South Plains Association of Governments

South Plains Association of Governments Regional Aerospace Study

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Prepared for:

South Plains Association of Governments

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1. INTRODUCTION AND BACKGROUND

1.1. Project Overview and Goals

The South Plains Association of Governments (SPAG) has selected Kimley-Horn to conduct a Regional Aerospace Planning Study. The goal of this planning study is to determine the feasibility of aerospace operations within the SPAG region and determine strategies that support economic growth within the region. This study will consist of the following key elements:

- Introduction to Aerospace and Market Overview
- Concept of Operations Development and Existing Conditions Analysis
- Site Investigation and Feasibility Analysis
- Stakeholder Engagement and Public Interest
- Study Results and Next Step Recommendations

This study will focus on determining the best use-case for the SPAG region to develop an aerospace-oriented market strategy. While launch operations will be analyzed, final recommendations will rely on factors that reasonably allow for economic growth potential directly related to aerospace industry drivers. Utilizing the key elements listed above, the study will compare potential Concepts of Operations (CONOPs), evaluate and prioritize them based on suitability, and develop a plan to gauge market capture potential and strategize key focus areas for SPAG to pursue.

1.2. South Plains Association of Governments

SPAG is a regional council serving 15 counties across Texas State Planning Region Two, where each of the 15 counties, 46 cities, and 9 special purpose districts are voluntary members. Established in 1967, SPAG promotes collaboration among local governments to advance economic development, infrastructure, and regional planning [1]. The South Plains region spans over 13,700 square miles and is characterized by its strong agricultural base, energy production, and growing manufacturing sector. The area is known for producing cotton, corn, grains, wheat, dairy, livestock, and wine grapes. Beyond agriculture, the area supports diverse industries including healthcare, education, and transportation. SPAG works to coordinate resources and strategic initiatives that enhance connectivity, support workforce development, and improve quality of life for communities throughout the region. A map of the SPAG region is depicted in **Figure 1**.

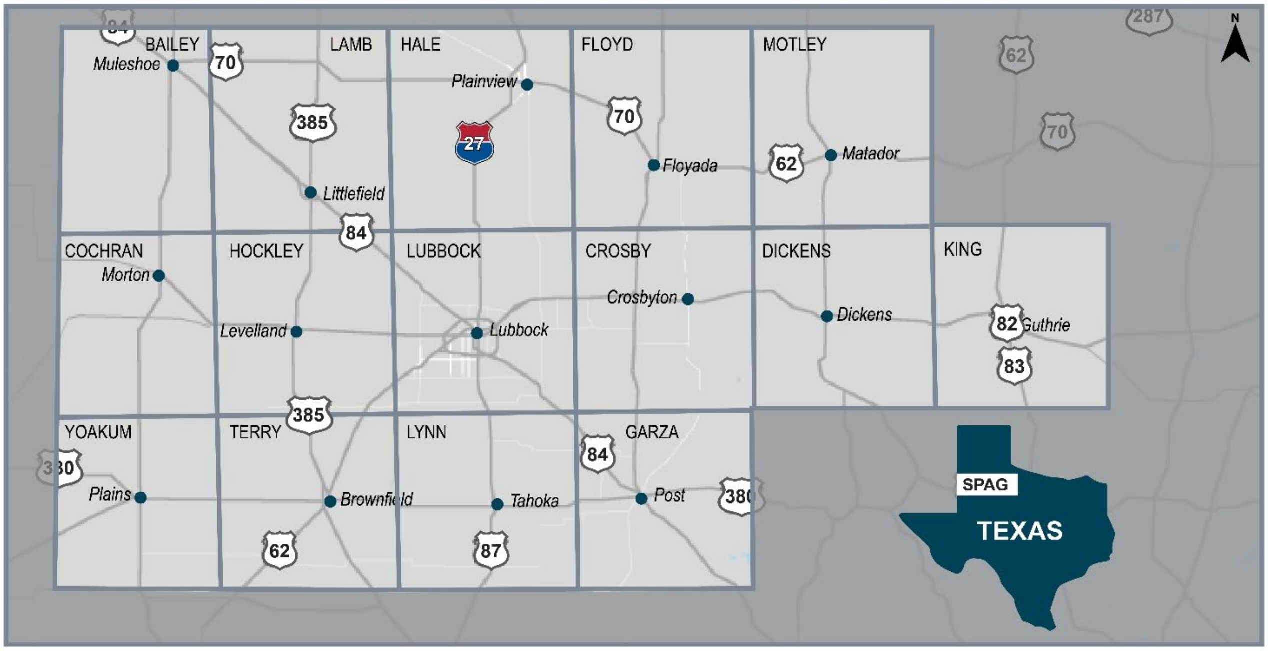

Figure 1: Map Illustrating the SPAG Region.

1.3. Texas Space Commission

The Texas Space Commission (TSC) was established by the 88th Texas Legislature in 2023 as part of a statewide initiative to advance Texas leadership in space-related industries. The creation of the TSC was driven by the growing need to coordinate and stimulate innovation across space operations, aeronautics, and aviation sectors, promoting integration into the Texas economy. The Commission is tasked with fostering public and private partnerships, supporting workforce development, and enabling infrastructure investments critical to the growth of the aerospace sector in Texas [2].

To further its mission, the TSC oversees the Space Exploration & Aeronautics Research Fund (SEARF) grant program, which was authorized concurrently with the Commission's establishment in 2023. The SEARF program was designed to provide financial support to businesses, nonprofit organizations, and governmental entities engaged in space exploration, research, and aeronautics activities. The grant program officially began releasing funding in early 2024, following the adoption of program guidelines and an initial round of applications. Since its launch, SEARF has enabled recipients to pursue innovative projects, advance research, and expand the capabilities of Texas's aerospace industry [3].

SEARF recipients include:

- Private aerospace firms: Launch systems, propulsion, manufacturing, testing.

- Universities: Aeronautics and space research.
- Nonprofits: STEM outreach, workforce development.
- Public agencies: Infrastructure upgrades for aerospace operations.

SEARF funding targets innovation, facility enhancement, and research expansion for the Texas aerospace economy. SPAG was awarded SEARF funding to perform this planning study and determine the region's ability to grow and support the TSC mission. It is anticipated that SPAG will continue to work with TSC to realize growth potential following this study through additional project phases and grant funding.

1.4. Project Methodology

Aligning with project goals identified in Section 1.1, this study is meant to determine the feasibility of aerospace operations and identify strategies that support economic growth within the SPAG region. To accomplish this, Kimley-Horn, in coordination with SPAG leadership and associated members, identified the following key components and evaluation criteria:

1. Project Goals – Define feasible outcomes such as job creation, infrastructure improvement, and increased aerospace activity. Assess strategies for effectiveness and sustainability.
2. Concept of Operations (CONOP) – Develop and evaluate operational options, including launch capabilities and manufacturing hubs, based on alignment with project goals and stakeholder input.
3. Regional Evaluation – Determine regional capabilities, readiness, and potential gaps through review of workforce, infrastructure, airspace, environment, etc.
4. Market Conditions – Analyze the current and future aerospace industry to determine its ability to support the growth of the identified activities.
5. Stakeholder and Public Engagement – Seek input from community members and organizations to confirm alignment with regional needs.

The study results will include focus areas for SPAG related to aerospace industry needs and regional capabilities. The recommendations from this study will include launch feasibility results, potential siting locations or criteria, as well as other opportunities within the aerospace market.

2. CONCEPT OF OPERATIONS

In coordination with SPAG members, Kimley-Horn worked with multiple stakeholders to analyze potential operations, known as Concept of Operations (CONOPs). The following operations were considered:

1. Vertical Launch
2. Horizontal Launch
3. Reentry
4. Advanced Testing (rocket engine, pressure, flight systems, avionics, telemetry, etc.)
5. Highspeed Aircraft (supersonic/hypersonic)
6. Aerospace Support Facilities (integration and processing)
7. Aerospace Manufacturing

Throughout the study, these identified operations are defined, evaluated, and prioritized as described in Section 1.4. Additional details regarding the stakeholder engagement activities are disclosed in Chapter 9 of this report.

2.1. Introduction to Launch and Reentry

This section presents an overview of the various launch operations considered in the study, outlining the distinct categories and processes associated with each type. By examining the operational requirements and integration strategies for different launch systems, including vertical, horizontal, and non-traditional methods, the study aims to assess their feasibility and compatibility within the regional context. The following provides a detailed breakdown of launch classifications, essential operational procedures, and the sequence of events associated with launch activities.

This study defines a variety of launch operations to be analyzed for operational feasibility and regional integration. Launch may be categorized as follows:

1. Vertical Launch
    - Orbital Vertical Launch Systems
        - Small
        - Medium
        - Heavy
        - Super Heavy
    - Suborbital Vertical Launch Systems
    - Low-Altitude Vertical Testing or Research Systems
        - Sounding Rockets
        - Low Impulse
    - Balloon
2. Horizontal Launch
    - Aircraft Assist Launch Systems
    - Integrated Spaceplanes
3. Non-Traditional Launch Systems
    - Centrifugal Launch
    - Rail Launch
    - Electromagnetic Catapult

Each launch category defined will have unique operational needs. Launch operations consist of numerous control procedures. Typical elements include propulsion system verification, avionics diagnostics, structural load assessments, telemetry system integration, and environmental conditioning. Additional launch procedures included flight readiness reviews that are conducted prior to static fire tests and final launch sequencing, and all procedures are closely monitored by command and control teams within ground operations centers. The sequence of these events is defined in **Table 1** below:

Table 1: Typical Launch Sequencing

Process	Description
Propulsion System Verification	Conduct hot-fire engine tests and calibrate thrust vector control to ensure engines and directional systems are functioning correctly.
Avionics Diagnostics	Perform comprehensive checks of onboard electronics, guidance, navigation, and flight control systems.
Structural Load Assessments	Evaluate the vehicle's structural integrity by simulating launch and flight loads.
Telemetry System Integration	Integrate and test communication systems to enable real-time data transmission throughout the launch process.
Environmental Conditioning	Prepare and condition the vehicle for launch by controlling temperature, humidity, and other environmental factors.
Flight Readiness Review	Conduct a formal review involving all teams to verify readiness for launch.
Wet-Dress Rehearsal	Perform a controlled operational rehearsal with the vehicle secured to the launch pad, and cryogenics loaded for system verification.
Final Launch Sequencing	Execute the final series of steps leading to launch, monitored by command and control teams in ground operations centers.

Vertical vs. Horizontal

Vertical launch operations typically utilize launch pads equipped with specialized infrastructure such as flame deflection structures, cryogenic propellant transfer systems, and rapid disconnect umbilicals. These facilities can accommodate high-thrust, multi-stage launch vehicles, supporting orbital trajectories in many cases, contributing to national security mission support and large-scale commercial capability. Some vertical launch sites are limited to suborbital launch capabilities that utilize similar infrastructure at a smaller-scale.

Horizontal launch operations typically utilize runways, sharing infrastructure with traditional aircraft operations. Horizontal launch platforms are generally more easily integrated into inland regions due to compatibility with traditional aviation systems, airspace, and operational adaptability. These operations normally require less specialized infrastructure than vertical operations and are subject to a less complex federal licensing review, making horizontal launch site selection a consistently preferred alternative for inland spaceports.

Spaceport Integration

Due to the significant differences in operations and infrastructure required, compatibility for spaceport development must be defined on a case-by-case basis, as all spaceports are unique in what they offer and may be defined by the type of launch (vertical vs horizontal) or even by the type of commerce conducted within the spaceport boundary.

A commercial spaceport may be classified and licensed by the federal government as either a vertical launch, horizontal launch, or reentry facility. The most classic example of a commercial spaceport is a vertical launch facility. The Cape Canaveral Spaceport in Florida is a prime example of a vertical launch facility that is widely recognized and utilizes specialized launch infrastructure to enable large-scale vertical launch. In contrast, horizontal launch facilities that utilize traditional airport infrastructure have widely available options for integration, as there are many airports across the world with compatible infrastructure already in place.

In some cases, a spaceport is used as a business park with a focus on aerospace economic development, serving as a hub rather than a launch site. This could mean that the spaceport would function primarily as a center for research and testing, development, and manufacturing of aerospace products; this creates new jobs and business opportunities for the surrounding community.

A federal range is a type of spaceport that is owned and operated by the U.S. government. Federal ranges are controlled launch sites primarily used for orbital and suborbital testing, as well as national security and government-sponsored missions. Examples include Vandenberg Space Force Base and Cape Canaveral Space Force Station, which are consistently utilized for military launches, scientific satellites, crewed missions, and government payloads.

While federal ranges are designed to support government and defense activities, they also host commercial operations. Many commercial launches, such as satellite deployments and resupply missions to the International Space Station (ISS), are conducted from federal ranges due to their robust infrastructure, regulatory oversight, and ability to accommodate complex launch profiles. Commercial companies must coordinate with federal authorities for access and scheduling, but federal ranges increasingly facilitate private sector activity as the commercial space industry grows.

In contrast, commercial spaceports are typically owned and operated by state, local, or private entities. These facilities focus on supporting commercial launches, space tourism, research, and development missions, often with more flexibility in scheduling and operational requirements. Commercial spaceports may host horizontal launches or reentries (using runways) or vertical launches (using specialized pads) tailored to business-driven space activities with less emphasis on national security and government payloads.

2.1.1. Vertical Launch Systems

Vertical launch systems require substantial specialized infrastructure and are heavily regulated operations. These launch systems are typically distinguished into two categories—Orbital, which achieves a stable orbit around Earth, and Suborbital, which travels into space but does not complete an orbit, and are typically short-duration missions.

Orbital launch systems utilize multi-stage rockets designed to accelerate payloads to orbital velocity and achieve stable trajectories around Earth. These vehicles, such as the SpaceX Falcon 9, are used regularly for satellite deployment and ISS resupply missions. They utilize complex guidance, control, and propulsion architectures. Orbital missions often require precise stage separation, engine ignition sequences, and are supported by extensive ground infrastructure. This infrastructure includes elements like launch pads, propellant storage, and telemetry systems. Typical applications include communications satellites, scientific probes, and crewed spacecraft. Orbital launch vehicle classes are typically categorized based on payload capacity to Low Earth Orbit (LEO). **Table 2** provides classifications based on payload capacity to LEO.

Table 2: Orbital Launch Vehicle Classifications

Class	Payload Capacity (LEO)	Representative Examples	Description
Small-lift	Under 2,000 kg	Electron (Rocket Lab), Vega (ESA), LauncherOne	Payloads include small research experiments and small satellites. Require the least amount of infrastructure. Typically expendable.
Medium-lift	2,000 to 20,000 kg	Atlas V (ULA), Soyuz-2, PSLV (India), Falcon 9 (standard)	Can deliver larger satellites and payloads into orbit. Traditionally expendable.
Heavy-lift	20,000 to 50,000 kg	Falcon 9 (full capability), Ariane 5/6, Delta IV Heavy, New Glenn	Delivers large payloads to Low Earth Orbit and beyond. Some (Falcon 9) are reusable due to vertical landing capabilities. Traditionally expendable.
Super Heavy-lift	Over 50,000 kg	Starship (SpaceX), SLS (NASA), Falcon Heavy, Saturn V	Largest class of orbital vehicles. Requires the most ground support infrastructure, which can cost hundreds of millions or more to construct. Some vertical landing capabilities. No longer primarily expendable due to advances in landing technology.

In contrast, Suborbital launch systems propel payloads along ballistic arcs, reaching altitudes above the Kármán Line (100 km) without the need to achieve orbital velocity. Their flight profiles are often short, typically less than 15 minutes, providing brief access to microgravity and space environments. Vehicles like Blue Origin's New Shepard and Virgin Galactic's SpaceShipTwo are optimized for rapid turnaround and reusability. Suborbital launches support technology validation, atmospheric and space science, defense testing, and commercial space tourism. Ground infrastructure requirements are typically reduced for these types of operations.

Both systems are governed by strict regulatory frameworks, with orbital launches facing more complex licensing due to higher risk profiles and international agreements.

Figure 2: SpaceX's Falcon 9 Rocket [4].

2.1.2. Suborbital Launch Systems

Sounding Rockets

Sounding rockets are suborbital rockets used primarily for research purposes. Sounding rockets often carry instrument payloads that are used to collect measurements and conduct scientific experiments. Sounding rockets are a desirable platform for research scientists and educational organizations because they are relatively affordable and have a short lead time. The rockets are typically designed to reach apogees between 30 and 90 miles, but some have the capability to reach altitudes of up to 930 miles [5].

Sounding rockets are typically unguided vehicles, which means they are uncontrolled on both ascent and descent. The uncontrollability of the vehicle makes it incompatible with population centers due to an unacceptable level of risk to the uninvolved public. In fiscal year 2025, National Aeronautics and Space Administration (NASA) sounding rockets were launched 17 times with a vehicle success rate of approximately 94% [6].

Figure 3: NASA Sounding Rocket [7].

Suborbital Experimentation and Space Tourism

Suborbital space tourism is a growing field within the aerospace industry. Companies such as Virgin Galactic, Blue Origin, and Airbus have vehicles in various stages of development. Virgin Galactic's SpaceShipTwo is a carrier-launched suborbital spaceplane. SpaceShipTwo first launched in 2019 and conducted six commercial flights between Q2 2023 and Q4 2023. Virgin Galactic is currently developing the next iteration of its Delta Class spaceship, with planned capabilities of flying eight missions per month. Delta Class vehicles are anticipated to begin commercial service in 2026 [8], [9].

New Shepard is a fully reusable vertical takeoff and vertical landing suborbital launch vehicle designed and manufactured by Blue Origin. New Shepard has been primarily used for space tourism, carrying 98 passengers (92 individuals) above the Kármán Line. Human flights began in 2021, following the conclusion of flight testing. On January 30, 2026, it was announced that Blue Origin would be pausing New Shepard flights to redirect company resources toward accelerating its lunar human flight program [10].

2.1.3. Horizontal Launch Systems

Horizontal Launch Vehicles (HLVs) are being evaluated for space missions due to their potential as cost-effective and versatile solutions for certain mission types [11]. These vehicles are envisioned to serve as “mobile launch pads,” capable of utilizing existing airport runways, operating above weather disturbances, loitering while awaiting mission directives, and enabling accurate positioning for orbital intercepts, rendezvous operations, or reconnaissance activities [11]. Multiple HLV designs are currently being evaluated, with further information available in Chapter 5 of this report. There are nine licensed horizontal spaceports in the United States, but most projects have ended due to low vehicle success rates. The main market remains research and development, with industry needs generally favoring vertical launch solutions.

Northrop Grumman’s Pegasus Rocket represents an operational example of an HLV, launching from the Stargazer L-1011 aircraft at approximately 40,000 feet over the ocean. To date, Pegasus has completed over 45 missions and successfully deployed nearly 100 satellites into orbit [12].

2.1.4. Additional Launch Systems

High-altitude balloons can reach near-space altitudes. Currently, unmanned high-altitude balloons are used for research purposes, including weather monitoring, atmospheric research, and climate research. However, companies like World View Enterprises are looking to expand the potential uses of high-altitude balloons to include space tourism, telecommunications, expanded research capabilities, and other commercial uses.

There are benefits and drawbacks to high-altitude balloons. High-altitude balloons tend to be less expensive and more readily available for launch than other more traditional launch vehicles, which may make them more desirable for student research groups or enthusiasts. However, the near-space balloons that are currently operational typically only reach the stratosphere and are not as controllable as other types of launch vehicles, thus restricting the data collection and making the payload landing location unknown.

Figure 4: High-altitude Balloon [13].

Railgun Launch Systems

A railgun is a type of rail launch system that converts electrical energy into kinetic energy instead of relying on chemical energy produced by explosive propellants. In a railgun launch system, the launch vehicle is positioned between two rails. An electrical current is sent through one rail and returned through the other, with the vehicle serving as the conductive connection between the two rails. The opposing current flowing through the conductive rails generates an electromagnetic field that exerts a force on the vehicle, accelerating it forward.

The infrastructure for a railgun launch system would require several miles of fixed rail. Early designs for a NASA railgun launch system estimated to be a two-mile long track. Railguns remain experimental and continue to be studies for use in aerospace applications.

Figure 5: Artist Concept of Potential Design for Rail-Launched Aircraft [13].

Maglev Launch Systems

The term "Maglev" stands for magnetic levitation and is a technology that uses two sets of magnets to (1) repel the vehicle off the tracks and (2) propel the vehicle forward. This technology is currently used in high-speed superconducting Maglev trains in Shanghai, Japan, and South Korea [14].

Maglev launch systems have been pursued by multiple organizations, including NASA and StarTram. The StarTram Gen-1 Maglev Launch System was proposed as a cargo-only launch system due to the acceleration profile and would require a three-meter-diameter evacuated accelerator tunnel approximately 110 kilometers long. The inventors believe that the StarTram Gen-1 Maglev Launch System could be built within 10 years if sufficient funding were secured.

Figure 6: Maglev System Evaluated at NASA's Marshall Space Flight Center [13].

Centrifugal Launch Systems

Centrifugal launch systems are systems that accelerate a vehicle along a circular track to build up the kinetic energy required for launch into space. This type of launch system has been pursued by companies such as Hyper V Technology Corporation and SpinLaunch. There is very little published about the technology used to generate the required kinetic energy, and there are no centrifugal launch systems currently operational. However, SpinLaunch has leased 10 acres of land at Spaceport America and has built a facility for flight testing. The anticipated footprint required to support a centrifugal launch system is comparable in size to that of a small vertical launch vehicle.

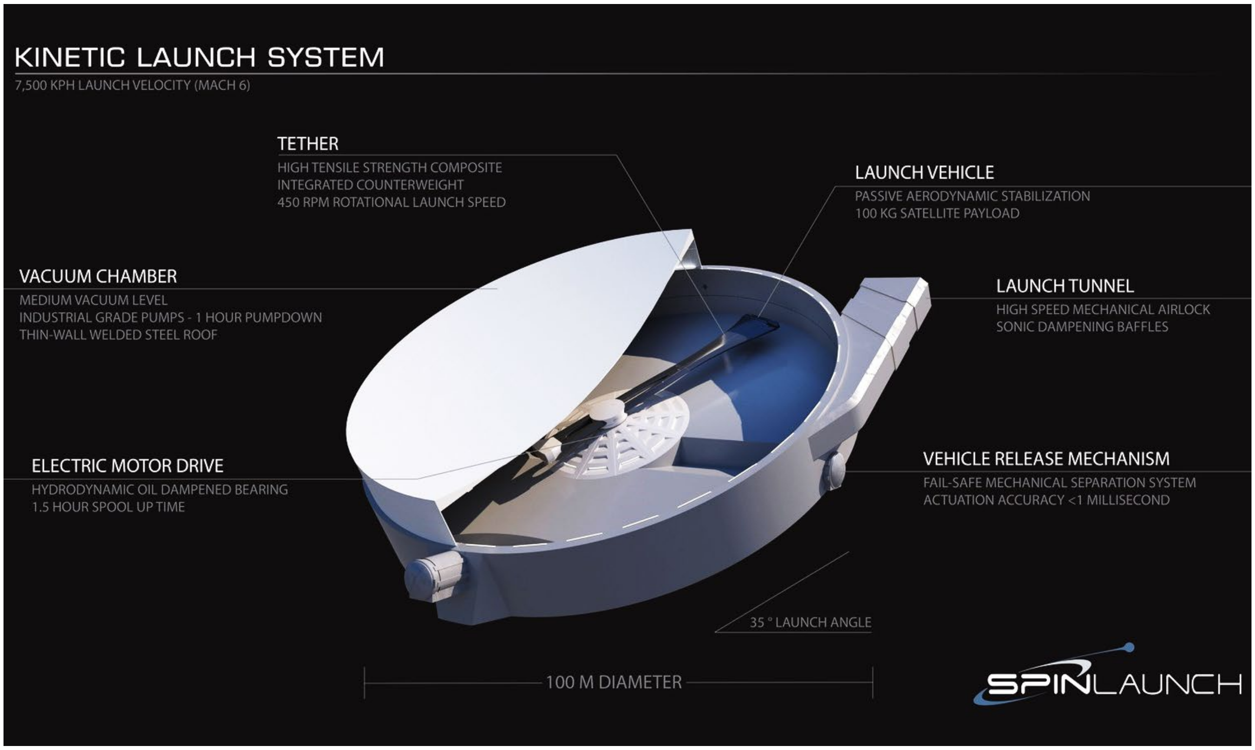

Figure 7: SpinLaunch Centrifugal Launch System [13].

