



MICHIGAN LAUNCH INITIATIVE
SPACEPORT, COMMAND AND CONTROL CENTER
MARKET FEASIBILITY REPORT
(ADDENDUM TO THE ECONOMICS AND BUSINESS REPORT OF AUGUST 2020)

February 2021



InterFlight Global

Intelligent Aviation & Aerospace Solutions



MICHIGAN LAUNCH INITIATIVE
MARKET FEASIBILITY REPORT
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NOTES:

The terms “Michigan Spaceports”, “Oscoda-Wurtsmith”, “Loma Farms”, “LF” and “OSC”, “Command and Control Center”, “CCC”, “Chippewa” are used interchangeably to connote the Michigan Spaceports development project at Oscoda-Wurtsmith Airport and Loma Farms. Michigan Aerospace Manufacturers Association is abbreviated as “MAMA” and the Michigan Launch Initiative is abbreviated as “MLI”

The State of Michigan from the International Space Station

Photo Credit: NASA



PREFACE

1. PREFACE

The Michigan Launch Initiative (MLI) is at the forefront of game changing space enabled technologies, products and services revolutions also known as the “space economy”. The space economy approached \$500 Billion in 2020 and is expected to exceed the \$1 trillion mark by 2030¹.

The MLI is enabling two launch sites (Oscoda-Wurtsmith-Horizontal Launch) and Marquette Country (Vertical Launch), and a Command and Control Center (CCC) in Chippewa County. The CCC will serve both launch sites and act as a central node, connecting all stakeholders as a center of excellence for innovation, R&D and manufacturing growth. In addition, the CCC location next to the Chippewa International Airport’s 7,000 ft runway (extensible to 12,000 ft) is a valuable alternate runway for horizontally launched and recovered vehicles flying to and from the two spaceport facilities.

This Report’s Letters of Interest (LOI), Memorandums of Understanding (MOU) and other documents from space economy key companies that are ready, willing and able to partake in the success of the MLI demonstrate, that the MLI is very well positioned to lead and grow the ecosystem of space, aerospace and aviation related industries that support the space enabled economy both in the USA and globally.

InterFlight Global (IFG) provides this Report as an Addendum to its Michigan Spaceports Economic and Business Report (August 2020) and as a pillar for the economic and business development efforts to enable the entry into service of the two spaceports and the Command and Control Center.

This Report includes a rational and feasibility linkage between the prospective customers documents and the projected ground and flight operations, launches and related activities, forecast for the timeframe 2021-2031.

This Report includes materials and references form the following MAMA and MLI documents:

- IFG Michigan Spaceport Economics and Business Report-August 2020
- BRPH-Kimley-Horn Spaceport Site Selection and Feasibility Study-May 2020
- Proposal for Career Jobs Growth with Private Capital Partners-MAMA-May 2020
- Selected Press Releases and MAMA/MLI Briefings to IFG
- BRPH State of Michigan Command and Control Center Site Selection Assessment-January 2021

¹ Sources: Morgan Stanley, UBS and Bank of America

MICHIGAN LAUNCH INITIATIVE COMMAND & CONTROL CENTER AND SPACEPORTS



MICHIGAN LAUNCH INITIATIVE COMMAND & CONTROL CENTER



BACKGROUND

2. BACKGROUND

MICHIGAN LAUNCH INITIATIVE: SPACEPORTS, COMMAND AND CONTROL CENTER

The Michigan Aerospace Manufacturers Association (MAMA) leads the State of Michigan’s vision for leadership in the commercial space industry at the convergence of the aviation and aerospace industries. MAMA’s execution plan is aptly named the Michigan Launch Initiative (MLI). The mission is to design, develop, license, and operate two commercial spaceports, one for vertical launch, one for horizontal launch, a state-of-the-art Command and Control Center and their related industrial ecosystems of aviation, aerospace and space companies. This specialized industrial ecosystem of enterprises and businesses will yield innovation that allows and supports horizontal and vertical launch vehicles activities to place, control and recover spacecraft (satellites and other payloads) primarily into Low Earth Orbit (LEO) and secondarily into higher orbits (SSO, MEO). The launchers envisioned to operate from the Michigan Spaceport are known as Reusable Launch Vehicles (RLV’s).

This vision involves three development pillars; first, the conversion of a portion of Oscoda-Wurtsmith Airport (OSC) into a licensed spaceport, second, the development and licensing of a vertical launch site at Loma Farms, located in Marquette County, and third the development of a state-of-the-art Command and Control Center to support both launch sites and to provide classified and unclassified capabilities to the Department of Defense (DOD) and commercial space organizations. The three developments will be focal points for a vibrant aerospace ecosystem of enterprises and businesses focused on innovation, research, development, testing, evaluation and training – envisioned as a regional center, or cluster of aerospace entities acting as incubators and accelerators for aviation, aerospace and space technology development.

The area linking both launch sites and the CCC as an industrial cluster could be characterized as the “Space Harbor” as a brand or industry reference against other Spaceports in the Nation and the world and their environs.

