SPACE FLORIDA

Cape Canaveral Spaceport Master Plan

January 2017

ACKNOWLEDGMENTS

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COVER PHOTO CREDITS

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Revision history

Revision	Revision date	Details	Authorized	Name	Position

"To achieve this vision, we must engage our stakeholders with conviction. This shared opportunity for sustained leadership in space will only be realized by relying on the agility and innovation of the private sector."

Frank DiBello, Space Florida President and CEO

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ACRONYMS

AADF	Annual Average Daily Flow
ARFF	Aircraft Rescue and Firefighting
ASOC	Atlas V Spaceflight Operations Center
ATCT	Air Traffic Control Tower
ATK	Alliant Techsystems
BO	Blue Origin
C3PF	Commercial Crew and Cargo Processing Facility
CCAFS	Cape Canaveral Air Force Station
CCS	Cape Canaveral Spaceport
CIP	Capital Improvements Program
CMP	Center Master Plan
CNS	Canaveral National Seashore
COMSAT	Communications Satellite Corporation
CSF	Customer Support Facility
CVLC	Commercial Vertical Launch Complex
DoD	Department of Defense
DOI	Department of Interior
EELV	Evolved Expendable Launch Vehicles
EPF	Eastern Processing Facility
ESA	Engineering Support Area
FAA	Federal Aviation Adminstration
FAA-AST	FAA Office of Commercial Space Transportation
FAR	Far Field Antenna Testing Range
FCG	Florida City Gas
FDC	Future Development Concept
FDOT	Florida Department of Transportation
FEC	Florida East Coast Railway
FPL	Florida Power and Light Company
FSSP	Florida Spaceport System Plan
FTP	Florida Transportation Plan
GC3	Ground Command, Control, and Communication
GEO	Geostationary Orbit, Geostationary Earth Orbit or Geosynchronous Equatorial Orbit
HTOL	Horizontal Takeoff and Landing
IDA	Institute for Defense Analysis
ISS	International Space Station
KARS	Kennedy Athletic, Recreation and Social Parks
KSC	Kennedy Space Center
LC	Launch Complex
LCC	Launch Control Center
LEO	Low Earth Orbit
LNG	Liquid Natural Gas
LOC	Launch Operations Center
LSOL	Launch Site Operator License
LUT	Launch Umbilical Tower
MARS	Mid-Atlantic Regional Spaceport in Virginia
MDC	Mission Director's Center
MGD	Millions of Gallons per Day
MINWR	Merrit Island National Wildlife Refuge
ML	Mobile Launcher
MOC	Morrell Operations Center
MPPF	Multi-Payload Processing Facility
MAS	Mobile Access Structure
MSR	Mission Support Room
MST	Mobile Service Tower
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NDPES	National Pollutant Discharge Elimination System
NEPA	National Environmental Policy Act
NOTU	Naval Ordinance Test Unit
NOTU ADP	Naval Ordinance Test Unit Area Development Plan
NPS	National Park Service
NRO	National Reconnaissance Office
O&C	Operations and Checkout Building
OCC	Operations Communication Center
OIS	Operational Intercommunication Systems
OPF	Orbiter Processing Facilities 1 and 2
OSTP	Office of Science and Technology Policy
OTV	Operational Television
PAFB	Patrick Air Force Base
PCC	Processing Control Center
PEIS	Programmatic Environmental Impact Statement
PHSF	Payload Hazardous Servicing Facility
RF	Radio Frequency
RLV	Reusable Launch Vehicle
RPSF	Rotation Processing and Surge Facility
SAB	Satellite Assembly Building
SF	Space Florida
SFA	Spaceport Florida Authority
SIS	Strategic Inter-modal System
SLC	Space Launch Complex
SLF	Shuttle Landing Facility
SLSL	Space Life Sciences Laboratory
SPFL	Space Florida
SOC	Spacecraft Operations Center
SOCC	Space Operations Control Center
SRB	Solid Rocket Booster
SSP	Strategic Systems Program
SSPF	Space Station Processing Facility
STIMF	Space Transportation Infrastructure Matching Fund
STS	Space Transportation System
SW	Space Wing
SWS	Strategic Weapons System
TPSF	Thermal Protection System Facility
USAF	United States Air Force
USFWS	U.S. Fish and Wildlife Service
VAB	Vehicle Assembly Building

01
EXECUTIVE SUMMARY

"It is the intent of the Legislature that Space Florida will...preserve the unique national role served by the Cape Canaveral Air Force Station and the John F. Kennedy Space Center by reducing costs and improving regulatory flexibility for commercial sector launches while pursuing the development of complementary sites for commercial horizontal launches."

"Space Florida shall develop a Spaceport master plan for expansion and modernization of space transportation facilities within Spaceport territories... the plan shall contain recommended projects to meet current and future commercial, national, and state space transportation requirements. The plan shall identify appropriate funding levels and include recommendations on appropriate sources of revenue that may be developed to contribute to the State Transportation Trust Fund. The territory consisting of areas within the John F. Kennedy Space Center and the Cape Canaveral Air Force Station may be referred to as the Cape Canaveral Spaceport."

"Space Florida shall carry out its responsibilities for Spaceport operations by supporting federal efforts to clarify roles and responsibilities of federal agencies and eliminate duplicative rules and policies, in an effort to streamline access for commercial launch users...seeking federal support and developing partnerships to renew and upgrade infrastructure and technologies at the Cape Canaveral Air Force Station, the John F. Kennedy Space Center, and the Eastern Range that will enhance space and military programs of the Federal Government, and improve access for commercial launch activities."

—Florida Statutes 331, Part II;
Sections 331.3011, 331.304, 331.360, 331:3051

The Cape Canaveral Spaceport (CCS) has the greatest growth potential of Florida's five defined Spaceport territories that currently comprise the Florida Spaceport System.

With a rich legacy of federal space program infrastructure developed over its first six decades, and a storied heritage of hosting the world's greatest spaceflight achievements, CCS is also uniquely positioned to be the planet's premiere transportation hub enabling global space commerce throughout the 21st Century and beyond.

Today, CCS is midway into a fundamental transformation, from its past as a collection of launch site facilities dedicated to specific federal space missions, to a future of integrated yet autonomous activities conducted across the broad landscape of a multi-sector space transportation complex.

This transformation began more than a decade before the final Space Shuttle mission lifted off from Launch Complex 39A at Kennedy Space Center (KSC). It will remain underway for at least another decade, as Space Florida works with its federal partners and industry stakeholders to adapt the Spaceport's management, policies, and regulatory environment to face an evolving industry serving a global marketplace. It is essential that this transformation be guided by a collaborative, flexible, and economically sustainable plan for modernization of Spaceport infrastructure and operations.

This 2017 update of the CCS Master Plan confronts a dynamic planning environment facing all stakeholders, providing both strategic and real property visions that support shared needs. Florida's legislative direction is to preserve CCS's unique national role while reducing costs, improving regulatory flexibility, and improving access for commercial launch activities. Its challenge and opportunity is to align the diverse mission interests into an integrated Spaceport architecture that enables all sectors to function and grow effectively, with optimum efficiency, and mission accomplishment.

The State of Florida is a highly-invested stakeholder in the outcome of this endeavor. It has provided land and resources in support of the CCS since its origins. Over the past 15 years, Space Florida and predecessor entities employed statutory authorities to produce non-federal investment of over $1 billion in modernized infrastructure throughout CCS. This remarkable capitalization of Spaceport assets has been achieved through both public and private investments leveraged with the financial risk capital of commercial space providers. These investments advance Florida's leadership in civil, commercial, and military aerospace activity. They create jobs, economic growth, and mitigate the impacts of federal program realignments.

The CCS Master Plan is a living road map to the future. Its purpose is to lay a sound foundation for defining the development priorities for this strategically-critical area of designated Spaceport territory within the Florida Spaceport System.

It is organized to:

- Describe CCS as a unified part of Florida's space-connected geography, and its place within an emerging global network of Spaceports
- Build on previous and concurrent planning activities
- Provide a Vision for the Spaceport of the future, together with implementing goals and measurable market-facing objectives to guide investment decisions
- Define the roles and responsibilities of its land owners, managers, operators, and regulators
- Provide an up-to-date physical inventory of capabilities and supporting infrastructure, identifying the challenges of modernization and expansion
- Highlight market conditions and trends driving current and future industry needs
- Present an annually-updated Development Program of Spaceport Improvement Projects and other investments aligned with the Master Plan Vision, Goals, and targeted Objectives, including identification of unfunded needs.

This 2017 update of the 2013 CCS Master Plan is intended to set the stage for future planning efforts by Space Florida which will provide a more comprehensive analysis and definition of future development needs.

While this interim plan serves to redefine the planning environment, vision the future, assess trends, and identify essential characteristics for successful operations at CCS, it must be augmented by detailed assessments of the space commerce marketplace, the needs of the commercial industry, and the optimum management structure which will enable success.

Most importantly, the next update of the CCS Master Plan must comprehensively identify CCS's core supporting infrastructure – both within and outside the CCS territory boundaries. Industry will rely on affordable and sustainable infrastructure to support CCS as the global leader in enabling space commerce.

To expand on this 2017 CCS Master Plan and provide the groundwork for its next update, Space Florida will perform additional studies guided by the advice and input of a Space Florida-chartered Commercial Industry Task Force, being formed to focus on future requirements and desired characteristics of the Spaceport of 2025.

The following have already been identified as key requirements for successfully enabling the CCS to become the global leader in space commerce:

ADAPTING AN AGING INFRASTRUCTURE

As noted in NASA, KSC and United States Air Force (USAF) Cape Canaveral Air Force Station (CCAFS) institutional plans, much of the core infrastructure at CCS – its roads and bridges, rail and seaport connectors, utility and

commodities support systems – was originally constructed in the 1960s or earlier. Some elements were added or modernized in the 1970s for NASA's Space Shuttle Program. Necessary updates of utility systems on portions of the CCS have been performed as needed to satisfy U.S. Government mission requirements.

However, federal funding for major repairs and replacement of infrastructure has been limited and generally deferred in order to prioritize current programmatic needs of defined Government missions. The challenge for the federal agencies in sustaining and re-capitalizing their core infrastructure at the CCS has been highlighted by several recent examples. Just this year, NASA has identified a need to replace the 1964 Indian River Bridge, a project NASA estimates at $140 million for which it does not have the funds to proceed with. The bridge provides the primary access route to KSC from the mainland and supports heavy-weight transport of spacecraft payloads and other freight to various locations at CCS. NASA hopes to find non-federal fund sources to allow a near-term initiation of the bridge replacement, or it anticipates having to restrict usage by heavier vehicles and their loads due to the deteriorating bridge structure.

Other federally-installed infrastructure cannot keep up with the growth of commercial launch operations at CCS. Changes in operational technologies and tempos are stressing the existing, traditional systems. These include heritage range control and support capabilities operated by the USAF and high-pressure gas commodities – nitrogen and helium – distributed by pipeline on both KSC and CCAFS.

In addition, Space Florida recognizes the need for more comprehensive consideration of infrastructure outside the CCS that is critical to its function. This includes Florida Strategic Inter-modal System (SIS) connectors like State Road 401, connecting CCS with State Road 528 Beachline Expressway. Utilization of Port Canaveral as a regional asset for space-transportation related operations is an essential element of the Spaceport of the future.

While this update helps to focus attention on these infrastructure issues, significant additional analysis of existing conditions, necessary capacity improvements, and long range operating models are needed to plan an effective modernization program.

A continuing, collaborative planning effort among all stakeholders is required to define appropriate cost-sharing and sustainable solutions to re-capitalizing CCS's core supporting infrastructure.

To achieve its statutory responsibilities to seek the growth and modernization of the CCS, Space Florida must plan together with its federal partners and industry stakeholders to address and resolve these issues. Effective solutions will enable CCS to achieve an economically and environmentally sustainable future, realizing its destiny to be the planet's hub for global space commerce in the 21st Century.

SERVING THE MARKETPLACE OF THE FUTURE

In order to be the global leader in enabling space commerce, CCS must have a Development Plan based on the foresight and agility required to serve a diverse, competitive, and demanding marketplace of the future.

Understanding the needs of that marketplace, and enabling the space transportation industry hosted here to effectively compete, is critical to guiding investments in and evolving the operations of CCS.

Departing from the detailed market forecasts included in the 2013 CCS Master Plan, this update has incorporated a qualitative assessment of the current dynamic trends that are shaping both the markets and the industry serving them. This updated assessment supported the sharpening of CCS Master Plan goals and objectives.

A more comprehensive analysis of the current and future space commerce marketplace, and the space transportation industry, will be performed to support the next plan update, and further refinement of objectives as that analysis may indicate.

EVOLVING SPACEPORT MANAGEMENT AND GOVERNANCE

Vision 2025 calls for a transformative process to evolve an independent Cape Canaveral Spaceport Authority over the next ten years. Establishment of Space Commerce Zones with an operating environment tailored to commercial activities is a more immediate measure envisioned and described in concept in this update.

The success of the CCS depends on restructuring the roles of the current players and developing the optimum management structure to facilitate access to private capital for long-term recapitalization of the Spaceport's core infrastructure and dedicated facilities for commercial space operations.

Federal agencies such as NASA and the USAF are not chartered, equipped, or structured to manage investments for commercial purposes, and have specific mission roles and programmatic funding priorities. Further, they are not designed to fund with federal appropriations the infrastructure and support services needed to keep up with commercial needs and markets.

At the same time, Space Florida recognizes the scope and duties of an independent Cape Canaveral Spaceport will require an evolved set of transportation authority operational capabilities and implementation skills tailored to serve and grow the world's premiere commercial spaceport.

It is not the purpose of this Plan to define the specific structure of the Cape Canaveral Spaceport Authority, but rather to energize the maturation of the concept through active engagement of CCS stakeholders, most critically the industry that Authority must enable and support.

Several examples of successful transitions from Federally-owned and operated transportation assets to non-federal independent authorities are cited in this update (See Section 2.2.3 Evolving Governance).

Space Florida will perform additional studies and engage its federal partners – NASA, USAF, and Federal Administration Authority (FAA) in particular – in developing an evolved governance and management structure that will ensure a CCS that nurtures space commerce.

This initiative will build on the progress that has been made by the federal agencies in recognizing the needs of a commercial operating environment. It will restore focus on a principle that the leadership team of CCS federal and state planning partners agreed to as part of the CCS Master Plan in 2002, that the space transportation complex must be viewed and managed as a whole.

STRENGTHENING THE DEVELOPMENT PLAN

Space Florida's previous and current Development Plan for the CCS has led to a significant number of successful projects that improved the Spaceport's infrastructure, attracted private investment, and created jobs.

These projects have leveraged State of Florida investments to facilitate private sector financing of new capabilities that have supported U.S. Government programs such as the International Space Station, NASA's Commercial Cargo and Crew, and the USAF's Evolved Expendable Launch Vehicle Program. More recently, Space Florida-facilitated projects are enabling the growth and diversification of the commercial markets served at CCS.

The Development Plan outlined in this 2017 update will support these expanding commercial markets that will soon include commercially-funded and operated activities beyond earth orbit and the beginnings of a Cis-lunar economy.

While the previous Master Plan of 2013 defined a Development Plan consisting primarily of discrete projects associated with a single Spaceport launch facility or support site, this updated and future plan must recognize that federal budget resources for core, common-use infrastructure cannot be taken for granted as they were in the past.

Strengthening the CCS Development Plan for the future requires the identification of a new, comprehensive Capital Improvement Program for the next update that will optimize federal, state, local, and private funding resources, including the definition of revenue streams from a diversified customer base, similar to the approaches employed by airports and seaports.

Through these spaceport improvement initiatives, Space Florida is fulfilling its statutory role to promote modernization of the CCS so this national asset will meet the evolving needs of its Government and commercial users. Going forward, a collaborative effort on the part of the CCS stakeholders can optimize the capabilities and management of the CCS, ensuring its sustained position as the global leader in enabling space commerce.

INTRODUCTION

SPACE FLORIDA

CCS: “A Different Perspective”

Source: NASA

02
INTRODUCTION

The Cape Canaveral Spaceport (CCS) is a multi-sector space transportation complex. It hosts and supports the world's most advanced launch and re-entry systems which enable space exploration, security, and commerce to expand the frontiers beyond our atmosphere.

The expanse of the property, characteristics of its geography, and its capacity to support diverse space launch systems in all lift classes puts CCS at the top of the world's major Spaceports.

The CCS is located along Florida's east coast in Brevard and Volusia counties roughly 50 miles east of Orlando. The CCS is the legal boundaries of the Kennedy Space Center (KSC) and the Cape Canaveral Air Force Station (CCAFS). In all, it is comprised of approximately 157,400 acres under both federal and state land ownership.

Land jurisdiction is divided between the National Aeronautics and Space Administration (NASA) and United States Air Force (USAF). By designation of Congress, NASA has jurisdiction over KSC's 140,000 acres, including approximately 56,000 acres via use permit and easements granted by the State of Florida. The USAF has jurisdiction over the CCAFS remaining 17,420 acres of CCS.

CCS consists of facilities and infrastructure which Space Florida develops, owns, or manages under property agreements with both NASA and the USAF. It also consists of U.S. Government-owned facilities, and privately-owned assets, which make up its current physical inventory of launch, support, processing, utilities, commodities systems, and transportation network.

Much of the CCS core infrastructure – its roads and bridges, rail and seaport connectors, utility and commodities support systems – was originally constructed in the 1960s or earlier. Some elements were added or modernized in the 1970s for NASA's Space Shuttle Program.

Necessary updates of utility systems on the Cape and portions of KSC have been performed as needed to meet U.S. Government mission requirements. But federal funding for major repairs and replacement of infrastructure has been limited and often deferred in order to prioritize current programmatic needs of defined Government missions.

While its primary land use function is to support space transportation operations and associated support requirements, only a small percentage of the Spaceport's land and water area is presently developed. Approximately 95% of CCS property is managed for conservation and conditional use public access. This includes portions of KSC property managed by the U.S. Fish and Wildlife Service (USFWS) and the National Park Service (NPS). Land management roles and responsibilities for these overlay areas of KSC are defined in agreements between NASA and the two Department of Interior (DOI) agencies (USFWS and NPS).

CCS does not presently function as a unified entity or operate under any integrated management structure or authority. Its status as a multi-sector space transportation complex is defined only in Florida Statute designating it as a Spaceport territory for purposes of Space Florida's statutory roles and responsibilities in implementing the intent of the Florida Legislature.

As directed in its authorizing Florida Statute, Space Florida is charged with planning the expansion and modernization of CCS, preserving its unique national role while reducing costs and improving regulatory flexibility.

Figure 2.1. Shows the layout of the CCS and the Facilities that Space Florida has an existing property agreement with NASA/ USAF.

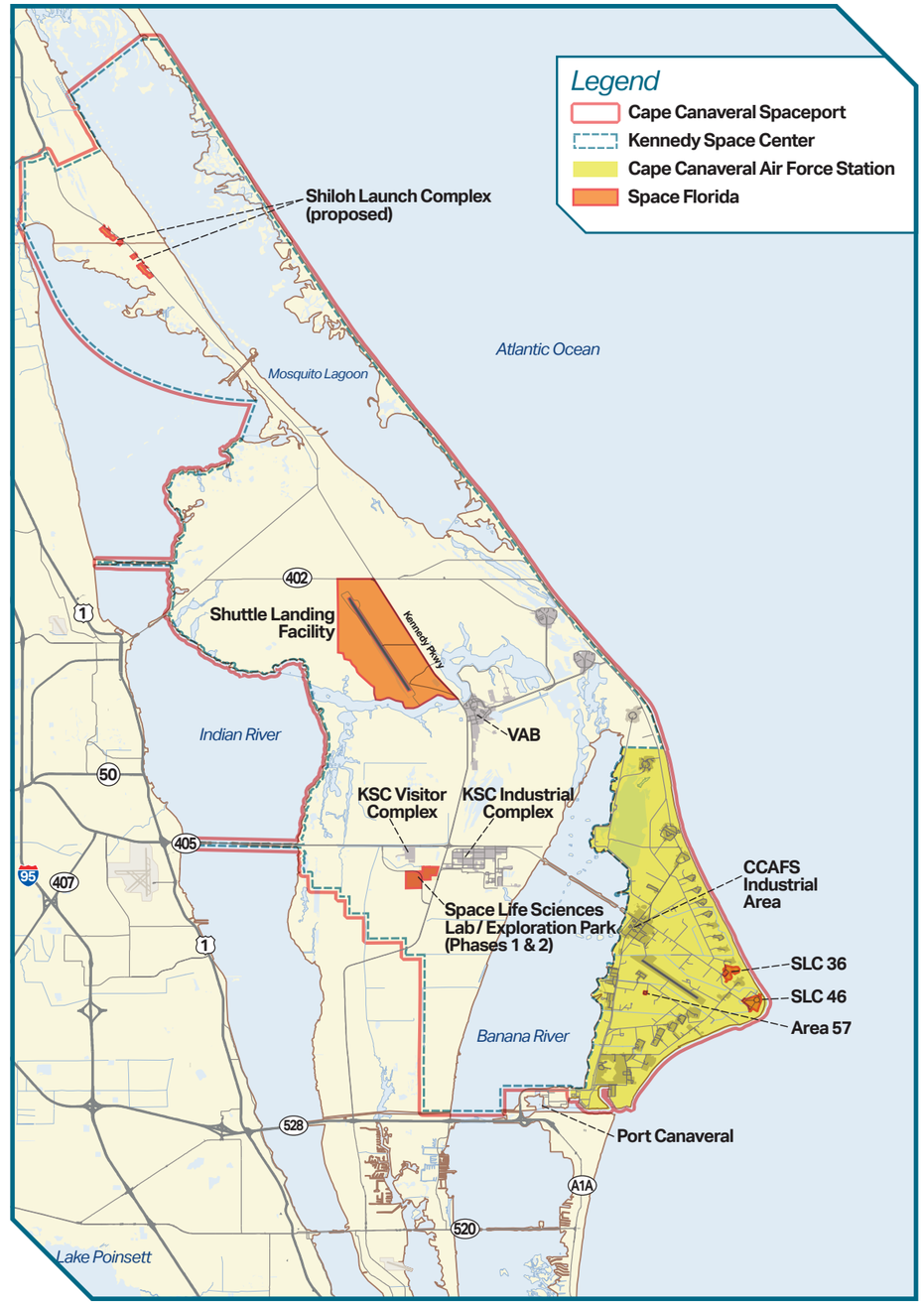


Figure 2.1. CCS Boundary
Source: AECOM

2.1 PURPOSE OF A MASTER PLAN

A dynamic, evolving space transportation industry presents current and anticipated future challenges to Space Florida, NASA, the USAF, the U.S. Navy and their respective, often shared, commercial and federal program customers. This planning environment is driven by changing national policies and budgets, accelerating private sector innovations in technology, all in a context of increased globalization and competition in space markets.

