective Date + 3 weeks
3. NASA will modify the DCP	Effective Date + 4 months
4. USAF will notify NASA of planned construction efforts	Effective Date + 5 months
5. USAF will build experimental structures with DCP	Effective Date + 12 months
6. Parties will evaluate structure characteristics	Effective Date + 18 months
7. USAF will return DCP to NASA	Completion of MOA

ARTICLE 5. FINANCIAL OBLIGATIONS

There will be no transfer of funds between the Parties under this Agreement and each Party will fund its own participation. All activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act (31 U.S.C. § 1341).

ARTICLE 6. PRIORITY OF USE

Any schedule or milestone in this MOA is estimated based upon the Parties' current understanding of the projected availability of its respective goods, services, facilities, or equipment. In the event that either Party's projected availability changes, NASA or USAF, respectively, shall be given reasonable notice of that change, so that the schedule and milestones may be adjusted accordingly. The Parties agree that NASA's and USAF's use of its own goods, services, facilities, or equipment shall have priority over the use planned in this MOA.

ARTICLE 7. LIABILITY AND RISK OF LOSS

Each Party agrees to assume liability for its own risks arising from or related to activities conducted under this MOA.

ARTICLE 8. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

NASA and USAF agree that the information and data exchanged in furtherance of the activities under this MOA will be exchanged without use and disclosure restrictions unless required by national security regulations (e.g., classified information) or as otherwise provided in this MOA or agreed to by NASA and other Federal Agency for specifically identified information or data (e.g., information or data specifically marked with a restrictive notice).

ARTICLE 9. INTELLECTUAL PROPERTY RIGHTS - HANDLING OF DATA

A. In the performance of this Agreement, NASA or USAF (as "Disclosing Party") may provide the other Party (as "Receiving Party") with:

1. data of third parties that the Disclosing Party has agreed to handle under protective arrangements or is required to protect under the Trade Secrets Act (18 U.S.C. § 1905) ("Third Party Proprietary Data"), or
2. Government data, including software, the use and dissemination of which, the Disclosing Party intends to control ("Controlled Government Data").

B. All Third Party Proprietary Data and Controlled Government Data provided by Disclosing Party to Receiving Party shall be marked by Disclosing Party with a restrictive notice and protected by Receiving Party in accordance with this Article.

C. Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data.

1. Third Party Proprietary Data:

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

None

2. Controlled Government Data:

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

None

3. NASA software and related Data will be provided to Partner under a separate Software Usage Agreement (SUA). USAF shall use and protect the related data in accordance with

this Article:

None

4. For Data with a restrictive notice and Data identified in this Agreement or an accompanying funding document, Receiving Party shall:
5. Use, disclose, or reproduce the Data only as necessary under this Agreement;
6. Safeguard the Data from unauthorized use and disclosure;
7. Allow access to the Data only to its employees and any Related Entity requiring access under this Agreement;
8. Except as otherwise indicated in D.3., preclude disclosure outside Receiving Party's organization;
9. Notify its employees with access about their obligations under this Article and ensure their compliance, and notify any Related Entity with access about their obligations under this Article; and
10. Dispose of the Data as Disclosing Party directs.

D. If the Parties exchange Data having a notice deemed ambiguous or unauthorized by the receiving Party, it should tell the providing Party. If the notice indicates a restriction, the receiving Party must protect the Data under this Article unless otherwise directed in writing by the providing Party.

E. Notwithstanding any restrictions provided in this Article, the Parties are not restricted in the use, disclosure, or reproduction of Data provided under this Agreement that is:

1. Known or available from other sources without restriction;
2. Known, possessed, or developed independently, and without reference to the Proprietary Data;
3. Made available by the owners to others without restriction; or
4. Required by law or court order to be disclosed.

If a Party believes that any exceptions apply, it shall notify the other Party before any unrestricted use, disclosure, or reproduction of the Data.

ARTICLE 10. INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS

Unless otherwise agreed upon by NASA and USAF, custody and administration of inventions made (conceived or first actually reduced to practice) under this MOA will remain with the respective inventing Party. In the event an invention is made jointly by employees of the Parties (including by employees of an Party's contractors or subcontractors for which the U.S. Government has ownership), the Parties will consult and agree as to future actions toward establishment of patent protection for the invention.

ARTICLE 11. RELEASE OF GENERAL INFORMATION TO THE PUBLIC AND MEDIA

NASA or USAF may, consistent with Federal law and this Agreement, release general information regarding its own participation in this MOA as desired. Insofar as participation of the other Party in this MOA is included in a public release, NASA and USAF will seek to consult with each other prior to any such release, consistent with the Parties' respective policies.

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

ARTICLE 12. TERM OF AGREEMENT

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

ARTICLE 13. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Agreement by providing thirty (30) calendar days written notice to the other Party.

ARTICLE 14. CONTINUING OBLIGATIONS

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

ARTICLE 15. POINTS OF CONTACT

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

Management Points of Contact

NASA George C. Marshall Space Flight Center

Raymond Clinton
Associate Manager, Science and Technology
Marshall Space Flight Center, AL 35812
Phone: 256-544-2682
raymond.g.clinton@nasa.gov

Unites States Air Force Air Force Civil Engineer Center

Brian Skibba
Chief, Airbase Technologies Branch
139 Barnes Dr., Suite 2
Tyndall Air Force Base, FL 32403-5323
Phone: 850-283-6170
brian.skibba.1@us.af.mil

Technical Points of Contact

NASA George C. Marshall Space Flight Center

Michael R. Fiske
In-Space Manufacturing Engineer
Mail Suite: ST23
Marshall Space Flight Center, AL 35812
Phone: 256-544-6456
michael.r.fiske@nasa.gov

Unites States Air Force
Air Force Civil Engineer Center

Charles Nikon
Research Engineer
139 Barnes Dr., Suite 2
Tyndall Air Force Base, FL 32403-5323
Phone: 850-283-2604
charles.nikon.1@us.af.mil

ARTICLE 16. DISPUTE RESOLUTION

All disputes concerning questions of fact or law arising under this MOA shall be referred by the claimant in writing to the appropriate person identified in this MOA as the "Points of Contact." The persons identified as the "Points of Contact" for NASA and USAF will consult and attempt to resolve all issues arising from the implementation of this MOA. If they are unable to come to agreement on any issue, the dispute will be referred to the signatories to this MOA, or their designees, for joint resolution after the Parties have separately documented in writing clear reasons for the dispute. As applicable, disputes will be resolved pursuant to The Department of the Treasury's Intragovernmental Transaction Guide (Treasury Financial Manual, Vol. 1, Chapter 2, Part 4700, Appendix 10 (hereinafter, the "Intragovernmental Transaction Guide")).

ARTICLE 17. MODIFICATIONS

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

ARTICLE 18. APPLICABLE LAW

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

ARTICLE 19. LOAN OF GOVERNMENT PROPERTY

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

ARTICLE 20. SIGNATORY AUTHORITY

Approved and authorized on behalf of each Party by:

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE
FLIGHT CENTER

UNITES STATES AIR FORCE AIR
FORCE CIVIL ENGINEER
CENTER

BY: _____
Rae W. Meyer
Manager (Acting), Science and
Technology Office

BY: _____
JOHN E. TRYON, Colonel, USAF
Commander, Det 1

DATE: _____

DATE: _____