Michigan Spaceports and the CCC’s advantages as a future regional hub of commercial spaceflight and supporting industries are due to Michigan’s unique location, connectivity between Canada and the USA and proximity to one of the largest automotive industry hubs in the USA, as well as one of the largest concentrations of DOD air and space defense industry expertise in the country. The convenient location in relation to Chicago and Detroit International Airports provide two gateways with ease of access necessary to allow industry stakeholders, space tourists and spaceflight participants, crew and visitors to travel to Michigan by conventional flight for transitioning to a launch, and/or suborbital space flight. As a spaceport, Michigan Spaceport is an ideal location for horizontal launch and landing because of its proximity to Lake Huron for staging horizontal and vertical launch operations. It is important to mention the ability to effect Polar Orbit launches from OSC’s 44 degrees of North Latitude, as this Report will highlight.

For Michigan, the spaceport presents a tremendous opportunity for becoming a major contender in the rapidly growing commercial space industry. These distinct advantages position Michigan Spaceport at OSC as the next level for the emerging commercial spaceflight industry in the US Eastern Seaboard, and as a connector between the USA and Canada. Allowing Michigan to stake a claim that will keep its culture



vibrant, and at the forefront of space industry innovation and flight.

A successful Michigan Spaceport at OSC, will be one that fits in, and adds value to the local, Eastern US Space Coast regional economy and international US- Canada commercial space economy.

In the opinion of the author, the Michigan Spaceport with Low Earth Orbit (“LEO”) launch capabilities economic, social and business feasibility is favorable and worth pursuing. Moreover, the project will likely ensure sustainable growth, both financially and environmentally.

The spaceport, and its capital investment justifications, as well as the potential for growth and development of the surrounding communities and industrial ecosystems, in particular the automotive ecosystem with a strong focus on Autonomous Vehicles (AV) guided from LEO satellites and ground infrastructure, are vital questions addressed in this executive level Report.

The Economic and Business Development Report of August 2020 produced the following framework metrics to be validated by this Market Feasibility Report:

Projected Costs:

- Spaceport at Oscoda-Wurtsmith (OSC) Horizontal Launch Facility
 - Flight Operations Facilities \$22-64 million
 - Business and Research Park Facilities (IFG estimate) \$25-50 million

- Spaceport at Loma Farms (LF) Vertical Launch Facility
 - Site infrastructure ROM \$31-91+ million
 - Business and Research Park Facilities (IFG estimate) \$20-35 million

- Command and Control Center (CCC)
 - Command and Control Center Facilities \$TBD²

Projected Revenues:

The total market launches (air-launch, suborbital and orbital) and revenue in the Report’s market forecast, air-launches, horizontal and vertical launches will grow from more than 15 per year in 2023 to more than 100 per year in 2033, with revenue going from \$150 million in 2023 to \$500 million in 2033 (revenue does not grow at the same pace as air-launches, flights and launches because launch prices are projected to decline during the forecast period). The job creation in this scenario would range from more than 650 jobs in 2023 to more than 2,660 jobs in 2033 with an average salary of \$85,000-100,000 per employee per year.

This Report also identifies an addressable market of well over one hundred companies and businesses in five ecosystems (transportation, communication, human factors, supply chain and energy) and sixteen sub ecosystems within them which could benefit from establishing their activities in the Michigan Spaceport and their environs.

² BRPH and MLI to provide projected costs

Market Feasibility Rationale:

This Report addresses the feasibility of the market assessing the marketability of the Michigan Launch Initiative (MLI) primarily by seeking potential customers expressions of interest and commitment. The Report provides, specifically, the identification of potential customers of the MLI's proposed Horizontal and Vertical Spaceports and Command and Control Center by obtaining Letters of Interest (LOI) and Memorandums of Understanding (MOU) and other relevant documents from those potential customers. The moniker "**Space Harbor**" is proposed by the author of this Report as the marketing term that will uniquely characterize Michigan's dual-spaceport facility, associated business and research parks and expanded industry clusters, academic and governmental facilities.