To face this accelerating pace of change, the CCS federal, state, and industry stakeholders must take every opportunity to build on recent partnership successes. Preparing CCS for sustained global leadership requires determining the appropriate and most effective:

- Division of roles and responsibilities among the organizations which share jurisdiction, regulation, and use of the Spaceport to satisfy a wide range of mission needs;
- Approach to define flexible land uses and a land management regime that readily satisfies operating needs for each sector with assured capacity for future growth and adaptation;
- Funding mechanisms to sustain, modernize, and expand as needed critical Spaceport infrastructure;
- Balance between the primary land use function of supporting space transportation operations and technology development with stewardship of the Spaceport's extensive, high-value natural environment for conservation, with managed public uses where compatible; and,
- Method for equitably allocating priority of use among each sector and resident system operator, all requiring predictable and reliable assured access to space -- measured by the availability of Spaceport support capabilities and an open flight path to space on the U.S. Eastern Range.

The planning partners have a leadership opportunity to collaboratively address these issues. In carrying out its charter, Space Florida will seek to promote and accelerate progress at CCS in achieving its full potential for leading the future of space transportation for the benefit of all stakeholders.

2.1.1 NEED FOR THE 2017 UPDATE

This update of the previous 2013 CCS Master Plan confronts this planning environment by offering a new set of planning principles and concepts for guiding the future operation and growth of the CCS. Federally-installed infrastructure has not kept up with the growth of commercial launch operations at the CCS. While some systems have been modernized to meet federal programmatic requirements, the federal installations at CCS are not chartered or funded to respond to commercial infrastructure needs supporting privatized launch and recovery sites. Changes in operational technologies and tempos are stressing the existing, traditional systems. In addition, Space Florida recognizes the need for a more comprehensive consideration of infrastructure outside the Spaceport territory but critical to its function.

While the previous 2013 Master Plan defined a Development Plan consisting primarily of discrete projects associated with a single Spaceport launch facility or support site, this update and future development plan recognizes that federal budget resources for core, common-use infrastructure cannot be taken for granted as they were in the past.

A modified set of goals, strategies, and objectives supports implementation of Space Florida's new Strategic Vision 2025 with a plan that builds on recent successes by Space Florida in partnership with the Florida Department of Transportation (FDOT) and industry representatives. Finally, the CCS Master Plan Update frames an agenda of specific, targeted projects for capacity improvements at CCS that will guide allocation of available capital improvement resources in the planning horizon and generate a sustainable CCS.

2.1.2 LIVING DOCUMENT

The CCS Master Plan Update is a living document intended to evolve with the Spaceport whose future it serves. It is not meant to be prescriptive, but to frame a collaborative dialogue of alternatives regarding integrated planning, management, modernization, and sustainment of CCS as a world leader in the increasingly complex environment of global space commerce. As illustrated in Figure 2.2, it is intended that this document will be updated periodically based on actual prioritization and allocation of funds following a call for projects via the Space Florida's Space Transportation Infrastructure Matching Fund (STIMF) annual prioritization and funding application process.

While this 2017 update serves to redefine the planning environment, vision the future, assess trends, and identify essential characteristics for successful operation, it must be augmented by detailed assessments of the space commerce marketplace, the needs of the commercial industry that serves it, and the optimum management structure to enable that industry.

Most importantly, the next update of the CCS Master Plan must comprehensively identify the Spaceport's core supporting infrastructure – both within and outside the CCS territory boundaries.

Relationship between Strategic Vision and Master Plan
Source: AECOM

Figure 2.2. Annual Project Funding Year (Fiscal Year)
Source: AECOM

2.2 BACKGROUND

A key to planning any transportation facility's future is an understanding of its past, particularly how and why it was developed. The CCS has a well-publicized history which includes key national milestones, such as the lunar landing in the 1960's to launch of the Hubble Telescope in the early 1990s. However, technological advancements have propelled the CCS and the industry into the 21st Century with non-federal entities as the primary leaders of what can be characterized as a modern-day space race. The following sections provide a brief history of the CCS and the significance of its location.

2.2.1 HISTORY

In the post-World War II era of rising tensions between former allies, the United States and Russia intensified national efforts to develop intermediate and long range missiles. Both built upon the rocket technology and intellectual capital of a defeated Germany.

CCS had its origins in establishment of the Joint Long Range Proving Ground on October 1, 1949. A 15,000-acre site at Cape Canaveral was selected over alternatives in California, Georgia, and Texas. The Cape was isolated, relatively uninhabited and undeveloped, with portions already Government owned. Less than a year later, a captured German V-2 rocket with an added second stage became the first launch on the Atlantic Missile Range, with thousands more to follow.

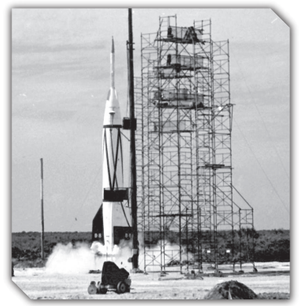
The 1950s was a decade of intensive missile development at the Cape, which enabled the technical and operational evolution of America's intermediate, long range, and fleet ballistic missiles.

CCS dramatically expanded after President Kennedy in 1961 committed the nation to land Americans on the Moon and safely return them home before the decade was over. Again, a joint review of possible sites in Texas, Georgia, and other locations resulted in NASA and Air Force officials opting for additional land north and west of the Cape for the nation's manned lunar program.

Initially, the land acquisition to support the space effort was to extend northward to the old Haulover Canal. In 1962, an impasse between the NASA and USAF program managers over the siting requirements for the Saturn, Nova, and Titan launch facilities resulted in their agreement and Congressional authorization to acquire an additional 15,000 acres extending into Volusia County. While the USAF retained responsibility for management and operation of the Atlantic Missile Range, now the Eastern Range, the land jurisdiction for what is now the Kennedy Space Center was designated to NASA, with the USAF retaining land jurisdiction for the CCAFS.

The first formalized use of the term CCS was in association with the Spaceport Florida Authority's commercial site license for Space Launch Complex (SLC) 46. Its application to the entirety of the land boundaries of KSC and CCAFS was recognized as an unofficial designation in the joint 2002 CCS Master Plan performed by NASA KSC, the USAF's 45th Space Wing, and Florida Space Authority. The multi-agency leadership team for the Plan agreed on a key principle: As the Spaceport evolves, its management must oversee the CCS as a whole. Today, Space Florida carries out its Spaceport planning and operations responsibilities for the CCS territory as officially defined in Florida statute.

The modern history of CCS is written as an era of transformation that began long before Orbiter Atlantis came to "wheels stop" on the Shuttle Landing Facilities Runway 15-33 at the conclusion of STS-135. Still underway, this transformation is reshaping roles, accessing non-federal resources, and altering the operational landscape of CCS as it becomes a true multi-sector space transportation complex.



July 24, 1950
First missile launched from Cape Canaveral

May 5, 1961
First U.S. suborbital human spaceflight, Freedom 7 launched from LC 5 on 14.8 minute flight as part of the Mercury program

1963-1966
NASA's Complex 39 and USAF Titan III constructed

July 16, 1969
Apollo 11 launched from LC 39A, with first humans to land on the Moon four days later in the first of six lunar surface exploration missions

April 6, 1965
Intelsat 1, first commercial telecommunications satellite launched by NASA for COMSAT Corporation on reimbursable basis, launched from LC 17

April 28, 1975
KSC's three-mile concrete runway under construction to prepare for Space Shuttle landings

April 12, 1981
STS-1 After six years of silence, the thunder of human spaceflight was heard again, as the successful launch of the first space shuttle ushered in a new concept in utilization of space. Mission STS-1, on Space Shuttle Columbia, launched from LC 39A

1995/1996
Spaceport Florida Authority develops LC 46 as first commercial launch site on Cape; demonstrates conduit financing capability to privately fund $25 million Apollo-Saturn V tourist attraction at KSC

October 1949
Cape Canaveral selected for establishment of Joint Long Range Proving Grounds

Jan. 31, 1958
Explorer 1, first American satellite, successfully placed in orbit after launch from LC 26A

Oct 1, 1958
NASA begins operations

Aug 2, 1963
Construction begins on VAB

Jan 28, 1986
Space Shuttle Challenger accident results in loss of vehicle, crew and termination of Shuttle's use for commercial payloads; international competition for commercial satellite customers expands

1989
Spaceport Florida Authority created to promote and expand Florida's Spaceports

May 22, 1997
FAA issues "Cape Canaveral Spaceport" commercial launch site operator's license to SFA

Jan. 6, 1998
Spaceport Florida's support of NASA's Lunar Prospector marks first launch from an FAA-licensed, state-operated commercial site

1950's | 1960's | 1970's | 1980's | 1990's

Photos courtesy of their respective owners

2000
SFA negotiates land use agreements with KSC and facilitates State funding and construction of an RLV hangar at the SLF

2000
SFA finances $294 million of Lockheed's commercial redevelopment of LC 41 to support USAF acquisition of commercial launch services

2000
SFA finances $24 million integration facility for Boeing at LC 37

2002
Cape Canaveral Spaceport Master Plan published as a collaborative effort by KSC, 45th Space Wing, Florida Space Authority (SFA's new name), and other federal stakeholders

Feb 1, 2003
Space Shuttle Columbia (STS-107) disintegrated during re-entry, suspending Space Shuttle flight operations for more than 2 years

2003
$30 million State funded Space Life Sciences Laboratory opens as a modern, world-class space experiments processing facility supporting ISS

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2006
Florida Legislature creates Space Florida, combining predecessor entities and functions

2006-2010
NASA and Space Florida cooperate on projects demonstrating commercial uses of KSC's Shuttle runway; jointly develop plans and a 90-year lease for Exploration Park with State-funded construction of horizontal infrastructure

2009
Space Florida provided $35 million to refurbish and modernize the Operations & Checkout (O&C) facility. Working closely with the Orion contractor, Lockheed Martin, Space Florida has assured that the Orion Multi-Purpose Crew Vehicle (MPCV) will be built and refurbished in Florida for many years

June 4, 2010
SpaceX successfully launches first Falcon 9 from LC 40

July 21, 2011
STS-135 - Orbiter Atlantis lands at KSC to close out NASA's 30-year Space Shuttle Program and CCS begins an intensive effort to reduce and restructure KSC's NASA-maintained infrastructure

2012-2013
Florida proposes use of former Shiloh citrus groves for a state-managed, state controlled commercial vertical launch complex; Space Florida initiates FAA-led environmental study as first step of licensing process

2013
Previous CCS Master Plan published

October 2014
Boeing announces they will upgrade and utilize Orbiter Processing Facility (OPF) Bays 1 and 2 for the USAF X-37B program

April 14, 2014
NASA signs over to SpaceX former Shuttle Pad 39A for commercial operation using Falcon 9 and Falcon Heavy vehicles

September 15, 2015
Grand Opening of the Commercial Crew and Cargo Processing Facility (C3PF) for processing of the Boeing's CST-100 Starliner

September 15, 2015
Blue Origin announces selection of Cape Canaveral Spaceport for location of its orbital vehicle manufacturing in Exploration Park and launch facility at LC 36

June 30, 2015
Space Florida assumes management, operation, and future development of NASA's former Shuttle runway to function as a commercial horizontal launch and landing facility supporting spaceflight and advanced aerospace users

April 19, 2016
OneWeb announces selection of Exploration Park for location of an advanced satellite manufacturing facility, with Cape Canaveral Spaceport as a launch site

Into the 21st Century **2010** **2015**

Photo Sources: NASA; SpaceX; Space Florida; Blue Origin; OneWeb

2.2.2 LOCATION AND CONTEXT

CCS is Earth's Mile Marker Zero for Space™.

Strategically located in East Central Florida (**Figure 2.3**) on a coastal geography well known to explorers in the 16th Century ocean voyages of European discovery, it today is known for a modern era of exploration to the regions that lie beyond our atmosphere.

Cape Canaveral has been the embarkation point for more cargo tonnage and humans launched into space than anywhere else on earth. It has also served as port of return for space travelers, retrieved cargo, and processed goods.

The Cape is located at 28° N latitude. Its launch complexes offer a wide range of safe flight trajectories ranging in azimuth from approximately 35° to 120° which support a broad range of Earth orbit and lunar/planetary missions.

Reaching beyond its territorial boundaries, the Spaceport of the future extends throughout the region's and the state's technology business networks. It is fully supported by Florida's statewide transportation, universities, and economic infrastructure.

That statewide infrastructure is anchored by technology assets and intermodal transportation clustered within a 50-mile radius of CCS. This area is identified as the Cape Canaveral Spaceport Technologies Triangle. At each point of that triangle is an international airport and world-class aerospace university.

At the eastern portion of Florida's High Tech Corridor, CCS is integrated with the region and State's commodities production, supply chain, and talent pool. CCS's extended presence reaches Florida's highly accessible research, development, workforce, and training capabilities. It offers the benefits of a foreign trade zone.

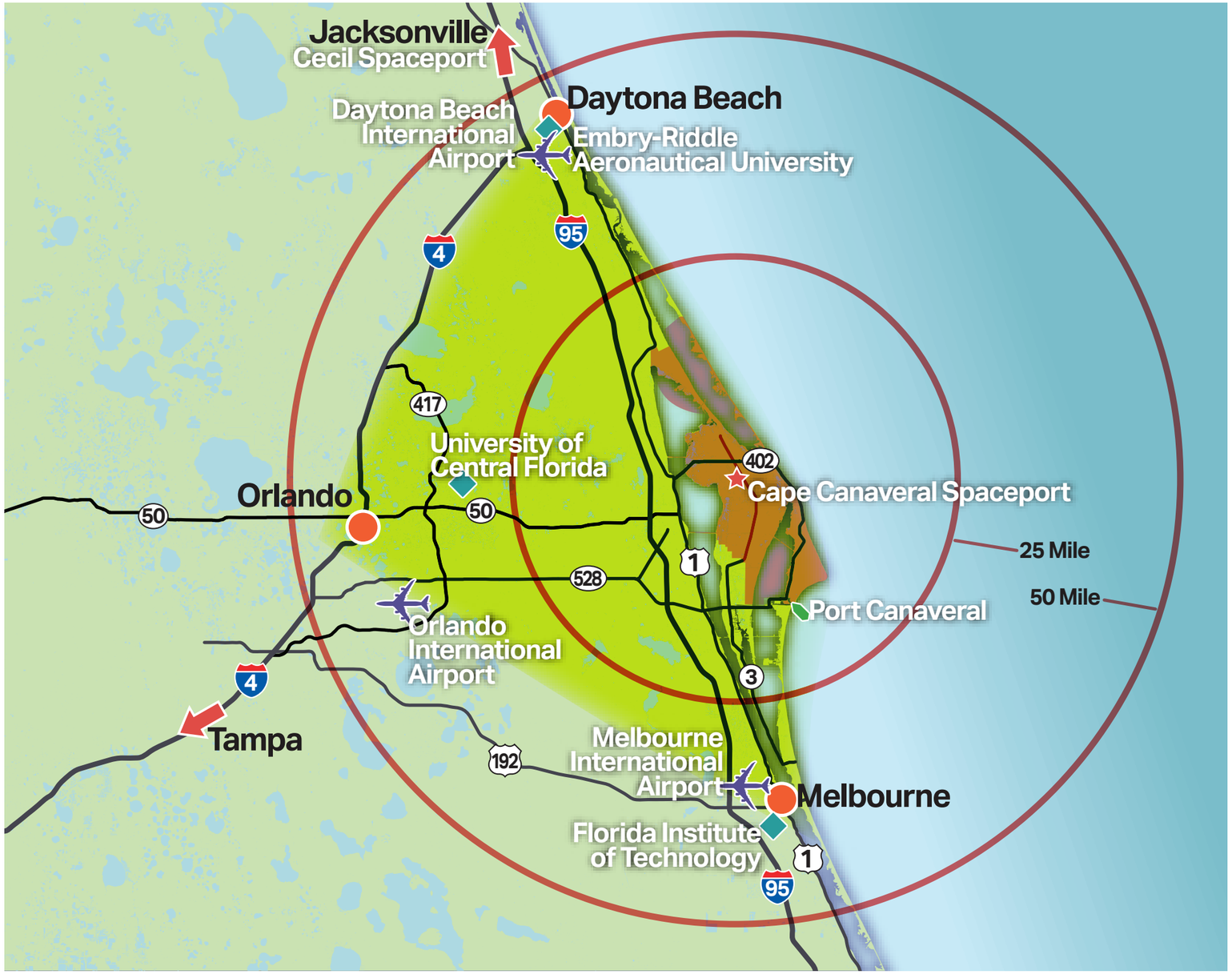


Figure 2.3. CCS Location Map
Source: AECOM

2.2.3 EVOLVING GOVERNANCE

There is broad consensus among the CCS stakeholders that an evolved governance and management structure is required for the Spaceport of the future. Space Florida's Vision 2025 calls for the realization of an independent Authority to operate CCS as an integrated multi-sector Spaceport by 2025, with a collaborative effort to begin transitional steps towards that goal by establishing space commerce zones and, potentially, a transitional council.

As the leadership of the federal and state partners of the 2002 Cape Canaveral Spaceport Master Plan agreed to the following more than a decade ago: "As the Spaceport evolves over the next 50 years, it must have optimal management and operation to achieve its goals. Management could take various forms, but it must oversee the complex as a whole." Since then, both NASA and USAF planning activities have envisioned a future state where a Spaceport Authority could become the operator of the CCS, with NASA and the USAF becoming mission focused users.

The key objective for Floridians and Space Florida is to ensure that the CCS maintain and enhance its position as the global leader in enabling space commerce, and that the State of Florida remains a leader in the emergence of space transportation as an integral element of our nation's transportation infrastructure.

Frank DiBello, Space Florida CEO, highlighted the Space Florida Vision and the need for an evolved governance approach at the National Space Club Luncheon on Tuesday, June 14, 2016. Some of the key points from those remarks are summarized here:

- To realize a shared opportunity to be the global leader in enabling space commerce, the CCS will require an evolved governance and management structure, one that is tailored to nurture commerce, with an "operating environment" to match.
- Future management of the Spaceport environment and functions are accomplished by an Independent Spaceport Authority, serving all users and their customers.
- That authority – whether state-chartered or quasi-federal -- would manage most of the Spaceport territory, except for a reduced footprint of land and facilities retained by NASA and the USAF to service unique or special-consideration national security, or extraordinary space exploration missions.
- Just as the Canaveral Port Authority -- or the Greater Orlando Aviation Authority -- manage commercial enterprises at those ports, so too can an independent Spaceport Authority at Cape Canaveral.
- As NASA and the USAF increasingly rely on commercial space transportation capabilities to support their missions, a CCS multi-sector Spaceport, managed by an Independent Spaceport Authority can:
  - Ensure current NASA, USAF and Naval Ordinance Test Unit (NOTU) missions are not compromised
  - Provide a level playing field for private, public, and government space industry
  - Provide access to private capital markets to finance needed common infrastructure
  - Remove regulatory and bureaucratic barriers
  - Provide common goals and processes

There are a number of success stories where Federal transportation assets have been transitioned to state or local government authorities to facilitate modernization, multi-sector use, and significantly enhance economic value. A few examples include:

- The 1987 transfer of the previously FAA owned and operated Washington National and Dulles International airports to the state-chartered Metropolitan Washington Airports Authority
- The transfer of Navy property as a Public Benefit Conveyance for purposes of promoting maritime commerce to a California-created special district, the Port of Stockton, which is now California's third largest port;
- The public benefit transfer of the former Bergstrom Air Force Base under a Base Realignment and Closure action to the City of Austin, Texas for re-development as Austin-Bergstrom International Airport.

The long term successful operation of state-chartered transportation authorities can be found in examples such as the Port Authority of New York and New Jersey.