Hypersonic Launch Systems

Hypersonic launch systems are vehicles that are capable of speeds of Mach 5 or higher. These vehicles typically require a larger carrier vehicle to fly to a certain altitude before being deployed and engaging its own engines. Stratolaunch’s Talon-A is a hypersonic vehicle that requires a carrier vehicle, the Stratolaunch Roc. The Talon-A is reusable, autonomous, liquid-rocket-powered hypersonic testbed capable of speeds over Mach 5 for defense and research applications [15].

Figure 8: Stratolaunch Talon-A [15].

2.2. United States Space Network

A spaceport is traditionally thought of as a facility that is specifically designed for launch and landing of spacecraft. However, spaceports are constantly adapting to the evolving landscape of the space industry. While spaceports serve primarily as a base for spaceport operations, the specific operations performed from these spaceports vary. Operations may include satellite development and launch, human spaceflight operations, spacecraft manufacturing, and component testing.

Commercial spaceports play an important role in satellite development, providing infrastructure to support the assembly, testing, and launch of specialized payloads. Spaceports often support aerospace ventures, serving as hubs where companies conduct research and development that advance aerospace missions, vehicles, infrastructure, and overall industry growth. Spaceports may also facilitate collaboration between academic institutions and private entities, contributing to technological advancements and scientific research in the space industry.

Spaceports in the United States are categorized as FAA-licensed, federal, and exclusive-use sites. Federal launch sites can be mainly categorized in the Eastern and Western ranges. The Eastern range consists of both Cape Canaveral Space Force Station and Kennedy Space Center, while the Western range includes the Vandenberg Space Force Base. Wallops Flight Facility is also classified as a federal launch site outside of the Eastern and Western ranges. There are two exclusive-use spaceports: Launch Site One West Texas (Blue Origin) and Boca Chica (SpaceX), both located in

Texas. The following are commercial spaceports, of which there are currently 14 actively licensed by the FAA:

Table 3: Table of Spaceports and Subsequent Locations and FAA License Dates.

Spaceport	Launch Type	Location	FAA Licensed Date [16]
Huntsville International Air and Space Port	Reentry	Huntsville, Alabama	May 13, 2022
Pacific Spaceport Complex Alaska	Vertical	Kodiak Island, Alaska	September 12, 2003
Mojave Air & Space Port	Horizontal	Mojave, California	June 17, 2004
Colorado Air & Space Port	Horizontal	Watkins, Colorado	August 17, 2018
Space Florida Launch and Landing Facility	Horizontal and Reentry	Cape Canaveral, Florida	November 8, 2018
Space Florida Launch Complex 46	Vertical	Cape Canaveral, Florida	July 1, 2010
Cecil Air and Space Port	Horizontal	Jacksonville, Florida	January 11, 2010
Space Coast Regional Airport - Exploration Spaceport	Horizontal	Titusville, Florida	May 5, 2020
Spaceport Camden	Vertical	Camden County, Georgia	December 20, 2021
Spaceport America	Horizontal and Vertical	Truth or Consequences, New Mexico	December 15, 2008
Oklahoma Spaceport	Horizontal	Burns Flat, Oklahoma	June 12, 2006
Houston Spaceport	Horizontal	Ellington Airport, Houston, Texas	June 26, 2015
Midland Air and Space Port	Horizontal	Midland, Texas	September 15, 2014
Mid-Atlantic Regional Spaceport	Vertical	Wallops Island, Virginia	December 18, 2002

The existing U.S. spaceport network is shown in **Figure 9.** Additionally, there are several proposed spaceports that are in various stages of licensing.

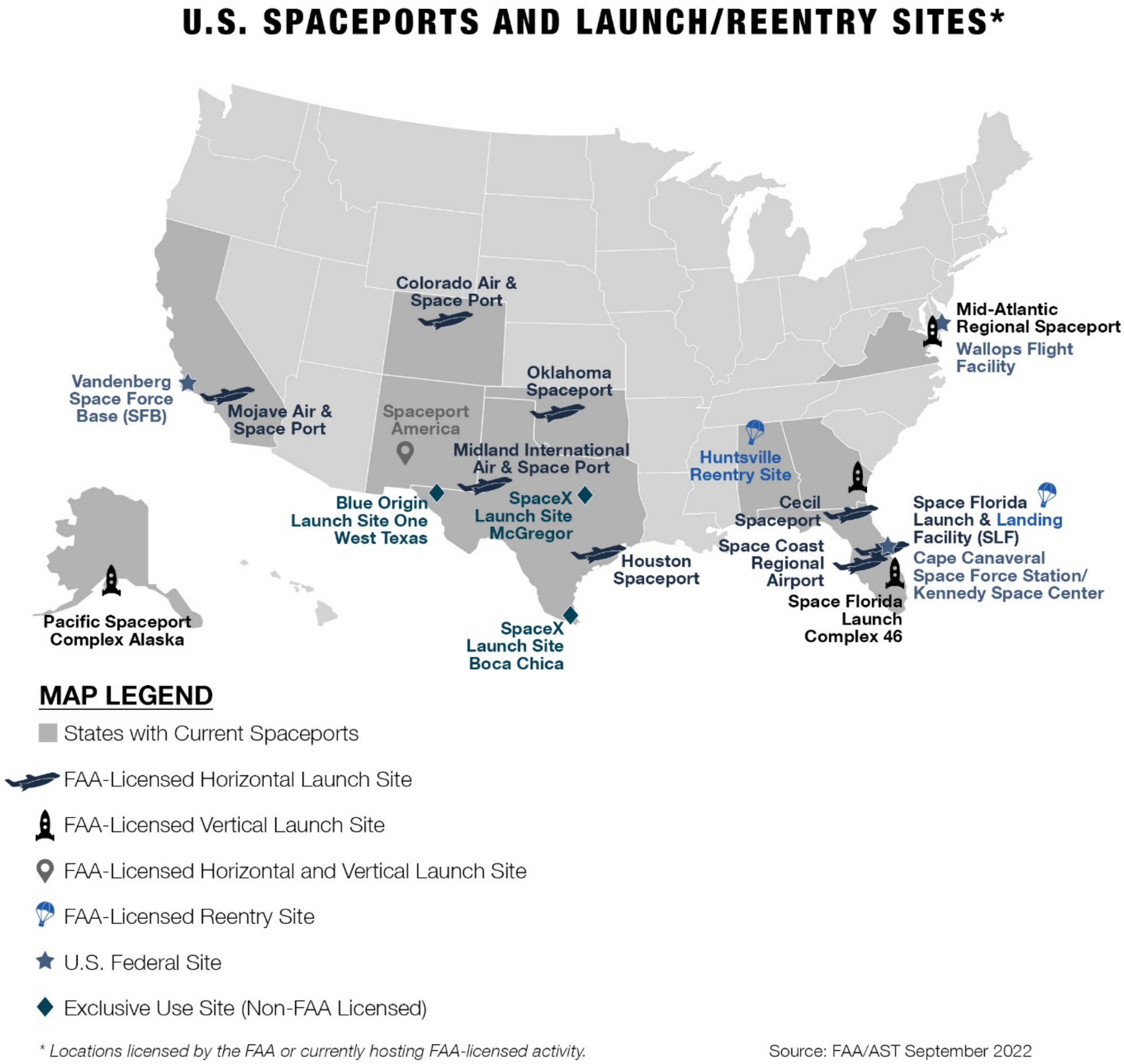

Figure 9: Map of U.S. Spaceport Network.

3. AEROSPACE DEVELOPMENT

The aerospace industry in the United States is a dynamic and rapidly advancing sector that provides access to both economic development and technological progress. This chapter provides an overview of operations, advancements, and market forces that are shaping the current landscape of aerospace development. It establishes context for spaceport infrastructure, technological advancements in launch systems, and the roles played by manufacturing, testing, and research facilities.

By exploring a variety of launch, research, manufacturing, and testing opportunities, this chapter describes how innovations such as rocket reusability are driving launch cadence and overall industry growth. This chapter also details the manufacturing needs, logistical complexities, and the relationship that educational and research institutions have with the industry to support skilled workforce growth.

3.1. Launch and Testing

3.1.1. Evolution of U.S. Launch Vehicle Development

Over the past seventy years, launch vehicle development in the U.S. has transitioned from a government-led, mission-specific initiative into a system that balances strategic national goals and commercial innovation. The origins of U.S. launch development trace back to the 1950s and 1960s, shaped by Cold War imperatives. Programs such as Atlas, Titan, and Saturn were established to support national security, scientific exploration, and the Apollo lunar missions. These early systems featured rapid technical advancement and were managed through vertical integration by the government, emphasizing expendable vehicles optimized for performance and mission success, with little consideration for cost or reusability.

Following the Apollo program in the early 1970s, U.S. policy shifted to prioritize reduced per-mission costs and greater operational flexibility. This led to the creation of the Space Shuttle program, which marked a significant technological and programmatic shift. The Shuttle was a partially reusable launch system designed to meet civil, defense, and commercial requirements within a unified national framework. Although the Shuttle achieved notable technical milestones, its complexity and high operational costs ultimately limited flight rates and market competitiveness.

3.1.2. Commercialization and Policy Reform

In the 1990s, U.S. launch vehicle development entered a new era, influenced by policy reforms, globalization, and advancements in manufacturing, avionics, and propulsion technologies. The Evolved Expendable Launch Vehicle (EELV) program was developed by the U.S. to ensure consistent and cost-effective access to space for national security, civil, and commercial missions. By introducing expendable launch vehicles like Atlas V and Delta IV, the EELV program aimed to replace older launch systems with more reliable and flexible options. These vehicles are designed to be used only once per mission, emphasizing reliability and affordability while supporting a wide range of payloads for government and commercial customers. Meanwhile, regulatory changes opened the launch market to private companies.

Several key regulatory changes enabled private companies to participate in the U.S. launch market. One of the most significant developments was the Commercial Space Launch Act of 1984, which established the legal and regulatory framework for private sector launch activities. This act authorized the U.S. Department of Transportation's Office of Commercial Space Transportation (OCST), later transferred to the Federal Aviation Administration's Office of Commercial Space Transportation (FAA-AST), to license and regulate commercial launches. This made it possible for non-governmental entities to conduct launch operations legally and safely. In the decades that followed, additional policy reforms expanded the market. These reforms included streamlined licensing requirements, export control adjustments, and increased support for commercial partnerships, all of which encouraged private investment and innovation in launch services.

3.1.3. Commercialization and Evolving Government Partnerships

Over the last twenty years, the U.S. launch vehicle landscape has shifted toward a commercially driven model, emphasizing reusability, rapid development cycles, and vertical integration. This transformation has fundamentally altered cost structures and development timelines across the industry. During this period, the federal government has moved away from direct system ownership and development, instead focusing on setting safety and mission requirements, anchoring demand, and developing heavy-lift and exploration-class systems for long-duration human and deep-space missions.

Recent advancements in launch vehicle technology have had a significant impact on satellite deployment and rideshare opportunities. Commercial launch providers now offer vehicles capable of deploying large satellite constellations, which has enabled rapid expansion of global communications, Earth observation, and navigation networks. The adoption of rideshare models, where multiple payloads share a single launch, has dramatically reduced per-satellite launch costs, increasing access for smaller commercial and research satellites. This approach is particularly advantageous for constellation deployments, allowing operators to launch numerous satellites at once and maintain or expand coverage with greater flexibility and affordability.

These developments have contributed to a more diverse and competitive launch market, supporting government missions as well as a wide array of commercial applications that depend on efficient, scalable, and cost-effective access to space. The result is a gradual shift from government-owned, custom-built systems to a hybrid architecture in which commercial providers and public institutions work together in complementary, interdependent roles.

In recent years, the establishment and growth of the U.S. Space Force has further transformed the relationship between government and the commercial aerospace sector. As the newest branch of the military, the Space Force is responsible for organizing, training, and equipping forces to protect U.S. interests in space, including the resilience and security of national satellites and space-based systems. This mission has driven the Space Force to actively collaborate with commercial launch providers and satellite manufacturers, leveraging private sector innovation to enhance national defense capabilities. The Space Force regularly contracts commercial companies for launch services, satellite deployment, and advanced technologies, accelerating the integration of cutting-edge solutions into military operations and supporting the rapid pace of industry development.

The relationship between the commercial industry and government agencies such as NASA and the Space Force is now characterized by partnership and shared objectives. Rather than relying solely on government-owned and operated assets, agencies increasingly utilize commercial offerings, fostering competition and encouraging technological advancements. Public-private partnerships, joint ventures, and contract awards for launch and satellite services have become standard practice. This collaborative approach allows government missions to benefit from commercial efficiencies, cost savings, and innovative practices, while commercial providers gain access to government funding, technical expertise, and long-term contracts.

Together, these trends are shaping a more interconnected, resilient, and agile space ecosystem, reflecting the ongoing evolution of the U.S. aerospace sector.

3.1.4. Component and Engine Testing

A consistent theme in U.S. launch vehicle development has been the evolution of component and engine testing as a primary method for reducing risk and validating designs. From early ballistic missile and Apollo-era programs, the United States adopted a "test-to-fly" philosophy, subjecting propulsion components, engines, and entire stages to extensive ground test campaigns before flight. The creation of large national test facilities, notably NASA’s John C. Stennis Space Center, enabled static firing of engines and stages under flight-like conditions. This allowed engineers to assess performance, structural integrity, combustion stability, and system interactions before committing hardware to launch.

During the Saturn V program, both first- and second-stage engines were hot-fired and certified on the ground, making comprehensive propulsion testing a prerequisite for mission assurance.

This focus intensified during the Space Shuttle era, as the complexity and reusability requirements of the Space Shuttle Main Engine (SSME) demanded unprecedented levels of component, subsystem, and integrated system testing. Elements such as turbopumps, thrust chambers, and preburners were tested individually and at subscale, followed by extensive full-engine hot-fire tests to validate performance across operational scenarios. Stennis Space Center became the center of excellence for SSME testing, supporting decades of work that directly informed design improvements, operating limits, and maintenance practices for reusable propulsion systems. These campaigns demonstrated the value of disciplined testing in enabling high-performance designs, while highlighting the cost and schedule impacts of deep test matrices and prolonged qualification cycles.

3.1.5. Modern Approaches to Testing

Today, in the commercial-led phase of U.S. launch vehicle development, component and engine testing remains central but is more tightly integrated with rapid design iteration and production learning. Modern programs continue to employ progressive test build-ups, from individual components to powerheads and full engines, using testing to enable faster feedback loops, rather than lengthy, single-qualification efforts. National test facilities such as Stennis Space Center now serve both government and commercial customers, offering support for large-thrust engines, subscale components, and acceptance testing. They also accommodate new entrants exploring alternative development strategies. Throughout this evolution, propulsion testing has remained a key function in U.S. launch system development, directly influencing vehicle reliability, operability, and readiness for flight, even as the organizational and economic context of launch has transformed. In addition to national test facility development, many commercial launch providers have designed and built dedicated test infrastructure for specific mission-oriented development, such as Firefly Aerospace and SpaceX.

3.2. Aerospace Manufacturing

Aerospace manufacturing involves the production of a wide range of products including aircraft, spacecraft, satellites, microchips, semiconductors, and other components essential to the aerospace industry. This sector plays a critical role in supporting commercial aviation, defense operations, and space exploration by supplying the necessary technologies and hardware.

Given the considerable size of many aerospace materials and components, manufacturing facilities are commonly established in locations that offer convenient access for transportation and logistics. These sites are typically chosen based on proximity to major highways, rail networks, airports, and ports, allowing for the efficient movement of oversized and heavy items such as rocket engines, fuselage sections, satellite assemblies, and structural elements. The logistical requirements for aerospace manufacturing include specialized handling equipment, such as cranes and flatbed trucks, as well as secure storage and staging areas to accommodate large-scale production and shipping activities.

Furthermore, facility location decisions often consider regional infrastructure, including the availability of skilled labor, utility capacity, and local regulatory support. In many cases, manufacturers collaborate closely with transportation providers to coordinate just-in-time delivery schedules, minimize transit times, and reduce costs associated with moving delicate or high-value aerospace hardware. As the industry continues to grow and diversify, especially with the rise of commercial launch providers and satellite manufacturers, the strategic placement of manufacturing sites remains a critical factor in ensuring reliable supply chains and meeting the demanding timelines of aerospace projects.

3.3. Aerospace Research Facilities

3.3.1. *Role and Structure of Aerospace Research Facilities*

Aerospace research facilities provide a platform for technological advancement, risk reduction, and workforce development across the U.S. aerospace industry. These facilities include federally operated centers (such as NASA research centers and FAA technical laboratories), Federally Funded Research and Development Centers (FFRDCs), university-affiliated research parks, and specialized test and evaluation sites. Collectively, they provide unique infrastructure such as wind tunnels, propulsion test stands, flight research ranges, high-performance computing, materials laboratories, and systems integration environments that cannot be economically replicated within private industry alone. Their mission is to mature foundational technologies, validate concepts at scale, and transfer knowledge into operational programs, enabling industry to focus on productization and production while reducing technical and financial risk [17], [18].

Historically, these facilities trace their lineage to the National Advisory Committee for Aeronautics (NACA), established in 1915 to restore U.S. leadership in flight through centralized research and experimental infrastructure. NACA laboratories, which later became NASA centers, set enduring standards for aerodynamics, propulsion, structures, and flight test methodology. That legacy continues today, with NASA research centers supporting aeronautics, space exploration, and advanced systems research that directly feeds into commercial aviation, launch systems, spacecraft, and emerging sectors such as advanced air mobility and sustainable aviation [19].

3.3.2. Contributions to the Aerospace Industry

The primary industrial contribution of aerospace research facilities lies in technology maturation and systems integration. NASA aeronautics research, for example, has contributed to nearly every modern commercial aircraft through advances in aerodynamics, noise reduction, materials, propulsion efficiency, and air traffic management concepts. According to NASA, all U.S. commercial aircraft incorporate NASA-developed technologies, reflecting decades of sustained pre-competitive research that reduces risk and accelerates innovation for manufacturers and operators [20].

Beyond aeronautics, propulsion and systems test facilities validating high-energy, safety-critical hardware prior to flight, which is particularly important for space launch and exploration systems. These facilities support both government and commercial customers, enabling new entrants and established firms to qualify engines, subsystems, and integrated stages without duplicating capital-intensive infrastructure. FFRDCs, such as those operated by nonprofit research organizations, further contribute by providing independent systems engineering, architecture evaluation, and mission assurance expertise that bridges government requirements and industry execution without competing commercially.

Research parks and university-affiliated aerospace laboratories play a complementary role by accelerating technology transfer and commercialization. By co-locating academic research, startup incubation, and industry partnerships, these ecosystems improve startup survival rates, support applied research, and create talent pipelines aligned with industry needs. Across North America, research parks collectively generate millions of jobs and contribute hundreds of billions of dollars in GDP annually, underscoring their role as engines of applied innovation rather than purely academic centers [21].

3.3.3. Regional and National Economic Impacts

The economic impact of aerospace research facilities is both deeply regional and broadly national. NASA's agency-wide activities, including those conducted at its research centers, generated more than $75.6 billion in U.S. economic output in Fiscal Year 2023 and supported approximately 305,000 jobs across all 50 states. These impacts extend well beyond direct employment and are driven by procurement, high-skilled labor income, and induced supply-chain activity across manufacturing, professional services, and advanced research sectors [22].

At the regional level, aerospace research centers serve as long-term economic anchors. States hosting major facilities, such as California, Texas, Alabama, Florida, Ohio, and Mississippi, experience sustained clusters of high-wage employment, specialized suppliers, and educational partnerships. Economic impact studies of individual NASA centers demonstrate substantial local benefits through payroll, contracting with regional firms, and awards to academic institutions, reinforcing durable aerospace ecosystems that persist across program cycles [22].

At the national scale, aerospace research facilities also reinforce U.S. competitiveness by supporting an industry that remains a leading contributor to GDP, high-skilled employment, and positive trade balance. The broader aerospace and defense sector generates hundreds of billions of dollars in annual economic activity and pays wages substantially above the national average, with research infrastructure playing a critical upstream role in sustaining innovation and productivity across the value chain [23].

3.3.4. Strategic Significance

Taken together, aerospace research facilities function as strategic national assets. They reduce systemic technical risk, enable cross-sector collaboration, and provide continuity of expertise that outlasts individual programs or market cycles. Their regional presence catalyzes high-technology clusters while their national mission underpins U.S. leadership in aerospace, aviation safety, space exploration, and emerging mobility domains. As the industry enters an era defined by digital engineering, sustainability imperatives, and commercial-government integration, these facilities remain central to aligning innovation with public benefit and long-term economic resilience [24].

4. EXISTING CONDITIONS OVERVIEW

4.1. Current Regulatory Environment

For a site to offer its services to multiple commercial launch or reentry vehicle providers, it must first obtain a Launch Site Operator License (LSOL) or Reentry Site Operator License (RSOL), respectively. The FAA Office of Commercial Space Transportation (AST) is the government organization that reviews and approves applications for site licenses that officially designate a site as a commercial spaceport.

4.1.1. Licensing Regulations

Licensing regulations required will depend on the development being made. Aerospace specific regulations are mainly found in the Code of Federal Regulations (CFR), Department of War (DoW), and NASA standards. A LSOL is primarily regulated under

Title 14 CFR Part 420, and an RSOL is regulated under Title 14 CFR Part 433. Application material and licensing are further regulated under Title 14 CFR Part 413 for both LSOLs and RSOLs.

4.1.2. Application Documentation

To comply with the requirements of Part 420 or Part 433, the applicant must prepare a license application that is submitted to AST. The typical structure of a site license application includes the following major components.

License Application Main Document (to comply with Part 413): The LSOL is issued under the FAA and has a 5-year lifespan before renewal. A LSOL allows spaceports to actively support launch operations. This application ensures that the suggested operations at a spaceport follow the FAA safety, operational, and environmental standards.

Control of Public Access Plan: Based on FAA requirements, this plan integrates with the Explosive Site Plan, Lightning Protection Plan, and Emergency Response Plan. This plan ensures that unauthorized individuals cannot enter hazardous areas during normal operations.