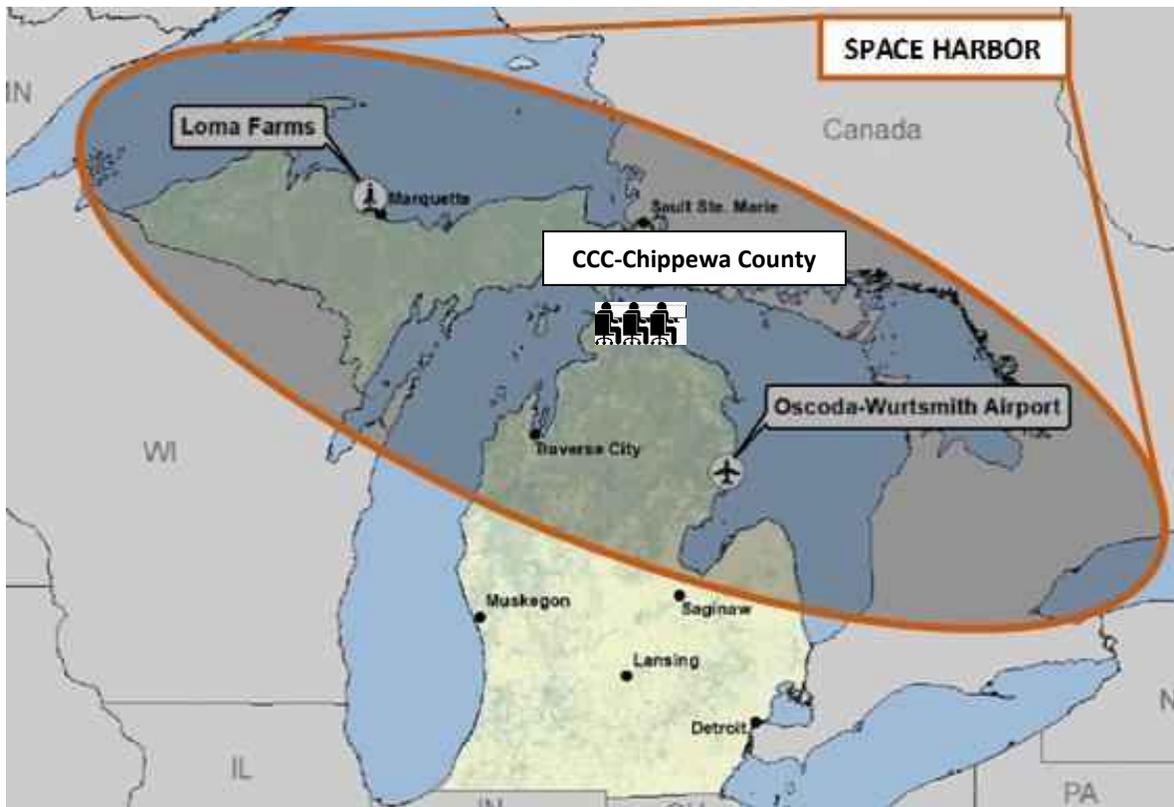


Figure Source: Spaceports General Location- BRPH-Kimley Horn Spaceport Site Selection, Feasibility Study, February 2020

KEYWORDS: User needs, spacecraft, operators, market assessment, demand forecast, business case, facilities, spaceport model/design, competitive assessment, economic impact, point-to point technology, automotive, autonomous vehicles, space industry, space ecosystem, Space Harbor, Michigan Space Corrido, Space Harbor, Command and Control Center, DOD, Space Force.

REPORT AUTHOR

INTERFLIGHT GLOBAL CORPORATION (IFG)

InterFlight Global Corporation (IFG) was chosen by the Michigan Aerospace Manufacturers Association (MAMA) to author the Michigan Spaceport Economics and Business Report.

Oscar S. Garcia, MBA writes the Report on behalf of IFG.

EXECUTIVE SUMMARY

3. EXECUTIVE SUMMARY

The MLI is enabling two space vehicles launch sites, one at (Oscoda-Wurtsmith-Horizontal Launch), a second one at Marquette County (Vertical Launch), and third, a Command and Control Center (CCC) to support and enhance launch and other space industry activities. The CCC final site selection was announced in January 2021. The facility will be located at the Chippewa County International Airport, on the grounds of the former Kincheloe Air Force Base grounds, in Chippewa County. The CCC will serve and support both launch sites and will also act as a central activities node connecting industry stakeholders as a center of excellence for innovation, R&D and manufacturing.

This Market Feasibility Report is a real-market validation of the market feasibility, market demand or “marketability” of the Michigan Launch Initiative (MLI) spaceports and Command and Control Center (CCC) infrastructures and resources.

This Market Feasibility Report has two components. The first component (Section 1.) is a current market demand validation, or marketability test, derived from companies who have confirmed to the MLI their interest to operate and be tenants of the MLI’s facilities, supported by Letters of Intent (LOI’s), MOU’s and other documents.

The second component (Section 2.) comprises an IFG expertly “curated” list of more target companies to contact in order to obtain more LOI’s, MOU’s and other documents.

Section 1. presents the initial findings, Letters of Intent (LOI), Memorandums of Understanding (MOU) and other documents and communications from aerospace, aviation and space industries’ companies presented in this Report, which confirm that the MLI’s Spaceports and CCC’s development are not only technically feasible, but also feasible in terms of market demand.

The Letters of Intent (LOI) and Expressions of Interest (EOI) of the companies listed below demonstrate the real-market appetite to consume, lease, rent, use, invest in and service both the above mentioned MLI infrastructures and its future ecosystem of aviation, aerospace and space companies.

Letters of Intent (LOI) from prospect customers are attached at the end of this document:

- Aerospace Flight Technologies/ 0-G Launch
- Dawn Aerospace
- Spire Global
- Starfighters Aerospace
- Virgin Orbit



Expressions of Interest (EOI):

- ArianeSpace
- SAFRAN
- Stratolaunch
- Voyager Holdings

The above mentioned companies are involved in activities delivering most of the products and services within the MLI strategic pillars: Space Enabled Communications and Advanced Mobility (SECAM), horizontal launch, air-launch and hypersonic flight, sustainable space propulsors and fuels and Orbital safety, sustainability and debris mitigation. All areas are powered and enabled by state-of-the-art 5G connectivity at present time, and ready for seamless enhancements when future 6-7 G connectivity becomes available.

Section 2. In addition to the companies contacted and listed above, this Report also provides a list of more target companies which are potential customers and candidates to issue more LOI's, EOI's and MOU's. IFG has selected companies based on the MLI competitive advantages over other space industry hubs, clusters and centers of gravity, focus on prospect companies to include:

- Canadian-US Companies: MLI is the Hub for cross border Space Industries
- Floridian-Michigander Companies: MLI is the HUB for Florida-Canada Eastern Seaboard Spaceport to Spaceport flight connectivity
- Space companies' candidates for Special Purpose Acquisition Company (SPAC) investment models: MLI is the leader in facilitating, promoting and enabling aerospace-space industries SPACs influencing the right legislative and regulatory environment at the State and Federal level
- Space companies aligned with automotive companies expanding into aerospace and space technologies, products and services: The MLI is the global reference for automotive-into-aerospace cross industry innovation

As next steps, IFG recommends that MAMA performs further economic and business development efforts on behalf of the MLI.