Conceptual Rendering of Shuttle Landing Facility Development
Source: AECOM

Major Spaceports of the World

Based on metric ton lift capacity, destinations supported

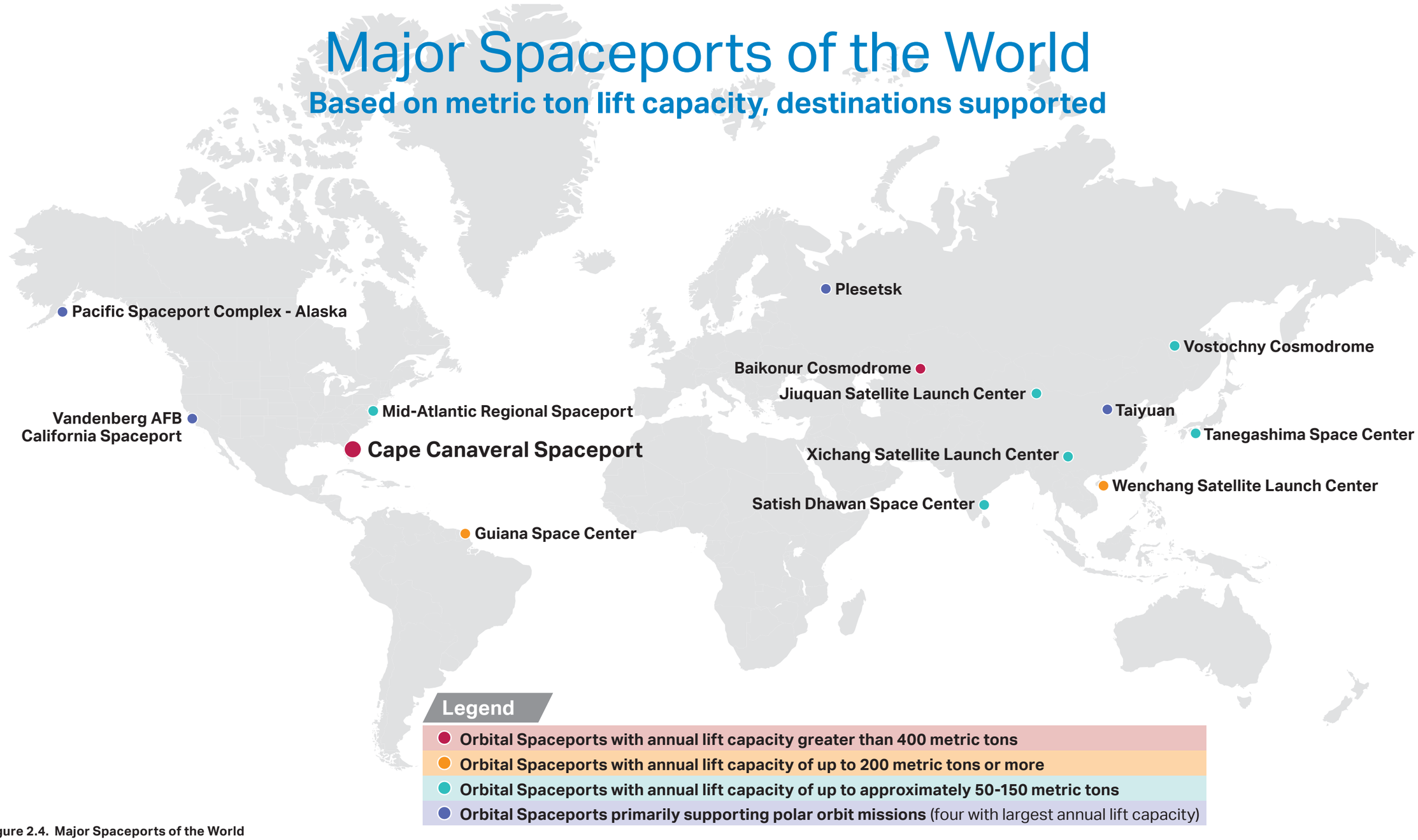


Figure 2.4. Major Spaceports of the World
Source: AECOM

2.2.4 COMPETITIVE POSITION

CCS currently holds a commanding competitive position among the world's Spaceports identified in **Figure 2.4**. CCS is one of only two Spaceports supporting the full range of launch vehicle classes – small, medium, and heavy – to lift the majority of payload types into orbit.

Launch trajectories from CCS accommodate a wide spectrum of mission requirements and offer azimuths from 35° to 120° as depicted in **Figure 2.5**. These typical trajectories are those commonly used for high-inclination orbital destinations, such as the International Space Station (ISS), and easterly flight paths for spacecraft being placed into geo-stationary orbits or in transfer orbits for later lunar or planetary flights.

This range of flight trajectories allow CCS launch providers to diversify their customer base by satisfying the mission needs of all three sectors and adapt their launch schedules to prevailing market demands. A broad range of orbits are achievable from the CCS, with the exception of polar-orbit trajectories which are currently unavailable due to safety constraints on overflying populated areas.

CCS will continue to serve as the primary launch facility for NASA's human exploration program, including the heavy-lift requirements for future missions to asteroids, the Moon, and Mars. The NASA-required launch services for delivery of cargo and crew to the ISS will continue to be supported by both CCS and the Mid-Atlantic Regional Spaceport in Virginia (MARS). Both CCS and MARS host launch systems that can supply the ISS and have been awarded commercial cargo delivery contracts. The two providers selected for commercial crew services – SpaceX and Boeing – both plan to launch from CCS.

CCS also retains a strong competitive position for meeting the continuing national mission requirements of the Department of Defense (DoD) and the National Reconnaissance Office (NRO), as well programs supported by the NOTU.

These national programs for civil science agencies and national security missions are not generally an "addressable" market for competing international Spaceports, though the next generation space telescope – the James Webb Space Telescope – is scheduled to be launched aboard an Ariane 5 from the Guiana Space Center.

CCS has strong competitive advantages afforded by the readily accessible technology and supplier network of the Cape Canaveral Spaceport Technologies Triangle. The multi-modal regional assets represented by Port Canaveral, the area's international airports, and rail service are described in subsequent sections.

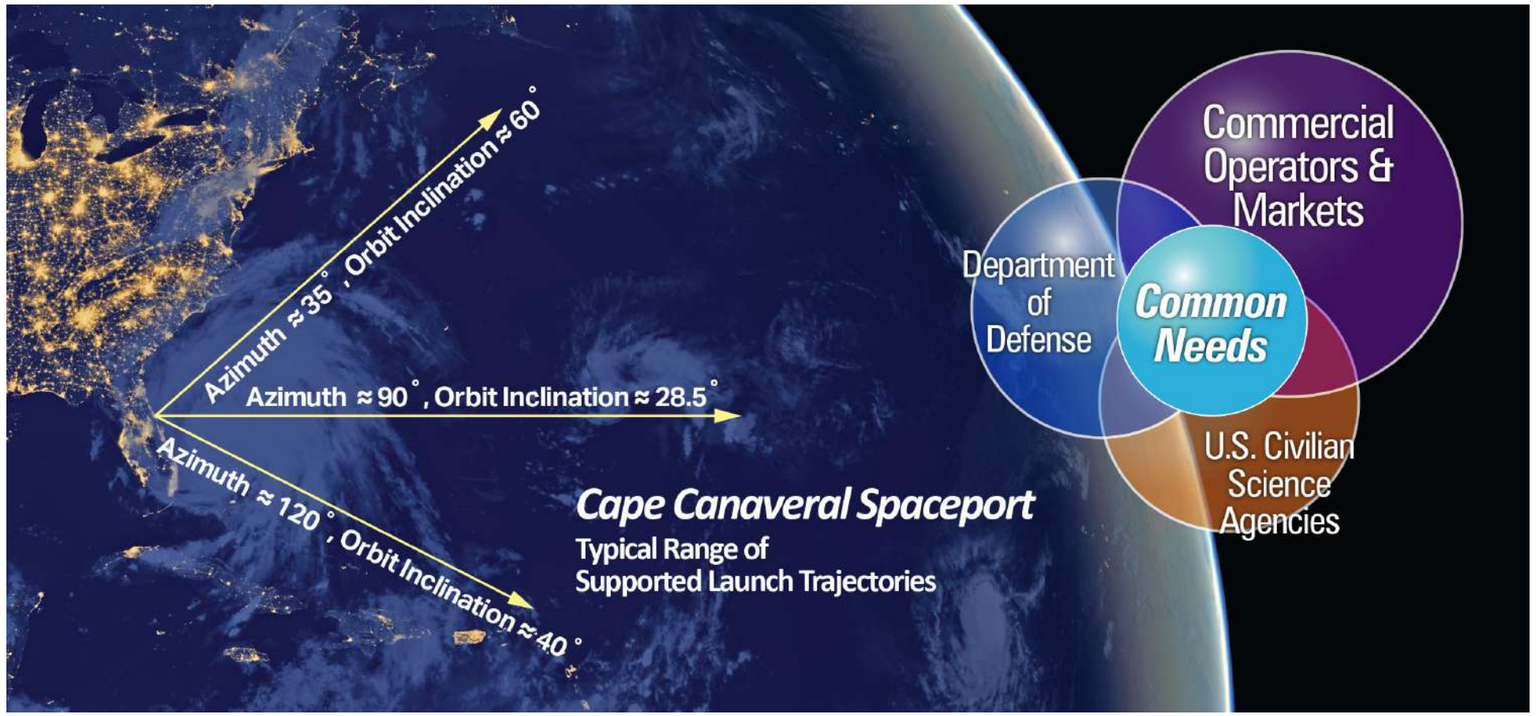


Figure 2.5. Supported Launch Trajectories at CCS
Source: NASA

2.3 BUILDING ON PREVIOUS WORK

Planning efforts and studies help provide the context for potential planning solutions included in this Master Plan Update. The Florida Department of Transportation (FDOT) maintains the Florida Transportation Plan (FTP) which establishes a framework for allocation of federal and state transportation funds in Florida. The FTP is typically informed by a collection of system plans and facility master plans such as the KSC Master Plan, CCAFS General Plan and Florida Spaceport System Plan.

2.3.1 FLORIDA SPACEPORT SYSTEM PLAN

The Florida Spaceport System Plan (FSSP) is the first statewide Spaceport system plan to be developed in the U.S. and will strengthen Florida's multi-modal infrastructure even further. The primary purpose of creating the FSSP is to understand Florida's space infrastructure and its interrelationships to guide public investment on behalf of Florida residents. Specifically, it examines the interactions between Spaceports and user needs, the economy, population, and the surface infrastructure needed to support a statewide system.

The FSSP provides methods to maximize the use of scarce resources. It is intended to offer information and guidance regarding infrastructure development aimed at giving Florida a competitive edge, both nationally and worldwide, in enticing new aerospace business. With an increasingly dynamic environment, Florida plays a significant role in partnering with federal, international, and commercial partners to shape a new global enterprise.

2.3.2 RELATIONSHIP TO OTHER MASTER PLANS

Although the CCS is geographically defined as "territory consisting of areas within the KSC and the CCAFS," it is recognized that these federal agencies, and the NOTU have existing forward-looking plans respective to their jurisdictions. While the CCS Master Plan may not completely align with these plans, it is also not intended to supersede or replace them.

KENNEDY SPACE CENTER (KSC) MASTER PLAN

Similar to CCS Master Plan's context within a hierarchy of the Florida transportation planning and policy documents, NASA requires a Center Master Plan (CMP) for KSC within the context of agency-wide plans and policy related to institutional infrastructure.

Concerned with the size, age, and sustainment cost of the NASA institutional footprint across field installations, Congress in 2010 directed NASA to identify a strategy for the most efficient retention, sizing, and distribution of facilities and infrastructure, consistent with missions and mandates. Responding to Congress, NASA initiated a process to integrate individual field center plans into an overall Agency Master Plan with the overall goal to achieve sustainable, right-sized institutional infrastructure, with a footprint aligned with its mission requirements and available resources.

KSC adopted a Future Development Concept (FDC) in 2012 envisioning a transition of KSC to a multi-user Spaceport. KSC would no longer be planned and operated solely for NASA programmatic missions, which had been its field center role since established in 1962. The FDC provided the basis for a 20-year CMP intended to guide NASA land use and Center Operations from 2012-2032. The 2014 CMP presents a long range vision which envisions management of CCS conducted by an independent Spaceport Authority.

Public scoping meetings were conducted in 2014 to initiate a Programmatic Environmental Impact Statement (PEIS) broadly assessing the potential environmental consequences of KSC's proposed CMP and Future Land Use alternatives. A Draft PEIS was published by KSC in March 2016 depicting NASA's preferred Future Land Use Map (**Figure 2.6**) which defines specific land use categories and relative size of each.

Space Florida is a Participating Agency for the PEIS and has provided substantive input consistent with its responsibilities under Florida Statutes Chapter 331 Part II. To assist NASA in the preparation of a Final PEIS and CMP, Space Florida identified key areas for aligning federal and state interests. Space Florida also offered recommendations for additional alternatives and analysis to support a final NASA decision on the CMP. The following summarizes Space Florida's recommendations to NASA's regarding the PEIS:

I. A priority emphasis on ensuring future capacity for space transportation infrastructure and operations, long-term economic sustainability, and market-driven opportunities for environmentally-responsible development

II. Additional alternatives for Future Land Use, including the location of notional vertical launch areas to the north of LC 39B and Beach Road

III. Flexibility in land use category definitions and boundaries within lands already identified in the KSC CMP as developable property

IV. An additional criterion for NASA divestment of unneeded transportation infrastructure to ensure Spaceport accessibility is not diminished for non-NASA programs and users of CCS

V. Collaborative planning of the CCS as an entirety by its federal and state jurisdictional entities

VI. Accelerated implementation of an independent CCS Authority and the bridge steps to that governance model (e.g. establishment of commerce zones)

These Spaceport land use and management recommendations are considered with this CCS Master Plan Update. The KSC Center-Wide Operations PEIS and the CCS Master Plan Update are being concurrently prepared with a projected completion in 2017. Space Florida will continue to engage its KSC planning stakeholders in the CCS Master Plan, promoting flexible land use and Spaceport management approaches that are consistent with national science/exploration mission needs and the increasing reliance on safe, efficient commercial operations.

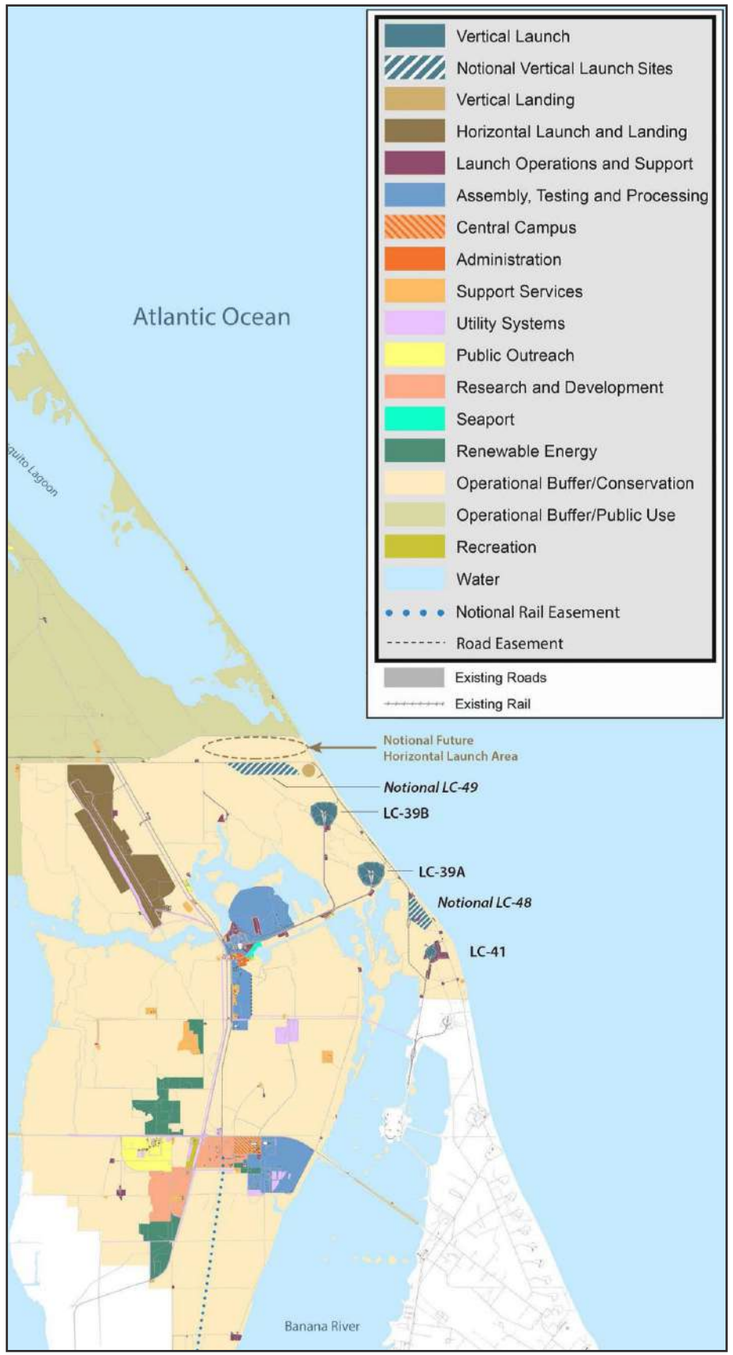


Figure 2.6 NASA's KSC Preferred Future Land Use Alternative
Source: NASA

CAPE CANAVERAL AIR FORCE STATION (CCAFS) GENERAL PLAN

While the CCAFS General Plan adopted in 2011 continues to provide the planning baseline for future development of this historic USAF installation, the 45th Space Wing is confronted with the same dynamic planning environment as all other CCS stakeholders.

The CCAFS Area Development Zones depicted in **Figure 2.7** which were defined in the 2011 plan, remain a valid representation of the general land use planning for the installation, which has been increasingly called on to provide property access to commercial launch providers such as SpaceX, ULA, Blue Origin, Moon Express and others.

While limited spaceflight systems development and testing can be accommodated on certain sites within the Administration and Operations South Zone, Vertical Launch sites for medium to heavy class launch vehicles are restricted to the zone north of CCAFS Skid Strip to ensure adequate separation from other land uses and the neighboring Port Canaveral and City of Cape Canaveral.

Space Florida currently holds property license/use agreements with the USAF for SLC 36 and SLC 46 as well as several support facilities and areas. In 2015 Blue Origin selected SLC 36 for development of its New Glenn Orbital Launch Vehicle Program.

The 45th Space Wing recently made the former SLC 13 site available to SpaceX for development of a landing site for returning booster stages launched from SLC 40 or KSC's LC 39A to the north. This site supported the historic powered return and landing of a Falcon 9 first stage.

Moreover, CCAFS is adapting to new partnering opportunities and evolving national space policy. In addressing these policy initiatives and expanding capabilities of private sector space transportation assets, USAF General John Hyten, Commander of Air Force Space Command, has established clear operational intent and action priorities applicable to CCAFS and other USAF ranges. That intent is to foster a robust commercial launch industry and encourage commercial launch operations in order to strengthen the nation's space access.

CCAFS is currently preparing an updated installation plan and may soon revisit its 2011 General Plan.

Space Florida will continue to engage its 45th Space Wing planning stakeholders in the CCS Master Plan, promoting flexible land use and Spaceport management approaches that are consistent with national security mission needs and the increasing reliance on safe, efficient commercial operations.

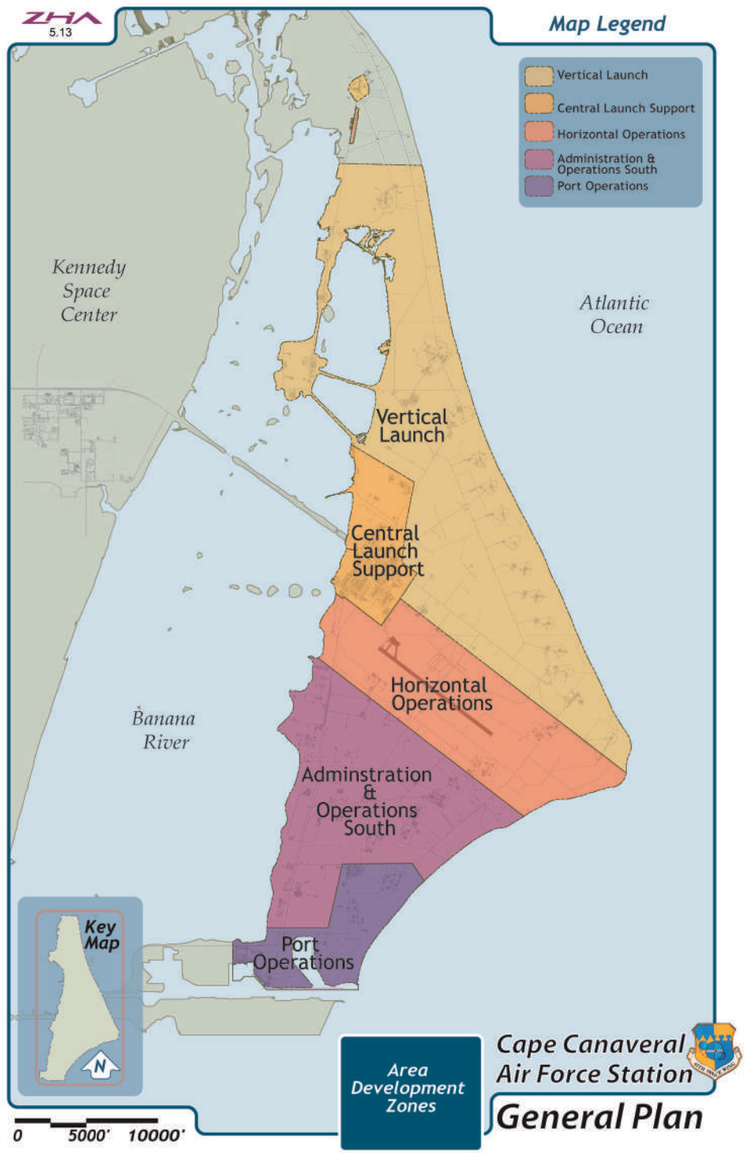


Figure 2.7 CCAFS General Plan
Source: ZHA

NAVAL ORDNANCE TEST UNIT AREA DEVELOPMENT PLAN

The Naval Ordnance Test Unit Area Development Plan (NOTU ADP) for CCAFS identifies various facilities programs, conceptually assesses their general conditions, and provides a strategy for optimization of facilities by presenting a long-term development plan (50-year) and a near-term (20-year) implementation plan. It is coordinated with the potential development of CCAFS, composite constraints, and ensures compliance with applicable Federal, State, and local laws, regulations and policies. The NOTU ADP incorporates the goals and objectives of facilities optimization, reduction in sustainment costs, environmental planning, cultural and historical resources preservation, and long-term sustainability

Since NOTU's inception in 1955, the Strategic Systems Program (SSP) has provided for the design, development and testing of fleet ballistic missile programs. The overarching purpose is to provide "credible and affordable" solutions for fleet and warfighter readiness. SSP provides and maintains the nation's sea-based missile deterrent system. Through strategic partnerships in the defense industry, unique private contractors, and foreign partnerships, SSP has provided over 56 years of safety, readiness and reliability to the U.S. Navy and the world.