Scheduling Plan: Corresponds closely with the Notification Plan. The scheduling plan ensures that hazardous operations are coordinated to prevent conflicts and provide timely notifications.

Notification Plan: Works alongside the Accident Prevention Plan. Requires notifications to the FAA and air traffic control about scheduled launches or hazardous operations. It also puts time restrictions on notification of mishaps or accidents, depending on the severity of the event. The plan will also go over order of events and importance of the line of communication.

Accident Investigation Plan: Now known as the Mishap Plan, it is a mandatory part of the LSOL application. It is used to ensure that the spaceport has a structured process to respond, investigate, and prevent recurring accidents or mishaps from happening. This includes anything that happens during launch and landing, or testing.

Explosive Siting Plan: A mandatory part of the LSOL application. This plan ensures safe separation distances between explosive hazard facilities (i.e. Fuel Storage Areas, Oxidizer Storage Areas, Vehicles Processing Facilities) that comply with FAA regulations.

Lightning Protection Plan: According to the FAA, every explosive hazard facility is required to have a lightning protection system and include: air terminals, down conductors, Earth electrode systems, bonding and surge protection, and inspection/testing unless there is a warning system that allows timely evacuation.

Environmental Review: The FAA must comply with the National Environmental Policy Act (NEPA) before issuing an LSOL. Depending on the circumstances, the applicant will either be required to provide an Environmental Assessment (EA), Environmental Impact Statement (EIS), Categorical Exclusion (CATEX), or a Written Reevaluation of a prior EA or EIS. The documentation will determine whether the proposed action will significantly affect the environment. If impacts are not significant, the FAA will issue a determination such as a Finding of No Significant Impact (FONSI).

4.2. Geopolitical Factors

4.2.1. Texas Aerospace Legislature

The Spaceport Trust Fund (STF) is a financial tool to support the development of infrastructure necessary for establishing a spaceport in the State of Texas [25]. To apply for financial assistance from the STF, the following requirements must be met:

- An established development plan for a spaceport project
- Demonstrated financial ability to provide a minimum of 75% of the funding required for the project
- A viable business entity with a business plan demonstrating the capability and expertise to launch and land a Reusable Launch Vehicle (RLV) or spacecraft
- A commitment to locating facilities at the planned spaceport

The Texas Enterprise Fund (TEF) awards “deal-closing” grants to companies that are considering new projects with one site in Texas in competition with other out-of-state sites [26]. These cash grants are intended to incentivize a company to bring its business to Texas, and they have been used in the aerospace sector already, bringing over 5,000 aerospace jobs to Texas [27].

The Texas Enterprise Zone Program (EZP) is a state sales and tax refund program implemented with the intention of encouraging private investment and job creation in economically distressed areas of Texas [28]. The Governor’s University Research Initiative (GURI) is a program used to recruit distinguished researchers from around the world and bring them to Texas to help bolster the legitimacy of higher education institutions in the state [29].

4.2.2. Executive Orders

The Enabling Competition in the Commercial Space Industry Executive Order was issued on August 13, 2025, with the intention of accelerating the development of spaceport infrastructure by creating a more streamlined launch and reentry licensing process through regulatory reform and leadership restructuring. The Regulatory Reform proposed by this executive order states that within 180 days, the Secretary of Transportation must reevaluate, amend, or rescind Title 14 CFR Part 450. The reevaluation is ordered to specifically address these key points:

- What regulatory requirements should be inapplicable for a launch or reentry vehicle that possesses a flight termination system or automated flight safety system
- What regulatory requirements should be inapplicable or waived for hybrid launch or reentry vehicles that hold valid Federal Aviation Administration airworthiness certificates
- Whether to expand the conditions that demonstrate reliability for a reentry vehicle, sufficient to protect against a high-consequence event on reentry; and
- Whether other existing requirements are too attenuated to a vehicle's actual launch or reentry to warrant retention in Part 450

4.3. Regional Accessibility and Logistics

Distribution logistics support the execution of aerospace development activities by enabling the movement of supplies, materials, and equipment required for operations and technology deployment. Logistics planning includes the evaluation of material requirements across operational phases, with consideration given to component lead times, transportation needs for oversized or sensitive equipment, and compliance with applicable regulatory requirements.

The SPAG region's roadway network supports logistics and operational activities by providing connections between project sites, suppliers, and population centers. Roadways within the region link to major cities across Texas and adjacent states, allowing for regional and interregional transportation of materials as needed. Areas with lower population density accommodate larger-scale logistics activities, while higher-population areas provide access to workforce resources.

Road access supports coordination among employers, suppliers, and supporting operations and contributes to operational continuity and economic considerations. Roadway design characteristics, structural capacity, and surface conditions should be evaluated to determine compatibility with heavy equipment transport, fuel deliveries, and time-sensitive cargo associated with aerospace activities. Roadways also provide access for personnel and emergency response services.

The SPAG region is served by a network of state and federal highways that provide regional connectivity. U.S. Highway 87 transitions into Interstate 27 in Lubbock and extends north to Amarillo, where it intersects with Interstate 40. Texas Highway 289 functions as a loop around Lubbock, connecting multiple intersecting highways. Texas Highway 114 provides an east-west route from Dallas to New Mexico through Lubbock, while U.S. Highways 84, 62, and 380 provide additional diagonal and east-west connections. Texas Highway 214 runs north-south along the western edge of the region, connecting Interstate 40 with U.S. Highway 385. These routes are shown in **Figure 10**.

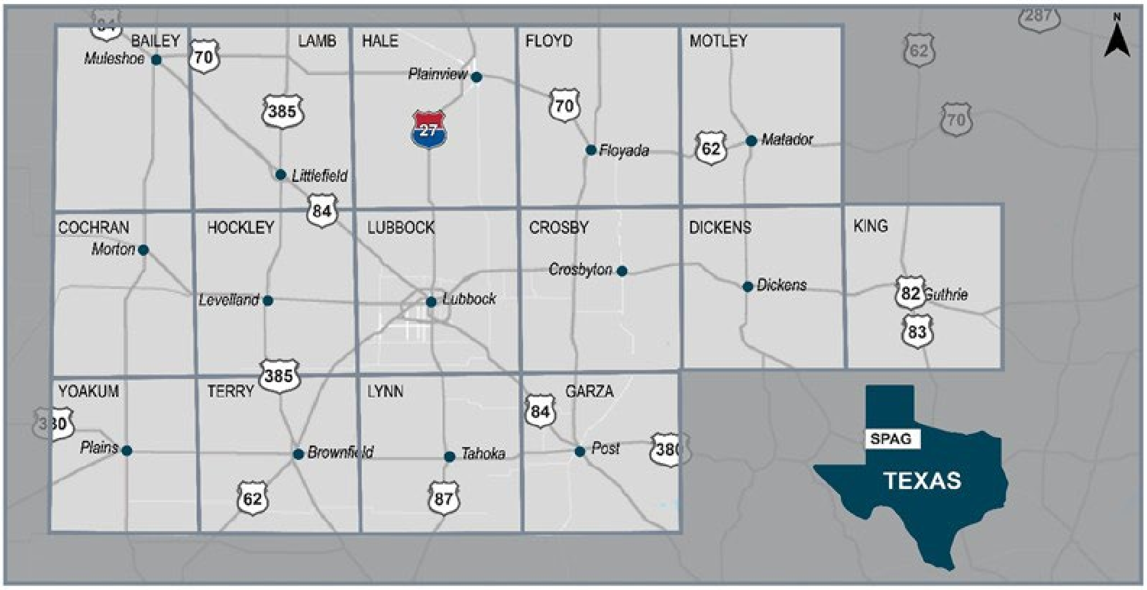

Figure 10: Map Depicting Major Roadways Through SPAG Region.

4.4. Environmental Review

Environmental factors that need to be considered during aerospace operations analysis include land use restrictions, protected habitats, and water resource management to ensure compliance with federal and state environmental regulations (such as NEPA). Stormwater drainage, soil stability, and contamination risks are evaluated to prevent ecological damage during construction and operations. Additionally, sustainability measures such as renewable energy integration and carbon reduction strategies are factored in, aligning with industry standards and community expectations. A thorough environmental review ensures that aerospace development minimizes ecological impact while meeting regulatory and safety requirements.

Preliminary review found that the SPAG region mainly consists of agricultural and scrublands land use. This can make it easier for potential aerospace development to take place, however additional review will need to be completed for full assessment. Utilizing the U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) tool as well as the EPA NEPA-Assist tool, preliminary investigations of environmental categories were reviewed.

Review of the SPAG region identified primary data points available to be biological habitat and air quality.

Biological review identified the following endangered species:

- Mammals: Texas Kangaroo Rat, Tricolored Bat
- Fishes: Sharpnose Shiner, Smalleye Shiner
- Birds: Lesser Prairie Chicken, Northern Aplomado Falcon, Piping Plover, Rufa Red Knot
- Insects: Monarch Butterfly

Critical habitat for endangered species consists of partial habitat to Sharpnose Shiner and Smalleye Shiner. Additionally, the SPAG region overlaps with the Grulla National Wildlife Refuge, and the Muleshoe National Wildlife Refuge.

Air quality is required to meet the national ambient air quality standards (NAAQs) for the following: Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), Particulate Matter (PM), Carbon Monoxide (CO), Ozone (O_3), and Lead (Pb) [30]. These emissions are all produced by aircraft and aerospace activities, which is why they are monitored by the EPA. Pollutants in the SPAG counties remain under the NAAQs thresholds and meet standards. Lubbock County's Air Quality Index (AQI) is currently in good range and there is no concern of poor air quality within the region [31].

These elements are taken into consideration during analysis of operations later in the study.

4.5. Utilities

The SPAG region is part of the Llano Estacado Regional Water Planning Group. The purpose of this group is to develop a water conservation and management plan for the region with the intention of stabilizing or improving the economic and social viability, and longevity of the region. Water and water availability is a crucial factor when it comes to vertical launch rockets. Every rocket launch requires an ignition overpressure and sound suppression system (IOP/SS). An IOP/SS is a system on a launch pad that covers the launch pad with water for the purposes of cooling and dampening the sound and heat produced by a rocket engine during the launch process. An IOP/SS can output approximately 450,000 gallons of water per minute and does so shortly before every launch. Due to this system's importance, it is essential to evaluate existing water plans in the region. The exact quantity of water that would be required annually is dependent upon the quantity of launches expected at the launch site.

Water availability in the region is an issue due to the semi-arid climate of West Texas. Annual average precipitation ranges from approximately 18 inches on the eastern border to approximately 14 inches on the western New Mexico state line. Due to the lack of rainfall, surface water in the region is scarce. The region's water is mainly sourced through a system of aquifers that run under the region. Approximately 97% of the water serving the Llano Estacado Water Planning Region is sourced from groundwater with the remaining 3% being sourced from a combination of reused water and surface water [32]. There are several aquifers used to source water for the region, but most of the water is provided by the Ogallala and Edwards-Trinity aquifers, which are part of the High Plains aquifer system. Other aquifers used to source water for the region include the Seymour aquifer and the Dockum aquifer.

Electricity in Lubbock is provided by Lubbock Power and Light within the city limits. Outside of Lubbock city limits, South Plains Electric Cooperative services the immediate suburbs and east as far as Foard County, Texas. All other counties in the SPAG region are serviced either partially or fully by Xcel Energy.

Natural Gas is provided by Atmos Energy and West Texas Gas. Atmos Energy is one of the largest natural gas distributors in the U.S. and operates one of the largest intrastate pipelines in Texas [33].

4.6. Water Resources

The Texas Commission on Environmental Quality (TCEQ) regulates and monitors surface waters throughout the state, including rivers, lakes, and other classified water bodies, through the Texas Surface Water Quality Standards and associated monitoring programs. Within the Llano Estacado region, surface waters are influenced by basin-level conditions identified by the TCEQ [32]. Portions of the SPAG region drain to the Brazos River Basin, where surface water segments have been documented to contain elevated concentrations of chloride, sulfate, and total dissolved solids (TDS), reflecting both natural conditions and historical land-use activities [32].

Oil and gas development within the broader region has contributed saline constituents to groundwater and surface water systems, prompting the establishment of regulatory requirements governing discharges and runoff associated with those operations. These activities are subject to additional TCEQ permitting and compliance measures intended to limit impacts to receiving water bodies.

Stormwater discharges in the SPAG region are regulated under the Texas Pollutant Discharge Elimination System (TPDES), which includes permitting requirements for construction activities, industrial facilities, and municipal separate storm sewer systems (MS4s). Local governments within the region, including the City of Lubbock and Lubbock County, operate stormwater management programs consistent with TCEQ requirements to control runoff, reduce pollutant loading, and protect receiving waters.

The region's extensive network of playa lake basins functions as a defining surface water and stormwater feature. Playa lakes act as natural detention basins for stormwater runoff and are a primary component of regional drainage systems. These basins are regularly monitored for water quality impacts associated with urban runoff, including sediment, nutrients, and other pollutants transported during storm events [32]. Local stormwater regulations emphasize the preservation and protection of playa lakes and require best management practices (BMPs) to minimize pollutant transport from developed areas.

Together, these surface water and stormwater regulatory frameworks establish the existing conditions under which development and industrial activities occur in the SPAG region and define the baseline requirements for managing runoff, protecting surface waters, and complying with state and federal water quality standards.

4.7. Land-Use

The SPAG region is geographically centered on Lubbock County and lies within the Llano Estacado, or Southern High Plains, a broad, flat plateau characterized by minimal surface relief and expansive open landscapes. Existing land use patterns across the SPAG region reflect a combination of long-standing agricultural activity, dispersed rural development, and concentrated urban growth within a limited number of population centers.

Agricultural land use encompasses much of the region, with extensive areas devoted to row crop production, rangeland, and associated agricultural infrastructure. Cotton and other irrigated crops are prevalent, supported historically by groundwater resources. Agricultural parcels are generally large in size, with low building density and limited vertical development. Outside municipal boundaries, land uses are predominantly rural, with wide expanses of undeveloped or minimally developed land remaining in agricultural production or open space.

Urban development within the SPAG region is concentrated primarily in Lubbock County, which contains approximately 60 percent of the region's population. The City of Lubbock serves as the region's principal urban center and includes a mix of residential, commercial, institutional, and industrial land uses supported by established transportation and utility infrastructure. Other municipalities within the region, including Plainview, Levelland, Brownfield, and Post, function as secondary population centers and exhibit smaller-scale urban development patterns. Development densities generally decrease rapidly outside city limits, transitioning to agricultural or undeveloped land uses.

Industrial land uses within the SPAG region are typically located within or adjacent to municipal boundaries and along major transportation corridors. These uses include agricultural processing facilities, manufacturing operations, warehousing, and energy-related activities. Industrial development is commonly separated from residential areas, reflecting local land use controls and compatibility considerations. The region's flat topography and availability of large parcels support industrial sites characterized by large building footprints and surface-level operations.

Transportation infrastructure is a defining feature of land use across the region. Major highways, rail lines, airports, and local road networks occupy linear corridors that influence adjacent development patterns. Aviation facilities and airports are generally surrounded by low-intensity land uses such as agricultural or industrial development to maintain compatibility with flight operations. Utility infrastructure, including power transmission lines and water facilities, is distributed throughout the region and is often co-located with transportation corridors or sited on previously disturbed land.

Open space and environmentally influenced land uses are interspersed throughout the SPAG region, particularly in association with playa lakes and natural drainage features characteristic of the Llano Estacado. Playa lakes function as natural stormwater detention basins and influence surrounding land use by limiting development within their basins. These features are commonly preserved as open space or integrated into local drainage systems within urban areas. Outside municipalities, large tracts of land remain undeveloped due to low development pressure and continued agricultural use.

Overall, existing land use conditions in the SPAG region are characterized by a predominantly rural landscape with concentrated urban development in a small number of cities. The combination of extensive agricultural land, dispersed industrial sites, established transportation corridors, and relatively low population density outside urban centers defines the region's current development pattern and provides the baseline context for land use compatibility and infrastructure planning considerations.

4.8. Infrastructure

The SPAG region is supported by an established network of transportation, utility, and public service infrastructure that reflects its predominantly rural character and the concentration of development within a limited number of urban centers. Infrastructure systems across the region have been developed to support agricultural activity, regional mobility, industrial operations, and municipal services, with the most extensive facilities located in and around Lubbock County.

Transportation infrastructure represents a primary component of the region's existing infrastructure conditions. The SPAG region is served by a network of interstate highways, U.S. highways, state highways, and county roads that provide regional and interregional connectivity. Interstate 27 serves as a primary north-south corridor through the region, while U.S. Highways 62/82, 84, and 87, along with Loop 289, support east-west and circumferential travel within and around the Lubbock urban area. Outside urban centers, the roadway system consists largely of two-lane rural highways and farm-to-market roads that facilitate agricultural transport and access to smaller communities. Rail infrastructure is present in the region and supports freight movement associated with agriculture, manufacturing, and energy-related activities. Aviation infrastructure includes commercial and general aviation airports, with facilities generally located near population centers and surrounded by compatible land uses.

Public transportation services are primarily concentrated within urban areas, particularly in Lubbock County, where fixed-route and demand-response services are available. In rural portions of the region, transportation options are more limited and are often provided through coordinated regional or county-based services. Regional transportation planning and coordination are supported through SPAG's role in facilitating collaboration among local governments and the Texas Department of Transportation within the Lubbock District.

Utility infrastructure across the SPAG region reflects both urban service systems and dispersed rural provision. Municipal water and wastewater systems serve incorporated areas, with infrastructure capacity and service coverage generally increasing with population density. In rural areas, water service is often provided through groundwater wells, rural water supply systems, or small utility districts. Wastewater treatment facilities are typically located within or adjacent to municipalities, while rural areas rely on decentralized systems such as septic tanks. Electrical transmission and distribution infrastructure is widespread and generally follows transportation corridors, providing service to both urban and agricultural users. Natural gas infrastructure is available in many communities and along major corridors, supporting residential, commercial, and industrial uses.

Stormwater infrastructure varies across the region and is closely tied to local drainage patterns. Urban areas utilize a combination of storm sewer systems, open channels, and natural drainage features to manage runoff. Playa lakes, which are characteristic of the Llano Estacado, serve as natural stormwater detention basins and are integral components of local drainage systems. In rural areas, stormwater is primarily managed through natural drainage and agricultural practices rather than engineered conveyance systems.

Public service and community infrastructure are distributed throughout the region and includes facilities for emergency services, solid waste management, healthcare, and education. Emergency response infrastructure includes fire stations, law enforcement facilities, and medical services located primarily within municipalities, with regional coordination supporting service provision in less densely populated areas. Solid waste infrastructure includes regional landfills, transfer stations, and collection systems operated by local governments or regional entities. Educational and institutional infrastructure, including school districts and higher-education facilities, is concentrated in population centers and supports the region's workforce and economic activity.

Overall, existing infrastructure conditions in the SPAG region reflect a balance between rural service provision and urban-focused systems. Concentrated infrastructure investment within Lubbock County and other municipal centers supports higher-density development, while extensive transportation and utility networks provide connectivity and basic services across the broader rural landscape. These existing infrastructure systems establish the baseline context for evaluating capacity, compatibility, and future planning considerations within the SPAG region.

4.9. Workforce Development/Existing Workforce

The regional workforce development system is anchored by existing educational institutions that support workforce readiness. K-12 schools, community colleges, universities, and trade schools provide foundational skills and early exposure to career pathways across multiple industries, including aerospace. Higher education institutions in the region represent a competitive asset and are an influential factor for companies evaluating potential locations for new or expanded operations.

South Plains College (SPC) is a local two-year community college with campuses throughout the region offering many educational programs. SPC offers technical educational programs that can help boost the manufacturing capacity of the region. The industrial manufacturing/emerging technologies program offers the machining training that is required for manufacturing. The welding program offered at SPC is also beneficial for the manufacturing capabilities of the region.

Texas Tech University is a local four-year university with its main campus in Lubbock. Texas Tech offers degrees in industrial engineering, mechanical engineering, chemical engineering, and other similar disciplines that are useful in the development of aerospace activities. In 2024 the Texas Tech College of Engineering awarded a total of 1,497 degrees to students in all programs. Of these, 348 of the degrees awarded were for mechanical engineering, 84 for chemical engineering, and 71 for industrial engineering. Educational institutions in the region offer appropriate programs for aerospace development.

West Texas A&M is a four-year university located just outside of the SPAG region. The proximity to the region makes it useful to draw from to develop the workforce. West Texas A&M offers some engineering programs but is not very specialized in the field. Engineering programs include mechanical engineering, electrical engineering, and engineering technology. West Texas A&M's chemistry program could develop workers for local pharmaceutical companies or research operations.

Abilene Christian University is a small four-year university just outside of the SPAG region. Potential programs helpful towards developing the local workforce include mechanical engineering, nuclear science and engineering, chemistry, general engineering, and electrical engineering. With around 7,000 students it could be recommended to focus resources on universities that are closer and offer more relevant programs.

Angelo State University is another four-year university near the SPAG region. Angelo State University is home to around 11,000 students. The university offers some programs that could be useful for the aerospace industry such as commercial aviation, mechanical engineering, and chemistry.

The University of Texas Permian Basin (UTPB) is located outside of the SPAG region. UTPB offers several degree programs relevant to aerospace development including mechanical engineering, chemical engineering, chemistry, and industrial technology.

4.10. Population Density/Growth

Population density within the SPAG region is generally low relative to major metropolitan areas in Texas and the broader central United States. As illustrated in Error! Reference source not found.,**Figure 11**, the region is characterized by dispersed rural populations with limited concentrations of higher density development. Population centers are primarily clustered within and around incorporated cities, while the majority of the surrounding area remains sparsely populated.

Higher population densities are observed along major urban corridors outside the SPAG boundary, including large metropolitan areas to the east and southeast. In contrast, much of the SPAG region and adjacent areas exhibit low population density, with extensive tracts of undeveloped or agricultural land. This pattern reflects the region's predominantly rural land use and limited urban expansion.

The existing population distribution results in reduced exposure to densely populated areas across much of the region. This characteristic is an important existing condition when evaluating land uses that require separation from population centers or benefit from large geographic buffers. Overall, population density within the SPAG region remains a defining physical characteristic that differentiates it from more urbanized portions of the state.

Population growth is influenced by the accessibility of surrounding infrastructure. Essential services and amenities, including roadways, municipal facilities, and commercial establishments, contribute to increased population, which leads to an increased availability of employment opportunities. The local population is expected to grow as additional infrastructure and workforce demands increase.