Future reports will further evaluate the direct-indirect and induced impact, forecast economic-and-financial returns on assets, investment and equity.

Such reports will quantify the expected returns on the projected public, private and hybrid (Public-Private-Partnership) capital investments.

REPORT COMPONENTS AND RATIONALE

4. REPORT COMPONENTS AND RATIONALE

This Market Feasibility Report has two components. The first component (Section 1.) is a current market demand validation, or marketability test, derived from companies who have confirmed to the MLI their interest to operate and be tenants of the MLI's facilities, supported by Letters of Intent (LOI's), MOU's and other documents.

The second component (Section 2.) comprises an IFG expertly "curated" list of more target companies to contact in order to obtain more LOI's, MOU's and other documents.

In terms of customers significance and rationale, IFG focused on prospective customers that fit the strategic industrial pillars of the MLI. These strategic industry pillars are listed below and presented in the table on the next page. These industry pillars are correlated to the activities of the companies engaged in LOI's, EOI's listed in this document. See Table 1 on the next page.

→ **Efficient and sustainable Ground, Air and Space Operations**

- FAA Licensing at the Oscoda horizontal-launch site and the Marquette vertical-launch site
- R&D and application of "green" propellant technology to fuel the rockets into orbit
- Command and Control Center to enable optimal and sustainable flight and ground operations
- Space orbital debris removal, which will extend MAMA's commitment to the environment by removing space debris. Not only will this reduce space orbital trash and negate the Kessler Syndrome in low-earth and middle-earth orbits, it will also remove highly toxic metals from the earth's ecosystem.

→ **Space Enabled Communications and Advanced Mobility (SECAM), Connectivity Integrated Mesh "CIM" and Sensitive Compartment Information Facilities "SCIF" (5G today-6/7G future)**

- Space based network through state-of-the-art sensors and low-earth orbit space satellites
- Direct applications in emerging and growing autonomous vehicles (air, ground, sea), and societal advancements such as health care and education.
- Space situational awareness including sensing, maneuvering and managing space traffic and orbital manmade and natural ecosystems, to promoted and ensure safety and security in orbit

IFG has catalogued the industry pillars above into five industry clusters or categories to simplify the grouping of potential customer of the MLI. The categories are Transportation, Communications, Human Factors, Supply Chain and Energy.



Table 1. Identified MLI Potential Customers and Tenants

Industry Ecosystem		Transportation	Communications	Human Factors	Supply Chain	Energy
MLI Strategic Pillars		Launch-Flight	Communications and Control Center	Orbital Management	Manufacturing	Sustainability
Sub Sectors		Vertical and Horizontal	Tracking and Telemetry	Space Traffic Management	R&D	Green-fuels
		Hypersonic Flight	5G Enabled Vehicle Autonomy, Space Sensing and Data Transmission	Orbital Safety	Debris Mitigation	Nuclear Power
MLI Potential customers: Status		Supersonic Flight	Mission Control	Human Spaceflight	Small Sats-LEO/MEO	Capture-Storage
Virgin Orbit	LOI	X			X	
Spire Global	LOI		X	X	X	
AFT-0-G Launch	LOI	X				
Dawn Aerospace	LOI	X				X
Starfighters Aerospace	LOI	X				
Stratlaunch	EOI	X				
SAFRAN	EOI		X		X	
ArianeSpace	EOI	X			X	X
Voyager Holdings	EOI			X	X	X

SECTION 1.

5. SECTION 1.

MARKET FEASIBILITY - IDENTIFIED POTENTIAL CUSTOMERS

In selecting and securing the prospect customer companies, IFG has placed due importance and vetting on the overall feasibility of the companies and its end users and clients. The companies selected, attracted and engaged with LOI's, EOI's and other prospect customer dialogues are listed below. All prospective customer companies are strategic MLI fits and expected to act as anchors and magnets for their own suppliers, partners and customers.

→ Virgin Orbit

A premier horizontal orbital air-launch industry leader and part of the Virgin Galactic Group, a publicly traded multi billion dollar company. (NASDAQ:SPCE) <https://virginorbit.com/>



→ **Spire Global**

A global leading Small Sat manufacturer, constellation operator and Command and Control Center supplier of data sensing and analytics tools, products and services. <https://spire.com/>



→ **Aerospace Flight Technologies/ 0-G Launch**

A horizontal launch and air-launch emerging company using Space Support Vehicles (SSV) involved in the launch of Small Sat and hypersonic vehicles and gravity management parabolic flight services. www.0-glaunch.com



➔ **Dawn Aerospace**

A well-established satellite “green” propulsion and spaceplane designer and manufacturer. Dawn is an innovative growing company with over fifty employees and offices in three continents.

<https://www.dawnaerospace.com/mission>



➔ **Starfighters Aerospace**

The preeminent Space Support Vehicle (SSV), Horizontal Air-Launch and supersonic horizontal launch, take-off and landing operator. Starfighters comprises a fleet of over ten F-104 SSV' s and caters to multiple rockets and Small Sat manufacturers and operators.