The Strategic Goals of the NOTU ADP are to:

- Establish, preserve and enhance NOTU SSP warfighter readiness testing, evaluation and training capabilities at CCAFS.
- Maintain and enhance NOTU wharf capabilities and port operations support facilities.
- Establish new and maintain current QD Arcs, as well as security and safety requirements.

The NOTU Objectives are to:

- Preserve and enhance primary SSP related mission.
- Develop complete Strategic Weapons System (SWS) Ashore Program at CCAFS.
- Support long-term beneficial host and tenant relationship with the 45 SW.
- Establish long-term encroachment documentation.
- Foster a proactive channel widening and maintenance relationship with the State of Florida.

2.3.3 CCS STRATEGIC VISION 2025

A vision statement is a clear and concise description of a desired end state. It creates a visualization of tangible assets to guide creation of a feasible development plan. In 2016, Space Florida developed a Strategic Vision 2025 for the anticipated operational conditions at CCS in 2025 to help guide decision making. As such, the Strategic Vision 2025 provides a foundation for a new CCS planning vision described on the following page. The planning vision serves as the guideline for the recommended CCS development plan. The key components of the Strategic Vision 2025 include:

I. The CCS of 2025 will be efficient, reliable, sustainable, and world renowned. It will have secured its role as world's busiest and most productive Spaceport, just as London became the world's most vibrant port of maritime trade in the 18th and 19th centuries. CCS will open up rapid-transport routes between major markets of the world. It will enable the establishment of pioneering outposts in high-value destinations in space and on celestial bodies such as the Moon.

II. As an independently operated Spaceport, CCS will continue to deliver essential support to military forces serving as guardian of our commercial and national interests in space. It will be the Spaceport of choice for international space operations and commerce, home to a growing trade association of developing nations aspiring to become spacefaring economies; a classroom of best practices.

III. Here, the world's civil space agencies and free market entrepreneurs will come together, forming a synergy of joint and independent enterprises to explore, develop, and one day settle the space frontier.

IV. In 2025, CCS will have fundamentally transformed as a multi-sector space transportation complex, efficiently serving the needs of commercial spaceflight operators together with the evolved operations of federal space missions.

V. It will be home to a fleet of many types of spacefaring vehicles, with all combinations of vertical and horizontal modes of launch and landing. It will host multiple space carriers serving multiple markets with demand for services to suborbital space and high-value earth orbits. Launch frequency will increase from the present tempo of one or more per month, to one or more per week, and then to one or more per day.

VI. The CCS of 2025 will have successfully preserved the vast majority of territory lands in a natural conservation state, while enabling development of repurposed and expanded capabilities in an environmentally responsible manner.

Vision 2025 describes a bold future for CCS (**Figure 2.8**), destined to be the world leader in enabling global space commerce. It embraces global trends in space transportation as opportunities to strengthen Florida's leadership in civil, commercial, and military aerospace activity. In doing so, Florida can strengthen America's leadership among the world's growing network of space faring nations as well as those which seek to participate in the space-enabled economy.

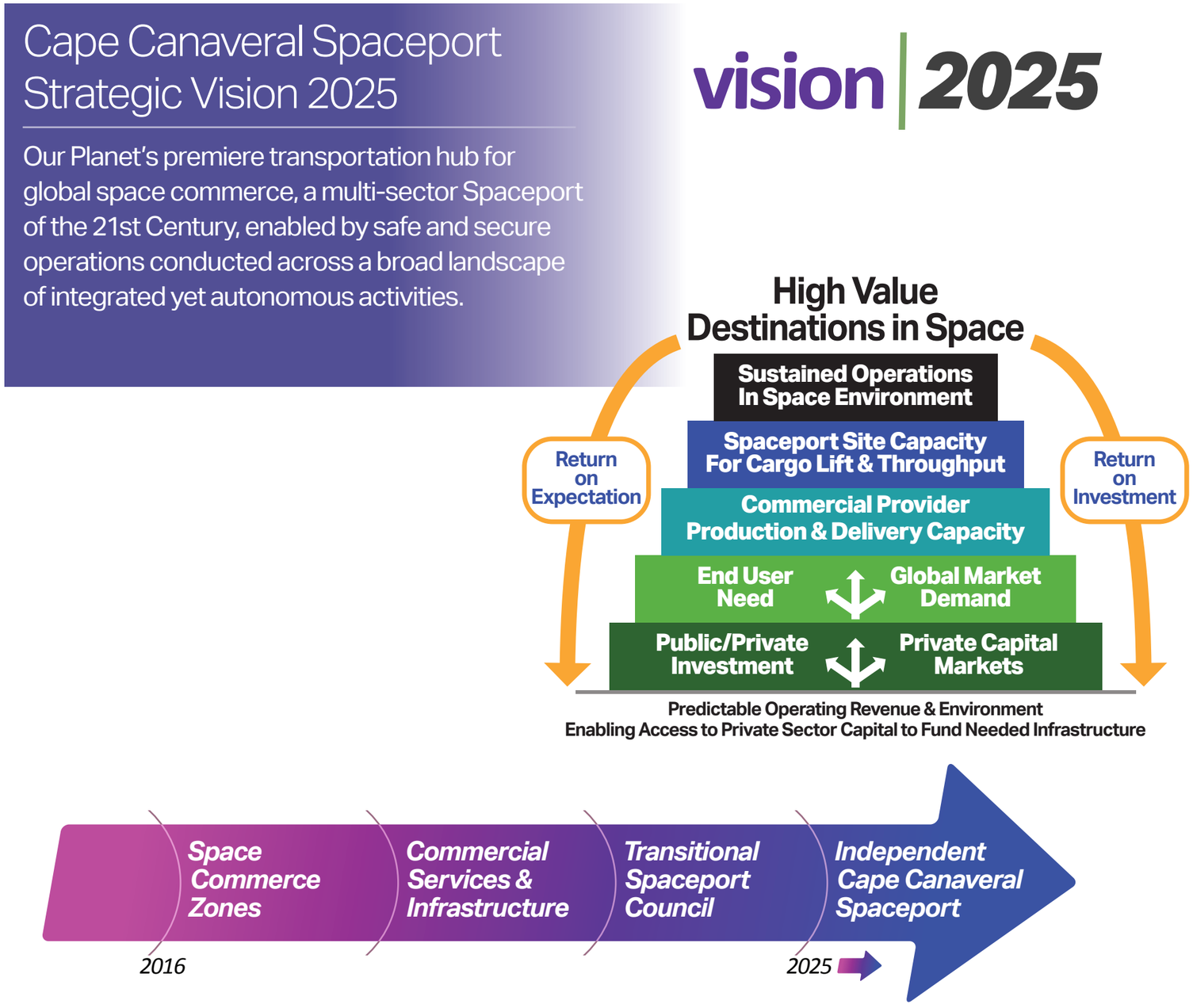
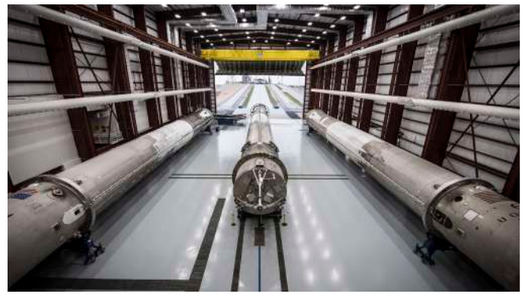


Figure 2.8 Vision 2025 Chart and Timeline
Source: Space Florida

CCS PLANNING VISION

Enable Cape Canaveral Spaceport as the hub of **global space commerce** by investing in **modern, efficient and adaptable facilities and infrastructure** within **inter-connected commerce and mission zones** while promoting **identity and quality of life** and protecting the area's natural environment.

Vision >



Goals >

GLOBAL SPACE COMMERCE

Facilitate global space commerce by enabling continuous multi-functional horizontal, vertical and integration activities and missions.

MODERN, EFFICIENT, AND ADAPTABLE FACILITIES AND INFRASTRUCTURE

Encourage development of buildings, facilities, infrastructure, and gathering areas that are adaptable and allow for a variety of uses and functions over time. Consolidate compatible uses.

INTER-CONNECTED COMMERCE AND MISSION ZONES

Provide safe, convenient, and comfortable transportation networks promoting clear wayfinding that leverages the multi-modal transportation opportunities at CCS: land, sea, air, and space.

IDENTITY AND QUALITY OF LIFE

Invest in amenities, services, and facilities while maximizing resources through creation of commerce opportunities to enhance the Spaceport community. Establish and promote CCS as a unified entity, multi-sector Spaceport.

Strategies >

- Create uniform and reliable operating conditions through regulatory predictability and transparent business practices
- Develop balanced and flexible land use processes adaptable to market needs
- Implement a capital improvement strategy for existing and future requirements
- Enable effective governance through establishment of independent Spaceport Authority
- Optimize organizational and operational effectiveness through effective area planning
- Integrate regional capabilities of universities, research, and technical suppliers
- Collaborate with international space entities to identify needs and opportunities

- Establish unified development codes and processes to minimize jurisdictional conflicts
- Incorporate flexible design standards and construct adaptable facilities for varying functionalities
- Establish consistent, authorized funding mechanisms to enable increased federal, state, and private investment at CCS
- Integrate energy efficient practices with operational procedures while sustaining facilities and capabilities to maximize the life cycle
- Collaborate on regional Capital Improvement Projects
- Enable multi-use facilities for transient operations to minimize operating costs

- Create connected and organized commerce zones using appropriately located and sized public roadways, trails, and greenways.
- Optimize commercial accessibility and movement by tiered structure of physical controls
- Maximize use of other transit modes available as a revenue source through improved connectivity and security
- Enhance building relationships to minimize operating costs and promote an integrated community
- Provide safe and comfortable pedestrian access using wide sidewalks, canopy trees and appropriate lighting
- Regional supply chain movement for freight and logistics to support CCS

- Facilitate commerce opportunities for CCS community support functions
- Create a one-of-a-kind professional workplace culture
- Enhance amenities and recreation systems
- Leverage regional and statewide assets
- Create work environment to attract and retain a talented and motivated workforce

Photo Sources (Left to Right): A-read.com, SpaceX, Shutterstock.com, Stephen Clark / Spaceflight Now

2.4 CCS PLANNING VISION

Derived from the organized Strategic Vision 2025 as well as the 2013 Master Plan Goals and Objectives (**Figure 2.9**), the new planning vision summarized on the preceding page was established to provide a clear direction for the physical environment at CCS and influence recommended development plans.

The planning vision includes major goals which were identified directly from the Strategic Vision 2025 and further defined to give clarity and direction in achieving them throughout the planning horizon. Each goal is complemented with specific objectives which are measurable and achievable.

2.4.1 SPACE FLORIDA 10-YEAR PERFORMANCE GOALS

The planning vision is also intended to align with the long-term performance goals of Space Florida as the entity responsible for promoting Florida's space industry and a key contributor to the ultimate development of CCS. Accordingly, **Figure 2.10** depicts the relationship between Space Florida's 10-year performance goals, as approved by the Space Florida Board of Directors in May 2016, and the CCS Master Plan Update goals included in the planning vision.

The Master Plan goal to enable the CCS as the hub of global space commerce aligns with Space Florida's primary goal of becoming the global leader in space commerce as well as the five performance goals derived from it.

Providing modern, efficient, and adaptable facilities and infrastructure as well as providing inter-connected commerce and mission zones will assist in Space Florida's goal of tripling the size of the space industry in Florida and becoming the site of choice for multiple aerospace/space related functions.

Similarly, promoting CCS's identity and quality of life aligns with Space Florida's goal of becoming branded and recognized as a global leader in space commerce as well as becoming the site of choice for multiple aerospace/space related functions.

2.4.2 PLANNING VISION IMPLEMENTATION

The feasibility and success of a planning vision is ultimately determined by the methods used to implement it. Whereas the Strategic Vision 2025 provides a description of the end state, the planning vision provides a guideline on how to achieve it. Building on this premise, implementation of the planning vision must consider the current conditions at CCS and identify the areas which need improvement.

Although CCS is roughly 157,000 acres, a large portion of it is environmentally constrained and/or undevelopable. As such, one of the crucial implementation methods incorporated into this Master Plan Update is recognition of the primary operational areas and the opportunities available for development and/or improvement.

These primary operational areas, or key destinations, within CCS provide specific focal points for successful implementation of the planning vision. This Master Plan Update also introduces "space commerce zones" within CCS to promote the growth of commercial aerospace activities and minimize the complexities associated with multiple jurisdictions and regulatory policies.

Furthermore, providing adequate access and connectivity between the key destinations and space commerce zones is a fundamental component for successful implementation of the planning vision. However, the ultimate development plan is only feasible if it is created with a proper understanding of the various roles and responsibilities of each of the main "players" at CCS.

GOAL ONE

Create a Spaceport that provides a positive economic benefit to the People of Florida.

GOAL TWO

Ensure responsible environmental stewardship and an efficient, safe, and secure transportation system at the Spaceport.

Figure 2.9 2013 CCS Master Plan Goals

Figure 2.10 Space Florida 10-year Performance Goals and 2017 CCS Master Plan Goals Comparison

ROLES and RESPONSIBILITIES

SPACE FLORIDA

Source: SpaceX

Processing for Launch

03
ROLES AND RESPONSIBILITIES

This section of the Master Plan describes the federal, state, and commercial enterprises which collectively make up "the players" in defining, managing, and operating the CCS. It is, as presently structured, a complex set of inter-relationships characterized by adjacent and sometimes overlapping land management and jurisdictional authorities.

An understanding of the roles and responsibilities of these various players is essential to approaching the concept of an integrated CCS ultimately functioning as a unified entity. The functional organizational elements described here, and their respective roles and responsibilities, define the influences on land use policies. Collectively, these entities establish the operating environment of the CCS, governing its utilization as well as the future development of CCS land and assets.

As illustrated in **Table 3.1**, the principal functions/roles at CCS include:

1. Spaceport Land Owners - The entities that own the land. The owners of the land within CCS are State of Florida, NASA and USAF.
2. Spaceport Land Managers - The entities that manage the use, development and operations on a parcel of land via a mutual agreement with the Land Owners.
3. Spaceport Developers and Operators - The private and commercial sectors of the aerospace and defense industries that conduct business operations at the CCS.
4. Spaceport Approval Authorities - The entities/agencies responsible for exercising autonomous authority for the mission or the betterment of humanity, environment and endangered species.

3.1 ROLE OF SPACE FLORIDA

In response to changing market conditions and federal missions, Space Florida was established in 2006 by Chapter 331, Part II, Florida Statutes as "an independent special district, a body politic and corporate, and a subdivision of the state, to foster the growth and development of a sustainable and world-leading aerospace industry in this state."

As the State of Florida's Spaceport Authority and aerospace economic development agency, Space Florida fosters bold economic activities to expand and diversify domestic and international opportunities that support talent development, enhance infrastructure and support governments and organizations in improving the state's competitive business climate.

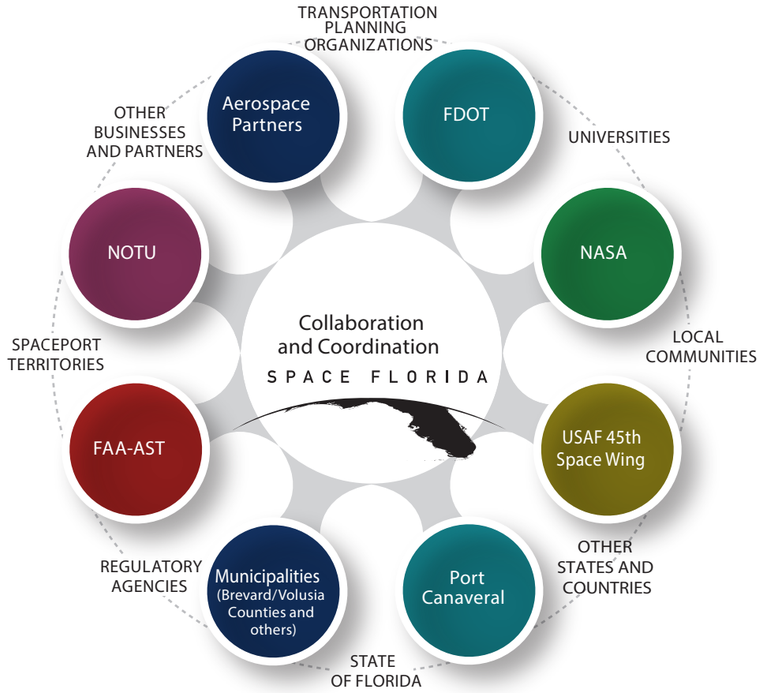


Figure 3.1 Space Florida Collaboration and Coordination
Source: AECOM

As depicted in **Figure 3.1** Space Florida can lead the collaboration and coordination activities for a successful CCS.

Space Florida accomplishes this by:

- Developing and coordinating the CCS Master Plan
- Arranging financial incentives and providing start up and relocation support
- Providing financial and business consulting on business formation, relocation and venture development
- Providing resources, retraining and access to an experienced professional workforce
- Developing targeted infrastructure and facilities improvements
- Researching and developing opportunities that enable target industry growth

As an independent special district of the State of Florida, Space Florida has unique financing capabilities that can significantly reduce the overall cost of infrastructure projects for aerospace customers. Space Florida's tax exempt status enables the organization to negotiate optimal terms on loans and reduce the overall tax burden associated with the construction of such facilities. Space Florida is working with the State of Florida, NASA, the USAF, the FAA, and other stakeholders and agencies to streamline the process of bringing space related businesses to Florida. In supporting this development, Space Florida is providing financial assistance, legislative support, customer assistance, and pre-negotiated access to launch complexes.

Table 3.1. CCS Roles

	ROLE			
THE "PLAYERS"	**LAND MANAGERS**	**LAND OWNERS**	**APPROVAL AUTHORITIES**	**DEVELOPERS AND OPERATORS**
Space Florida	●			●
SpaceX	●			●
United Launch Alliance	●			●
Boeing	●			●
Blue Origin	●			●
Moon Express	●			●
OneWeb / Airbus	●			●
NASA	●	●	●	●
FDOT	●		●	
USAF 45th Space Wing	●	●	●	●
State of Florida	●	●	●	
US Fish and Wildlife Service	●		●	
National Park Service	●		●	
FAA			●	
USACE			●	
Florida DEP			●	
SJRWMD			●	
US. Navy (NOTU)	●			●
AstroTech				●
Other Commercial Entities				●

Space Florida's vision is:

... to be the world leader in developing tomorrow's aerospace enterprise, creating a diversified business environment and robust continued economic growth for Florida.

In addition, while not functionally located within the CCS boundaries, regional partners are essential to the operation and growth of CCS. These partners include Port Canaveral, the Brevard Transportation Planning Organization, adjacent and nearby counties and municipalities, and the regional transportation asset operators.

3.1.1 STATUTORY CAPABILITIES

The powers of Space Florida are described in Sec. 331.305, of the Florida Statutes. These powers provide Space Florida with considerable abilities. Space Florida serves as both a Spaceport Authority and an economic development organization.