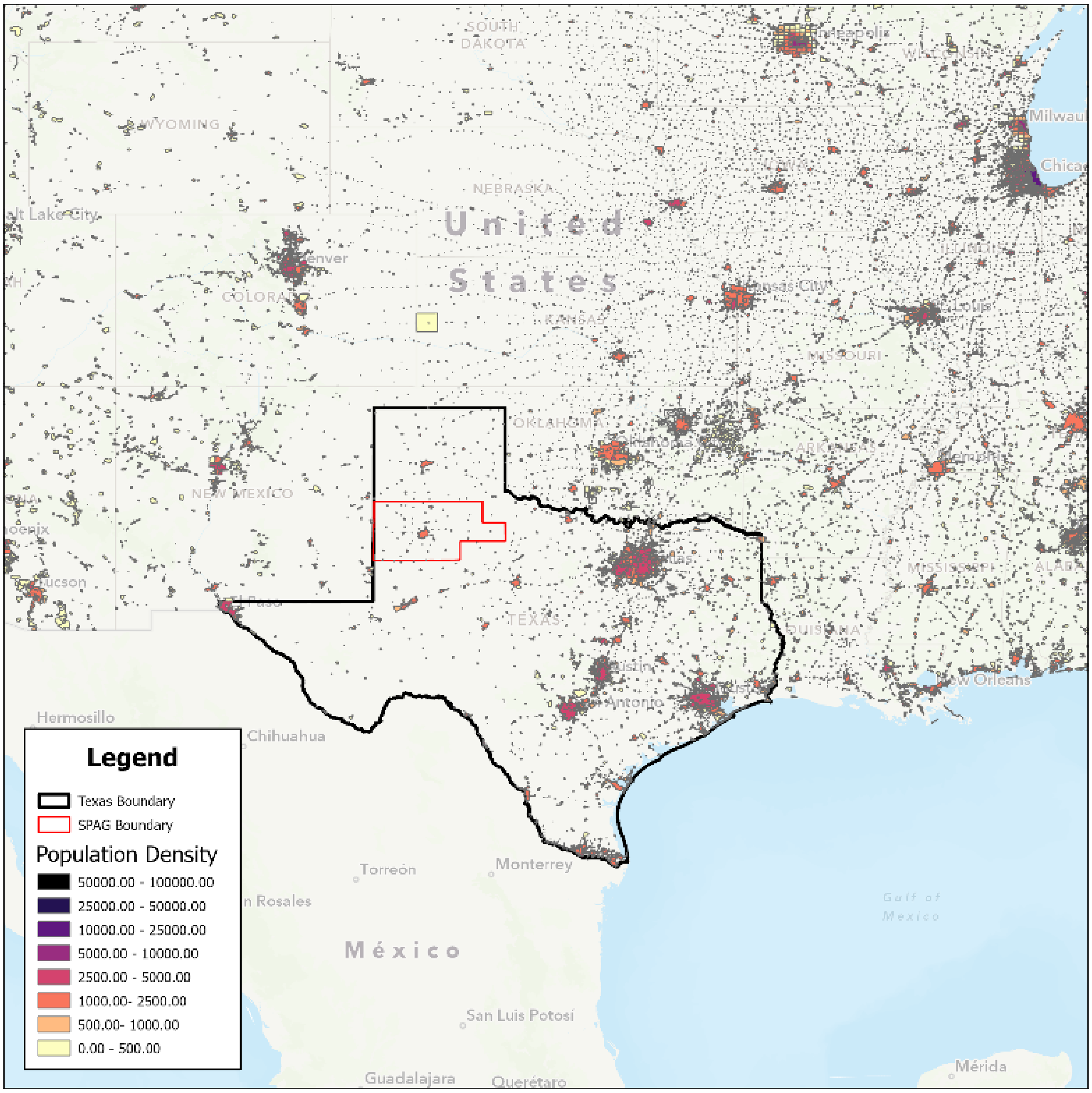

Figure 11: Population Density [34].

5. LAUNCH DEMAND AND ANALYSIS

5.1. Introduction to Launch Operations

This study analyzes two categories of launch operations, suborbital and orbital. A suborbital launch operation is an operation in which the launch vehicle has a parabolic flight profile. Suborbital flights launch to the edge of space, also known as the Kármán Line, 100 kilometers (62 miles) above sea level. Since suborbital launches require less fuel and velocity to get to their destination, they are much cheaper to conduct than orbital launches. A suborbital research mission may offer 3-4 minutes without gravity, which could give many research companies the ability to conduct their experiments within that time frame, saving the expense of orbital missions [35]. Many suborbital launch vehicles are also designed for reusability. Virgin Galactic's SpaceShipTwo and Blue Origin's New Shepard, although currently not in operation, are both examples of reusable vehicles that may contribute to lower operational costs and improve flight cadence [36]. Suborbital flight remains primarily developmental, which means there is still regulatory and safety uncertainty.

An orbital launch operation is an operation in which the payload of a launch vehicle is put into orbit. These are typically staged launches where rocket components will detach and return to the surface, either controlled or uncontrolled. Orbital launches are used to deploy satellites for scientific and exploration missions, including supporting the ISS and advancing research and technology. Using reusable rockets helps to increase launch cadence and support aerospace companies for commercial use. However, orbital launch tends to be more expensive and complex than suborbital. There are also unknown regulatory challenges and concerns regarding negative environmental impacts. An example flight profile of a traditional vertical launch to orbit is shown in **Figure 12**.

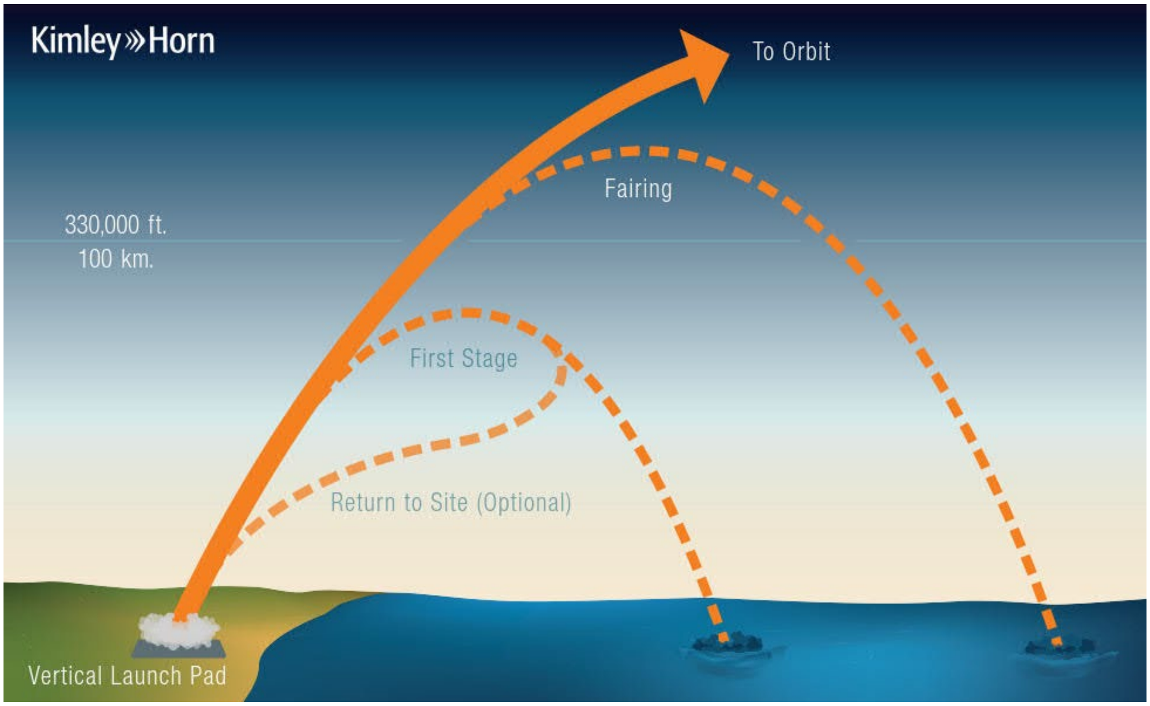

Figure 12: Diagram of an Example Flight Profile of a Vertical Launch to Orbit.

Horizontal Launch Operations

For an airport to support horizontal launch operations it must meet certain criteria. The runway must be capable of supporting various Horizontal Launch Vehicles (HLVs).

These HLVs are separated into several categories: Concept X, Concept Y, Concept Z, and horizontal reentry. The specific criteria for supporting HLV operations depend upon which concept is being evaluated. The criteria include runway width, condition, material, and length. Most horizontal launch vehicles require a minimum runway width of 150 feet and a minimum runway length of 8,000 feet. While concrete is the most optimal surface material for launch operations, asphalt is also sufficient for applications where it will not be introduced to reactive oxidizers.

Concept X

A Concept X Reusable Launch Vehicle (RLV) is a manned Horizontal Takeoff Horizontal Landing (HTHL) vehicle that utilizes both jet engines and rocket engines. A Concept X RLV departs from a runway under jet power, like other jet-powered aircraft. After departure but prior to rocket ignition, the Concept X RLV flies to a designated operating area. Once in the operating area, the Concept X RLV ignites its rocket engine(s) and begins the suborbital portion of flight. After the engine burn is complete, the vehicle coasts into a parabolic trajectory, reaching its apogee and then beginning its return to Earth. If the vehicle is delivering a payload to orbit, the Concept X RLV is used as a carrier, and a second stage is mounted to the RLV. This second stage ignites sometime after rocket burn is complete but before the apogee is reached. During the return to Earth, the Concept X RLV will fall into a ballistic trajectory toward the Earth's surface until aerodynamic control is regained. The Concept X RLV completes its mission by landing on the runway, by means of a controlled glide or jet power. Example Concept X suborbital and orbital flight profiles are shown in **Figure 13** and **Figure 14** respectively.

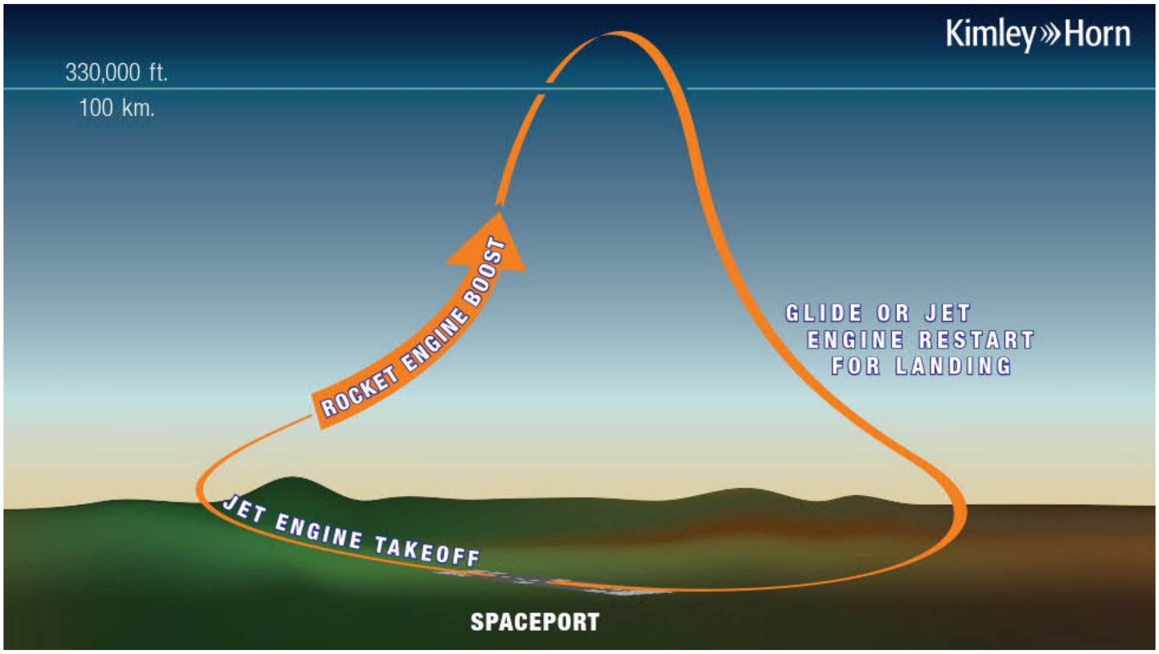

Figure 13: Diagram of a Concept X Flight Path for Suborbital Launch

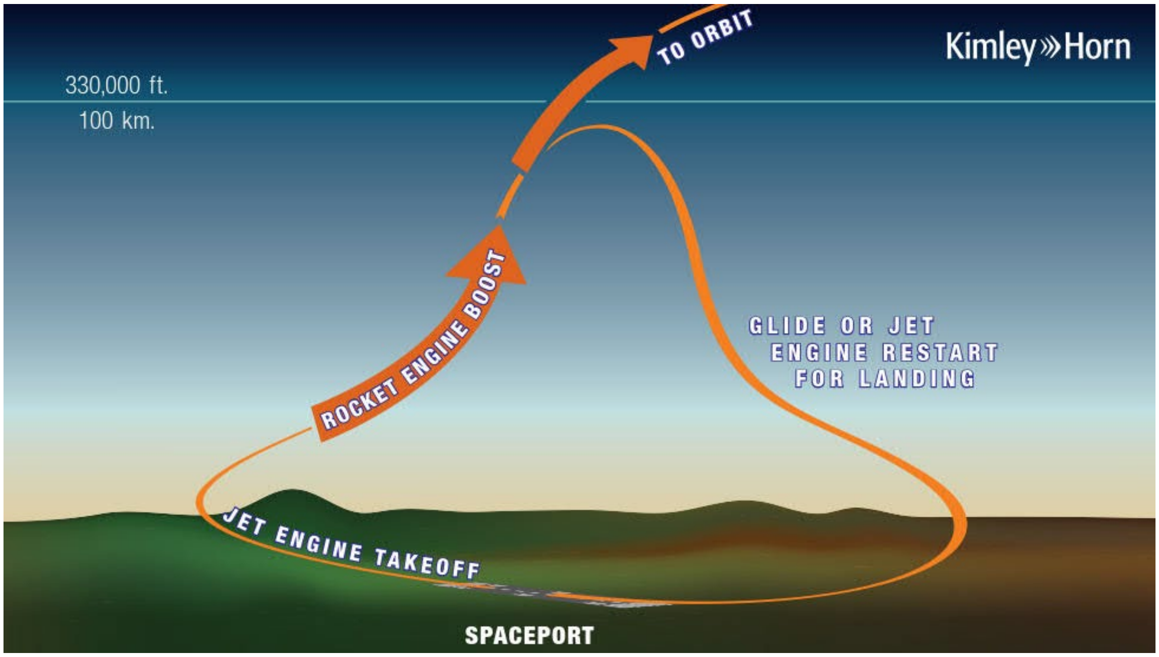

Figure 14: Diagram of a Concept X Flight Path for Orbital Launch.

Concept Y

A Concept Y RLV is a manned HTHL vehicle that takes off under rocket power and lands unpowered by gliding. Concept Y RLVs take off under rocket power from a runway and immediately begin to climb at a steep angle toward space. After engine cut off, the vehicle coasts in a parabolic trajectory, reaching its apogee and then beginning its reentry. If the vehicle is delivering a payload to orbit, the second stage will ignite sometime after rocket burn is complete but before apogee is reached. During reentry, the Concept Y RLV regains aerodynamic control and continues to glide to the runway for landing. An example Concept Y suborbital flight profile is shown in Error! Reference source not found..

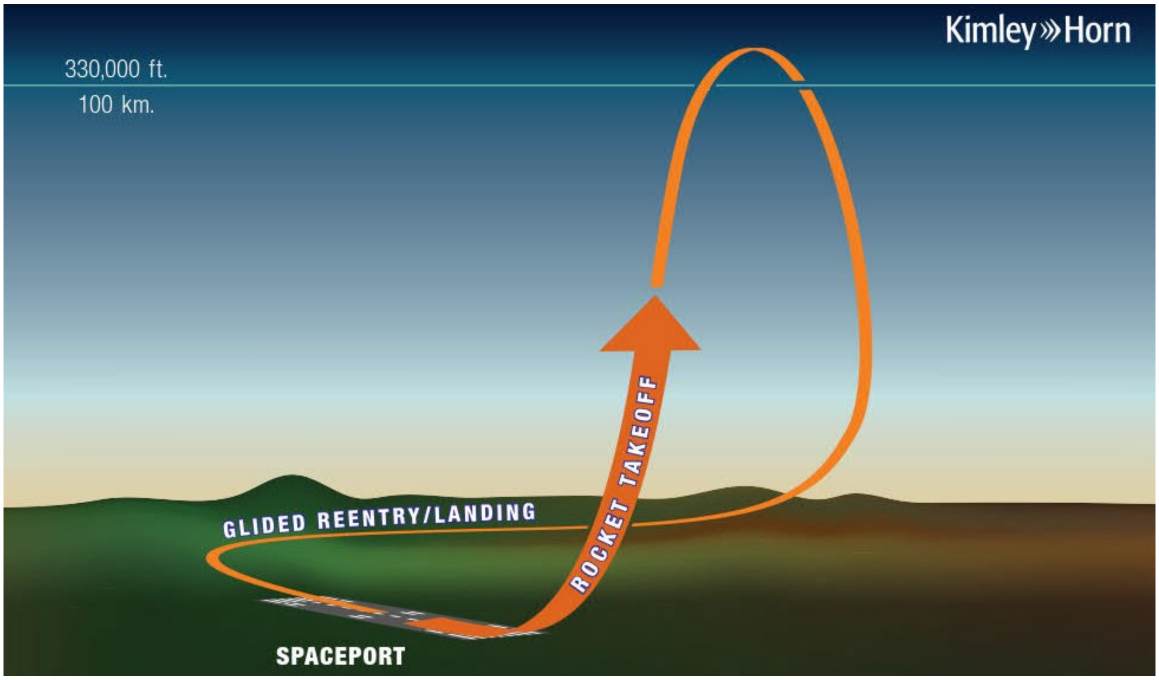

Figure 15: Diagram of a Concept Y Flight Path for Suborbital Launch.

Concept Z

A Concept Z RLV is comprised of a carrier aircraft and an air-launched vehicle that performs the suborbital or orbital portion of the flight. A Concept Z RLV carrier aircraft takes off from a conventional runway and travels to a designated operating area under jet power before the suborbital or orbital portion of flight is initiated. Once in the operating area, the launch vehicle detaches from the carrier aircraft, the rocket engine(s) ignite, and the space portion of the flight is conducted. After the engine burn is complete, the launch vehicle either returns unpowered to land on the runway or is delivered to orbit. The carrier aircraft returns to the runway under jet power. Examples of Concept Z orbital and suborbital flight profiles are shown in **Figure 16** and **Figure 17**.

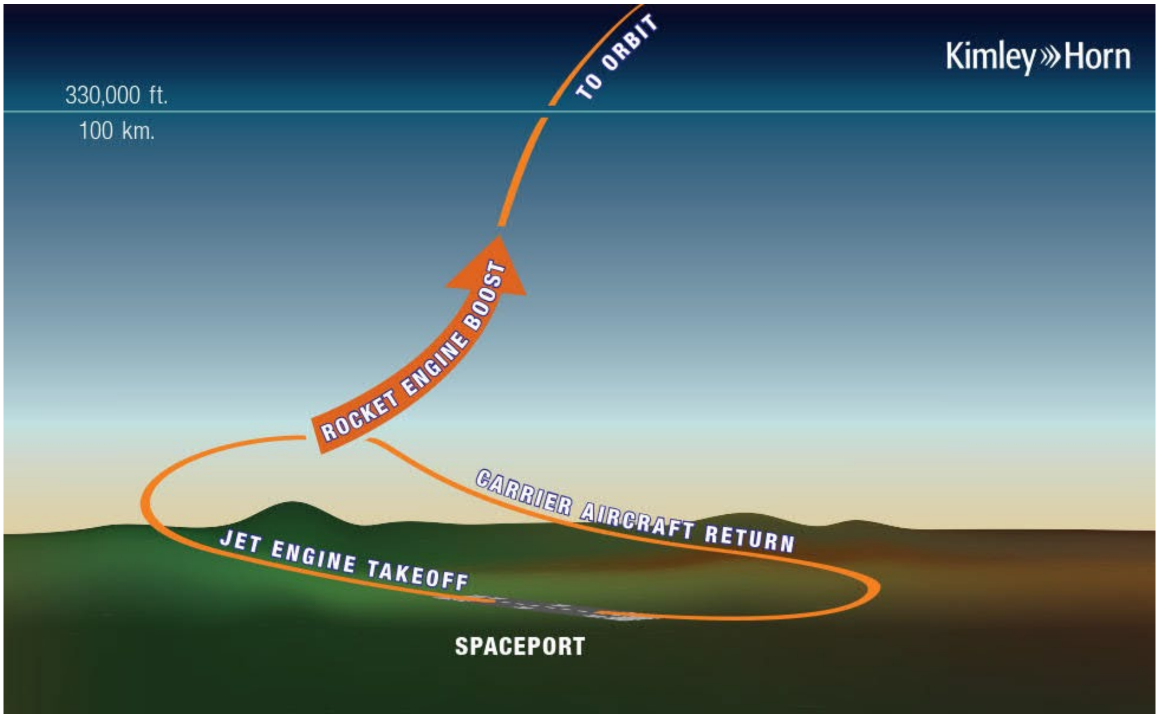

Figure 16: Diagram of a Concept Z Orbital Flight Path.

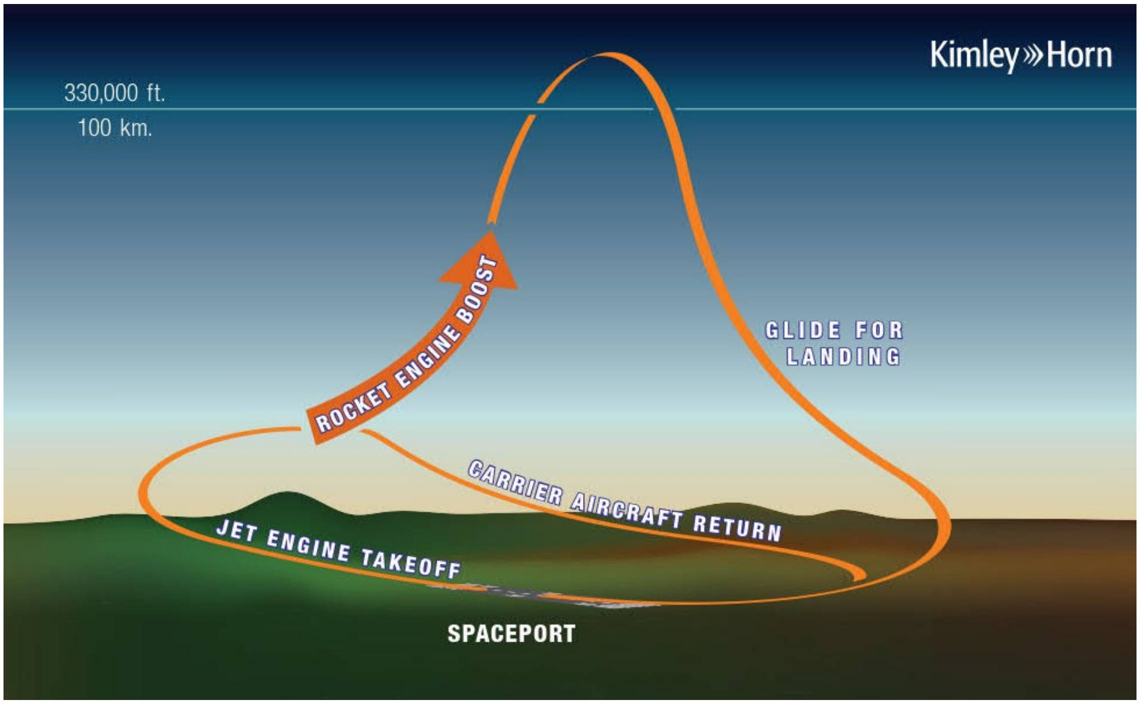

Figure 17: Diagram of a Concept Z Suborbital Flight Path.

