NASA SELECTS ORBITAL REEF TO DEVELOP SPACE STATION REPLACEMENT

December 2, 2021 - Orbital Reef, led by partners Blue Origin and Sierra Space, was selected today by NASA for a funded Space Act Agreement for collaboration to design a commercially owned and operated space station in low Earth orbit (LEO). NASA's Commercial LEO Development program aims to shift NASA's research and exploration activities in LEO to commercial space stations, helping stimulate a growing space economy before the International Space Station is retired. The Orbital Reef team includes Boeing, Redwire Space, Genesis Engineering Solutions, and Arizona State University.

"We are pleased that NASA supports the development of Orbital Reef, a revolutionary approach to making Earth orbit more accessible to diverse customers and industries," said Brent Sherwood, Senior Vice President of Advanced Development Programs for Blue Origin. "In addition to meeting the ISS partners' needs, the Orbital Reef mixed-use space business park will offer reduced costs and complexity, turnkey services, and inspiring space architecture to support any business. No one knows how commercial LEO markets will develop, but we intend to find out."

"Blue Origin and Sierra Space are proud to be awarded the NASA Commercial Destination Free Flyer program," said Tom Vice, CEO of Sierra Space. "Blue Origin and Sierra Space are committed to the realization of our vision of enabling humanity to build civilizations in space while enhancing life here on Earth. The commercialization of low Earth orbit is an important first step in this journey. We look forward to working with NASA on this important program that will advance humanity's settlement of space."

"This award shows NASA's foresight in prepping a commercial space station in the future that will be worthy of the legacy of the International Space Station," said Boeing's John Mulholland, VP and program manager of the International Space Station. "Orbital Reef will continue to expand access to space research capabilities to groups that have not been able to utilize the microgravity environment. We are excited about applying more than two decades' worth of expertise in the ISS operations to make the Orbital Reef a landmark success in orbit."

"NASA's support for Orbital Reef represents a strong commitment by the Agency to leverage an innovative public private partnership ensuring that America and its international partners maintain a continuous human presence in LEO," said Mike Gold, Redwire's Executive Vice President of Civil Space and External Affairs. "At Redwire, we are excited to transform the dream of Orbital Reef into reality via our innovative technologies, such as Roll Out Solar Arrays, digital engineering, and internal outfitting for scientific and commercial activities. The trailblazing microgravity research, development, and next-generation manufacturing that we conduct on Orbital Reef will not only enable future exploration missions to the Moon, Mars, and beyond, but will also substantively improve life here on Earth."

"Until now, excursions outside spacecraft have required the challenge, inconvenience, risk, and expense of spacesuits. Orbital Reef changes that with the Single Person Spacecraft, an efficient and tourist-safe alternative," said Brand Griffin, Program Manager for Genesis Engineering Solutions.

"We're grateful to receive NASA's support for Orbital Reef's shared mission. The University Advisory Group is ready to embark on this new challenge — to create guidelines for ethical research and manufacturing, to assemble experts in every field, and to create community connections to Orbital Reef that include science, engineering, art, history, philosophy and religion — all aspects of the human experience," said Lindy Elkins-

Tanton, Vice President of ASU's Interplanetary Initiative and Principal Investigator of the NASA Psyche mission.

The industry team brings together all the expertise to develop, integrate, and operate Orbital Reef's transportation and destination systems and services:

- Blue Origin leads development of the station's infrastructure, large-diameter metal modules, last-mile space tug, and reusable heavy-lift New Glenn launch system.
- Sierra Space leads development of the LIFE (Large Integrated Flexible Environment) and small-diameter metal node modules, and Dream Chaser spaceplane for crew and cargo transportation with runway landing anywhere in the world.
- Boeing leads development of the station's operations and maintenance and science module, and Starliner crew capsule.
- Redwire Space leads microgravity research payload development and operations, large deployable structures, and the Orbital Reef digital twin.
- Genesis Engineering Solutions develops the Single Person Spacecraft for routine operations and tourist excursions.
- Arizona State University leads the University Advisory Group, a global consortium of universities for research advisory services and public outreach.

Orbital Reef's vision is to provide an "address in orbit" for anyone. Early customers may include NASA, its traditional ISS partners, and non-traditional governments and agencies needing easier access to space. The station will grow as markets grow, including commercial industries such as research and manufacturing, media and entertainment, sports and gaming, and adventure travel and tourism.

For more information visit, www.orbitalreef.com.

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BLUE ORIGIN AND SIERRA SPACE DEVELOPING COMMERCIAL SPACE STATION

New Orbital Destination Opens Up Space For Business And Travel, Creating New Ecosystem

October 25, 2021 - Blue Origin and Sierra Space today announced plans for Orbital Reef, a commercially developed, owned, and operated space station to be built in low Earth orbit. The station will open the next chapter of human space exploration and development by facilitating the growth of a vibrant ecosystem and business model for the future. Orbital Reef is backed by space industry leaders and teammates including Boeing, Redwire Space, Genesis Engineering Solutions, and Arizona State University.

Designed to open multiple new markets in space, Orbital Reef will provide anyone with the opportunity to establish their own address on orbit. This unique destination will offer research, industrial, international, and commercial customers the cost competitive end-to-end services they need including space transportation and logistics, space habitation, equipment accommodation, and operations including onboard crew. The station will start operating in the second half of this decade.