As a Spaceport Authority, Space Florida may provide the following:

1. Provide new infrastructure, or maintain existing facilities:
    - Space Florida may own, acquire, construct, develop, create, reconstruct, equip, operate, maintain, extend, and improve launch and support facilities, including launch pads, landing areas, ranges, payload assembly buildings, payload processing facilities, laboratories, aerospace business incubators, facilities and equipment for the construction of payloads, space flight hardware, rockets, and other launch vehicles, and other Spaceport facilities and aerospace-related systems. It may also provide educational, cultural, or parking facilities for aerospace related initiatives. (Sec. 331.305(11), Florida Statutes)
    - Space Florida may own, acquire, construct, reconstruct, equip, operate, maintain, extend, or improve transportation facilities appropriate to meet the transportation requirements of Space Florida and activities conducted within Spaceport territory. (Sec. 331.305(12), Florida Statutes)

As an economic development organization, Space Florida may provide the following:

2. Finance and issue bonds for development:
    - Space Florida may lend money, invest, and reinvest its funds. (Sec. 331.305(6), Florida Statutes)
    - Space Florida may issue revenue bonds, assessment bonds, or any other bonds or obligations and pay all or part of the cost of the acquisition, construction, reconstruction, extension, repair, improvement, or maintenance of any project or combination of projects. It may provide financial assistance for payloads and space flight hardware; and equipment for research, development, and educational activities, provide for any facility, service, or other activity of Space Florida. (Sec. 331.305(20), Florida Statutes)
3. Provide utility services:
    - Space Florida may own, acquire, construct, reconstruct, equip, and operate utility services, including electrical power, natural gas, water, wastewater, and solid waste collection and disposal. (Sec. 331.305(13), Florida Statutes)

3.1.2 PLANNING AND OPERATIONS

Space Florida's role and responsibility in producing a Master Plan for CCS is defined in the Legislative intent of its enabling statute, and in specific responsibilities assigned to carry out that intent. The relevant portions of Florida Statute 331 Part II are:

"It is the intent of the Legislature that Space Florida will…preserve the unique national role served by the Cape Canaveral Air Force Station and the John F. Kennedy Space Center by reducing costs and improving regulatory flexibility for commercial sector launches while pursuing the development of complementary sites for commercial horizontal launches."

"Space Florida shall develop a Spaceport master plan for expansion and modernization of space transportation facilities within Spaceport territories…to meet current and future commercial, national, and state space transportation requirements. The plan shall identify appropriate funding levels and include recommendations on appropriate sources of revenue that may be developed to contribute to the State Transportation Trust Fund. The territory consisting of areas within the John F. Kennedy Space Center and the Cape Canaveral Air Force Station may be referred to as the Cape Canaveral Spaceport."

"Space Florida shall carry out its responsibilities for Spaceport operations by supporting federal efforts to clarify roles and responsibilities of federal agencies and eliminate duplicative rules and policies, in an effort to streamline access for commercial launch users…seeking federal support and developing partnerships to renew and upgrade infrastructure and technologies at the Cape Canaveral Air Force Station, the John F. Kennedy Space Center, and the Eastern Range that will enhance space and military programs of the Federal Government, and improve access for commercial launch activities."

Space Florida's operational responsibilities at CCS include management, operation, and development of the property and facilities that comprise:

- Exploration Park Phases I & II including the Space Life Sciences Laboratory
- KSC's former Shuttle Landing Facility (SLF)
- USAF-licensed property and facilities on the CCAFS including SLC 36, SLC 46, and Area 57

3.1.3 LAND MANAGER AND REGULATOR

Space Florida's role and responsibilities as a Land Manager and Development Operator at CCS are established by the terms and conditions of its various property agreements with NASA and the USAF. These designated properties include leases, licenses, and use permits for both undeveloped land and existing improvements.

Space Florida has a responsibility to manage and regulate the tenants and uses on these properties by flowing down federal requirements, and where it has been given the authority, by acting as the "Building Department" for application of state and local building codes, as well as area-unique standards and codes adopted by Space Florida. Space Florida has developed a CCS Development Manual to document these design standards, building codes, and permitting processes.

3.2 ROLES OF OTHER PLAYERS

The following section summarizes the primary roles and responsibilities each of the other entities has on CCS, whether it is within one principle function or all four. Although it is currently the responsibility of Space Florida to produce a development plan for CCS, the "players" at CCS also have a role and influence on the plan. Furthermore, transitioning management of CCS from multiple organizations to a single independent authority will require an understanding of the existing roles played by each and how it will impact future development.

Looking forward, as the CCS evolves into the center of global space commerce, the major users at CCS will be the existing and future commercial enterprises that operate at CCS. While these enterprises are not land managers, land owners, or regulators within CCS, they do contribute to the development of CCS via significant investment in new facilities that directly support their mission as well as the renovation of existing facilities. Enabling commercial activities is essential for CCS to become the hub of global space commerce. Accordingly, while NASA and USAF policies and practices have improved, a continuing transformation of CCS from a federally operated, owned, and regulated facility to a more commercial focused facility, while still enabling the critical federal missions, is a key measure for successful implementation of the planning vision.

Developers and Operators

BLUE ORIGIN

BOEING

MOON EXPRESS

SPACEX

OneWeb
ACCESS FOR EVERYONE

AIRBUS

ULA
United Launch Alliance

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

The FDOT does not own or operate any transportation assets at the CCS, but it does play a critical role in facilitating new Spaceport infrastructure development through its designated responsibilities to plan for space transportation as an element of Florida's Strategic Inter-modal System (SIS), and to work with Space Florida to plan and fund a Spaceport Improvement Program to address goals and priorities established within the state's Spaceport territories.

Section 331.360 Florida Statutes directs FDOT to promote the further development and improvement of aerospace transportation facilities. Within FDOT, Spaceport activities and programs are handled by multiple offices. The Aviation and Spaceports Office has been assigned the lead responsibility for FDOT Spaceport related issues.

FDOT District offices are responsible for administering infrastructure funding agreements with Space Florida. Space Florida works with FDOT to implement a process for identifying and funding projects that meet Florida Spaceport System and CCS goals and objectives, meet other funding requirements, and have been prioritized.

Florida's SIS is a transportation system comprised of facilities and services across the entire State of Florida and having interregional significance, including major air, space, water, rail, and highway facilities.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA owns or controls by land permit the entire portion of the CCS that represents the John F. Kennedy Space Center (KSC). KSC is the largest of NASA's field center installations, with a total of about 140,000 acres of land and water areas. KSC constitutes about two-thirds of NASA's total land holdings.

In addition to being one of CCS's three landowners, NASA has been a principal developer of the Spaceport's infrastructure and existing launch support facilities. Beginning with the major capital investments required to build the facilities and support infrastructure for the Apollo project in the early 1960s, NASA has developed and re-developed KSC areas for subsequent programs including the Space Shuttle, International Space Station, and now the Space Launch System (SLS).

However, NASA's role as a developer of the CCS is transitioning. With an agency policy that is focused on acquiring and retaining only those physical assets needed to support NASA's programmatic missions, NASA seeks to reduce its institutional footprint at KSC, divesting unneeded assets and looking to others to develop or redevelop the Spaceport as needed to support non-NASA users.

NASA retains a role and responsibility as a land manager, by virtue of its real property ownership, and as an operator of many Spaceport services and capabilities, which it makes available on an as-available and reimbursable basis to non-NASA users.

NASA also has a role as KSC's land owner and facility operator as well as an approval authority of all Spaceport uses and users on KSC property. This role as an approval authority is most evident in areas of safety, security, environmental management, and facilities construction.

UNITED STATES AIR FORCE (USAF) 45TH SPACE WING

The USAF owns or controls by land permit the entire portion of the CCS that represents the Cape Canaveral Air Force Station (CCAFS) which is managed under the command of the USAF 45th Space Wing.

In addition to its role and responsibility for the CCAFS installation, the 45th Space Wing is responsible for the management and operation of the Eastern Range, together with all of its assets for command and control of launches occurring under its supervision.

Similar to NASA, and for more than a decade longer, the USAF has been in the role of developing and sustaining the infrastructure needed to support its launch customers, which have included various DoD organizations, NASA, and commercial providers.

The USAF transitioned away from developing and operating launch complex facilities beginning with the Evolved Expendable Launch Vehicle Program that turned over responsibility for ownership, redevelopment, and sustainment of major active sites to the system operators – Lockheed and Boeing, later to merge those operations under United Launch Alliance.

The role of the USAF in this respect has become one of customer instead of owner-operator, buying launch services. NASA has followed this model as well for many mission needs, including those managed by the NASA Launch Services Program and commercial cargo missions to the International Space Station.

However, with a continuing CCAFS installation and Eastern Range flight safety responsibility, the USAF has continued to be a regulator of both ground and flight activities at the Spaceport.

FEDERAL AVIATION ADMINISTRATION (FAA)

The FAA Office of Commercial Space Transportation's (FAA-AST) role at CCS is primarily as the federal agency responsible for both the promotion and regulation of the U.S. commercial space industry but also as the operator of the National Airspace System. The FAA has responsibility for ensuring public safety during licensed commercial launch and reentry activities. Given the increasing scope of commercial space operations at CCS, the FAA presence is expanding.

FAA Air Traffic Controllers must be involved in the activation and operation of special-use airspace which may be required in support of CCS launches, reentries and/or other flight activities. The FAA's Office of Commercial Space Transportation issues licenses and permits for commercial space launches and reentries, and for the operation of launch sites and reentry sites.

The FAA strives to provide the safest, most efficient aerospace system in the world. To fulfill this mission, the FAA is composed of 14 distinct offices with management over specific aspects of the U.S. aerospace system. The FAA-AST was created in 1984 as a part of the Commercial Space Launch Act. Its mission is to "ensure protection of the public, property, and national security and foreign policy interests of the U.S. during commercial launch or reentry activities, and to encourage, facilitate, and promote U.S. commercial space transportation." AST has responsibility to:

- Regulate the U.S. commercial space transportation industry to ensure compliance with international obligations and to protect the public health and safety, property, national security and foreign policy interests
- Encourage, facilitate, and promote commercial space launches and reentries by the private sector
- Recommend appropriate changes in Federal statutes, treaties, regulations, policies, plans, and procedures
- Facilitate the strengthening and expansion of the U.S. space transportation infrastructure

U.S. DEPARTMENT OF INTERIOR (DOI) AGENCIES

Two agencies of the U.S. Department of Interior – the U.S. Fish and Wildlife Service (USFWS) and the National Park Service (NPS) – have land management roles and responsibilities over a vast majority of the CCS, but are not the owners of any CCS land. These management roles are defined in agreements with NASA, and in the case of the NPS, in legislation that established the Canaveral National Seashore (CNS).

The origin of the USFWS management role was the result of large areas of KSC that remained vastly undisturbed when the property was acquired in 1962, or were not needed for the immediate requirements of space program infrastructure. To promote conservation and management by the agency most skilled to provide it, NASA entered a 1963 agreement with the Bureau of Sport Fisheries and Wildlife to manage portions of the Center. In 1972, formal agreements with the DOI established the Merritt Island National Wildlife Refuge (MINWR) as an overlay of the entire KSC, with the USFWS having land management responsibility for all areas of KSC not used by NASA for space program activities, and providing that NASA could withdraw lands from the MINWR for space program uses.

MINWR comprises approximately 140,000 acres (including some acreage not within the Spaceport) and includes the areas of Indian River Lagoon, Mosquito Lagoon, and Banana River, some of the most productive estuaries in the country. MINWR is managed according to a 2008 Comprehensive Conservation Plan.

CNS was established by Congress in 1975, splitting the roles and responsibilities of the DOI-administered parts of the CCS. CNS is managed by the NPS. It is approximately 58,000 acres in size, including barrier islands, open lagoon, coastal hammock, pine-flatwoods, and offshore waters. Approximately two- thirds of the CNS acreage is owned by NASA within the boundaries of the CCS. The CNS General Management Plan acknowledges that a primary purpose of the national seashore is to support the space program.

OTHER REGULATORY AGENCIES

Other federal and state regulatory agencies with roles and responsibilities at the CCS include those that have federal or state environmental management functions, including the issuance of specific environmental permits and related compliance actions.

These agencies include the U.S. Army Corps of Engineers, the Florida Department of Environmental Protection, and the St. Johns River Water Management District.

The U.S. Fish and Wildlife Service exercises regulatory jurisdiction for endangered species on all of the Spaceport, whether within the MINWR or not.

In addition to environmental regulatory activities, the Occupational Safety and Health Administration has workplace safety jurisdiction in addition to the installation regulations that may be applicable on either KSC or CCAFS.

The next Master Plan update shall identify the roles and responsibilities of:

- NOTU
- Brevard TPO
- Brevard County
- Volusia County
- Universities
- Port Canaveral
- Local Communities
- Cites
- State of FL

Logo Source in Section 03: Respective Company or Regulatory Agency

INVENTORY and DISCOVERY

SPACE FLORIDA

Transport to Launch Complex

Source: ULA

04
INVENTORY AND DISCOVERY

An inventory of the existing conditions provides a view of the current infrastructure and assists in the discovery of strengths and opportunities. Pertinent information on the physical, operational, and functional characteristics of the CCS serves as the baseline for recommended improvements when considering expected developments in the space transportation market.

The following sections describe the vital features of the CCS which may influence and/or impact recommended projects and includes physical traits, existing facilities and infrastructure, utilities, and regional assets.

It is important to note that a comprehensive assessment of condition and capacity of existing infrastructure was beyond the scope of this update and is identified as forward work for the next iteration of the CCS Master Plan.

Much of the CCS core Spaceport infrastructure was constructed in the 1960s and earlier. While there has been some upgrades as required by specific mission needs, major repairs and replacements have been often deferred. The next update of the CCS Master Plan must comprehensively identify the Spaceport's core supporting infrastructure – both within and outside the CCS territory boundaries. Industry will rely on affordable and sustainable infrastructure to support CCS as the global leader in enabling space commerce.

4.1 PHYSICAL TRAITS

The physical traits of CCS include the key destinations, the transportation network providing access to and connectivity between them, and environmental features which either need to be protected, mitigated to support development, or enhanced for promoting the identity and quality of life at CCS.

As depicted in **Figure 4.1**, the CCS key destinations represent the primary operational areas that existing and/or future users of CCS, particularly commercial enterprises, want to access. For the purposes of this Master Plan Update, the key destinations are categorized as Launch Complexes (Vertical Operations), Shuttle Landing Facility (Horizontal Operations), and Multi-Function Support Areas. These destinations can include multiple facilities which serve a common, overarching function.

The transportation system at CCS connects the key destinations to one another as well as adjacent communities and regional assets. Enabling the efficient transfer of people and goods amongst the various transportation modes improves accessibility and quality of life for users of CCS.

The nationally recognized environmental features at CCS are a part of its identity. NASA established a precedent for protection of the natural environmental since they first began operations in the 1960s. It is the intent of this Master Plan Update to maintain and promote the environmental stewardship initiated by NASA.

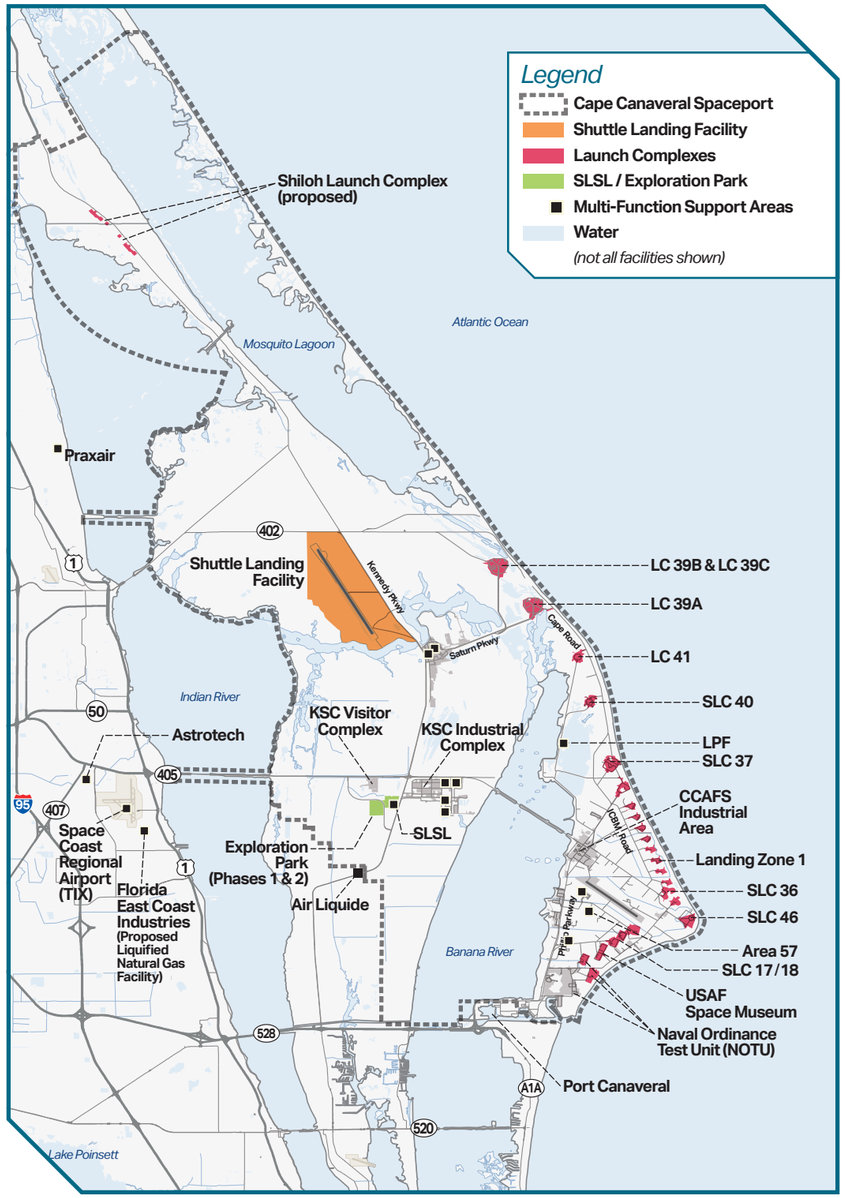


Figure 4.1. CCS Key Destinations
Source: AECOM

4.1.1 KEY DESTINATIONS

LAUNCH COMPLEXES

The Launch Complexes or Space Launch Complexes (referred to as LCs within NASA KSC boundary or SLCs within USAF boundary) are those sites built for vertical spacecraft operations. The availability of ready and suitable launch sites is a key consideration of commercial enterprises when selecting an operating location. CCS currently has approximately 27 vertical LCs but a majority of them are inactive, in need of refurbishment, and/or unusable for current/future launch requirements. Furthermore, given the rich history of space operations at CCS, a few launch complexes are protected as historic monuments (such as SLC 14 used for the NASA Mercury program) and cannot be disturbed. Refer to Section 4.2 for additional information on existing LCs.

Considering the needs of commercial operators, the focus area for LCs in this Master Plan Update is the refurbishment of existing launch complexes, as available, to support a range of launch vehicle types and identification of new launch sites. Preparing these sites for new launch operations is a fundamental component to CCS becoming the hub of global space commerce by providing modern facilities and infrastructure constructed to support the operational needs of the user.

SHUTTLE LANDING FACILITY

The Shuttle Landing Facility (SLF) is a 4,400-acre (6.9 square mile) complex formerly used for landings and recovery of the NASA space shuttle. The SLF and its facilities, except the Reusable Launch Vehicle (RLV) hangar, is owned by NASA but is operated by Space Florida under a 30-year use permit which is extendable up to 60-years. The SLF runway, at roughly 3 miles long, is one of the longest in the world and is capable of supporting most, if not all, horizontal spacecraft departures. While the site includes a few support facilities such as an Aircraft Rescue and Firefighting (ARFF) station and air traffic control tower (ATCT), the complex is largely undeveloped and available for commercial use. The layout of the existing infrastructure at the SLF is provided in Section 6 Figure 6.6.

Similar to the LCs, promoting development opportunities for horizontal operations and support functions is the primary focus for the SLF. Constructing modern, efficient, and adaptable facilities and infrastructure in a community oriented manner will further enable CCS as the hub of global space commerce and promote its identity and quality of life.

Space Florida is in the process of obtaining a Launch Site Operator License (LSOL) from the FAA-AST.

MULTI-FUNCTION SUPPORT AREAS

Multi-Function Support Areas, such as Exploration Park, offer a clustering of essential support functions including manufacturing, assembly, integration, test, refurbishment, logistics, operations control, administration, and commercial support services. They can also provide convenient access to workforce and visitor services (e.g. dining, fuel, health and fitness, education/ training, business services) and a range of commercial Spaceport functions.

Exploration Park is a relatively new and undeveloped community outside the KSC security perimeter that is leased for 50 years by Space Florida from NASA. It currently consists of the Space Life Sciences Laboratory (which is owned by Space Florida) and is in the process of a development program to construct operational facilities for both Blue Origin and OneWeb/Airbus.

Expansion of the Multi-Function Support Area that includes Exploration Park northward along Kennedy Parkway up to the SLF will create an opportunity for the first inter-connected commerce and mission zone for multiple users. It will also provide an opportunity to further enhance the workplace environment with community support functions as well as promoting CCS as a unified, multi-sector Spaceport.

Space Launch Complex 40
Source: SpaceX

Shuttle Landing Facility
Source: Space Florida

Space Life Sciences Laboratory (SLSL)
Source : Space Florida

4.1.2 MULTI-MODAL CONNECTIONS

The organization and operational efficiency of CCS is centered around the transportation network. CCS is widely recognized as one of the only facilities in the world that supports a quinti-modal transportation network consisting of air, rail, road, sea, and space. This system is an integral part of Florida's Strategic Inter-modal System (SIS) and a principal component in the creation of inter-connected commerce and mission zones.

Adequate connections between each mode of transportation enables, enhances, and promotes commercial activities. Given the mass of the payloads typical of space operations from both a weight and size perspective, it is imperative that adequate networks are provided to support the transportation of these materials between each mode.