5.2. Launch Demand

Since 1989, there have been just over 1,000 launch missions tracked by the FAA in the U.S. Approximately two-thirds of these missions occurred after 2020. The significant increase in launch operations since 2020 is primarily attributed to SpaceX's advancement and efficiency of its reusable Falcon 9 rocket. **Figure 18** illustrates the annual number of launches, incorporating both federal and commercial operations. The majority of launches analyzed here are driven by satellite deployment needs. The figures below provide vertical and horizontal launch data, although only a small fraction is attributable to horizontal launch vehicles.

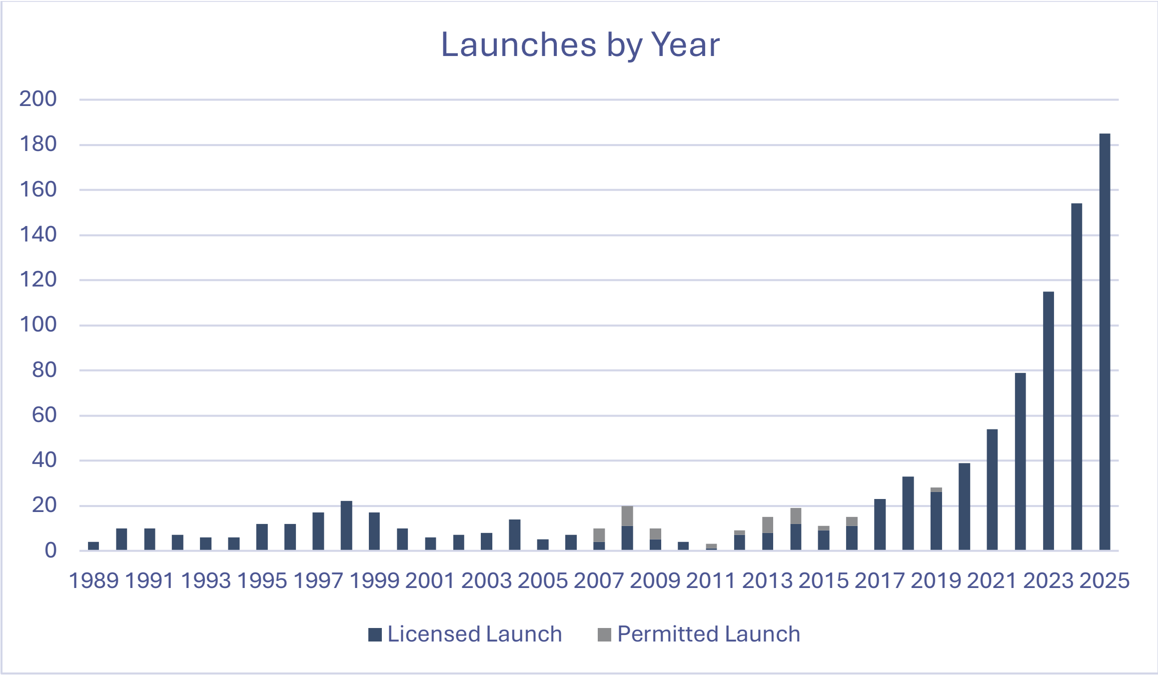

Figure 18: Launches per Year in the U.S.

The aerospace industry in the United States is comprised of roughly 10 companies actively launching to space. Between January 1, 2024 and December 2, 2025, there were a total of 342 launches in the United States and New Zealand by United States-based space companies. RocketLab, a United States-based company, performs launches from New Zealand. The launch data during this timeframe are evaluated in **Figure 19** below. The data are segmented by company, launch system, launch site, and location (state/region).

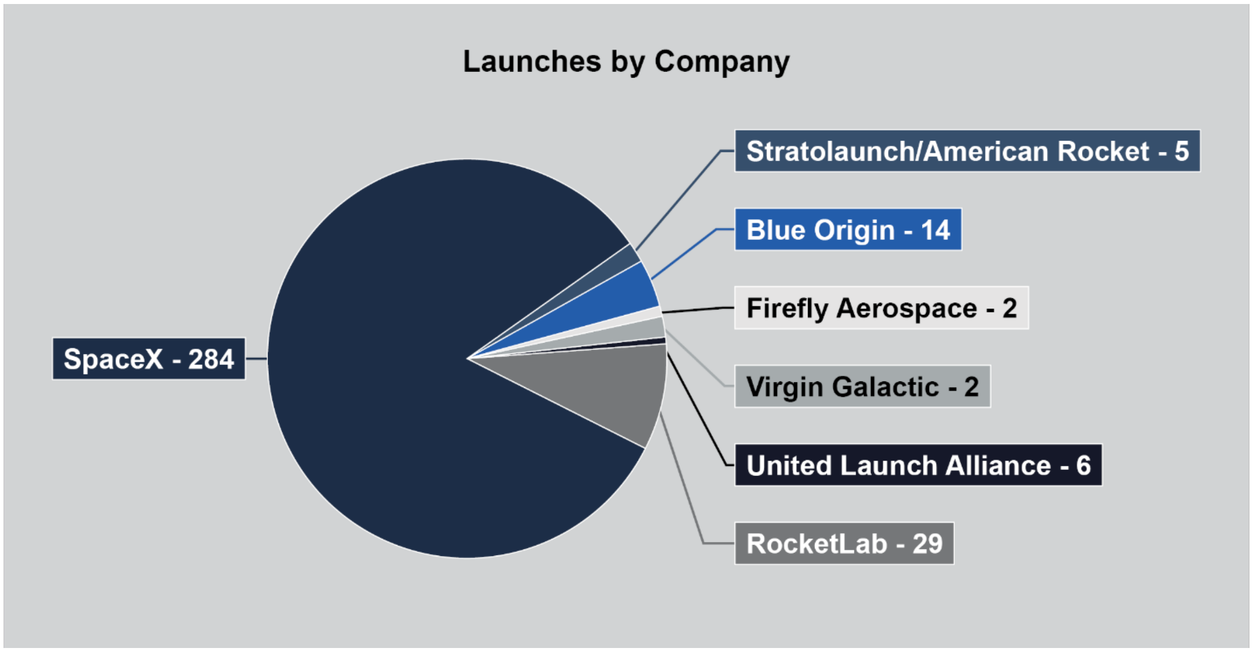

Figure 19: Launches by Company between January 2024 and December 2025.

The largest launch operator in the world is SpaceX. As shown in **Figure 19** above, it makes up approximately 75% of the launches between January 2024 and December 2025. SpaceX's Falcon 9 rocket is the world's first orbital-class reusable rocket, allowing them to launch much more frequently than its competitors. As shown in the chart below, the Falcon 9 is by far the most frequently launched vehicle, accounting for 275 of the 342 total launches charted. Horizontal launch vehicles make up a small portion of the overall launch operations performed in this dataset, with only Virgin Galactic's SpaceShipTwo and Stratolaunch's Talon-A representing horizontal launch operations.

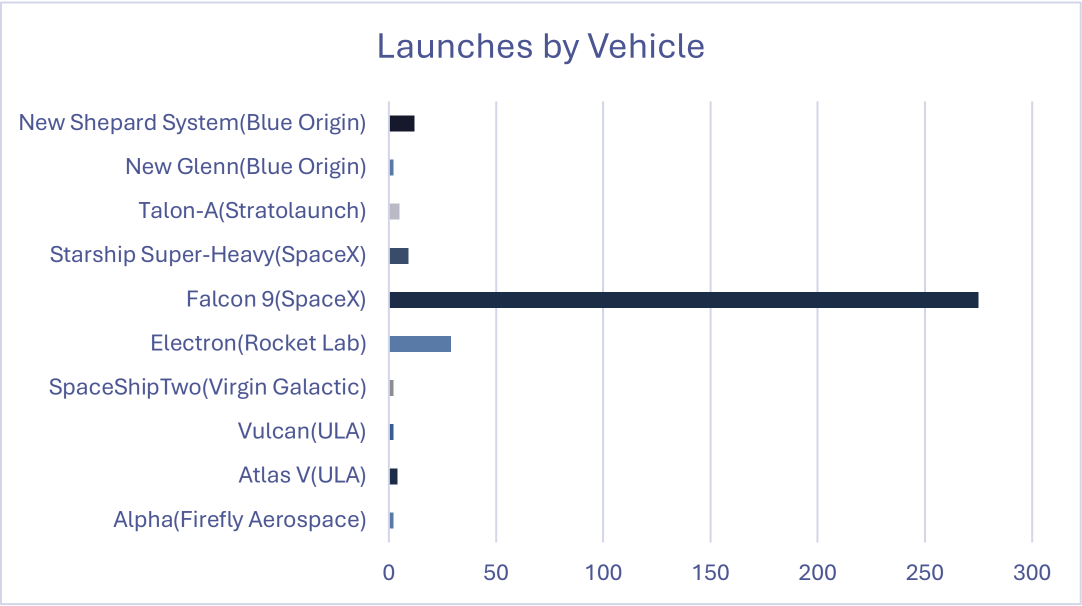

Figure 20: Graph of launches by vehicle between 2024 and 2025.

On November 13, 2025, Blue Origin performed the second launch of New Glenn and accomplished the first successful landing of the booster. Shortly after the successful landing of the New Glenn booster, Blue Origin announced that it would suspend operations of the New Shepard launch program. This decision may have been made in order to strategically reallocate resources toward scaling up operations within the New Glenn initiative. As previously mentioned, SpaceX's advantage in the industry comes from the reusability of its Falcon 9 rocket. However, as Blue Origin makes advancements in its reusable capabilities with their New Glenn vehicle, the industry will likely experience increased competition. While the exact timeframe for Blue Origin's operational increase is unknown, it could look similar to SpaceX's increase in operations since its first successful landing of Falcon 9 in December of 2015. All historical SpaceX launches are shown in **Figure 21**.

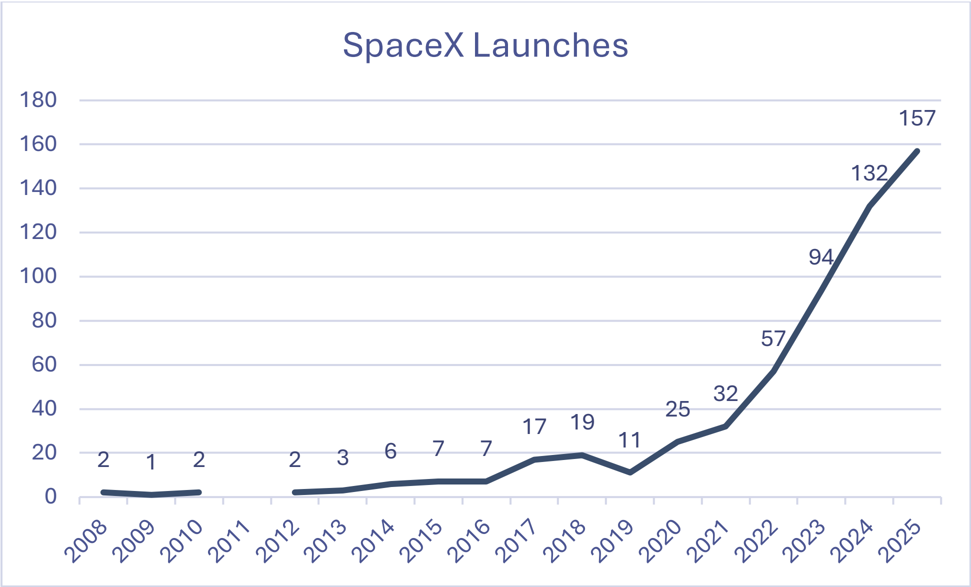

Figure 21: Graph of SpaceX Launches by Year from 2008 to 2025.

The chart below is a visual representation of launches based on launch location between 2024 and 2025. Florida and California combined accounted for over 75% of launches in the designated period, primarily made up of SpaceX and its Falcon 9 rocket. Texas had a total of 21 launches which accounted for approximately 6% of all launches in this timeframe. Of these 21 launches, nine were SpaceX's Starship Super-Heavy and the remaining 12 were New Shepard. The conclusion of the New Shepard launch program will likely lead to a reduction in overall launch operations within the state of Texas in the foreseeable future.

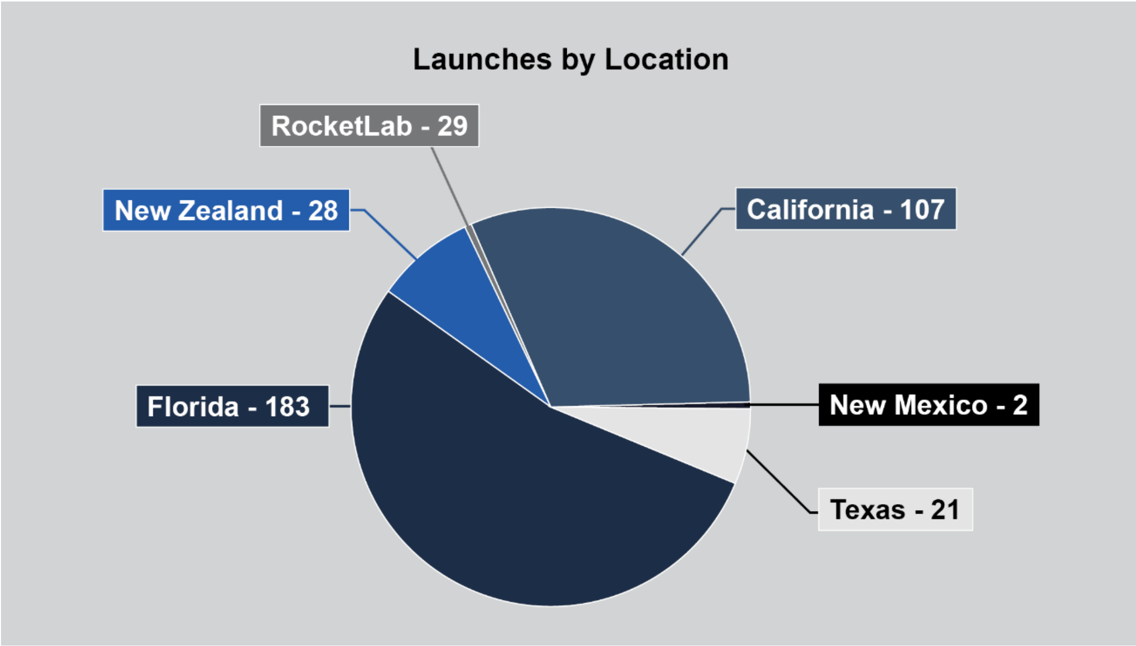

Figure 22: Launches by Location Between 2024 and 2025.

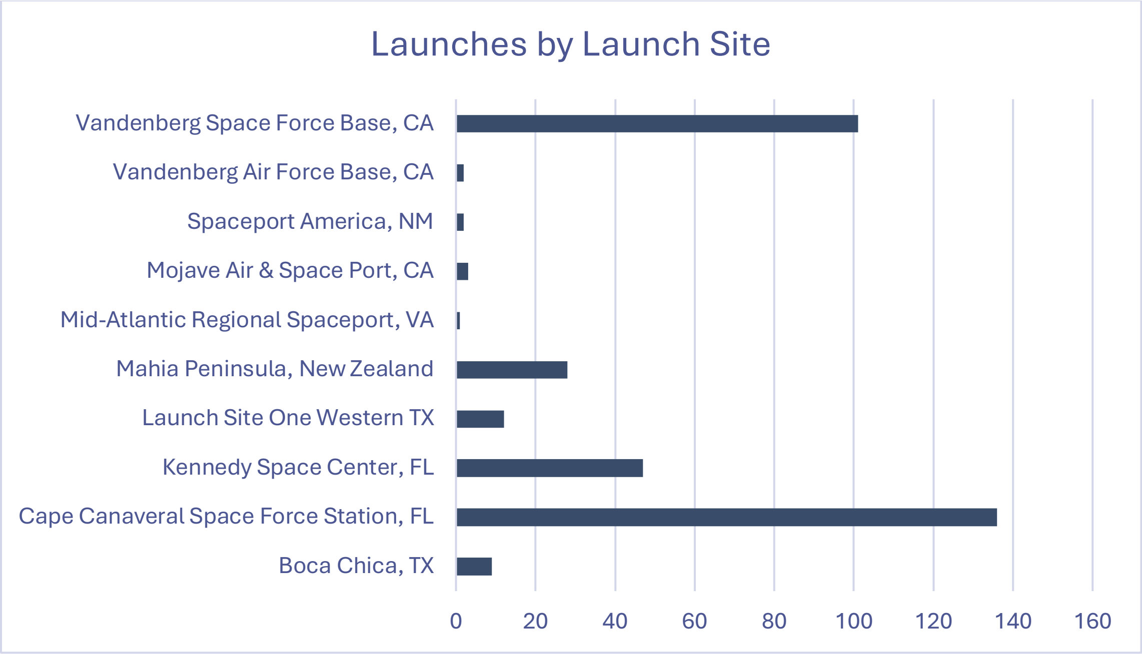

Figure 23: Total Launches by Launch Site Between 2024 and 2025.

5.2.1. Horizontal Launch Demand

Currently in the United States there are nine locations licensed for horizontal launch operations. Of these nine locations, only two have performed launches: Mojave Air & Space Port and Spaceport America. Since opening in 2004, Mojave Air & Space Port has had 13 horizontal launches. These launches were primarily tests of horizontal launch vehicles still in development from companies such as Stratolaunch, Virgin Orbit, and Scaled Composites. Similar to Mojave, Spaceport America has conducted 18 horizontal launches since its opening in December 2008, most of which have been test flights for vehicles still in development. Launch operations at Spaceport America and Mojave Air & Space Port have become less frequent due to one of their primary tenants, Virgin Orbit, bankrupting in 2023.

5.2.2. National Security and Defense Launch Demand

Rocket launches for national security and defense are a strategic aspect of aerospace activity and are directly integrated with commercial launch activity. Agencies such as the United States Space Force (USSF) and other defense organizations maintain regular launch schedules to deploy and upgrade satellite constellations for secure communications, surveillance, reconnaissance, and navigation. The ongoing deployment of GPS III satellites highlights the continued demand for launches that increase the accuracy and reliability of military navigation and timing. These missions require specialized vehicles, scheduling, and risk mitigation. The evolving threat landscape and the need for space-based situational awareness drive ongoing investment in defense-related launch operations.

As demand for more advanced defense technologies increase to secure U.S. national security from space, the commercial industry will serve as the backbone for the development of advanced satellite systems and missile defense technologies. Recently, the Trump administration alluded to plans for a missile defense system similar to the Iron Dome, named the “Golden Dome.” The Golden Dome system remains a prominent subject, with the potential to generate substantial employment opportunities and technological progress that may contribute to further aerospace industry growth. While the Golden Dome project is still mostly a theoretical initiative, the defense-sector initiatives tend to create high-demand and competitive career opportunities, develop workforce, and contribute to technological advancements that ultimately migrate to commercial industry. Programs like this can have a profound impact on community growth in the aerospace sector and on launch cadence demand as well.

5.2.3. Space Tourism Demand

Space tourism is a rapidly developing segment of the aerospace industry, with increasing demand from private individuals and commercial entities. Suborbital launch systems are designed to transport civilian passengers above the Kármán Line, providing brief microgravity experiences and a unique view of Earth. The introduction of vehicles like Blue Origin's New Shepard in 2021 contributed to market growth, though its cessation has reduced available flights and limited access. Other providers, such as Virgin Galactic and other emerging startups, may accelerate development to meet ongoing demand. As technology matures and costs decrease, space tourism is expected to expand to orbital flights, lunar excursions, and bespoke experiences, driving further demand for launch operations and infrastructure development.

5.2.4. Cargo and Resupply Mission Demand

Cargo and resupply missions are a significant driver of demand for commercial aerospace launches, particularly for space stations and deep-space exploration. The ISS requires regular deliveries of supplies, equipment, and scientific payloads. Companies such as SpaceX and Northrop Grumman (formerly Orbital ATK) have contracts with NASA under the Commercial Resupply Services (CRS) program to facilitate routine logistics. These missions require reliable launch vehicles, precise scheduling, and robust coordination for timely delivery. As plans for lunar gateways, Mars missions, and expanded orbital platforms advance, the frequency and complexity of cargo launches are expected to increase. This necessitates continuous advancement in launch capacity, automation, and mission flexibility.

5.3. Launch Analysis and Regional Compatibility

5.3.1. Infrastructure Compatibility

A commercial vertical launch complex can support multiple commercial launch vehicles from fixed pads but typically require extensive infrastructure development. The infrastructure depends on the needs of each launch customer and system, including both critical and supporting elements for operations. When planning a launch site, it's important to assess key infrastructure components like launch pads, water systems, environmental controls, and flame detection. **Table 4** details the infrastructure required for a spaceport.

Table 4: Launch Infrastructure Components and Descriptions.

Infrastructure Component	Definition
Launch Pad	Typically, a concrete or steel base with launch mounts required to stabilize rockets prior to launch.
Flame Deflector/Duct	Vent system designed to redirect heat, flames, and exhaust produced during launch to prevent damage to launchpad, vehicle, and surrounding area
Lighting Protection System	Tall towers designed to attract lightning and positioned to provide protection to flight hardware.
Pad Water Systems (Deluge Water)	Sprays massive amounts of water onto the launch pad during launch to suppress sound and vibrations causing potential damage while also cooling the surrounding area.
Pad Electrical Systems	Various electrical systems including data systems, communications lines, power lines, and uninterruptible power supply (UPS).
Propellant Storage Systems	Highly dependent upon type of propellant due to varying physical and reactive properties.
Propellant Transfer Systems	Facilitate the movement of propellants from one location to another typically for fueling launch vehicles.
Vehicle Transportation Route	Vehicles often require specialized transportation routes for transport from processing and integration facilities to the launch pad. This could consist of specialized pavement design.
Site Security	Security fences, surveillance systems, and guard houses are needed to protect the public from potential hazards.

Analysis of the SPAG region determined that in order to meet the requirements for a vertical launch site and operate the required infrastructure the following criteria would have to be met:

1. **Water infrastructure would require upgrades** to provide sufficient capacity and pressure for fire suppression systems, deluge systems, and other launch-support utilities.
2. **Electrical power infrastructure would need to be expanded and hardened**, including increased capacity, redundant feeds, and on-site backup power to support launch pads, processing facilities, and critical ground systems.
3. **Roadway and access infrastructure would need to be improved** to accommodate the transport of oversized launch vehicles, propellants, and heavy equipment, including potential roadway widening, pavement reinforcement, and turning-radius enhancements.
4. **Fuel and propellant storage infrastructure would need to be developed**, including dedicated storage areas, safety setbacks, and distribution systems compatible with vertical launch vehicle requirements.
5. **Communications infrastructure would need to be enhanced** to support data transmission, telemetry, command and control, and coordination with external agencies during launch activities.
6. **Stormwater and drainage infrastructure would require upgrades** to manage runoff associated with large paved areas, launch pads, and support facilities, while meeting applicable design standards.
7. **Launch-support facilities and hardstand areas would need to be constructed**, including pads, flame trenches or deflectors (as applicable), equipment foundations, and utility connections necessary to support vertical launch operations.