<https://www.starfighters.net/>



Expressions of Interest (EOI):

→ Stratolaunch

Operator of the world's largest and most capable horizontal take-off and landing air-launch platform. Stratolaunch's design, manufacturing and launch capabilities include rocket and hypersonic vehicles. This growing company was founded by the late Paul Allen and now managed by Cerberus Capital and a distinguished leadership and executive team.
<https://www.stratolaunch.com/>



→ **SAFRAN**

An international high-technology group, operating in the aviation (propulsion, equipment and interiors), defense and space markets. Safran has a global presence, with 81,000 employees and holds, alone or in partnership, world or regional leadership positions in its core markets. Safran undertakes research and development programs to maintain the environmental priorities of its R&T and Innovation roadmap. (OTCMKTS: SAFRF) <https://www.safran-group.com/>



→ **Arianespace**

A Global multibillion dollar leading vertical launch rocket manufacturer and launch services provider with operations in three continents. Ariane launches the Vega and Ariane family of rockets to LEO, SSO, MEO and GEO for its large and growing Small Sat, Medium and Large Sat payload customers in five continents. <https://www.arianespace.com/>



➔ **Voyager Holdings**

A global leader and investor in space exploration with a portfolio of vertically integrated companies and mission capability. Its portfolio of companies covers a wide range of vertical, horizontal and command and control technologies and include Pioneer Astronautics, Altius Machines, The Launch Company and Nano Racks. <https://voyagerspaceholdings.com/>



SECTION 2.

6. SECTION 2.

MARKET FEASIBILITY - TARGET POTENTIAL CUSTOMERS

In addition to the companies contacted and listed in Section 1. of this Report, Section 2. provides an initial list of additional target companies which are potential customers and candidates to issue more LOI's, EOI and Memorandums of Understanding (MOU).

IFG has selected companies based on the MLI competitive advantages over other space industry hubs, clusters and centers of gravity, focus on prospect companies to include the lists below:

- ➔ Canadian-US Companies: MLI is the Hub for cross border Space Industries

Maritime Launch Services	LEO	Rocket	Canada	Halifax, Nova Scotia	Building up Canada's NewSpace industry as the first private launch provider in Canso, Nova Scotia.
Space Engine Systems	Lunar	Spaceplane	Canada	Edmonton, Alberta	Designing a reusable, single-stage-to-orbit cruise vehicle
C6 Launch Systems	LEO	Rocket	Canada	Toronto, Ontario	Providing dedicated launch services for cube and nanosatellites
Reaction Dynamics	LEO	Rocket	Canada	St. Laurent, Quebec	Making it affordable for companies and universities to launch small satellites into orbit
SpaceRyde	LEO	Balloon, Rocket	Canada	Toronto, Ontario	SpaceRyde offers affordable, on-schedule, dedicated launch for small sats
SpaceHorizon	LEO	Rocket	Canada	Ottawa, Ontario	Striving to design, build, and launch rockets, in and from Canada

- ➔ Floridian-Michigander Companies: MLI is the HUB for Florida- Eastern Seaboard Spaceport to Spaceport flight connectivity

- ➔ Space companies that have received or are candidates to receive Special Purpose Acquisition Company (SPAC) investment funding: MLI is the leader in facilitating, promoting and enabling aerospace-space industries SPACs influencing the right legislative and regulatory environment at the State and Federal levels
- ➔ Space companies aligned with automotive companies expanding into aerospace and space technologies, products and services: The MLI is the global reference for automotive-into-aerospace cross industry innovation

A sample Master List of Target Launch and Space Transportation Prospect Companies in the above three categories are listed on Table 2.

Table 2. Selected Space Transportation and Launch Targets for MLI- Including SPAC, Florida and Automotive-Derived Technologies (SPAC denotes completed, or target)

UP Aerospace	Suborbital	Rocket	UP Aerospace is a suborbital space launch and flight test service provider
Virgin Orbit/VOX Space SPAC	LEO	Plane, Rocket	The small payload orbital launch sister company to Virgin Galactic
World View SPAC	Suborbital	Balloon	The Stratellite is a remotely operated, navigable vehicle that can remain aloft for days, weeks, and months on end
Astra Space SPAC	LEO	Rocket	Providing routine launch access to Earth orbit for entrepreneurs and enterprises
Sierra Nevada	LEO	Spaceplane	Dream Chaser space plane for space station resupply missions
Virgin Galactic/The Spaceship Company SPAC	Suborbital	Spaceplane	Building a fleet of WhiteKnight Two carrier aircraft and SpaceShipTwo reusable spaceships
Firefly Aerospace SPAC	LEO	Rocket	Developing the Firefly Alpha launch vehicle; highest payload performance with the lowest cost per kg to orbit in its vehicle class
Relativity Space SPAC	LEO	Rocket	Designing an orbital class launch vehicle that's autonomously constructed
ABL Space Systems	LEO	Rocket	Building rockets to launch small satellites
Exos Aerospace SPAC	Suborbital	Rocket	Selling reusable launch vehicles for small, sub-orbital scientific/experimental payloads
Launcher	LEO	Rocket	A team on a 10-year journey to deliver small satellites to orbit.
Space Perspective SPAC	Suborbital	Balloon	The off-world travel company
Sugarhouse Aerospace	Suborbital	Rocket	Sugarhouse Aerospace is built on a simple idea - space shouldn't be reserved for governments and billionaires
Aevum SPAC	LEO	Plane, Rocket	Provides earth-to-space space delivery services for small payloads
bluShift Aerospace	LEO	Rocket	Developing a unique line of rockets powered by bio-derived fuels to launch tiny satellites into space