A key component of the multi-modal connectivity was recently exemplified when the Crew Access Arm which will be used to support commercial human spaceflight at ULA's SLC 41 was transported over the Haulover Canal on its trip from the Oak Hill (pictured right). It was trucked to the CCS launch pad on August 11, 2016. It is the first new crew access structure at the Spaceport since the space shuttle's Fixed Service Structures were put in place before Columbia's first flight in 1981. It also is the first new crew access arm and tower at CCAFS since the Apollo Program.

Photo Sources: Left to Right in Clockwise Direction:
Greater Orlando Aviation Authority; ULA; NASA; Spaceport Strategies; Port Canaveral; NASA; NASA

ROADWAY FACILITIES

As depicted in **Figure 4.2**, from the north and south, I-95 provides highway access to CCS via SR 405 and SR 528. Multi-lane arterial highways, including SR 50 and SR 528, provide access from the west and connect the Spaceport to Orlando. Major roadways within the Spaceport include SR 3 (N. Courtenay Parkway becomes Kennedy Parkway within KSC), the NASA Causeway (SR 405), Space Commerce Way and Samuel C. Phillips Parkway.

The existing NASA Causeway East is inadequate to support transport of all payloads between the KSC and destinations within the CCAFS. Thus, access to CCAFS sites from Exploration Park and other areas within the KSC are required to take a circuitous route. Similarly, the existing Haulover Canal bridge providing access to the future Shiloh LC from the south is inadequate to support transport of all payloads. Enhancements to each of these bridges will significantly improve access and the overall efficiency of operations.

AVIATION FACILITIES

Nearby aviation facilities include military, air carrier, and general aviation airports in Brevard County such as Melbourne International Airport. The Orlando International Airport in Orange County and Orlando Sanford International Airport in Seminole County are both major gateways to and from the U.S., located less than 50 miles from CCS. Even closer to CCS are the Space Coast Regional Airport and the Merritt Island Airport, both of which are designated as Regional General Aviation airports in the National Plan of Integrated Airports Systems (NPIAS) which allocates funding needs for airports in the national system.

PORT FACILITIES

A major cargo and cruise ship terminal, Port Canaveral, is adjacent to CCS. To allow for barge delivery of large spacecraft components, additional deepwater port facilities are located within CCS territory itself. Waterways are used at the CCS and Port Canaveral to transport payloads, construction material, and other large spacecraft components which include the VAB basin and Kennedy Athletic, Recreation and Social (KARS) park boat basin. Other key port assets at CCS include Air Force wharf (used by Military Sealift Command), the Evolved Expendable Launch Vehicle (EELV) berth (used by United Launch Alliance), the Poseidon and Trident wharves and the Trident turning basin (used by the Naval Ordnance Test Unit).

RAIL FACILITIES

The NASA railway at CCS connects to the main line of the Florida East Coast Railway (FEC) at the SIS rail connector crossing the Indian River via the Jay Jay railroad bridge. However, the bridge will likely require significant renovations in order to transport the large payloads typical of space vehicles.

Within CCS, the NASA railway extends east-west, with two north-south branches serving the majority of the facility. There is currently no rail connection to Port Canaveral although assessment discussions are on-going, either for connections with/through CCS or outside CCS limits.

STRATEGIC INTER-MODAL SYSTEM (SIS) FACILITIES

Plans for surface transportation facilities, including highway, rail, and waterway facilities, are developed and maintained by the FDOT, primarily through Florida's SIS. The SIS is a statewide network of high-priority transportation facilities, including the State's largest and most significant commercial service airports, Spaceports, deepwater seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways, and highways. Under current FDOT policy, capacity projects that are included in the Florida SIS have a higher priority for state funding than other capacity projects that are not included in the SIS.

The CCS is a Spaceport hub currently identified as a SIS facility. All of the hubs in the SIS are linked together via a network of designated corridor and connector facilities, including highway, rail, and waterway facilities.

Projects currently funded under the SIS program include:

- SR 528 widening from east of SR 3 to Port Canaveral ($7 million)
- SR 528 widening from east of SR 524 to SR 3 ($7.7 million)
- Port Canaveral/CCS Rail Improvements ($30 million)
- Port Canaveral Container North Cargo 5 and 6 and Terminal ($20.5 million)
- Port Canaveral Northside Container Yard Expansion ($19.5 million)

Projects currently not funded include:

- Space Commerce Way widening from two to four lanes
- SR 405 improvements (SR 407 to Space Commerce Way)
- SR 405 / NASA Parkway Indian River Bridge replacement
- SR 3 Christa McAuliffe Bridge improvements
- Kennedy Parkway Haulover Bridge improvements
- Launch vehicle recovery wharf improvements

Each of these projects will help enhance the overall transportation network available at CCS.

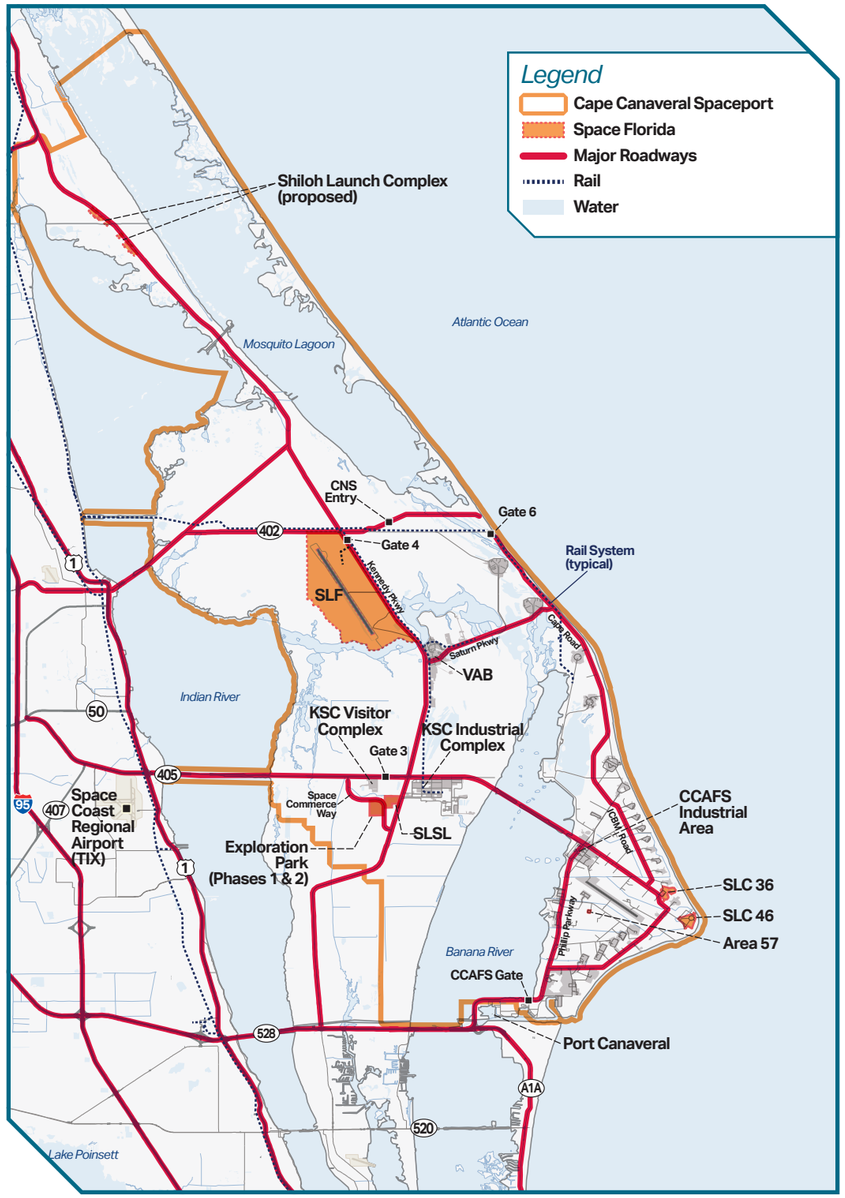


Figure 4.2 Existing Transportation Network
Source: AECOM

4.1.3 ENVIRONMENTAL FEATURES

For the KSC, NASA has taken a proactive approach to protecting the natural environment at CCS, the 1970 National Environmental Policy Act (NEPA) requires that each federal agency assess the environmental impact of each proposed project. While the NEPA process is completed on a project basis, identification of the existing environmental features provides a baseline for the preliminary evaluation of the development plan and any subsequent analyses which will need to be completed when implementing the plan.

The existing environmental features at the KSC were identified from NASA resources. The infrastructure required to support NASA operations has only accounted for roughly 5% of the 140,000 acres within the boundaries of KSC. NASA enabled the other 95% to be used for conservation of wildlife habitats within the MINWR as well as public recreational activities available at the CNS. Similary the USAF has an actice and award-winning Environmental Program, fully compliant with NEPA and other regulatory guidelines.

Prominent environmental features with the CCS include the Mosquito Lagoon, Indian River Lagoon, Banana River, and other numerous inlets and wetlands. These features represent development constraints which would require significant mitigation measures if impacted.

As illustrated in **Figure 4.3**, large citrus groves, active and/or abandoned, are aligned along Kennedy Parkway in the proximity of Exploration Park and the KSC Visitor Complex as well as the future Shiloh LC north of the Max Brewer Memorial Parkway. While an environmental feature, impacts to the citrus groves are generally acceptable as they typically attract invasive species.

Per NASA's CMP, there are large areas designated as scrub jay habitat. The scrub jay is classified as an endangered species and therefore, impacts to their habitats will require significant mitigation measures. Similarly, other threatened/endangered species are located within CCS and impacts to these areas should be avoided unless no other practical alternative exists. **Figure 4.4** illustrates the existing scrub jay habitat areas on KSC.

Other environmental features that are less "natural" but equally important to protecting it include renewable energy resources. NASA set a precedence for protecting the environment and incorporating renewable energy resources with the development of a 10 megawatt photovoltaic solar farm in partnership with Florida Power and Light Company. While an additional 1,000 acres is designated for renewable energy uses in NASA's preferred future land use map; there is an opportunity to identify higher value uses within these sites.

Protecting and promoting the natural environment is a primary component to successful implementation of the planning vision. Providing open space areas, amenities, and recreation parks improves the identity and quality of life associated with CCS.

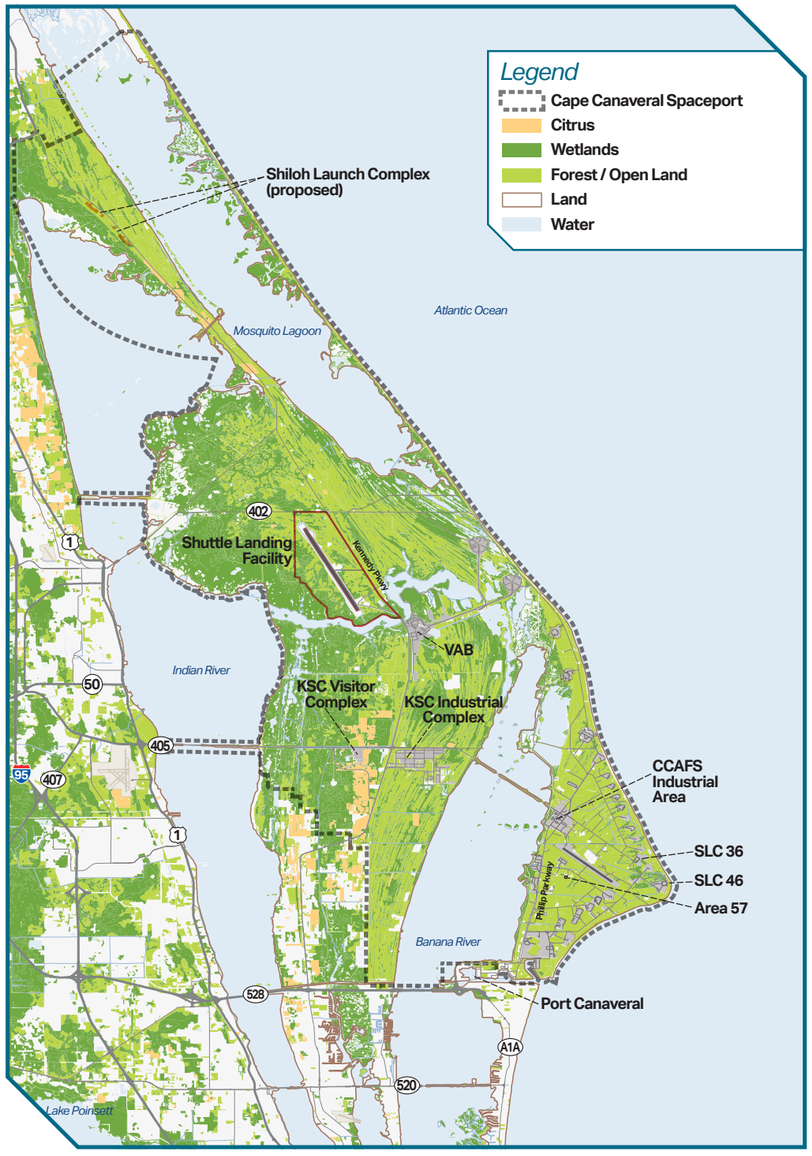


Figure 4.3 Natural Features
Source: AECOM

Figure 4.4 CCS Scrub-Jay Habitat
Source: NASA KSC Master Plan

4.2 EXISTING FACILITIES AND INFRASTRUCTURE

Florida is geographically situated in a near perfect launch location for space missions requiring access to either equatorial or inclined orbits up to 60 degrees (North or South). In addition, several billion dollars' worth of launch infrastructure already in place makes Florida a leader in military and civil launch operations and affords entry into a burgeoning commercial market.

With the legacy of NASA and the USAF, the CCS offers many benefits to the emerging commercial aerospace industry. Its experienced local talent, innovative workforce, mature industrial base and suppliers make CCS an ideal place for operations. More than just operations, the CCS has become the hub for human spaceflight transportation development.

Both the Orion Multi-Purpose Crew Vehicle (Lockheed Martin) and the Starliner Commercial Crew Transportation System (Boeing) have selected CCS for final assembly and test operations. Space Florida played a central role in securing those facilities for development and eventual operations. Moreover, Space Florida has partnered with commercial launch providers and operators to provide infrastructure funding and finance upgrades to existing launch and related facilities at CCS. Examples of other recent industry successes include the Boeing X-37 program, Blue Origin's New Glenn launch and manufacturing site, and selection by OneWeb Airbus for a state-of-art satellite manufacturing facility in Exploration Park.

Both KSC and CCAFS provide a number of existing facilities that can and have accommodated the commercial market. Space Florida is assisting the industry in obtaining usage agreements for excess facilities on both KSC and CCAFS.

These facilities are categorized as control centers and airspace, launch and launch vehicle processing, payload processing facilities, and research and development facilities.

The following pages provide a summary of the major mission-related assets located within or near CCS for each of these categories.

CONTROL CENTERS AND AIRSPACE

SPACE OPERATIONS CONTROL CENTER (SOCC), 90327

PROCESSING CONTROL CENTER (PCC), K6-1094

LAUNCH CONTROL CENTER (LCC), K6-0900

ASOC LAUNCH OPERATIONS CENTER (LOC), 75251

DELTA OPERATIONS CENTER, 38835

MORRELL OPERATIONS CENTER (MOC), 81900

HANGAR AE

LAUNCH AND LAUNCH VEHICLE PROCESSING

REUSABLE LAUNCH VEHICLES (RLV) HANGAR, J6-2466

SHUTTLE LANDING FACILITIES AND ASSOCIATED BUILDINGS

LAUNCH COMPLEX 39A, LC-30A, J8-1708

LAUNCH COMPLEX 39B, LC-39B, J7-0337

LAUNCH COMPLEX 39C, LC-39C.

VEHICLE ASSEMBLY BUILDING (VAB), K6-0848

SPACE LAUNCH COMPLEX 36, SLC-36

SPACE LAUNCH COMPLEX 37, SLC-37

SPACE LAUNCH COMPLEX 40, SLC-40

SPACE LAUNCH COMPLEX 41, SLC-41

SPACE LAUNCH COMPLEX 46, SLC-46

ROTATION PROCESSING AND SURGE FACILITY (RPSF), K6-0494

HYPERGOLIC MAINTENANCE FACILITY, M7-1059

THERMAL PROTECTION SYSTEM FACILITY (TPSF), K6-0794

SOLID ROCKET BOOSTER (SRB) ASSEMBLY AND REFURBISHMENT FACILITY, L6-247

AREA 57 FACILITIES, 50801/50803/45607

LANDING ZONE 1

PAYLOAD PROCESSING FACILITIES

SATELLITE ASSEMBLY BUILDING (SAB), 49904

COMMERCIAL CREW AND CARGO PROCESSING FACILITY (C3PF), K6-0696

ORBITER PROCESSING FACILITIES 1 AND 2 (OPF), K6-0894

NEIL ARMSTRONG OPERATIONS and CHECKOUT BUILDING (O and C), M7-0355

AREA 59

EASTERN PROCESSING FACILITY (EPF)

ASTROTECH PROCESSING FACILITIES

SPACE STATION PROCESSING FACILITY (SSPF), M7-0360

MULTI-PAYLOAD PROCESSING FACILITY (MPPF), M7-1104

PAYLOAD HAZARDOUS SERVICING FACILITY (PHSF), M7-1354

LAUNCH ABORT SYSTEM FACILITY, M7-0777

RESEARCH AND DEVELOPMENT FACILITIES

ADMIN BUILDING, 90326

SPACE LIFE SCIENCES LABORATORY, M6-1025

EXPLORATION PARK PHASE I

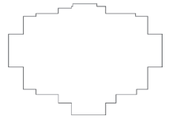
EXPLORATION PARK PHASE II

FAR FIELD ANTENNA TESTING RANGE (FAR)

Space Launch Complex 40
Source: SpaceX

Launch Complex 41
Source: ULA

CONTROL CENTERS AND AIRSPACE

FACILITY TITLE	SPACE OPERATIONS CONTROL CENTER (SOCC), 90327	PROCESSING CONTROL CENTER (PCC), K6-1094	LAUNCH CONTROL CENTER (LCC), K6-0900	ASOC LAUNCH OPERATIONS CENTER (LOC), 75251	DELTA OPERATIONS CENTER, 38835	MORRELL OPERATIONS CENTER (MOC), 81900
USER	SPACEX	SPACE FLORIDA / BOEING	NASA / KSC	ULA	ULA	CCAFS / 45TH SPACE WING
FACILITY DESCRIPTION / CURRENT USE	 The SOCC is located at the Space Florida CCAFS South Gate Campus, just outside the south security gate to CCAFS. The SOCC is currently occupied by SpaceX and is being operated as a LCC for their SLC-40 Falcon 9 operations. The LCC has a primary control room, a support room, a smaller auxiliary support room, and a conference room.	 The PCC building is a three-story facility originally built for Shuttle orbiter testing, launch team training, and Launch Processing System (LPS) maintenance. It is located between the Orbiter Processing Facility (Bays 1 and 2) and the Operations Support Building.	 The LCC is a four-story building that is the electronic "brain" of LC-39. The LCC is attached to the southeast corner of the VAB and is about 3.5 miles from Pad 39A. The LCC contains four main control rooms which are also referred to as firing rooms.	 The Atlas V Spaceflight Operations Center (ASOC) is located approximately 4 miles from the SLC-41 complex. The LOC in the ASOC provides interfaces for command, control, monitoring, readiness reviews, anomaly resolution, office areas, and day of launch viewing. The LOC design provides maximum flexibility to support varying customer requirements. The main areas of the LOC include the LCC; the Mission Director's Center (MDC); the Spacecraft Operations Center (SOC); the Engineering Support Area (ESA); the Customer Support Facility (CSF); the Operations Communication Center (OCC); Mission Support Rooms (MSRs); and the Ground Command, Control, and Communication (GC3) Support Area.	 The LCC for SLC-37 is located in the Delta Operations Center, Building 38835.	 The MOC was built in March of 1995. The facility is named after Major General Jimmey R. Morrell, who served as the first commander of the 45th Space Wing. The MOC was formerly known as the Range Operations Control Center prior to November of 2007. This facility was designed to consolidate and house the facilities which manage tests and control launches for the nation's eastern launch site. The MOC controls launches, both military and civilian, from all Cape Canaveral Spaceport launch complexes.
FACILITY LAYOUT	1 	2 	3 	4 	5 	6 
AVAILABLE AREA	AREA: 4,378 SF LAYOUT: Open office plans MODIFICATION SCHEDULE: No items scheduled	AREA: 99,000 SF LAYOUT: Open office plans MODIFICATION SCHEDULE: Updated in 2016	AREA: 230,436 SF LAYOUT: Open office plans MODIFICATION SCHEDULE: No items scheduled	AREA: 82,981 SF LAYOUT: Open office plans MODIFICATION SCHEDULE: No items scheduled	AREA: 70,993 SF LAYOUT: Open office plans MODIFICATION SCHEDULE: No items scheduled	AREA: 127,000 SF/ and80,000 SF Basement LAYOUT: Open office plans MODIFICATION SCHEDULE: No items scheduled
CAPITAL IMPROVEMENT PLAN				Proposed renovation upgrades include conference room and office space additions.		