Horizontal launch specific infrastructure was conducted by available airport infrastructure and compatibility. Infrastructure was evaluated by assessing the existing conditions of airports within the SPAG region. The evaluation criteria for horizontal launch assessed the airport's existing airport based on specific key criteria. The width of each runway at an airport was assessed to determine their capability of handling HLV's which typically require 150 feet of runway width. The condition of each runway was evaluated to determine if a runway would need to be repaved. The material composition of each runway is a critical factor in site evaluation, as concrete runways are more capable of withstanding the backblast produced by HLV's during takeoff. The runway length was evaluated for each concept of HLV (X, Y, Z), with a general assumption that the minimum length was 8,000 feet long to meet historical needs. All SPAG airport runway lengths are shown in **Figure 24.**

Figure 24: Longest Runway Length (in Feet) of SPAG Airports.

Lubbock Preston-Smith International Airport (LBB) and Reese National Security Complex meet runway criteria the best. Both sites are near Lubbock, the SPAG region's largest town. LBB has three concrete runways, two of which are suitably sized for horizontal launch (11,500 ft x 150 ft and 8,000 ft x 150 ft). LBB is the busiest and only towered airport in the SPAG region. Its airspace is also partially within a Military Operations Area, which will require more coordination for operations. The site is surrounded by agricultural land and bordered by major highways, allowing for ample space for future development and expansion. Due to this airport's proximity to Lubbock and Texas Tech University, recruiting skilled labor has a strong potential, as well as a low employee turnover rate due to the ongoing developments and economic growth in Lubbock [37].

The Reese National Security Complex is designed for research and features facilities that foster technological innovation. It houses the only Data Center of its kind in West Texas, as well as resources for research such as small incubator labs and privately hosted projects. The site also accommodates engineering and manufacturing operations, providing expansive commercial space suitable for diverse companies.

Additionally, Reese National Security Complex supports educational initiatives, hosting South Plains College and serving the needs of nearby universities [38]. Reese National Security Complex's airfield consists of three asphalt/concrete runways, two of them meet size requirements to support horizontal launch capabilities with dimensions of 10,500 ft x 150 ft [39]. The airfield is located in Foreign Trade Zone (FTZ) Number 260 [40]. FTZ 260 designates Reese National Security Complex as a Magnet Site, which are most commonly used for warehouse and distribution activity, but also extend benefits to manufacturing. The facility has already partnered with Texas Tech University to host programs in wind energy, propulsion systems, AI-driven aerospace design, and defense technologies. The airspace surrounding this airport is also relatively uncongested, which helps make flight testing and launch operations easy. The site supports phased development for aerospace ventures and there are minimal environmental constraints due to the land use and site location [39]. The Reese National Security Complex benefits from its proximity to Lubbock and nearby educational institutions, giving it a large population of viable workers to utilize to expand operations. The existing infrastructure and general use of the Center makes it an excellent candidate for potential horizontal and reentry operations, subject to environmental review.

Plainview-Hale County Airport (PVW) is in Plainview, TX off I-27 and SW 3rd, just south of I-70. It has two runways, neither of which meet standard for horizontal launch vehicles currently in development. There is space available for aerospace development and operations between the airfield and the roads [41].

Levelland Municipal Airport (LLN) is in the City of Levelland next to HWY 385, just south of the town. The airport has two runways, neither of which meet requirements for horizontal launch currently in development. There is enough space on the airfield for small aerospace development, and it is close to a town with a strong population for employment [42].

5.3.2. Regional Access, Land Availability, and Environmental

Regional Access

As discussed in Chapter 4: Existing Conditions Overview, the SPAG region provides a network of state and federal highways that link major Texas cities, making the area highly geographically accessible.

SPAG's integrated roadway network shows an ability to meet demand for launch operations, supporting the movement of launch vehicles, payloads, and essential equipment. Direct access via state and federal highways simplifies logistics, reduces transit times, and ensures delivery of components to launch sites. Lower congestion in rural areas streamlines transportation, while urban proximity secures a skilled workforce for on-site and support roles.

Infrastructure capable of accommodating oversized and hazardous cargo is needed for transferring rockets and propellants safely and efficiently. The roadways available would provide reliable supply chains, enable rapid emergency responses, and meet regulatory compliance. These features would benefit the launch operator's ability to maintain schedules and meet the operational demands of aerospace activities within the SPAG region.

Land Availability and Population Density

The land that is within the SPAG region and surrounding area primarily consists of open agricultural fields, rural landscapes, and sparsely populated communities. This low population density is advantageous for aerospace development. It reduces safety risks to the public and simplifies regulatory compliance related to safety and environmental impact within the immediate vicinity of SPAG. Additionally, the abundance of undeveloped land provides opportunities for site selection, expansion, and construction of large-scale facilities required for launch operations and other related activities. The proximity to urban centers, such as Lubbock, provides access to infrastructure, utilities, and a skilled workforce, while the overall rural environment minimizes potential conflicts with residential or commercial developments.

Environmental

The issuance of a spaceport license is a major federal action that requires federal agency, typically the FAA, compliance with NEPA. Signed into law in 1970, NEPA is often described as an "umbrella" law because it establishes a process through which federal agencies can comply with other laws and planning requirements. NEPA emphasizes the federal government's leadership role in ensuring that environmental impacts are factored into the federal decision-making process. Under NEPA, federal agencies must use a systematic, interdisciplinary approach to project planning to ensure that environmental resources are given appropriate weight in the decision-making process. The NEPA process ensures that decision-makers understand the potential environmental impacts of proposed licensing and permitting activities, and that the potential impacts to the human and natural environment are fully disclosed.

To move forward with site selection, SPAG will likely need to conduct an Environmental Assessment, which is a document used to describe the Proposed Action's anticipated environmental impacts. As stated in FAA Order 1050.1G Paragraph 3-1.2, the purpose of an EA is to determine whether a Proposed Action has the potential to significantly affect the human environment. Typically, for a proposed spaceport co-located with an airport, the appropriate level of environmental review is an EA, where more complex operations such as vertical launch could require and Environmental Impact Statement (EIS) which is a more detailed document used when potential impacts are present.

The main environmental concerns that are associated with launch operations consist of the following categories:

Air Quality: Launch operations can emit pollutants, including particulate matter, nitrogen oxides, and unburned hydrocarbons, which may impact local air quality. Assessments must account for both routine emissions and potential accidental releases of hazardous materials.

Noise: Rocket launches generate significant noise levels, which can affect nearby communities and wildlife. Proper mitigation strategies, such as buffer zones and scheduling launches during less sensitive periods, are essential to minimize impacts.

Water Resources: Propellant storage, vehicle fueling, and launch activities can pose risks to surface and groundwater through accidental spills or runoff. Environmental reviews must evaluate facility design and operational procedures to prevent contamination.

Wildlife and Habitat: The construction and operation of launch sites may disturb local ecosystems, particularly in rural or undeveloped areas. Environmental assessments should identify sensitive species and habitats and propose measures to avoid or minimize disturbances.

Solid and Hazardous Waste: Launch operations produce various waste streams, including spent rocket components, maintenance materials, and hazardous chemicals. Proper waste management practices are required to ensure compliance with environmental regulations.

Socioeconomic and Land Use: Expanding launch facilities may affect local land use, population density, and community resources. Environmental reviews should consider potential impacts on nearby residents, businesses, and infrastructure.

Each of these categories requires careful evaluation as part of the Environmental Assessment (EA) or Environmental Impact Statement (EIS) process, ensuring that all potential effects are disclosed and appropriately addressed in compliance with NEPA and other relevant federal, state, and local regulations.

Preliminary environmental review identified the level of concern associated with each of these categories and is provided in the **Table 5** below.

Table 5: Table of Environmental Impacts and Relative Concerns.

Impact Category	Level of Concern	Justification
Air Quality	Low	Review of U.S. Environmental Protection Agency air quality designations indicates that the SPAG region is located entirely within areas designated as attainment for all National Ambient Air Quality Standards (NAAQS). No counties within the region are currently classified as nonattainment or maintenance for any criteria pollutants.
Noise	Low to Moderate	The SPAG region has an abundance of land available for operations that provides opportunities to be sited away from sensitive receptors such as wildlife refuges, critical habitat locations, and local communities.
Water Resources	Moderate	Dependent on infrastructure requirements and proximity to ground water and surface water. Public engagement is encouraged.
Wildlife and Habitat	Low	Minimal wildlife critical habitat and refuges exist within the SPAG region, operations around these areas can be mitigated.
Solid and Hazardous Waste	Low	Utilizing industry standard practice and conscientious material handling can be used to mitigate effects of this category as this is not typically a significant environmental constraint.

5.3.3. Airspace and Risk Assessment

As the frequency and complexity of launch operations continue to grow, it is important to consider how launch operations may interact with existing airspace structures. The main focus for airspace analysis is to identify suitable airspace for missions that consider potential risks to public safety and ongoing aviation activities.

The FAA generally classifies airspace into categories such as controlled, uncontrolled, Special Use Airspace (SUA), and others. Controlled airspace includes Class A, B, C, D, and E, in which Air Traffic Control (ATC) services are provided. Uncontrolled airspace, for example, Class G, is airspace which ATC does not have authority or responsibility. SUA is a designation for airspace in which certain activities must be limited due to the specialized use of that airspace or area of operations. Examples of Special Use Airspace include Prohibited Areas, Restricted Areas, Warning Areas, Military Operations Areas (MOAs), Alert Areas, Controlled Firing Areas (CFA), and National Security Areas (NSA). Other airspaces include Military Training Routes (MTRs), Temporary Flight Restrictions (TFRs), and other designations for airspace not already classified under control, uncontrolled, or special use airspace. Airspace, which supports horizontal and vertical spaceport operations, typically includes special airspace, most often in the form of Restricted Areas, MOAs, and TFRs. An example of the different types of controlled and uncontrolled airspace is shown in **Figure 25** below.

Figure 25: FAA Airspace Class Designation Diagram. [43].

The SPAG region is primarily comprised of Class E and Class G airspace. All airports in the SPAG region are uncontrolled non-towered airports, except for Lubbock Preston-Smith International Airport (LBB). Within the SPAG region, all non-towered airports feature class G airspace between the surface and 700 feet above ground level, at which point it transitions to class E up to Flight Level 180 (FL180). LBB is both the busiest and only towered airport in the region. The airspace around LBB is designated as Class C. The inner core covers a radius of 5 nautical miles from the airport, extending from the surface up to 7,300 feet. Beyond this, the outer shelf starts 5 nautical miles from the airport at 4,500 feet and continues upward to 7,300 feet for an additional 5 nautical miles.

Airspace over SPAG between 18,000 feet above Mean Sea Level (MSL) and FL600 is classified as Class A airspace. There are 4 Military Operations Areas that overlap parts of the SPAG region. An MOA is an airspace with defined vertical and lateral limits that are established for the purpose of separating certain military training activities from Instrument Flight Rules (IFR) traffic. Each MOA has different hours of operations; when a MOA is in use, nonparticipating IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC. MOAs are created in areas where the military are performing certain actions such as air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics. The MOAs that overlap SPAG airspace are BRONCO 3, BRONCO 4, LANCER, and WESTOVER 2. **Figure 26** below provides a visual depiction of the locations of each MOA within the region.

Figure 26: Special Use Airspace Zones Surrounding the SPAG Region.

Table 6 below organizes the operational hours for the MOAs within the SPAG region.

Table 6: Specifications of Military Operations Areas Near SPAG [44].

MOA Name	Low Altitude	High Altitude	Using Agency	Controlling Agency	Times of Use
BRONCO MOA COMPLEX					
BRONCO 3	10,000 ft. MSL	18,000 ft. MSL	U.S. Air Force 7th Bomb Wing, Dyess AFB, TX	FAA Fort Worth ARTCC	0700-2000 Mountain Time
BRONCO 4	10,000 ft. MSL	18,000 ft. MSL	U.S. Air Force 7th Bomb Wing, Dyess AFB, TX	FAA Fort Worth ARTCC	0700-2000 Mountain Time
LANCER MOA COMPLEX					
LANCER	6,200 ft. MSL	18,000 ft. MSL	U.S. Air Force 7th Bomb Wing, Dyess AFB, TX	FAA Fort Worth ARTCC	0900-0000 Local Time
WESTOVER MOA COMPLEX					
WESTOVER 1	9,000 ft. MSL	18,000 ft. MSL	U.S. Air Force, 80th Flying Training Wing (ATC), Sheppard AFB, Wichita Falls, TX	FAA, Fort Worth ARTCC	One hour before sunrise to one hour after sunset, Monday-Friday; other times by NOTAM
WESTOVER 2	10,000 ft. MSL	18,000 ft. MSL	U.S. Air Force 80th Flying Training Wing (ATC), Sheppard AFB, Wichita Falls, TX	FAA Fort Worth ARTCC	Monday-Friday One hour before sunrise to One hour after sunset

Horizontal Launch operations begin at a given airport before reaching an operating area and engaging their rocket engines (Concept X and Z). It is common practice to have this point be at the upper ceiling of an MOA due to predefined boundaries and reduced traffic. Launch corridors are chosen based upon airspace and population density. Analysis identified 3 potential MOA complexes which could be used for launch operations.

The BRONCO MOA Complex is located in the southwest portion of SPAG. BRONCO MOA Complex consists of 2 military operations areas, BRONCO 3 and BRONCO 4. Both of these areas have low altitudes of 10,000 ft MSL and extend to an upward ceiling of 18,000 ft MSL. This option would not require Air Route Traffic Control Center (ARTCC) handoff, as the duration of the flight would remain in the Fort Worth ARTCC (ZFW) jurisdiction.

The LANCER MOA Complex is located in the southern portion of the SPAG region. LANCER MOA Complex consists of 1 military operations area, LANCER. LANCER has a low altitude of 6,200 ft. MSL and extends to an upward ceiling of 18,000 ft. MSL. This option would not require Air Route Traffic Control Center handoff, as the duration of the flight would remain in the Fort Worth ARTCC (ZFW) jurisdiction.

The WESTOVER MOA Complex is located in the eastern portion of the SPAG region. WESTOVER MOA Complex consists of 2 military operations areas, WESTOVER 1 and WESTOVER 2. WESTOVER 1 has a low altitude of 9,000 ft. MSL and extends upwards to 18,000 ft. MSL. WESTOVER 2 has a low altitude of 10,000 ft. MSL and extends upwards to 18,000 ft. MSL.

These MOA complexes combined provide sufficient compatibility for near-term pre-rocket ignition horizontal launch operations given that the controlling agencies and site operators enter into an agreement for use. Additional FAA coordination will be needed to allow initiation of launch within the MOA and through controlled airspace above 18,000 feet MSL.

Risk Assessment and Vertical Airspace Compatibility

Due to the nature of rocket launch operations, there are strict safety requirements established through FAA regulations. To be approved for a launch license, an operator must prove that they can safely conduct launches by meeting specific launch risk criteria. This specific criterion is described in Title 14 CFR Part §450.101. This regulation separates risk into 4 parts: collective risk, individual risk, aircraft risk, and risk to critical assets.

Collective risk is measured as expected number of casualties (E_c), and consists of the risk that is posed by debris, toxic release, and far field overpressure. The risk to all members of the public, excluding people in the aircraft and neighboring operations personnel, must not exceed an E_c of 1×10^{-4} or 1 in 10,000. The risk to all neighboring operations personnel must not exceed an E_c of 2×10^{-4} or 1 in 5,000.

Individual risk is measured as the probability of casualty (P_c), and consists of the risk posed by debris, toxic release, and far field overpressure. The risk to any individual member of the public, excluding neighboring operations personnel, must not exceed 1×10^{-6} or 1 in 1,000,000. The risk to any individual neighboring operations personnel must not exceed a probability of casualty of 1×10^{-5} or 1 in 100,000.

While most U.S. rocket launches occur at coastal sites due to safety requirements, there have been ongoing efforts to pursue inland launch projects. Notably, Blue Origin operates Launch Site One in West Texas, an inland facility used for both suborbital and test launches of its New Shepard vehicle. While Launch Site One has successfully conducted numerous suborbital flights, its operations remain focused on missions that avoid populated areas and do not involve large-scale orbital launches. Other facilities, such as Spaceport America in New Mexico and Midland Air and Space Port in Texas, have also sought approval for vertical launches inland. However, these sites have not received any approval or indicate approval for orbital launch within the bounds of the current regulatory framework. To date, no inland vertical launch site has received FAA approval for routine orbital launches over populated regions, largely because the risk thresholds outlined by federal regulations are difficult to meet without coastal proximity.

An inland launch would be extremely difficult to gain approval for because the flight path would be required to pass over populated areas, which would most likely exceed the E_c and P_c requirements listed above and therefore fail to meet FAA approval.

Due to this safety criteria, it is unlikely that the SPAG region would be issued a license for vertical launch operations where an orbital trajectory would be desired. However, it is possible for suborbital vertical operations to take place if appropriate risk analysis was completed and approved by the FAA. This process would require collaboration with a launch provider whose suborbital vehicle characteristic satisfy FAA compliance protocols, demonstrating that the vehicle meets or exceeds Part 450 requirements. Since there are very few companies pursuing suborbital space operations, the lack of market demand paired with highly-specific regulatory compliance pushes this operation outside of the scope of this study to determine suitable site criteria or operational compatibility. Additionally, orbital operations are not being further analyzed at this time due to insufficient confidence in regulatory acceptance, as well as parallel initiatives being performed. The TSC has already made substantial investments in this region to assess whether licensing can be secured for what may become the first inland orbital launch facility. On July 25, 2025, TSC awarded a grant of $5 million to the City of

Midland. The intent of this grant is to develop vertical launch capabilities at Midland International Air & Space Port. If successful, this would make Midland the first commercially available inland spaceport capable of supporting vertical launch [3].

6. REENTRY DEMAND AND ANALYSIS

6.1. Introduction to Reentry Operations

Reentry vehicles are generally classified as capsules, spaceplanes, and uncrewed payload modules. Capsules employ heat shields and parachutes to withstand atmospheric entry, typically landing in water or on land. Spaceplanes glide to a runway after reentry, utilizing aerodynamic control and thermal protection. Uncrewed payload modules are used for cargo and may descend with parachutes or employ guided landings for recovery. Each type is engineered to address intense heat, high velocity, and safe retrieval, with design choices matched to mission and operational requirements.

6.2. Reentry Demand

Since 2010, there have been a total of 57 licensed reentry operations. The overall trend in reentries is on the rise with the development of new technology and the increase in launch operations. The chart below visualizes a shift between 2020 and 2021 from no more than 3 reentries per year to double that in most years since (data for 2026 is not yet finalized, however, as of March 11 there have been 3 reentry operations). This increase in reentries operations is likely to continue increasing due to the increased number of launches anticipated in the coming years along with the development of new reentry vehicles like Virgin Galactic's Delta Class spacecraft.

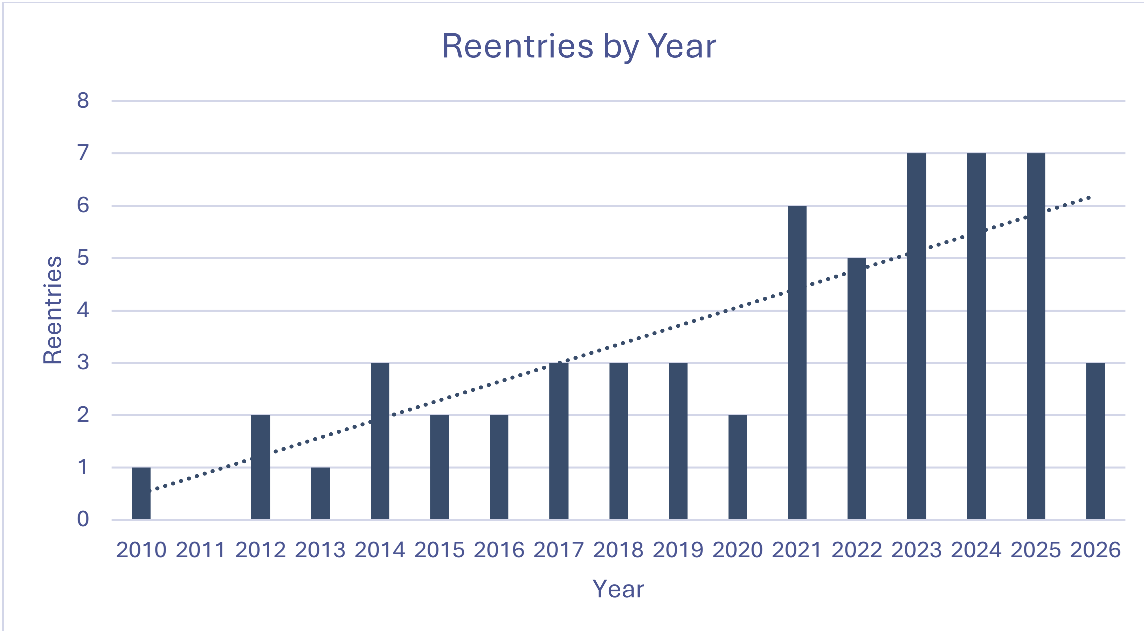

Figure 27: FAA Licensed Reentries By Year.

Similar to launch operations, SpaceX makes up the majority of reentry operations. The chart below uses reentry operations from 2010 to March 2026. SpaceX accounts for over 90% of all reentry operations since 2010.

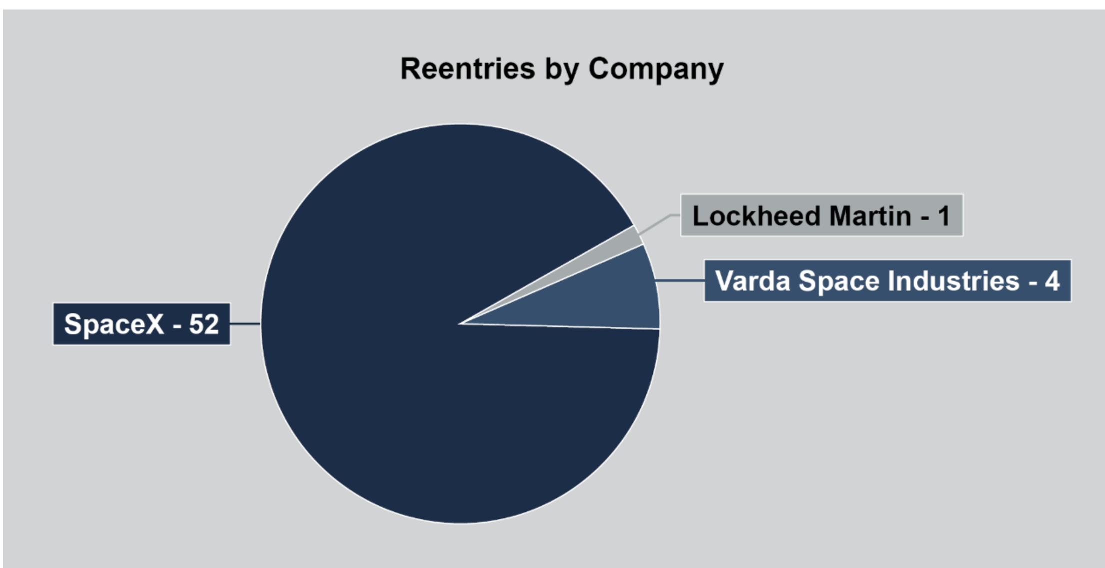

Figure 28: FAA Licensed Reentries By Company.