Earth to Sky	LEO	Rocket	Providing launch services to LEO at an affordable cost
Green Launch	LEO	Other	Green Launch is a technology created to revolutionize and expand our access to space
Microcosm	LEO	Rocket	Developing the Demi-Sprite Launch System
Pipeline2Space (by HyperSciences)	LEO	Other	Using RAM-accelerators to change the economics of space launch
Pythom	LEO	Rocket	Pythom is creating a custom-built, two-person craft to explore Mars
Rocket Crafters SPAC	LEO	Rocket	Developing the STAR3D (Safe, Throttleable, Affordable, Reliable, 3D-Printed) Hybrid Rocket Engines and the Intrepid-1 smallsat launcher
Space Vector	LEO	Rocket	Space Vector has launched 37 vehicles to date with program turnaround times as short as 8 months
SpinLaunch SPAC	LEO	Other	Small satellite space launch via a kinetic launch system
Stofiel Aerospace	LEO	Balloon, Rocket	Balloon-based small satellite launcher
Stratolaunch SPAC	LEO	Spaceplane	Developing Black Ice, a fully reusable space plane initially optimized for cargo launch
WAGNER Star Industries	LEO	Spaceplane	WAGNER is a simple, reliable, low-cost launch systems company
X-Bow Launch Systems	LEO	Rocket	Dedicated to providing affordable access to orbit for commercial and government payloads
0-G Launch	LEO	Plane, Rocket	Developing the Space Jet air-launch platform
Advanced Rockets Corp	LEO	Rocket	The Dynamics Enhanced Launch Vehicle is designed for a life of over 400 reuses with very minimal maintenance and rapid turnarounds
ARCA Space Corporation	LEO	Rocket	Single Stage to Orbit (SSTO) rocket leveraging aerospike engine technology launching to low earth orbit
Bagaveev	LEO	Rocket	Dedicated nanosatellite launch provider
Beyond Earth	LEO	Rocket	Providing rapid response small satellite launch vehicles for government and commercial customers
Exodus Space Corp	LEO	Spaceplane	Developing the Horizontal Takeoff Horizontal Landing (HTHL) AstroClipper for the future of commercial space transportation
Gloyer-Taylor Labs	LEO	Rocket	Developing the Advanced Cryogenic Expendable (ACE) launch vehicle
Hudson Space Systems	Suborbital	Rocket	Developing a next generation of reusable launch vehicles for microgravity research
Interorbital Systems	LEO	Rocket	A rocket, satellite, and spacecraft manufacturing company.
iRocket	LEO	Rocket	Building the first fully autonomous, and fully reusable small launch vehicle for affordable access to space

JP Aerospace	Suborbital	Balloon	JP Aerospace is a volunteer-based DIY Space Program. Home of PongSat and Airship to Orbit. We invented the better sandbag
Phoenix Launch Systems	LEO	Rocket	Developing responsive launch services and products for the nanosatellite industry
RocketStar	LEO	Rocket	We offer rideshare and dedicated launch opportunities at severe discounts to other launch providers, and can go from first conversation to launch in 18 months or less
Stoke Space Technologies	LEO	Rocket	Developing the world's first 100% reusable rocket
Thor Launch Systems (by 8 Rivers)	LEO	Other	Enabling the mass commercialization of space by moving beyond chemical rockets
CloudIX	LEO	Balloon, Rocket	Ultra low-cost rockets and satellite deployment
CubeCab	LEO	Rocket	LEO launch provider for 3U cubesats
ESC Aerospace	LEO	Other	Enabling transportation to LEO
Fore Dynamics	LEO	Rocket	Affordable and reliable small satellite launch system for LEO, SSO, and GEO missions
IO Aircraft	LEO	Spaceplane	Developing single stage to orbit, fixed wing, hypersonic aircraft
LongShot	LEO	Other	Developing a non-traditional hypervelocity launch system
Odyne Space	LEO	Rocket	Cheaper access to space for nanosatellite payloads
VALT Enterprises SPAC	LEO	Rocket	Hypersonic Delivery Systems: Suborbital & Orbital Missions
Vector	LEO	Rocket	Developing suborbital and orbital launch vehicles
Vogue Aerospace	LEO	Rocket	Developing a unique launch vehicle and propulsion system
Wave Motion Launch	LEO	Other	Building a space launch system for sending hardened satellites and bulk cargo into space
Eclipse Orbital	LEO	Rocket	Making space affordable and available to everyone
Fenix Space	LEO	Plane, Rocket	Developing a reliable tow-glider launch system
Forever Space	Lunar	Other	Developing the Otis electric vehicle for civil space transportation
Launch Tech Space	LEO	Other	Developing an eco friendly, electromagnetic space launch system
New Ascent	-	Other	Redefining launch from the ground up
Rocketplane Global	LEO	Spaceplane	Spaceplane based satellite launch
Deywoss One	LEO	Spaceplane	Developing PROTEUS, an innovative hybrid and autonomous launcher for small sats
Halo Aerospace	Suborbital	Balloon, Rocket	Providing launch services via HABs and sounding rockets

LEO Launcher	LEO	Plane, Rocket	Long range heavy lift aircraft horizontal launches
Space Railway Corporation	LEO	Other	Developing a proposed "railway" to space that is safer, cheaper, and greener than rockets
United Frontiers	LEO	Rocket	SpaceBox is a suborbital launch and recovery platform designed to enable affordable access to space for educational, professional, consumer and hobbyist payloads

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NEXT STEPS

7. NEXT STEPS

As next steps, IFG recommends that MAMA performs further economic and business development efforts on behalf of the MLI.