FACILITIES :	HANGAR AE
USER :	NASA

6A

Hangar AE was built in 1958 for DoD missile program at the CCAFS. NASA acquired the facility in 1960 for use on numerous missions. It has evolved as a facility to allow independent verification and validation of vehicle and spacecraft telemetry for unmanned launch operations. It has control rooms that provide real-time voice, data and video information for expendable vehicle checkout and launch operations, and can be reprogrammed to support any of the unmanned vehicle fleet.

Photo Sources: courtesy of respective owners

LAUNCH AND LAUNCH VEHICLE PROCESSING

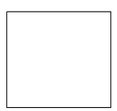
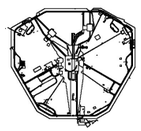
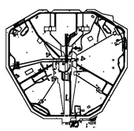
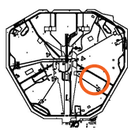
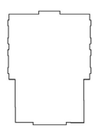
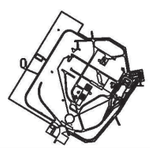
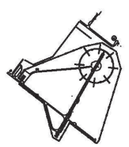
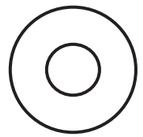
FACILITY TITLE	REUSABLE LAUNCH VEHICLES (RLV) HANGAR, J6-2466	SHUTTLE LANDING FACILITY AND ASSOCIATED BUILDINGS	LC-39A, J8-1708	LC-39B, J7-0337	LC-39C, J7-0337	VEHICLE ASSEMBLY BUILDING (VAB), K6-0848
USER	SPACE FLORIDA	SPACE FLORIDA	SPACEX	NASA / KSC	NASA / KSC	NASA / KSC
FACILITY DESCRIPTION / CURRENT USE	 The RLV Hangar is a multi-purpose facility that was developed in partnership with NASA KSC. It was originally designed to serve as a host for RLV development and operations delivered to the Space Center. Features: 185 ft. wide by 30 ft. high vehicle access door with additional tall door height of 65 ft. Full environmental controlled space 12 ft. thick, 3,000 psi concrete slabs for jacking operations Adjacent to SLF Processing area is 200 ft. long by 239 ft. wide and 66 ft. high	 The SLF served as the primary landing and recovery site for the space shuttle orbiter. The SLF is 15,000 ft. long and 300 ft. wide. The SLF area houses a Control Tower, Airfield Rescue and Fire Facility (ARFF), office complex, convoy equipment shelter, Landing Aids Control Building (LACB), and a hangar used to support RLV which is operated by Space Florida.	 LC-39A has served America's most significant manned space flight endeavors: Apollo, Skylab, and the Space Shuttle Program. Modification of Pads 39A began 2014 for the Falcon 9 and Falcon Heavy Launch Vehicles.	 LC-39B has served America's most significant manned space flight endeavors, Apollo, Skylab, and the Space Shuttle Program. Modification of Pad 39B began 2010 to support Space Launch System (SLS) Program.	 LC-39C was constructed in July 2015 with a 100 ft. long by 50 ft. wide pad. KSC's newest Launch Pad, designated 39C, is designed to accommodate Small Class Vehicles. Located in the southeast area of the Launch Pad 39B perimeter, this new concrete pad measures approximately 50 feet wide by 100 feet long. Launch Pad 39C will serve as a multi-purpose site allowing companies to test vehicles and capabilities in the smaller class of rockets, making it more affordable for smaller companies to break into the commercial spaceflight market.	 The VAB was constructed in the 1960s to support the Apollo program and was sized to fit the Saturn V LV and Mobile Launcher (ML) with Launch Umbilical Tower (LUT). The VAB is 525 ft. tall and has four high bays, each sized for processing a single Saturn V LV.
FACILITY LAYOUT	7 	8 	9 	10 	10A 	11 
AVAILABLE AREA	AREA: 50,000 SF LAYOUT: Hangar space MODIFICATION SCHEDULE: No items scheduled	AREA: 4,200 acres LAYOUT: Runway, traffic control tower, office space MODIFICATION SCHEDULE: LACB, AARF	AREA: 66,211 SF LAYOUT: Launch pad MODIFICATION SCHEDULE: Scheduled to be completed in 2017	AREA: 57,589 SF LAYOUT: Launch pad MODIFICATION SCHEDULE: No items scheduled	AREA: 5,000 SF LAYOUT: Launch pad MODIFICATION SCHEDULE: No items scheduled	AREA: 1,831,549 SF LAYOUT: Optimized for the vertical integration of rockets MODIFICATION SCHEDULE: No items scheduled
CAPITAL IMPROVEMENT PLAN		Proposed upgrades include: Common Infrastructure improvements (taxiways, comm/ utilities, security enhancements, customer experience center, etc.) Provisions for permanent fueling capabilities Permitting ongoing	LC-39A is a launch pad to be used by SpaceX for the Falcon Heavy and Falcon 9.	LC-39B will be the future launch site for NASA's SLS program.	LC-39C will be the future launch site for small-class launch vehicles.	A recent study was completed to review options to turn the VAB into a multi-user facility. Currently, High Bay 3 is under renovation for the SLS program. Orbital ATK to negotiate an agreement with NASA to utilize High Bay 2

Photo Sources: courtesy of respective owners

LAUNCH AND LAUNCH VEHICLE PROCESSING

FACILITY TITLE	SLC-36	SLC-37	SLC-40	SLC-41	SLC-46	LANDING ZONE 1
USER	SPACE FLORIDA / BLUE ORIGIN	ULA	SPACEX	ULA	SPACE FLORIDA	SPACEX
FACILITY DESCRIPTION / CURRENT USE	 SLC-36 at CCAFS has a long and interesting history. SLC-36A and B were built under the sponsorship of NASA in support of the Atlas/Centaur program in 1961 and 1963 respectively. SLC-36 has seen hundreds of Atlas I and II launches. It was deactivated in 2006 and turned over to Space Florida in 2008. In 2015, Blue Origin (BO) selected SLC-36 orbital launch site.	 SLC-37 is operated by United Space Alliance to launch Boeing's Delta IV Evolved Expendable Launch Vehicles (EELV). SLC-37 previously supported NASA's Saturn I program in the 1960s. The pad was modified recently to support the Delta IV program including the addition of a 330 ft. Mobile Service Tower (MST), two large lightning protection towers, and a fixed pad erector.	 SLC-40 supports the launch of SpaceX Falcon 9 Rockets. SLC-40 has seen over 50 Titan launches. It was deactivated in 2006 and turned over to SpaceX in 2007 and has been renovated to support the Falcon 9 LV.	 SLC-41 was originally developed to support the Titan III program in the 1960s. Following the last Titan IVB launch in 1999, the launch site was renovated by Lockheed Martin to support their Atlas V EELV.	 The SLC-46 was used for meteorological rocket launches from 1962 through 1985. From 1987–1989 the U.S. Navy used SLC-46 to launch ground-based Trident II ballistic missiles. Space Florida supported two Athena launches from SLC-46 in 1998 and 1999. Future home of the NASA Orion Ascent Abort 2 test flight (2019) and USAF/Orbital ATK Minotaur IV ORS-5 mission (2017).	 Landing Zone 1 is a landing pad for recovering components of SpaceX's VTVL. The facility was built on land leased in February 2015 from the USAF and is the former site of SLC 13 at the CCAFS.
FACILITY LAYOUT	12 TBD	13 	14 	15 	16 	16A 
AVAILABLE AREA	AREA: 138 ac. LAYOUT: Two launch pads 36A and 36B MODIFICATION SCHEDULE: 2016-2018	AREA: 450,000 SF LAYOUT: Pad 37B active MODIFICATION SCHEDULE: No items scheduled Launch Vehicle: Delta IV family	AREA: LAYOUT: Single launch pad MODIFICATION SCHEDULE: No items scheduled Launch Vehicle: Falcon 9	AREA: LAYOUT: Single launch pad MODIFICATION SCHEDULE: Planned upgrades through 2018 Launch Vehicle: Atlas V family	AREA: 70 acres LAYOUT: Single launch pad MODIFICATION SCHEDULE: Ready for first launch by 2nd quarter 2017	AREA: The landing pad is approximately 282 feet in diameter. It consists of concrete pavement surrounded by compacted gravel and earthwork areas.
CAPITAL IMPROVEMENT PLAN	Infrastructure upgrades at the launch site: Future home of BO heavy class launch vehicle Design-build is ongoing for improvements			Proposed launch site upgrades include: Commercial Crew Accommodations and Cargo Access Tower Accommodation of Vulcan Launch Vehicle	Infrastructure upgrades at the launch site include: Continued corrosion control efforts on the MST Communication refurbishment MAS refurbishment Flame Duct reinforcement Minatour Mission (2017) Modifications for Orion Abort test launch	Two (2) to Four (4) additional 150 feet diameter pads are planned to be constructed surrounding the existing Landing Zone 1 pad to support the recovery the Falcon Heavy boosters.

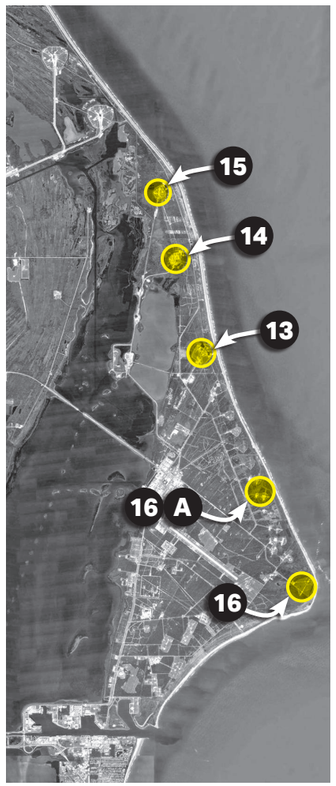


Photo Sources: courtesy of respective owners

LAUNCH AND LAUNCH VEHICLE PROCESSING

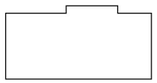
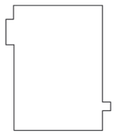
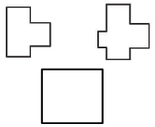
FACILITY TITLE	ROTATION PROCESSING AND SURGE FACILITY (RPSF), K6-0494	HYPERGOLIC MAINTENANCE FACILITY, M7-1059	THERMAL PROTECTION SYSTEM FACILITY (TPSF), K6-0794	SOLID ROCKET BOOSTER (SRB) ASSEMBLY AND REFURBISHMENT FACILITY, L6-247	AREA 57, FACILITIES 50801/50803/45607
USER	NASA / KSC	NASA / KSC	NASA / KSC	NASA / KSC	SPACE FLORIDA / AIR FORCE
FACILITY DESCRIPTION / CURRENT USE	 The RPSF consists of a primary building for rotating and processing the SRB segments, and two secondary surge (storage) buildings. It is anticipated that the RPSF will be used to support NASA's future SLS but has been identified by NASA as a potential multi-use facility available to commercial and/or government launch providers on a non-interference basis.	 This facility contains several buildings in the KSC Industrial Area. They include hazardous explosion-rated processing buildings, storage areas, waste staging and hypergolic support buildings, and associated engineering control rooms.	 The two-story facility is also known as the shuttle tile factory. This facility was constructed to support the Space Shuttle Program. The thermal protection system or Shuttle tiles, are manufactured and repaired in this facility. This facility will likely be made available to multiple users as a provided service.	 This facility was constructed to support the Space Shuttle Program. It contains high bays and control rooms for the processing of unfueled SRB segments. It also contains connected office space for administrative personnel and an area for testing of hydrazine powered devices. It is anticipated that the RPSF will be used to support NASA's future SLS.	 Area 57 comprises three buildings (50801, 50803, 45607) which are used for spacecraft and LV processing. Space Florida intends to enter into lease agreements with several vendors for these buildings.
FACILITY LAYOUT	17 	18 	19 	20 	21 
AVAILABLE AREA	AREA: 17,871 SF LAYOUT: Large bays for SRB segment rotation MODIFICATION SCHEDULE: No items scheduled	AREA: 17,550 SF LAYOUT: Hazardous explosion-rated processing MODIFICATION SCHEDULE: No items scheduled	AREA: 44,100 SF LAYOUT: Optimized for shuttle tile processing MODIFICATION SCHEDULE: No items scheduled	REA: 168,014 SF LAYOUT: Optimized for SRB processing MODIFICATION SCHEDULE: No items scheduled	AREA: Total for the 3 buildings is 28,619 SF LAYOUT: LV processing MODIFICATION SCHEDULE: Phase I upgrades completed by 2017; Phase II upgrades completed by 1st quarter 2018
CAPITAL IMPROVEMENT PLAN					Infrastructure upgrades include: Facility structural modifications Fluid system support Facility and technical grounding Fire suppression and detection New bridge crane in high bay Access security systems

Photo Sources: courtesy of respective owners

PAYLOAD PROCESSING FACILITIES

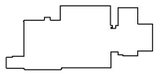
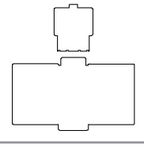
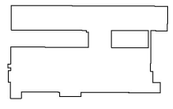
FACILITY TITLE	SATELLITE ASSEMBLY BUILDING (SAB), 49904	COMMERCIAL CREW AND CARGO PROCESSING FACILITY (C3PF), K6-0696	ORBITER PROCESSING FACILITIES 1 AND 2 (OPF), K6-0894	NEIL ARMSTRONG OPERATIONS AND CHECKOUT BUILDING (OANDC), M7-0355	ASTROTECH PROCESSING FACILITIES, TITUSVILLE, FLORIDA
USER	AIR FORCE	SPACE FLORIDA / BOEING	BOEING	NASA / KSC	ASTROTECH
FACILITY DESCRIPTION / CURRENT USE	 The SAB is a single-story facility built in 1964 for the USAF and other U.S. DoD affiliates to process flight hardware. Features: 100,000 ft. high bay clean room capable High bay is 116 ft. long by 37 ft. wide by 38 ft. high Low bay is 50 ft. long by 37 ft. wide by 21 ft. high High bay cranes: 10-ton and 5-ton Low bay crane: 2-ton Services include: vacuum, compressed air, and chilled water	 The C3PF previously known as the Orbiter Processing Facility 3, is located north of the VAB. It is leased to Space Florida from NASA and has been repurposed for the manufacturing, processing, testing, and development of the Starliner Commercial Space Transportation Crew Capsule (CST-100).	 Located west of the VAB, the Orbiter Processing Facility1/2 were originally built in 1977 for horizontal processing of the Space Shuttle Orbiters. The facility consists of two highbays with a lowbay between them which houses storage, shops, conference rooms, data processing rooms, and offices. OPF 1 was upgraded for the X 37-B program in 2015.	 Armstrong OandC Building is located in the KSC Industrial Area. The OandC building consists of a central high-bay area with a four-story laboratory and control area on one side and a single story service area on the other. There is over 60,000 SF of high-bay area with overhead cranes which are used for processing horizontally integrated payloads.	 The Astrotech Florida facilities are located on 62 ac. of company-owned property just outside the gate of KSC, in Titusville approximately 20 miles west of CCAFS. The facility consists of nine major buildings dedicated to spacecraft non-hazardous and hazardous processing, payload and hardware storage, and customer office accommodations.
FACILITY LAYOUT	22 	23 	24 	25 	26 
AVAILABLE AREA	AREA: 26,733 SF LAYOUT: Large bays for payload processing MODIFICATION SCHEDULE: No items scheduled	AREA: 148,470 SF LAYOUT: Optimized for spacecraft processing MODIFICATION SCHEDULE: No items scheduled	AREA: 131,948 SF LAYOUT: Optimized for spacecraft processing MODIFICATION SCHEDULE: No items scheduled	AREA: 604,912 SF LAYOUT: Optimized for spacecraft processing MODIFICATION SCHEDULE: No items scheduled	AREA: Processing area of 125,000 SF LAYOUT: Optimized for payload processing MODIFICATION SCHEDULE: No items scheduled
CAPITAL IMPROVEMENT PLAN				Modifications and upgrades to the OandC building for Orion assembly and checkout were complete in 2011.	

Photo Sources: courtesy of respective owners

PAYLOAD PROCESSING FACILITIES

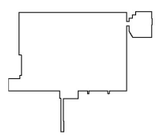
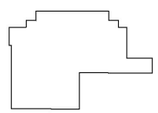
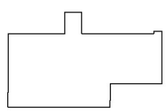
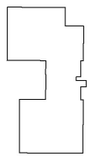
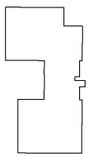
FACILITY TITLE	SPACE STATION PROCESSING FACILITY (SSPF), M7-0360	MULTI-PAYLOAD PROCESSING FACILITY (MPPF), M7-1104	PAYLOAD HAZARDOUS SERVICING FACILITY (PHSF), M7-1354	LAUNCH ABORT SYSTEM FACILITY, M7-0777	AREA 59	EASTERN PROCESSING FACILITIES (EPF)
USER	NASA / KSC	NASA / KSC	NASA / KSC	NASA / KSC	AIR FORCE	AIR FORCE
FACILITY DESCRIPTION / CURRENT USE	 The SSPF is located in the KSC Industrial Area just east of the OandC Building. Construction for the SSPF was completed in 1992 and the facility was designed specifically to support the ISS flight hardware. Features: Class 100k Airlock 108 ft. long by 46 ft. wide by 61 ft. high with a 51 ft. wide by 41 ft. high door and a 5-ton and 15-ton bridge cranes. Class 100k high bay 363 ft. long by 79 ft. wide by 61 ft. high with a 50 ft. wide by 41 ft. high door and a two 30-ton bridge cranes.	 MPPF is located south of the OandC Building in the KSC industrial area. The MPPF complex, which was constructed in 1995 consists of the MPPF building and the Multi-Operations Support Building (MOSB). The MPPF building contains a highbay, a lowbay, and an equipment airlock. Features: Class 300k Airlock 28 ft. long by 39 ft. wide by 20 ft. high with a 20 ft. wide by 15 ft. high door Class 100k high bay 135 ft. long by 60 ft. wide by 62 ft. high with a 28 ft. wide by 42 ft. high door and a 20-ton bridge crane capable of processing 3 small, 2 medium, or 1 large payload at one time.	 PHSF Building was built in 1986 and is located in the KSC Industrial Area south of the MPPF. The PHSF is a payload processing facility that is capable of hazardous processing operations. The PHSF is designed to accommodate a variety of NASA and NASA customer payloads. Features: Class 100k Airlock 80 ft. long by 58 ft. wide with a 35 ft. wide by 75 ft. high door and a 15-ton bridge crane with 75 ft. hook height Class 100k high bay 110 ft. long by 70 ft. wide with a 35 ft. wide by 75 ft. high door and a 50-ton bridge crane with 85 ft. hook height.	 A steel frame building consisting of a 142 ft. high, high-bay area for erection of Shuttle cargo payload canister. Entire high-bay building is pressurized with HEPA-filtered conditioned air and houses a 100-ton bridge crane with 112 ft. hook height.	 The facility consists of several specialized buildings that were utilized for satellite processing. **DPF -** 4M Fairing processing Two High Bays 50x50x55'100K Clean room Hazardous OPS 15T Crane 45' Hook Spin Balance Machine Main Bay 100x50x25ft 5T crane 20' hook A/L Door 50' H X 24' W **NPF -** 4M Fairing processing High Bay 91x37x48ft 100K Clean room 15 Ton Crane; 40' hook Main Bay 80x50x25ft 2 Ton Crane; 20 ' hook Airlock 50 x 28 x 33ft Door 25ft 4in H x 21ft W 6 Ton Bridge Crane **SAF -** No Encapsulation Bay 50ftx50ftx40ft No Clean room Cat 5 Hurricane rated 16 ft. storm surge rated. Storage of up to 3 containerized satellites Access Door Height: 25ft 5 Ton Bridge	 The EPF consists of four (4) high bays for large satellite processing; each electromagnetically shielded and explosively segregated from each other; individual control rooms for each; double redundant power and HVAC systems. It has International Standards Organization Clean Room Certified Processing Bays and adjacent Transfer Aisle, an Equipment Airlock, Propellant Conditioning Rooms, and low-bay support space of one and two story construction of varying height.
FACILITY LAYOUT	27 	28 	29 	30 	31 	32 
AVAILABLE AREA	AREA: 522,313 SF LAYOUT: Optimized for payload processing MODIFICATION SCHEDULE: No items scheduled	AREA: 25,667 SF LAYOUT: Optimized for payload processing MODIFICATION SCHEDULE: No items scheduled	AREA: 18,813 SF LAYOUT: Optimized for payload processing MODIFICATION SCHEDULE: No items scheduled	AREA: 25,121 SF LAYOUT: Large bay for canister rotation and processing MODIFICATION SCHEDULE: No items scheduled	AREA: LAYOUT: MODIFICATION SCHEDULE:	AREA: The nominal first floor plan area covers 120,000 +/- square feet. One Processing Bay is 100' by 100' by 200' tall and three are 100' by 100' by 145' tall.
CAPITAL IMPROVEMENT PLAN				Planned upgrades include: High bay door enlargement LAS processing and assembly modifications	None: USAF is evaluating options for disposition	