The chart below displays reentry operations by location. It is visible that the vast majority of reentry operations are currently performed over water. This is due to the design of the current vehicles being used. SpaceX's Dragon capsule is responsible for over 90% of reentry operations and the design of Dragon requires reentry into a large body of water for safe recovery. FAA licensed reentry operations that take place on land make up only a small fraction as shown in **Figure 29** where the Utah Test and Training and Koonibba Test Ranges area the only land locked reentry locations where operations have taken place.

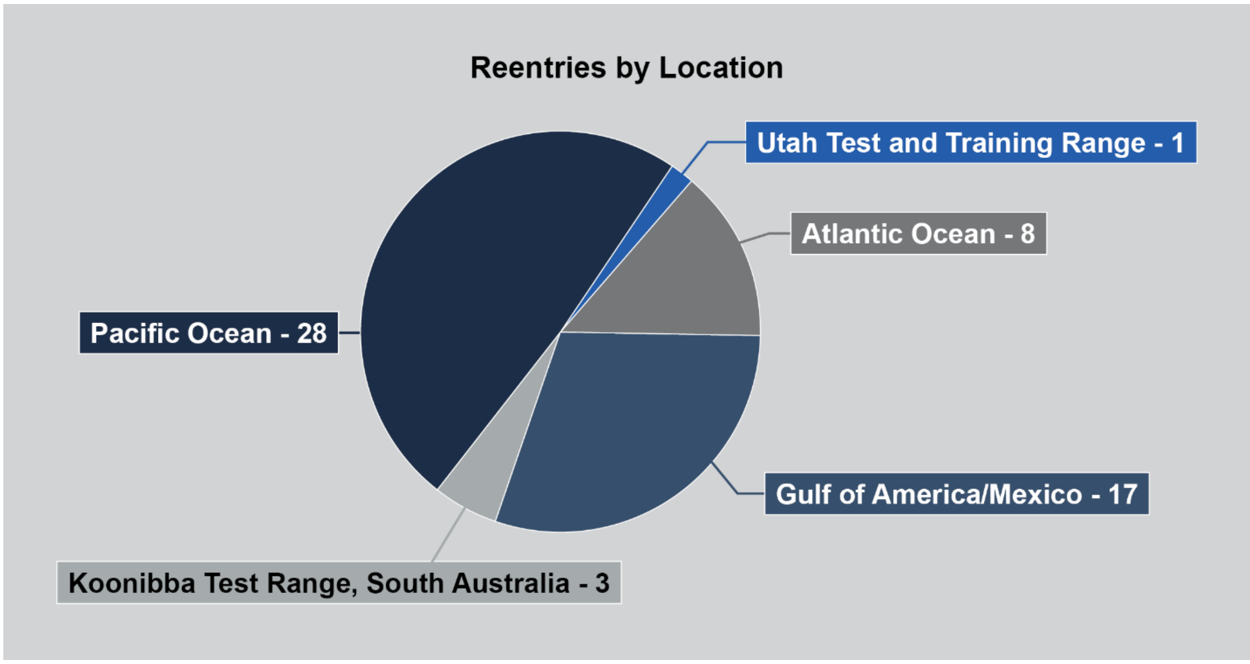

Figure 29: FAA Licensed Reentries By Location.

Both the Launch and Landing Facility (LLF) in Florida and Huntsville in Alabama hold FAA reentry licenses, but no FAA-licensed reentry operations have occurred at either site. The LLF was licensed for commercial spaceplane and capsule reentries, yet water recoveries and alternative land sites remain preferred due to operational and vehicle requirements that meet Part 450 requirements for safety.

Similarly, Huntsville's license was granted for commercial reentry, but no missions have launched, primarily because vehicle recovery logistics and market demand favor established zones. Consequently, neither site appears in the FAA-licensed reentry operation data.

6.3. Reentry Analysis and Regional Compatibility

6.3.1. Infrastructure and Operational Compatibility

Similar to infrastructure requirements for launch operations detailed in Section 5.3.1, reentry programs involve infrastructure specific to user needs and mission types. However, reentry operations require a more limited and specialized set of infrastructure compared to vertical or horizontal launch activities. Core requirements typically include designated recovery or landing areas, secure ground access for retrieval operations, communications and tracking systems, and facilities to support vehicle safing, inspection, and transport following landing. Unlike launch infrastructure, reentry does not require propellant storage, flame trenches, or high-capacity power systems, which reduces overall development complexity and footprint. Infrastructure needs are largely driven by the reentry vehicle type and whether recovery occurs on land or via controlled airspace with off-site recovery operations.

Consistent with the infrastructure criteria evaluated for launch analysis. The SPAG region is generally compatible with land-based reentry concepts, particularly for suborbital or hypersonic vehicles designed for runway landings or controlled ground recovery. The region's low population density, extensive open land, and established transportation network provide flexibility for establishing recovery corridors, safety buffers, and temporary exclusion zones. Existing regional roadways support rapid post-landing access and transport of vehicles to processing or analysis facilities.

In contrast, water-based capsule reentries are less compatible with the SPAG region due to the absence of large navigable water bodies and maritime recovery infrastructure. As noted, capsule systems such as those used for crewed orbital missions typically rely on ocean recovery zones, making coastal locations more suitable for those mission profiles. As a result, SPAG's strongest alignment is with future reentry vehicle classes emphasizing controlled descent, runway landing, or terrestrial recovery rather than traditional splashdown architectures.

It is important to consider that many of the criteria evaluated for horizontal launch applies to reentry as well. Utilizing similar airspace, environmental, and risk assessment data, it can be determined that, overall, reentry represents a feasible and scalable opportunity for the SPAG region when aligned with appropriate vehicle concepts. When integrated with existing airports – primarily those with compatible runway characteristics, logistics infrastructure, and airspace coordination frameworks already evaluated in the regional aerospace planning process, reentry operations can be supported with modest incremental investment and minimal environmental or land-use constraints.

7. RESEARCH AND TESTING

7.1. Introduction to Research and Testing

Research and testing present a broad range of opportunities to support aerospace innovation, economic development, and workforce advancement. Across government, private industry, and academic institutions, these functions form the backbone of technology development by enabling new concepts to be evaluated, refined, and matured prior to operational use. Facilities such as laboratories, wind tunnels, and ground test stands support this process by providing controlled environments where performance can be validated, risks can be reduced, and design improvements can be identified.

Aerospace research and testing opportunities span the full technology development lifecycle. Early stage efforts focus on component and subsystem level evaluation, while more advanced activities examine integrated systems under increasingly realistic conditions. Ground-based laboratories enable detailed experimentation and verification, while modeling and simulation tools expand testing capabilities by replicating environments that are difficult or impractical to reproduce physically, such as microgravity or extreme thermal conditions. Together, these capabilities allow regions to support a wide range of research, testing, and validation functions without the need for active launch operations.

Federally funded research and development centers, national laboratories, and university-affiliated research institutions play a critical role in advancing these opportunities by providing specialized facilities, independent technical expertise, and collaborative environments. These entities help bridge the gap between foundational research and applied aerospace development, creating pathways for innovation, workforce training, and industry partnerships.

With aerospace systems becoming more complex, research and testing are placing greater focus on evaluating entire systems. Modern aerospace platforms require the integration of hardware, software, communications, and human interfaces, all of which must operate reliably as a unified system. Research and testing facilities provide the ability to evaluate these interactions holistically, identify potential vulnerabilities, and improve operational readiness. This capability supports not only technology advancement but also long-term safety, reliability, and mission success.

7.2. Research and Testing Demand

Current aerospace market conditions reflect a shift in how research and testing activities are conducted and valued across both commercial and defense sectors. Aerospace development has moved toward shorter design cycles, rapid iteration, and continuous validation rather than infrequent, milestone-based testing. As a result, testing activities are occurring more often and earlier in the development process, increasing overall demand for facilities that can accommodate repeated use, flexible scheduling, and evolving test requirements.

Deloitte's 2026 Aerospace and Defense Industry Outlook shows aerospace testing is driven by innovation and rising demand for advanced technologies, requiring new safety and certification protocols. Moving toward digital transformation to streamline processes that may also create challenges in cybersecurity and talent [45].

At the same time, the technical complexity of emerging aerospace systems has expanded the range of research and testing environments required. Advances in propulsion, materials, autonomy, and integrated digital systems often require testing under highly specific physical conditions involving noise, vibration, thermal loads, and safety constraints. These requirements cannot always be met within traditional laboratory settings or heavily utilized national facilities, prompting organizations to seek additional locations capable of supporting specialized testing under controlled conditions.

In parallel, aerospace firms are responding to capacity constraints, scheduling competition, and operational risk by distributing testing activities across multiple locations. By partnering with educational institutions private industry can limit some of their research costs, while creating opportunities within the academic community. This approach supports program resilience, reduces reliance on single facilities, and enables parallel development efforts. Demand has therefore expanded beyond a limited set of legacy testing sites to include regions that can support independent testing operations while remaining compatible with regulatory and infrastructure requirements.

Collectively, these factors mean that current market demand for research and testing is not driven solely by the number of new aerospace programs, but by the need for more frequent, more specialized, and more distributed testing environments. Testing is no longer limited to only places that can perform launch operations. Regions that can offer land availability, safety buffers, infrastructure access, and regulatory compatibility, without relying exclusively on launch operations, are increasingly relevant to the testing market. Research institutions like UT Austin's Center for Aeromechanics Research are just as relevant as launch testing sites, like Mojave Air and Space Port. In this context, research and testing demand functions as a near-term, structurally supported segment of the aerospace market that aligns with spaceport adjacent and controlled environment facilities.

This pattern of market demand aligns closely with existing conditions and planning objectives in the SPAG region. The region encompasses a large, predominantly rural area with relatively low population density outside of Lubbock County, providing land availability and natural safety buffers that are increasingly important for propulsion research and testing activities. These physical characteristics are consistent with the types of controlled and distributed propulsion testing environments sought by aerospace organizations responding to increased testing frequency and specialization.

The region's existing infrastructure further supports alignment with current research testing demand. Transportation networks, utility systems, and proximity to workforce and educational institutions centered in Lubbock provide the connectivity required to support testing operations while allowing those activities to occur in less congested settings if desired. This combination of accessibility and separation mirrors the distributed model emerging across the aerospace sector, where organizations seek alternatives or complements to heavily utilized legacy facilities.

From a market-demand perspective, these characteristics position the SPAG region as relevant to the research and testing segment precisely because it does not rely exclusively on launch activity to establish value. Instead, the region aligns with demand for frequent, repeatable, and specialized testing conducted under controlled conditions. In this context, research and testing represent a near-term, structurally supported market opportunity that is compatible with SPAG's land use patterns, infrastructure profile, and phased approach to aerospace development.

7.3. Regional Compatibility

Research and testing represent intentionally broad aerospace activity categories, encompassing a wide spectrum of technical, operational, and facility requirements. Unlike launch operations, which are constrained by fixed safety, airspace, and trajectory requirements, research and testing activities are highly adaptable and can be configured to match a variety of physical settings, infrastructure conditions, and regional strengths. This flexibility allows these activities to be distributed across multiple locations rather than concentrated in a single, specialized facility.

Both research and testing activities include numerous sub-categories ranging from early stage experimentation and component evaluation to advanced system validation that vary significantly in scale, complexity, and facility needs. As a result, the criteria used to support these activities can be tailored to local conditions. Facilities may be purpose-built or incrementally developed, allowing regions to scale investment in response to demand rather than committing to a single predefined development model.

Market demand plays a major role in shaping how and where research and testing activities occur. Aerospace organizations increasingly seek locations that offer flexibility, cost efficiency, workforce access, and scheduling availability. When a site is marketable, research and testing activities can be successfully accommodated across a wide range of geographic and industrial contexts. This market-driven approach enables regions to attract specialized testing functions without needing to replicate the full scope of national-level facilities.

The breadth of research and testing also allows regions to align opportunities with existing assets, such as educational institutions, industrial areas, or underutilized land. Because these activities do not require uniform infrastructure standards, they can support diverse customer needs, including commercial innovation, defense-related development, and academic research. This adaptability makes research and testing among the most accessible aerospace opportunities for regions seeking to enter or expand within the aerospace sector.

7.3.1. Educational Institutions

Although research and testing can be tailored to meet many environments, marketability of aligning with existing education institutions in the near term is a component worth consideration. Regional opportunity was assessed based on availability of higher-education institutions and technical training centers that provide relevant programs that support skills desired to support aerospace research and testing.

Table 7: Surrounding Educational Institutions and Relevant Programs Offered [46], [47], [48], [49], [50], [51].

School	Texas Tech University	West Texas A&M University	South Plains College	Abilene Christian University	Angelo State University	University of Texas Permian Basin
Location	Lubbock, TX	Canyon, TX	Levelland, TX	Abilene, TX	San Angelo, TX	Odessa, TX
Student Population	40,969	9,037	8,552	6,730	11,542	5,899
Relevant Programs						
Aerospace Engineering	🚀	-	-	-	-	-
Bioengineering	🚀	-	-	-	-	-
Biology	-	-	🚀	-	-	-
Chemical Engineering	🚀	-	-	-	-	🚀
Civil Engineering	🚀	🚀	-	🚀	🚀	🚀
Commercial Aviation	-	-	-	-	🚀	-
Computer Aided Drafting and Design	-	-	🚀	-	-	-
Computer Engineering	🚀	-	-	-	-	-
Computer Science	🚀	-	-	-	-	-
Construction Engineering	🚀	-	-	-	-	-
Electrical Engineering	🚀	-	-	🚀	-	🚀
Engineering	🚀	🚀	-	🚀	-	-
Engineering Technology	-	🚀	-	-	-	-
Environmental Engineering	🚀	🚀	-	-	-	-
Industrial Manufacturing/ Emerging Technologies	-	-	🚀	-	-	-
Industrial, Manufacturing, and Systems Engineering	🚀	-	-	-	-	-
Mathematics	-	-	🚀	-	-	-
Mechanical Engineering	🚀	🚀		🚀	🚀	🚀
Petroleum Engineering	🚀	-	-	-	-	🚀
Pre-Engineering	-	-	🚀			
Robotics	🚀	-	-	-	-	-
Sciences	-	-	🚀	-	-	-
Software Enginerring	🚀	-	-	-	-	-

8. AEROSPACE MANUFACTURING

8.1. Introduction to Aerospace Manufacturing

Aerospace manufacturing represents a major component of the aerospace industry and a significant opportunity for regional economic development, the primary focus of this study. Manufacturing activities support the production of aircraft, spacecraft, satellites, propulsion systems, and a wide range of associated components that are essential to commercial aviation, defense, and space-related operations. These activities form the foundation of the aerospace value chain and are closely linked to research, testing, integration, and operational deployment.

Similar to research and testing, manufacturing opportunities within the aerospace sector are broad and encompass varying levels of scale, specialization, and technological complexity. Operations may range from component fabrication and advanced materials production to final assembly, integration, and supply-chain support. Unlike launch operations, aerospace manufacturing is not constrained by airspace or trajectory requirements and can be distributed across multiple locations based on workforce availability, infrastructure capacity, logistics efficiency, and market access.

Modern aerospace manufacturing increasingly emphasizes advanced production techniques, including precision machining, additive manufacturing, automation, and digital manufacturing systems. These processes require reliable utilities, transportation connectivity, and a skilled labor force, but they can be tailored to a wide range of sites and regional conditions. As a result, manufacturing facilities can be developed incrementally and scaled over time to meet changing customer demand.

From a regional planning perspective, aerospace manufacturing offers durable economic benefits, including long-term employment, supply-chain development, and opportunities for workforce training and education. When aligned with market demand and supported by appropriate infrastructure and workforce resources, manufacturing activities can serve as anchor uses that attract related aerospace operations and support sustained growth within the broader aerospace ecosystem.

8.2. Manufacturing Demands

Due to the broad nature of manufacturing functions possible, this section will primarily focus on the satellite manufacturing sector, a major market serving the launch industry with ample opportunity.

The satellite manufacturing sector is experiencing significant growth as the demand for space-based services continues to expand across a range of industries. Demand for satellites in the aerospace industry is influenced by a variety of factors. Private industries, including internet, communications, and technology companies, rely on satellite infrastructure in space to support their operations on the ground. These sectors require reliable and scalable satellite capabilities for services such as broadband internet, mobile networks, broadcast media, and global data connectivity. As the need for real-time information, secure communications, and expanded digital coverage grows, companies increasingly depend on advanced satellite networks to meet consumer and enterprise demands.

While these private industries drastically drive demand most companies do not typically have the capability to conduct their own launches. As a result, they require support infrastructure and thus purchase payload space on private launches via the ridesharing model. Ridesharing allows multiple organizations to share the cost of a single launch by combining their payloads, making access to space more affordable and efficient. This approach is especially attractive for small satellite (CubeSat, microsatellite) operators, startups, and research institutions seeking flexible launch schedules and lower entry barriers.

SpaceX stands out as the largest provider of rideshare operations, offering several orbit options to accommodate diverse mission requirements. The company's Falcon 9 and Falcon Heavy launch vehicles are equipped to deliver payloads to a wide range of orbital altitudes and inclinations, supporting missions for telecommunications, earth observation, scientific research, and commercial applications. SpaceX's regular rideshare missions, such as the Transporter series, have enabled dozens of payloads from various international customers to reach space, accelerating industry growth and fostering innovation.

Satellite Deployment Demand

The deployment of satellites is a fundamental segment of aerospace operations and continues to experience robust demand. This demand is driven by industries such as telecommunications, navigation, meteorology, and environmental monitoring. Communication satellites enable global connectivity for broadband internet, mobile networks, and broadcast services. Navigation satellites, such as GPS, support mapping, timing, and transportation logistics. Weather satellites are essential for forecasting, disaster management, and climate research. Earth observation satellites provide high-resolution imagery and data for applications like agriculture, urban planning, resource management, and environmental monitoring. The growth of small satellites (including

CubeSats and microsatellites) and constellation architectures is accelerating demand, as organizations pursue scalable, cost-effective solutions for real-time data and enhanced coverage. Advances in technology and reductions in launch costs are expected to further expand the market for satellite deployment, with increased participation from both governmental and private entities.

As seen below in **Figure 30**, the 2024 global satellite industry revenues reached approximately $415 billion. The satellite industry accounted for approximately 71% of this, totaling $293 billion in revenues. The satellite industry can be split into 4 categories: satellite services, ground equipment, satellite manufacturing, and launch industry. The largest of these categories, ground equipment, accounted for $155.3 billion in revenues supporting consumer equipment, GNSS equipment, and network equipment. Satellite services were the next largest, accounting for $108.3 billion in revenues. Collectively, these components impact daily life, often unbeknownst to the general public. Ground equipment and satellite services include offerings many use in daily life such as satellite tv, satellite radio, and mobile voice and messaging.

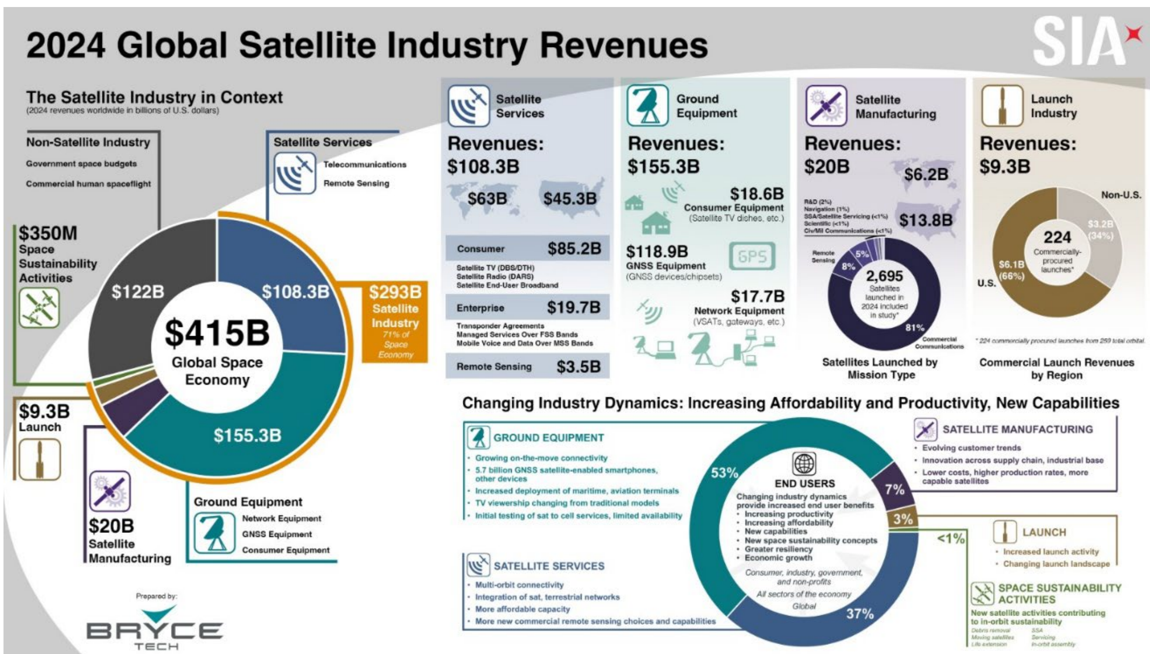

Figure 30: Global Satellite Industry Revenues [52].

Space-Based Research

The demand for space-based research and scientific experimentation is growing, driven by the unique microgravity environment that enables studies not possible on Earth. Aerospace launch operations facilitate the deployment of research payloads in fields such as physics, biology, materials science, and pharmaceutical development. Astropharmacy, or in-space pharmaceutical manufacturing, is emerging to address the need for medications during long-duration missions. Research focuses on bioreactors and automated systems capable of producing pharmaceuticals in situ, mitigating logistical constraints. The expansion of commercial platforms aboard the ISS and future space habitats continues to increase demand for launches supporting scientific research both in space and on the ground. Support facilities for in-space manufacturing, when paired with reentry and recovery operations, represent a promising opportunity across multiple markets. These facilities can support pharmaceutical production, advanced materials processing, and biological research by enabling the return of manufactured products and experimental results for terrestrial analysis, validation, and commercialization. The integration of manufacturing support infrastructure with reentry capabilities enhances supply chain flexibility, reduces mission risk, and broadens the range of research and commercial applications supported by launch operations.

8.2.1. Regional Compatibility

Manufacturing demonstrate a high degree of compatibility due to flexibility in siting, scalability, and ability to integrate with existing land uses and infrastructure. Within the SPAG region, manufacturing compatibility is primarily driven by the availability of developable land, access to labor, and the ability to support material movement and facility operations at an industrial scale. The Study finds that many areas across the region possess the spatial capacity and supporting conditions necessary to accommodate manufacturing uses without introducing significant operational conflicts.

Manufacturing operations rely on the efficient conveyance of materials and personnel, as well as sufficient space for production, staging, and future expansion. The SPAG region's land availability and distribution of population across multiple counties provide flexibility for locating facilities in ways that align with local planning objectives further strengthened by access to skilled workforce.

The presence of colleges and universities throughout the region contributes to a sustainable labor pipeline and supports long-term employment opportunities tied to advanced manufacturing. This alignment allows manufacturing operations to integrate with workforce development efforts and enhances the region's ability to attract and retain skilled labor.

From a broader industry perspective, aerospace manufacturing is well suited to the SPAG region due to its potential role in supply-chain diversification. Aerospace production remains heavily dependent on materials manufactured outside the U.S., creating opportunities for domestic production of components such as semiconductors, composites, and specialized materials is a current focus. Existing manufacturers operating within the region demonstrate that these activities can be successfully integrated into the local industrial base, reinforcing the region's compatibility with expanded manufacturing functions.