Future reports will further evaluate the direct-indirect and induced impact, forecast economic-and-financial returns on assets, investment and equity.

The reports will quantify the expected returns on the projected public, private and hybrid (Public-Private-Partnership) capital investments as follows:

- Converting LOI's, MOU's into term sheets for investment, tenancy agreements and other revenue producing mechanisms
- Assessing the possible revenues, financial and economic impacts, in terms of Gross Domestic Product (GDP) and jobs generated by the companies identified in this and ongoing market feasibility reports
- Performing Return on Investment, Cost-Benefit Analysis, Economic Development Impact studies

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APPENDIX

8. APPENDIX

LETTERS OF INTEREST (LOI'S) - IDENTIFIED POTENTIAL CUSTOMERS

(In Alphabetic Order)

1. Aerospace Flight Technologies/ O-G Launch
2. Dawn Aerospace
3. Spire Global
4. Starfighters Aerospace
5. Virgin Orbit

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December 1st, 2020

Gavin Brown
Executive director
Michigan Aerospace Manufacturers Association
Michigan Launch Initiative
DC3S Building
7205 Sterling Ponds Court
Sterling Heights, Michigan 48312

Re: Letter of Intent to Operate Horizontal Takeoff and Landing Air-Launch Services

Dear Mr. Gavin Brown:

We are the operators of the Space Jet™ air-launch aircraft system. Our aircraft system is meant to operate as a Space Support Vehicle (SSV) and requires a horizontal take-off and licensed facility, or Spaceport. The prospect of the Oscoda-Wurtsmith airport as an FAAAST licensed spaceport is of great interest to us.

This letter expresses our interest to operate Space support missions and other related Space industry flights, including but not limited to, parabolic flights, science R&D, test and development of Space-related technologies and multi-vehicle air-launch systems in Michigan. We would be happy to work with you to support the Presidential mandates related to your ambitious Space-related 5G program. In addition, we will cater to develop supporting flights for NASA, DARPA, DIUX, DOC, DOT and DOD and other public agencies.

We believe the Oscoda-Wurtsmith proposed spaceport meets our specifications and that it could be an optimal location for our flight missions in the Eastern Seaboard and Canada. Indeed, we also think that our activities could also benefit and catalyze the commercial Space sector and its related economic and business development in Michigan.

We look forward to discussing the next steps to enable our collaboration with MAMA, MLI and any other Michigan entities in public, private and PPP modalities that you might deem appropriate to begin a mutually prosperous and beneficial relationship.

With best regards,


Robert Feierbach, Co-Founder and CEO

Cc: Oscar Garcia, Chairman IFG

0-G Launch
1101 30th Street NW, Suite 500
Washington, DC 20007
www.0-GLaunch.com



Dawn Aerospace Nederland B.V.
Overslagweg 7
2645 EK Delfgauw
The Netherlands

December 1st, 2020

Gavin Brown
Executive director
Michigan Aerospace Manufacturers Association
Michigan Launch Initiative
DC3S Building
7205 Sterling Ponds Court
Sterling Heights, Michigan 48312

Re: Letter of Interest to Operate Horizontal Takeoff and Landing Suborbital Vehicles

Dear Mr. Gavin Brown:

Dawn Aerospace would like to express its interest to collaborate with you and the Michigan Aerospace Manufacturers Association (MAMA) to operate our Aurora MKII and future series of horizontal takeoff and landing suborbital spaceplanes in Michigan. Dawn's vehicles are expected to perform horizontal suborbital R&DTE flights as early as 2022.

We believe that our suborbital vehicles' performance and flight profiles will be well served at the to the Oscoda-Wurmsmith envisioned spaceport facility, and very importantly, at the wide-open nearby Alpena flight range airspace as well.

We are also aware of the Michigan Launch Initiative (MLI) plans to attract and grow an ecosystem of leading aerospace and space companies that might require our Aurora Spaceplane services such as small satellite launches to LEO.

Moreover, Dawn is a technology company and besides our Aurora spaceplane activities, we are also space industry leader in the design and manufacture of "clean" LEO satellite thrusters. Our technology is very well aligned with the MLI stated interest of becoming a leader in sustainable and environmentally friendly space technologies and products.

We look forward to further discussions and evaluations of what could be a phenomenal possible flight operations scenario for Dawn Aerospace in Michigan.

With best regards,

Jeroen Wink, Co-Founder and CEO

Dawn Aerospace
jeroen@dawnaerospace.com
+31641200882

December 23rd, 2020

Gavin Brown
Executive Director, Michigan Aerospace Manufacturers Association
Michigan Launch Initiative
7205 Sterling Ponds Court
Sterling Heights, Michigan 48312

Dear Mr. Gavin Brown,

Spire would like to express interest in a partnership with the Michigan Launch Initiative (MLI) to provide data services for the Michigan Spaceport Command and Control Center.

Spire is a space-based data and analytics company which firmly believes in the power of data to change the world. With world-class products including Numerical Weather Prediction, Spaceport situational awareness, high-precision wind data, and atmospheric modeling, Spire is well-equipped to provide the MLI Spaceport Command and Control Center with robust and resilient data capabilities.