Orbital Reef will be operated as a "mixed use business park" in space. Shared infrastructure efficiently supports the proprietary needs of diverse tenants and visitors. It features a human-centered space architecture with world-class services and amenities that is inspiring, practical, and safe. As the premier commercial destination in low Earth orbit, Orbital Reef will provide the essential infrastructure needed to scale economic activity and open new markets in space. Reusable space transportation and smart design, accompanied by advanced automation and logistics, will minimize cost and complexity for both traditional space operators and new arrivals, allowing the widest range of users to pursue their goals. The open system architecture allows any customer or nation to link up and scale to support demand. Module berths, vehicle ports, utilities, and amenities all increase as the market grows.

The Orbital Reef business model makes it easy for customers and is strategically designed to support a diverse portfolio of uses. The team has all the services and systems to meet the needs of emergent customers, including researchers, manufacturers, and visitors. Orbital Reef offers standard interfaces at all levels – locker, rack, and module. Seasoned space agencies, high-tech consortia, sovereign nations without space programs, media and travel companies, funded entrepreneurs and sponsored inventors, and future-minded investors all have a place on Orbital Reef.

The Orbital Reef team of experts brings proven capabilities and new visions to provide key elements and services, including unique experience from building and operating the International Space Station:

- Blue Origin – Utility systems, large-diameter core modules, and reusable heavy-lift New Glenn launch system.
- Sierra Space - Large Integrated Flexible Environment (LIFE) module, node module, and runway-landing Dream Chaser spaceplane for crew and cargo transportation, capable of landing on runways worldwide.
- Boeing – Science module, station operations, maintenance engineering, and Starliner crew spacecraft.
- Redwire Space – Microgravity research, development, and manufacturing; payload operations and deployable structures.

- Genesis Engineering Solutions – Single Person Spacecraft for routine operations and tourist excursions.
- Arizona State University – Leads a global consortium of universities providing research advisory services and public outreach.

"For over sixty years, NASA and other space agencies have developed orbital space flight and space habitation, setting us up for commercial business to take off in this decade," said Brent Sherwood, Senior Vice President of Advanced Development Programs for Blue Origin. "We will expand access, lower the cost, and provide all the services and amenities needed to normalize space flight. A vibrant business ecosystem will grow in low Earth orbit, generating new discoveries, new products, new entertainments, and global awareness."

"Sierra Space is thrilled to partner with Blue Origin and provide the Dream Chaser spaceplane, the LIFE module and additional space technologies to open up space for commercial research, manufacturing, and tourism. As a former NASA astronaut, I've been waiting for the moment where working and living in space is accessible to more people worldwide, and that moment has arrived," said Dr. Janet Kavandi, former three time NASA astronaut and Sierra Space president.

"This is exciting for us because this project does not duplicate the immensely successful and enduring ISS, but rather goes a step further to fulfill a unique position in low Earth orbit where it can serve a diverse array of companies and host non-specialist crews," said John Mulholland, Boeing VP and program manager for the International Space Station. "It calls for the same kind of expertise we used to first design and then build the International Space Station and the same skills we employ every day to operate, maintain and sustain the ISS."

"The Orbital Reef represents the next evolution of the commercial space paradigm by creating the first ever crewed private sector platform in low Earth orbit. The Orbital Reef will carry forward the singular legacy of the ISS, supporting innovative microgravity research, development, and manufacturing activities which will advance fields as diverse as communications and biotechnology," said Mike Gold, Executive Vice President for Civil Space and External Affairs at Redwire. "The microgravity environment presents an entirely new arena for commercial and scientific development, making Orbital Reef the platform that will launch new technologies and capabilities dramatically improving life on Earth while enabling humanity's journey to the stars."

"The Single Person Spacecraft will transform space walking," said Brand Griffin, Program Manager for Genesis Engineering Solutions. "Space workers and tourists alike will have safe, comfortable, and quick access outside Orbital Reef. Shirtsleeve environment, great visibility, automated guidance, and advanced precision manipulators will make external operations cost-effective and routine."

"ASU's Interplanetary Initiative is honored to be leading the university consortium that is supporting Orbital Reef," said Lindy Elkins-Tanton, Vice President of ASU's Interplanetary Initiative and Principal Investigator of the NASA Psyche mission. "We've brought together an international group of more than a dozen universities to work on the ethics and guidelines of research — on how we can bring to bear all our expertise in science and research and manufacturing in low gravity, to help nations, corporations and groups that want access to Orbital Reef. It's about collectively believing in our future and bringing science and engineering to bear on a better future – hugely exciting."

Orbital Reef University Advisory Council
Arizona State University (ASU) leads a global consortium of universities, the Orbital Reef University Advisory Council. Comprising more than a dozen leading academic institutions with expertise in space and

microgravity research, the University Research Advisory Council will focus academic community needs, stimulate research, advise novice researchers, evolve standards of conduct, and lead STEM outreach. University Advisory Council members include:

- Arizona State University
- Colorado School of Mines
- International Space University
- Oxford University
- Purdue University
- Southwest Research Institute
- Stanford University
- University of Central Florida
- University of Colorado at Boulder
- University of Florida
- University of Michigan
- University of Texas at El Paso
- University of Texas Medical Branch
- Vanderbilt University

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