Overall, manufacturing aligns strongly with regional conditions because it can be tailored to local land use, workforce, and infrastructure characteristics while supporting long-term economic development objectives. This compatibility makes manufacturing one of the most broadly applicable aerospace opportunities within the SPAG region and supports consideration across multiple counties rather than limiting development to a single site.

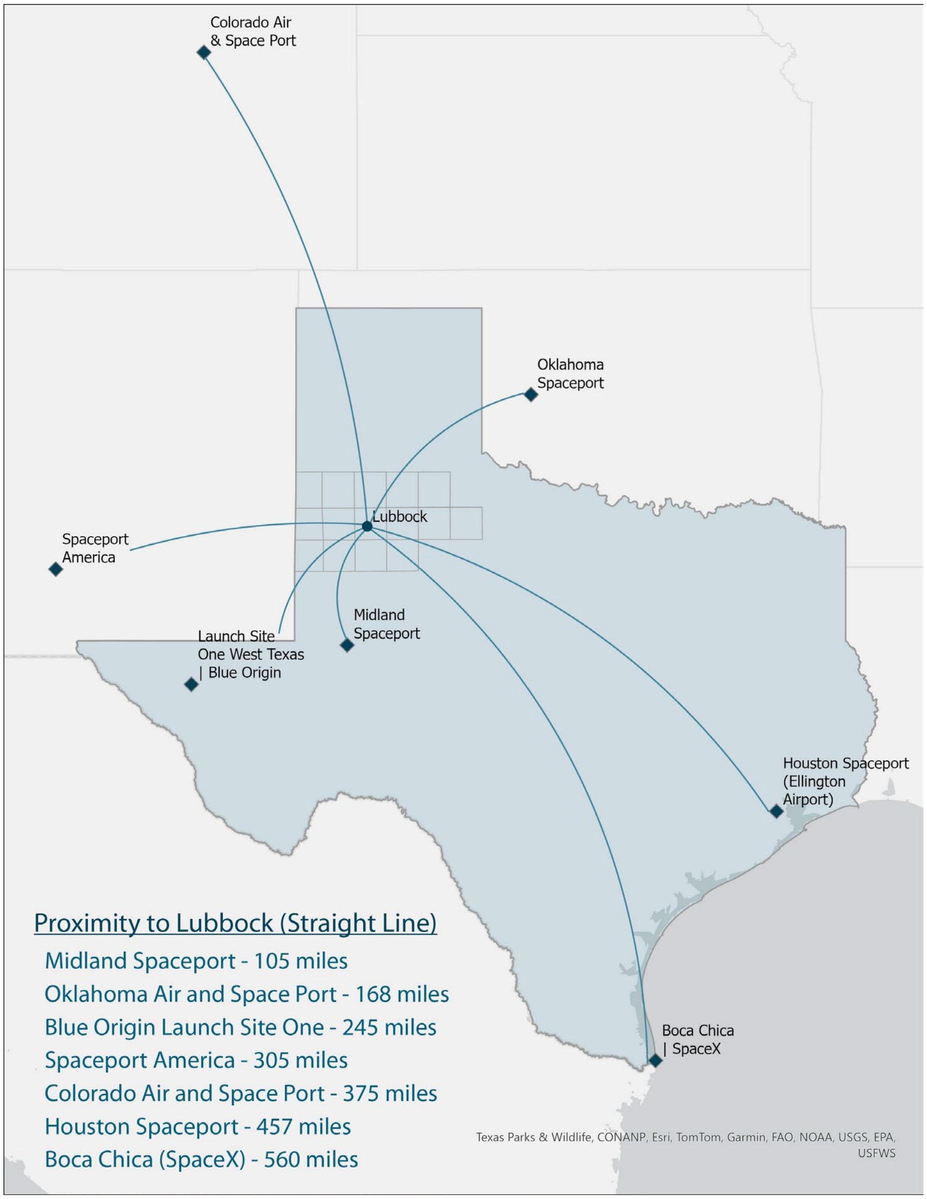

Figure 31: Spaceports Near SPAG.

As previously stated, the aerospace industry is highly reliant on the import of materials which are currently manufactured in other countries. As shown in **Figure 31**, SPAG's centralized position between multiple spaceports set it up to be a supply hub. Increasing the production of materials such as semiconductors and aerospace-grade composites in the region that can be dispersed within an existing space network has the potential for promising economic returns.

Capitalizing on existing manufacturers in the region could also prove beneficial. XFab Texas is one such manufacturer already operating out of Lubbock, offering semiconductor manufacturing services. Developing facilities capable of manufacturing aerospace-grade composites and fuels would benefit the Texas aerospace industry by providing local sources for growing companies. Ensuring aerospace quality materials are manufactured in the region could provide huge economic benefits from U.S. based aerospace companies.

9. STAKEHOLDER ENGAGEMENT

9.1. Stakeholder Engagement Process

Stakeholder engagement and transparency were integral to the planning process, ensuring that decision making for the report was informed, inclusive, and responsive to stakeholder input. Throughout plan development stakeholders were engaged through regular meetings, briefings, and coordinated outreach, providing opportunities to share information, gather feedback, and address concerns. Project updates were presented at scheduled meetings throughout the region to communicate progress, key milestones, and any changes to scope, schedule, or assumptions. A project timeline is listed below:

Table 8: Project Timeline and Stakeholder Meeting Topics.

Meeting	Date	Description
Board of Directors – Study Initiation	7/8/25	Kimley-Horn selected to compete study.
Board of Directors – Project Kickoff	8/12/25	Initial Scope and project team presented to South Plains Board of Directors.
Stakeholder Industry Connections	9/4/25	Targeted Stakeholder Engagement – Strategic meeting to determine key resources and ongoing planning available within the region relevant to the Study.
Site Investigation	9/18/25	Existing infrastructure and conditions inventory of key stakeholders such as Reese.
Board of Directors – Initial Study Briefing	9/19/25	Communication of initial findings and input for operational concepts to consider within Study.
Industry Connections	9/29/25	Continued industry connections for input.
Texas Space Commission Sync	10/2/25	Overall Texas goal planning and state sponsored strategic focus.
Site Investigation #2	10/9/25	Continued existing infrastructure and conditions inventory of key stakeholders.

Stakeholder Industry Connections - Education	10/9/25	Targeted Stakeholder Engagement – Strategic meeting to consider relevant local educational programs.
Stakeholder Industry Connections - Workforce	10/9/25	Targeted Stakeholder Engagement – Strategic meeting to gather data for workforce solutions within the industry, and the regions capability to provide skilled workforce.
Board of Directors Engagement	10/21/25	Study progress report, launch feasibility update and input.
Board of Directors Engagement	11/18/25	Study progress report and concept of operations prioritization.
Regional Engagement - Plainview	11/19/25	Strategic open regional engagement meeting where launch operation potential and site investigation data were presented. Concept of Operations prioritization workshop. Intake of stakeholder comments and questions regarding the study progress.
South Plains Economic Development District (SPEDD) Engagement	12/4/25	Presentation of economic growth strategies considered within the Study and input from the SPEDD advisory committee.
Board of Directors - Engagement	12/9/25	Study progress report, stakeholder engagement updates and takeaways.
Regional Engagement - Brownfield	12/16/25	Strategic open regional engagement meeting where launch operation potential and site investigation data were presented. Concept of Operations prioritization workshop. Intake of stakeholder comments and questions regarding the study progress.
Board of Directors Engagement	1/13/26	Study progress report, stakeholder engagement updates and takeaways.
Board of Directors Engagement	2/10/26	Study progress report, initial recommendations presented and input gathered.
Board of Directors Engagement	3/17/26	Study progress report, study results presented and input gathered.
Texas Municipal League (TML) Presentation	3/27/26	Results presentation and engagement intake. Texas Space Commission Briefing.

9.2. Engagement Takeaway

Stakeholder input was gathered progressively throughout the Study through a structured series of Board briefings, targeted industry meetings, site investigations, and open regional engagement sessions. This phased approach ensured that feedback informed the Study at key decision points, from initial scoping through final recommendations.

9.2.1. Early Alignment on Aerospace as a Regional Opportunity

Initial engagement with the Board of Directors and early industry stakeholders (July–September 2025) established a strong foundation of support for aerospace and space-related development. During the study initiation and project kickoff meetings, stakeholders confirmed interest in exploring launch-related operations and complementary aerospace activities. This early alignment was reinforced during the first round of targeted Industry Connections meetings, where stakeholders identified existing regional assets and ongoing initiatives relevant to the Study.

9.2.2. Existing Conditions Engagement

Site Investigations conducted in September and October 2025 provided context for further stakeholder discussions. Engagement with key stakeholders, including Reese, helped ground conversations in existing infrastructure conditions, operational constraints, and near-term opportunities. These investigations informed subsequent Board briefings and enabled more informed dialogue regarding feasible operational concepts and site-specific considerations.

9.2.3. Economic Development – Key Element

Across Board engagements, regional meetings, and discussions with the South Plains Economic Development District (SPEDD), economic growth emerged as a consistent and unifying theme. Stakeholders emphasized the importance of leveraging aerospace activity to drive job creation, attract private investment, and diversify the regional economy. Input gathered during SPEDD engagement and Board progress reports directly influenced the framing of economic development strategies considered within the Study.

9.2.4. Board Engagement

Recurring Board of Directors engagements (October 2025–March 2026) served as key checkpoints for refining Study direction. These sessions provided opportunities to present progress updates, launch feasibility findings, and operational concepts, while gathering strategic input from Board members. Concept of Operations prioritization discussions in November 2025 helped narrow focus areas and align Study recommendations with stakeholder priorities and regional capabilities.

9.2.5. Targeted Engagement on Education and Workforce

Dedicated stakeholder meetings in October 2025 focused on education and workforce development provided deeper insight into the region's capacity to support aerospace industry needs. Educational institutions and workforce stakeholders expressed interest in adapting programs and training pathways to meet anticipated demand. This targeted input reinforced workforce readiness as a critical enabling factor for future aerospace and spaceport-related development.

9.2.6. Regional Engagement

Open regional engagement meetings in the City of Plainview and the City of Brownfield (November and December 2025) served as important validation points. Stakeholders were presented with launch operation potential, site investigation findings, and preliminary operational concepts. Concept of Operations prioritization workshops conducted during these meetings generated meaningful dialogue, questions, and feedback from a broad range of regional participants, confirming strong community interest and support.

9.2.7. Aviation and Airport Stakeholder Participation

Throughout the engagement process, airport stakeholders contributed perspectives on how aviation infrastructure could support space-related activities. Discussions explored opportunities related to launch support, testing, cargo, logistics, and other aerospace-adjacent uses. This input highlighted airports as proactive partners and critical components of a broader aerospace ecosystem.

9.2.8. Strategic Alignment with Statewide Initiatives

Engagement with the Texas Space Commission and presentations to the Texas Municipal League Region 3 ensured alignment with statewide goals and strategic priorities. These discussions helped situate the Study within a broader policy and funding context, reinforcing the relevance of the Study's findings and recommendations beyond the regional level.

9.2.9. Industry Collaboration

Repeated Industry Connections meetings and continued outreach facilitated the development of strategic relationships with industry partners. These engagements highlighted opportunities to align existing projects, institutional efforts, and infrastructure investments with the Study's objectives. Collaboration with key stakeholders—including Reese Technology Center, the Lubbock Economic Development Alliance, Workforce

Solutions South Plains, local airports, universities, and industry partners—demonstrated how ongoing initiatives align with and support the recommended concepts of operations.

10. RECOMMENDATIONS

Study analysis and results conclude that the South Plains region is well positioned to pursue aerospace-related economic development when focused on **operationally compatible, lower-risk, and scalable activities**. The recommendations below establish a clear strategic direction, identify priority aerospace activities, and outline a phased path toward implementation.

10.1. Strategic Direction

SPAG should advance an aerospace strategy centered on **supportive and enabling aerospace operations**, rather than primary orbital launch infrastructure. Analysis and Board guidance indicate that inland safety constraints, regulatory complexity, and market duplication limit the feasibility of vertical orbital launch in the near term, while aerospace manufacturing, testing, research, and integration present stronger economic and operational alignment.

Strategic intent:

- Maximize regional economic impact
- Minimize regulatory and safety risk
- Maintain flexibility as aerospace markets evolve

This direction positions SPAG as an **inland aerospace support hub** that complements Texas and national launch infrastructure rather than competing with it.

10.2. CONOP Prioritization Results

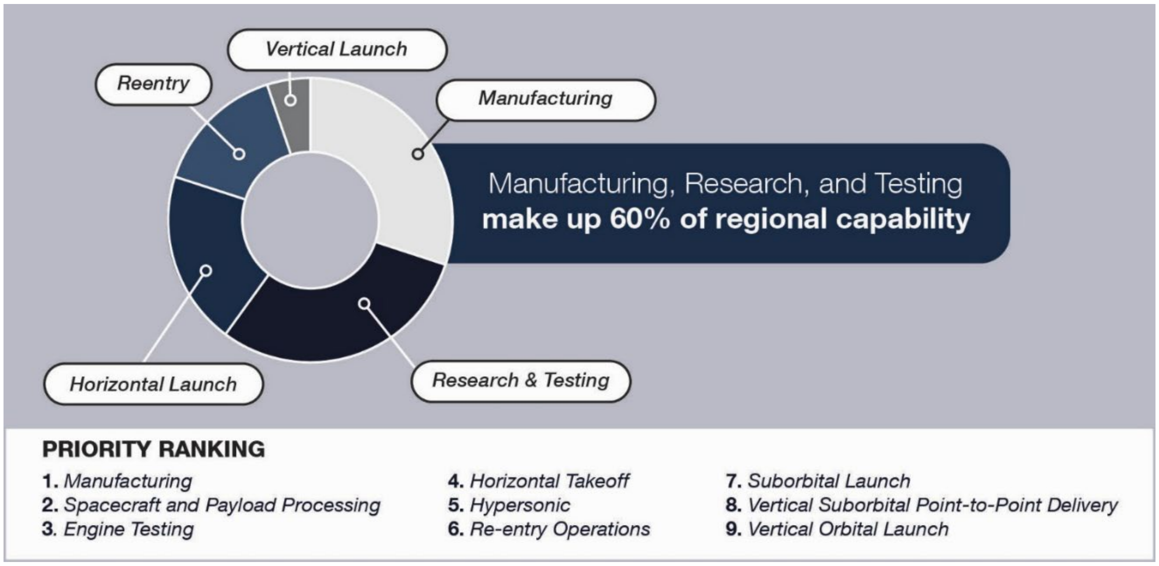

Figure 32: CONOP Priority Ranking List and Chart.

10.3. Priority Aerospace Focus Areas

Based on CONOP prioritization, evaluation matrices, and Board feedback, the following aerospace activities are recommended as priority focus areas for SPAG:

Tier 1 – Near- to Mid-Term Opportunities (Highest Priority)

These activities demonstrated strong compatibility with regional assets and the greatest potential for economic return:

- Aerospace manufacturing and advanced manufacturing
- Payload integration and processing
- Advanced testing and research (including propulsion, avionics, and systems testing)
- Aerospace logistics and support services

These uses leverage existing airport infrastructure, available land, proximity to educational institutions, and regional workforce capabilities.

Tier 2 – Conditional or Long-Term Opportunities

These activities may be considered in the future if market demand, safety compatibility, and regulatory feasibility improve:

- Suborbital or specialized testing operations
- Hypersonic or experimental research activities
- Horizontal launch and reentry operations utilizing appropriate concepts for inland launch capability (identified below).

Not Recommended at This Time

- Vertical orbital launch operations, due to inland safety constraints, regulatory challenges, and overlap with existing licensing efforts such as Midland Air and Space Port.

10.4. Launch Site Investigation Results

An evaluation of potential **horizontal launch and reentry site candidates** was conducted to identify facilities capable of supporting Concept X, Concept Z, and reentry vehicle operations based on priorities listed above. The assessment focused on runway infrastructure, operational context, strategic advantages, and compatibility with anticipated aerospace operations. Two candidate sites emerged from this investigation: **Reese National Security Complex** and **Preston-Smith International Airport**.

10.4.1. Reese National Security Complex (Primary Candidate)

The Reese National Security Complex was identified as the primary candidate for horizontal launch and reentry operations based on its infrastructure readiness, operational control, and strategic advantages.

From an infrastructure standpoint, Reese offers a compatible runway measuring approximately **10,500 feet by 150 feet**, which is sufficient to support the aircraft and vehicle profiles associated with horizontal launch and reentry concepts. Importantly, no runway extensions are required to accommodate these operations, reducing near-term capital investment and implementation risk.

Operationally, Reese functions as a **private airfield**, providing a controlled operating environment with fewer conflicts from commercial aviation activity. This operational context enhances flexibility for test, research, and specialized aerospace missions that may require unique scheduling, security, or safety considerations.

The site also presents several strategic advantages. Reese benefits from **existing partnerships with Texas Tech University**, supporting research collaboration, workforce development, and applied aerospace innovation. In addition, the presence of **existing lab space and manufacturing facilities** positions the site well for integration, processing, and testing activities. The availability of **national security infrastructure** further strengthens Reese's suitability for government, defense, and sensitive aerospace operations.

Collectively, these factors support Reese National Security Complex as the most favorable candidate for near-term advancement.

10.4.2. Preston-Smith International Airport (Secondary Candidate)

Preston-Smith International Airport was identified as a viable **secondary candidate** for horizontal launch and reentry operations.

The airport is supported by **existing runways measuring approximately 11,500 feet by 150 feet and 8,000 feet by 150 feet**, both of which are sufficient for the operational concepts evaluated. Similar to Reese, no runway extensions are required, indicating adequate baseline infrastructure.

However, Preston-Smith operates as a **commercial service airport**, introducing additional operational considerations. The presence of scheduled commercial flights and public aviation activity may limit flexibility for aerospace testing or launch-adjacent operations. As a result, further analysis would be required to confirm long-term **operational compatibility**, particularly related to scheduling, airspace coordination, and safety management.

Despite these considerations, Preston-Smith remains a capable alternative site, particularly for operations that can be integrated within a commercial airport environment.

10.4.3. Comparative Findings and Recommendation

The investigation determined that **both sites demonstrate the capability to support Concept X, Concept Z, and reentry vehicle operations** from an infrastructure perspective. However, differences in operational context and strategic positioning distinguish their respective roles.

Based on the findings:

Reese National Security Complex is recommended as the **Primary Candidate Site**, due to its private operational environment, existing aerospace and research infrastructure, and strong alignment with national security and advanced aerospace activities.

Preston-Smith International Airport is recommended as a **Secondary Candidate**, suitable for further consideration where operational compatibility with commercial aviation can be confirmed.

10.5. Economic Development Outcomes

Aerospace development should be pursued explicitly as an **economic development strategy**, not solely as an aviation or spaceport initiative. The Study and BOD update identified the following expected outcomes:

- Direct and indirect job creation
- Construction and infrastructure investment
- Supply chain and local business growth
- Long-term diversification of the regional economy
- Improved regional competitiveness within Texas' aerospace ecosystem

SPAG should integrate aerospace initiatives into broader regional economic development efforts to ensure measurable return on investment.

10.6. Workforce and Education Alignment

Workforce availability and education alignment are critical enabling factors for all recommended aerospace activities.

SPAG should:

- Coordinate workforce development efforts with industry needs tied to manufacturing, testing, and research operations
- Support industry-aligned training, apprenticeships, and certification programs
- Leverage proximity to universities, technical colleges, and research institutions as a competitive advantage
- Promote applied learning, internships, and STEM pathways to strengthen the long-term talent pipeline

This alignment ensures that workforce readiness evolves alongside phased aerospace investment.

10.7. Implementation Pathway (Phase 2+)

With CONOP prioritization and initial site screening complete, SPAG is positioned to transition from planning to targeted implementation through subsequent phases.

Recommended next steps include:

- Conduct site-specific due diligence for prioritized operations, including safety, infrastructure capacity, environmental constraints, and regulatory requirements
- Refine market and economic analyses to identify specific industry segments and potential anchor tenants
- Develop implementation frameworks addressing governance, funding strategies, and public-private partnership models
- Pursue additional funding opportunities, including future Texas Space Commission programs

A phased approach allows SPAG to manage risk while maintaining flexibility and momentum.

10.8. Final Recommendation

SPAG should proceed with an aerospace development strategy that emphasizes **manufacturing, research, testing, and integration**, supported by workforce and educational alignment, and implemented through phased, data-driven decision making.

This approach:

- Aligns with Board direction
- Reflects Study findings
- Maximizes economic benefit
- Positions SPAG as a strategic partner within Texas' growing aerospace economy

11. ACRONYMS

SPAG	South Plains Association of Governments
CONOPS	Concept of Operations
TSC	Texas Space Commission
SEARF	Space Exploration & Aeronautics Research Fund
ISS	International Space Station
LEO	Low Earth Orbit
FAA	Federal Aviation Administration
NASA	National Aeronautics and Space Administration
U.S.	United States
GA	General Aviation
LSOL	Launch Site Operator License
HLV	Horizontal Launch Vehicle
GPS	Global Positioning System
USSF	United States Space
STF	Spaceport Trust Fund
RLV	Reusable Launch Vehicle
TEF	Texas Enterprise Fund
EZP	Texas Enterprise Zone Program
GURI	Governor’s University Research Initiative
CFR	Code of Federal Regulations
RSOL	Reentry Site Operator License
AST	Office of Commercial Space Transportation

DoW	Department of War
ESP	Explosive Site Plan
NEPA	National Environmental Policy Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
FONSI	Finding of No Significant Impact
AI	Artificial Intelligence
NAAQ	National Ambient Air Quality Standards
NO_2	Nitrogen Dioxide
SO_2	Sulfur Dioxide
PM	Particulate Matter
CO	Carbon Monoxide
O_3	Ozone
Pb	Lead
AQI	Air Quality Index
dB	Decibel
IOP/SS	Ignition Overpressure and Sound Suppression System
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
SPC	South Plains College
UTPB	University of Texas Permian Basin
E_c	Expected Number of Casualties
P_c	Probability of Casualty

HTHL	Horizontal Takeoff Horizontal Landing
SUA	Special Use Airspace
ATC	Air Traffic Control
MOA	Military Operations Area
CFA	Controlled Firing Area
NSA	National Security Area
MTR	Military Training Route
TFR	Temporary Flight Restriction
LBB	Lubbock Preston Smith International Airport
F49	Slaton Municipal Airport
F83	Abernathy Municipal Airport
KPVW	Plainview-Hale County Airport
KLLN	Levelland Municipal Airport
2T1	Muleshoe Municipal Airport
LIU	Littlefield Taylor Brown Municipal Airport
BFE	Terry County Airport
5F1	Post-Garza County Airport
41F	Floydada Municipal Airport
F85	Cochran County Airport
8F3	Crosbyton Municipal Airport
F98	Yoakum County Airport
E57	Denver City Airport
TT97	Seagraves Airport

FL###	Flight Level (Altitude)
IFR	Instrument Flight Rules
EPA	Environmental Protection Agency
FTZ	Foreign Trade Zone
KPVW	Plainview-Hale County Airport
CNC	Computer Numerical Control

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