We are eager to support Michigan's ambitious space-related initiatives, including 5G-enabled space sensing, ground and air vehicle autonomy, and space situational awareness and sustainability. Spire believes that our partnership will act as a catalyst for the emerging Michigan commercial space sector and the related economic and business development activities that follow. Spire's capabilities will empower the growing ecosystem of space, aerospace, aviation, and defense companies in the state by supporting a wide array of businesses, including air-launch or hypersonic vehicles and rockets, space technology RDT&E, and astronaut and pilot training.

This letter expresses Spire's interest to be a partner to the MLI and support with data flight operations, including but not limited to parabolic flights, research and development, and the test and evaluation of space-related technologies and systems. Spire is also interested in further discussing with MLI future data support for vehicles to and from the envisioned Oscoda-Wurmsmith Horizontal and Marquette Vertical Spaceport facilities.

We look forward to discussing next steps in our collaboration with the MLI and other Michigan organizations engaged in supporting the state's commercial space sector.

With best regards,

WILLIAM S. CROMARTY
Federal Account Executive
Spire Global, Inc.
8000 Towers Crescent Drive, Suite 1225
Vienna, Virginia 22182
+1 (650) 300-9997

Glasgow - San Francisco - DC - Singapore - Boulder - Luxembourg



December 15th, 2020
Gavin Brown
Executive director
Michigan Aerospace Manufacturers Association
Michigan Launch Initiative
DC3S Building
7205 Sterling Ponds Court
Sterling Heights, Michigan 48312

Re: Letter of Interest to Operate Horizontal Takeoff and Landing Space Support Vehicles (SSV)

Dear Mr. Gavin Brown:

We are the operators of the world's only fleet of supersonic F-104 Starfighter aircraft. Our unique fleet is ready to support the commercial spaceflight industry in a number of ways, including air-launch or hypersonic vehicles and rockets, space technology R&DTE, astronaut and pilot training.

Our vehicles are Space Support Vehicles (SSV's) that require a horizontal takeoff and landing licensed facility, or Spaceport. We are interested in discussing further with you and to explore future operations to and from the envisioned Oscoda-Wurmsmith Spaceport facility.

This letter expresses our interest to operate Space Support Missions, and other space industry servicing related flights, including but not limited to, parabolic flights, research and development, test and evaluation of space related technologies and systems. We are interested in working with you to support the Presidential mandates related to your ambitious space related 5 G enabled space sensing, Command and Control Center, and space situational awareness and sustainability. In addition, we cater to and will be glad to support flights on your behalf for NASA, DARPA, DIUX, DOC, DOT and DOD and other public agencies.

We believe the Oscoda-Wurmsmith proposed spaceport meets our specifications and could be an optimal operating hub connecting Florida with Canada. Indeed, we also think that our activities would also benefit and catalyze the Michigan commercial space sector and all its related economic and business development.

We look forward to discussing next steps to fly out of Michigan's Spaceport and to enable our collaboration with MAMA, MLI and any other Michigan entities, public, private and PPP that you might deem appropriate to begin a mutually prosperous and beneficial relationship.

Best regards,



Rick Svetkoff, President and CEO
Starfighters Aerospace
Cell: 727-452-8817
Email: rick@starfighters.net

"Logic will get you from A to B. Imagination will take you everywhere"

STARFIGHTERS AEROSPACE INC
1808 N. Jasmine Avenue, Tarpon Springs - FLORIDA 34689-5250 Tel. 727 452 8817
info@starfighters.net www.starfighters.net



Virgin Orbit, LLC
4022 E Conant Street
Long Beach, CA 90808
Telephone: (562) 384-4400
www.virginorbit.com

November 20, 2020

Gavin Brown
Executive Director
Michigan Aerospace Manufacturers Association
DC3S Building
7205 Sterling Ponds Court
Sterling Heights, Michigan 48312

Re: Letter of Intent to Provide Support: Michigan Launch Initiative and 5G Infrastructure Initiative

Dear Mr. Brown,

Virgin Orbit, LLC ("Virgin Orbit" or "we") hope to collaborate with Michigan Aerospace Manufacturers Association ("MAMA" or "you"), to bring horizontal launch capability to Michigan as early as 2022. We believe our proposed collaboration would be an important milestone to advance the space sector and economic development in Michigan.

As global space activities are expected to ramp up rapidly in the coming years, a flexible launch capability becomes a crucial factor in ensuring the safety of space assets and continuous space economic growth for the region. Air launch technology and mobile Ground Support Equipment are important elements to achieve that goal. Virgin Orbit's ability to harness innovation, global talent, and critical technologies could quickly advance Michigan's ambitions in space.

After careful assessment of multiple airports in Michigan, we are happy to support Oscoda's development into a "LauncherOne Ready" spaceport to host potential launches for Virgin Orbit. We look forward to forming a partnership with you to drive and deliver value to the Michigan space ecosystem. With the 5G program, we will work with you to support initiatives for the US Presidential administration, NASA, Department of Commerce, and Department of Defense, for exclusive launch carrier rights for ground vehicle producers who want to make full use of Michigan Launch Initiative incentives.

We look forward to formalizing our collaboration with MAMA and hope that will mark the beginning of a successful and beneficial business relationship.

Sincerely,

A handwritten signature in black ink that reads "Monica Jan".

Monica Jan
Senior Director
Strategy & Customer Experience
Virgin Orbit, LLC

VIRGIN ORBIT 4022 E CONANT ST LONG BEACH CA 90808 USA



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