Photo Sources: courtesy of respective owners

AREA 59 FACILITIES PHOTOS

SAF

DPF

NPF

RESEARCH AND DEVELOPMENT FACILITIES

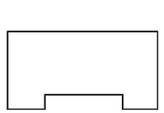
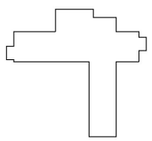
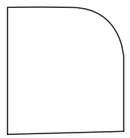
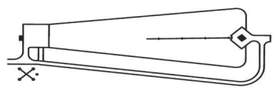
FACILITY TITLE	ADMIN BUILDING, 90326	SPACE LIFE SCIENCES LABORATORY (SLSL), M6-1025	EXPLORATION PARK PHASE I	EXPLORATION PARK PHASE II	FIELD ANTENNA TESTING RANGE (FAR)
USER	SPACE FLORIDA	SPACE FLORIDA	SPACE FLORIDA	SPACE FLORIDA / BLUE ORIGIN	NASA / KSC
FACILITY DESCRIPTION / CURRENT USE	 Space Florida's office near the south entrance gate to CCAFS, used as incubator space for new business development. Features: Single floor 18 offices Approximately 8 ft. ceilings Conference room with over-head projection and teleconference capabilities Reception area	 The SLSL is a State of Florida owned world-class facility built in 2003 for Life Sciences Research with 28 labs supporting cutting-edge life sciences space research containing 15 controlled environmental chambers and 15,000 SF of certified Animal Care Facility with a 100K Class clean room. Features: Services include vacuum, compressed air, deionized water, steam, and natural gas 25 laboratories approximately 10 ft. wide by 10 ft. long Steel structure and concrete tilt-up panels Conference rooms and Office space	 NASA's KSC and Space Florida have partnered to enable the development of a mixed-use technology and commerce park known as Exploration Park Phase 1 at KSC. Exploration Park Phase 1 will become home to diverse private sector technology and innovation enterprises. Initial site work has been completed in Exploration Park Phase 1, including site clearing, transporting fill dirt, initial site grading, and road and utilities infrastructure. Exploration Park Phase 1 initial 60-acre phase, located just outside the security gates at KSC, will accommodate up to nine separate buildings, and is expected to include educational, office, research/lab space, and flexible high-bay facilities.	 Space Florida has leased the Phase II area limits of 139 acres to Blue Origin. Blue Origin and Space Florida are currently constructing a rocket manufacturing facility. At the production facility Blue Origin will focus on manufacturing their reusable fleet of orbital launchers and readying them for flight again and again.	 The FAR, located in the Northeast area of the HMF of KSC, is certified to test antennas from 100 MHz to 18 GHz. It can test a variety of antenna types, which include Parabolic, Dipole, Strip-line, Quad Ridged Horn, Mono-pulse Phased, etc.
FACILITY LAYOUT	33 	34 	35 	36 	37 
AVAILABLE AREA	AREA: 5,160 SF LAYOUT: Office space MODIFICATION SCHEDULE: No items scheduled	AREA: 104,000 SF LAYOUT: Office space, research labs MODIFICATION SCHEDULE: No items scheduled	AREA: Phase I is 60 acres LAYOUT: MODIFICATION SCHEDULE: Development underway for specific tenants. OneWeb Facility Design on-going. Construction anticipated to begin October 2017.	AREA: Phase II is 139 acres LAYOUT: MODIFICATION SCHEDULE: Development under way for Blue Origin Orbital Launch Facility	AREA: 25 acres LAYOUT: MODIFICATION SCHEDULE: No items scheduled
CAPITAL IMPROVEMENT PLAN			Phase I construction includes: OneWeb Facility	Phase II construction include: Manufacturing Facility Annex Building	

Photo Sources: courtesy of respective owners

4.3 UTILITIES

The utilities at CCS, originally constructed in the 1950's and 60's, have been operated, maintained, and modified to support the federal missions of NASA at KSC and USAF at CCAFS. Utilities at CCS are not operated under a single entity. Despite interconnection of the water, wastewater, electrical, and communication systems, NASA and USAF typically operate their utilities separately. In some cases, commercial providers operate and maintain gas systems to the facility meter.

As the commercial, civil, and military aerospace activity on the CCS continues to grow and evolve, the capacity, condition, and operating parameters of both on-site and off-site utilities must be evaluated.

The infrastructure constructed to specifically support federal programs must be transitioned to accommodate the needs of multiple new customers. Unused facilities and infrastructure, not required for future missions are being either abandoned in place or demolished as part of KSC's Central Campus consolidation plan. KSC, CCAFS, and Space Florida have worked closely together to identify sustainable uses for facilities not required for future NASA or DoD missions. The successful transition of unused federal facilities and properties to commercial tenants demonstrates Florida's and the Federal Government's commitment to the evolution of the CCS. Additional studies are needed to support the next update of the CCS Master Plan to fully assess the condition and capacity of the existing utility and commodity distribution systems. This evaluation would also identify opportunities for privatization of utility services, and describe the means for transition of operations and maintenance responsibilities to enable commercial service. The following sections summarize the existing utilities available at CCS.

4.3.1 POTABLE WATER

Potable Water for CCS is provided by the City of Cocoa. KSC is feed from the south with a single 24-inch City of Cocoa supply line on SR 3 / Courtenary Parkway. CCAFS is fed from the south with a 24-inch City of Cocoa supply line on SR 401 at the entrance to CCAFS near Port Canaveral. Both KSC and USAF have their own pumping stations, storage tanks, chemical injection systems and distribution pipelines. The water systems is interconnected near LC-39A and a closed connection on NASA Causeway East. Despite being on KSC property, USAF maintains the water system near LC-41.

Both KSC and CCAFS have recently made significant modifications and upgrades to their water systems including mains, pump stations, tanks and hydrants. Most notably, both systems have had areas where the potable water and non-potable water for fire protection and industrial processes have been split into two separate lines. This has allowed KSC and USAF to reduce the size of their potable lines for water quality purposes without compromising their fire protection needs.

Cocoa's water supply comes from groundwater wells in east Orange County and the Taylor Creek Reservoir in Orange and Osceola Counties. The City of Cocoa has a Mutual Aid Agreement with KSC to ensure adequate provision of fire and water services and a Water Franchise Agreement with Patrick Air Force Base (PAFB) and CCAFS for the provision of water and wastewater services. Based on the City's water supply plans, Cocoa's largest wholesale water customer is the U.S. Government for a combined annual average daily flow (AADF) of 5 MGD at three installations: KSC, CCAFS, and PAFB. The historical flows peak to 4.2 MGD with the average being 3.7 MGD. Based on the City's Comprehensive Plan, the City believes it has sufficient water production and storage capacity to accommodate future average daily and typical peak day demands generated by customers in its water service area through the planning horizon.

With the recent modifications to the KSC and CCAFS water systems, as well as the age of the remainder of the system, there is a need for additional assessment of condition, maintenance costs and identification of any potential issues as part of the next master plan.

4.3.2 WASTEWATER

KSC and CCAFS have a combined collection and treatment system. KSC operates their own sewer mains, lift stations, and force mains but pumps the wastewater across the Banana River to the CCAFS for treatment. Both KSC and CCAFS wastewater is treated by a plant at CCAFS which is currently operating under capacity. The CCAFS General Plan anticipates that the current facility will continue to have sufficient wastewater capacity for both CCAFS and KSC. Given the age of the KSC and CCAFS wastewater collection systems, there is a need for additional assessment in the next master plan of condition, maintenance costs and identification of any potential issues.

4.3.3 ELECTRICAL

High voltage (115 kV) electrical power is provided by Florida Power and Light Company (FPL) to several substations at KSC and CCAFS. KSC and CCAFS operate and maintain medium voltage (13 kV) distribution systems. Electrical infrastructure is in place throughout KSC and CCAFS, although improvements may be required to respond to the specific needs of future customers. KSC and FPL have partnered to develop a 60-acre, 10-megawatt solar energy array near the SR 3 KSC south gate and a 5-acre, 1-megawatt array in the KSC Industrial Area with a future expansion planned. More recently, Space Florida and FPL coordinated plans with KSC to construct a new substation to provide direct commercial service to Exploration Park. The Eastern Processing Facility electrical supply at CCAFS is also direct from FPL. The concept of tenants having direct service from FPL could be applied to other areas of the CCS, such as the SLF and Space Commerce Zones. Given the age of the KSC and CCAFS electric distribution systems and the expected growth of the commercial market, there is a need for additional assessment in the next master plan of condition, maintenance costs and potential transition to direct service from the utility provider.

4.3.4 COMMUNICATIONS

Extensive communications systems supporting the telephone and data transmission services necessary to support all aspects of users' requirements are provided throughout the CCS. Systems supported include conventional telephone service, launch/ test data, countdown and timing, weather, range safety, paging and operational intercommunication systems (OIS), radio-frequency (RF) communications, wideband fiber-optics, operational television (OTV), video transmission and recording, and video teleconferencing.

Communications infrastructure has always been critical to launch operations and as commercial activity increases so will the demand for reliable, high-bandwidth communications. Several commercial Tier 1 providers are planning expansion of services to CCS; both through CCS networks and independently with new commercial fiber installations in new easements. Exploration Park will be serviced directly from providers without connectivity through KSC. The concept of tenants having direct service from providers could be applied to other areas of the CCS, such as the SLF and Commercial Launch Zones. Given the age of the KSC and CCAFS communication systems and the expected growth of the commercial market, there is a need for additional assessment in the next master plan of condition, maintenance costs and potential transition to direct service from the provider.

4.3.5 NATURAL GAS

Florida City Gas (FCG) owns and operates the natural gas utility at CCS which was constructed in the 1990's. FCG is responsible for the gas main from its station near NASA Parkway up the measuring meter of various facilities. KSC is served by a 12-inch main natural gas pipeline and an 8-inch branch line serves CCAFS. Downstream of the meters, tenants are responsible for operation and maintenance of the natural gas systems. Given the growth of the commercial market, there is a need for additional assessment in the next master plan to confirm that FCG can continue to expand and serve CCS tenants.

4.3.6 SPECIALIZED PROPELLANTS AND GASES

KSC and CCAFS both provide specialized propellant and gas services in support of launch vehicles and payloads including hypergolic fuels and oxidizers, cryogenic liquids, compressed gases, pressurants, and other specialty fluids and gases. These commodities are utilized in support for the commercial, civil, and DoD customers including Atlas, Delta, and Falcon Launch Vehicles, and payloads. Given growth of the commercial market, there is a need for additional assessment in the next master plan of condition, maintenance costs and business model for continuation and expansion of these services.

4.3.7 STORMWATER

Many of the existing facilities at CCS were built prior to modern stormwater management regulations, such as the 1972 Clean Water Act and National Pollutant Discharge Elimination System (NPDES) permitting process. All new development or redevelopment, including roadway improvements, will be subject to applicable St. John River Water Management District criteria for stormwater management facilities.

4.4 REGIONAL ASSETS

Not only is CCS the world's premiere Spaceport, it is also able to leverage prominent regional assets which collectively provide an unmatched set of amenities that further enhance it as the hub of global space commerce and the overall quality of life of its users and their families. From natural systems providing prominent recreational activities to commodities required to fuel rockets and other motorized equipment, CCS can support a wide range of activities and needs.

4.4.1 COMMODITIES

The availability and reliability of resources required to support space missions and business operations is extremely important to the ultimate success of a company. These resources not only include chemicals and gases but also a talented workforce with an educational background in the aerospace industry.

RESOURCES

In order to minimize launch turnaround times and increase the efficiency of operations for all users, the resources required to propel rockets into space as well as support equipment must be easily accessible.

Two primary companies currently provide these resources to the CCS: Praxair and Air Liquide. Each company maintains a production facility with a few miles of the CCS (**Figure 4.1**) and are able to supply the valuable resources all users need to complete their missions.

In addition, a new $250 million Florida East Coast Industries liquid natural gas (LNG) production and distribution plant was approved for construction in 2015 with an expected completion date sometime in the near future. The plant's proposed location is southeast of the Space Coast Regional Airport with an expectation to service the CCS and other regional locations.

WORKFORCE

As previously described and illustrated, CCS is strategically located within 50 miles of world class aerospace universities in Florida Institute of Technology, Embry-Riddle Aeronautical University, and the University of Central Florida. Each university provides opportunities in mechanical engineering, aerospace engineering, and other aviation related programs which attract students from all over the world.

4.4.2 PORT CANAVERAL

Port Canaveral is located immediately south of CCAFS and the NOTU. It was officially dedicated in 1953. The Port is a major tourism draw, serving more than 3.9 million cruise ship passengers in fiscal year 2014. The Port expands the freight and logistics capabilities of the region. Seaport Canaveral, for example, is an independent supplier of petroleum products with a capacity to provide 3 million barrels of refined products such a gasoline, diesel, biofuel and biodeisel, jet fuel, and fuel oil.

A 2012 Economic Impact Study by Martin Associates estimated that Port Canaveral cruise, cargo, marina, and real estate activity generates 16,983 total jobs and $808 million of direct, induced and indirect wages and salaries. Businesses providing services at port-owned marine cargo and cruise terminals, marinas, and real estate received just under $2 billion in revenue. Approximately $74.3 million of state and local taxes were generated by activity at the Port.

Recently, Port Canaveral received approval from the U.S. Army Corps of Engineers to widen the existing 400 ft. channel by 100 ft., while deepening it by 2 ft. along its 3.5-mile length. This will enable the port to more easily accommodate large cargo and cruise ships. The FDOT SIS Funding is contributing $24.4 million to the estimated $32.5 million project.

4.4.3 NATURAL SYSTEMS

As previously noted, within the boundaries of the CCS are two of the most productive and biologically diverse ecosystems in the U.S.: the Merritt Island National Wildlife Refuge (MINWR) and the Canaveral National Seashore (CNS).

MINWR provides a wide variety of habitats that provide various family oriented activities from wildlife viewing, hiking, kayaking, fishing, and bird watching among others.

CNS features 24 miles of undeveloped barrier island ecosystem, the longest stretch of undeveloped beach along Florida's east coast. CNS features prime habitat for many threatened and endangered species, providing nesting beaches for several thousand protected marine turtles. The national seashore contains cultural resources that reflects human history in the Florida peninsula from 2000 BC to the early 20th century Florida settlement.

NASA has successfully balanced space industry activities and the ecologically sensitive environment for decades. As such, existing and future space industry needs can be addressed more quickly within CCS because of NASA's CNS and MINWR mitigation plan. To coordinate between these agencies, NASA involves CNS, MINWR, and CCAFS in master planning and site planning/review processes.

The natural systems within CCS contribute to a unique setting for the future of global space commerce and add value by providing a large natural and protected buffer from incompatible land uses as well as abundant recreational opportunities for potential employers, their employees, and families.

4.4.4 TOURISM

Central Florida is the world's leading tourist destination. Orlando, less than 50 miles to the west, is the theme park capital of the world headlined by Walt Disney World which attracts over 50 million visitors every year. Within the Cape Canaveral Spaceport Technologies Triangle are two of the nation's most recognizable beach towns in Cocoa Beach and Daytona Beach.

Cocoa Beach, just south of CCS, is home to the Ron Jon Surf Shop and known for its prominent surfing activities. Daytona Beach is home to the most important and prestigious NASCAR race each year in the Daytona 500 which draws visitors from all over the nation. Just south of Daytona Beach is one of National Geographic's top 20 surf towns in the world, New Symrna Beach.

In addition to the other regional tourist attractions, CCS is home to the KSC Visitor Complex which hosts over 1.5 million visitors every year. The KSC Visitors Complex is a prominent family-friendly destination which provides a historical education on the technical achievements of space exploration and a glimpse at the future of space commerce.

Attractions at the KSC Visitors Complex include the KSC Bus Tour, an actual Saturn V moon rocket, Shuttle Launch Experience, the Shuttle Atlantis Museum, 3D IMAX® space films, the U.S. Astronaut Hall of Fame®, historic spacecraft and the world's largest collection of personal astronaut memorabilia. The Visitor Complex recently unveiled a new visitor entry and plaza, the first phase of a 10-year master plan to improve the guest experience.

The Mosquito Lagoon is designated as an estuary of national significance, an outstanding Florida water, and one of the most diverse and productive estuaries in North America. The national seashore also contains cultural resources that reflect human histotion" alternative, the Plan recommended Alternative B, which "preserves and enhances the natural and historic landscape features associated with the national seashore's eastern Florida coastal barrier island system."

Similar to the intent of the MINWR, the CNS General Management Plan acknowledges that a primary purpose of this section of the national seashore is to support the space program. Therefore, portions of the national seashore may at some point be closed to public access, and future development of visitor use facilities is limited.

Collectively, the regional and world-renowned tourist attractions in close proximity to CCS significantly increase the appeal of CCS over other Spaceports throughout the world. No other Spaceport comes close to the combination of commercial, technological, and entertainment capabilities offered at CCS.

Sunset over MINWR
Source: MINWR

Photos courtesy of their respective owners

strength + opportunity + timing

S U C C E S S

4.5 STRENGTHS AND OPPORTUNITIES

This completion of this Master Plan Update coincides with a period of rapid changes and developments in the space transportation industry. The inventory of existing conditions at CCS directly leads to the identification of numerous strengths and opportunities which can be leveraged into successful implementation of the planning vision.

4.5.1 STRENGTHS

The following summarizes the primary strengths at CCS which can be leveraged for future development.

ABILITY TO ACCOMMODATE GROWTH

The large and predominantly undeveloped land area translates into an ability to accommodate growth. The introduction of space commerce zones will allow CCS to protect these areas for specific uses geared towards commercial operations. Furthermore, the SLF can accommodate landings and departures by the largest aircraft currently in service. Land area on both sides of the runway are available for development and the site already provides essential support functions in the Air Traffic Control Tower (ATCT) and Air Rescue and Fire Fighting (ARFF) facility stations.

For example, KSC's Master Plan in its 20-year vision has identified over 14,000 acres of developed/developable land of which almost all of the developable land could be used to accommodate commercial space operational use. Additionally, a strategy of KSC's Master Plan is to reduce NASA's operational footprint at KSC by opening up more developed land for commercial space operational use and removing these users from operational incursions by NASA and other partners.

AIRSPACE

One of the primary strengths of the CCS is its airspace, commonly referred to as the "Eastern Range". The airspace above and surrounding CCS has successfully supported historical missions for the USAF, DoD, and NASA. While increasing demand for use of the airspace will require more detailed airspace analyses, the airspace is more proven than any other in the U.S in the capability to support various types of space orbits and missions as well as the safe integration into the overall National Airspace System (NAS).

TRANSPORTATION NETWORK

The quinti-modal transportation network is supported by a vast roadway network connecting the existing key destinations within CCS. There are currently four primary access points to CCS from cities and towns to the north, south, and west with direct connections to I-95.

GEOGRAPHY AND REGIONAL ASSETS

CCS is located in Central Florida at the apex of the Cape Canaveral Spaceport Technologies Triangle in which three international airports and three renowned aerospace universities exist. The extensive regional assets either within CCS or within a short driving distance enhance the site's identity and perceived quality of life.

CAPACITY AND ADAPTABILITY

CCS includes a total of 27 LCs with another proposed in the Shiloh area. Many of the early, smaller sites are unusable for historical and/or safety and operational separation standards for today's launch vehicles. However, some inactive launch complexes are available for redevelopment to support a launch system or for related test and development uses. The renovation and conversion by Space X of NASA's former LC 39A and repurposing of a former launch pad as a returning booster landing site are good examples of the adaptability of CCS infrastructure.

"CATALYTIC" CARRIERS

In the 1970s, rapid advancements in computing power led to the creation of several successful high-tech computer companies such as Apple, Google, Microsoft, and Oracle in what is now known as Silicon Valley. Similarly, technological advancements and commercial opportunities in the space transportation industry has led to an influx of new space-oriented companies such as SpaceX, United Launch Alliance, and Blue Origin among others. These enterprises are the "catalyst" for commercial space commerce. All of the primary space transportation companies operating today are located at CCS to some degree. With combined annual revenues exceeding multiple billions of dollars, these companies will continue to entice new entrepreneurs.

ENVIRONMENTAL STEWARDSHIP

As previously discussed, NASA and the USAF set a precedence for proactive protection of the environment since it began operations at CCS in the 1960s. As a key strength of CCS, the continued protection of the environment provides significant opportunities to enhance the open space and community which will improve the perceived quality of life.

4.5.2 OPPORTUNITIES

Considering the strengths of the existing conditions at CCS and the characteristics of the space industry, the following opportunities were identified for successful implementation of the planning vision.

REGULATORY COORDINATION

The four primary entities at CCS which have a significant role in all functions have a common goal to improve the commercial operating environment at CCS. Effective coordination amongst these entities will enable schedule reliability and operational predictability which will propel CCS to become the premier hub of global space commerce.

IMPROVED CONNECTIVITY AND ACCESSIBILITY

Although the existing transportation networks provide multi-modal connections between most areas of CCS, improved connectivity can increase operational efficiency for commercial users and enhance CCS as the site of choice for new companies considering CCS as an operating base. Improvements to bridges accessing the site are essential to support the payload sizes typical within the space industry and the relocation of existing security gates can maximize public access to key destinations and enhance the marketability of CCS for commercial users.

FEDERAL AGENCY "RIGHTSIZING"

Since the end of the Space Shuttle program, NASA's primary initiative has been to divest facilities and infrastructure without diminishing the capability to complete their mission. Similarly, the USAF 45th Space Wing has transitioned to utilization of commercial carriers to launch satellites and other payloads into space. As such, Space Florida and CCS can support this rightsizing by enticing and enabling commercial carriers to initiate and/or expand operations at CCS through funding support and implementation of the planning vision.

MODERNIZED INFRASTRUCTURE

The significant amount of undeveloped land provides an opportunity to construct modern and adaptable infrastructure that incorporates design standards geared towards renewable energy sources. Furthermore, NASA's divestment of it facilities and infrastructure provides an opportunity to modernize existing facilities at a lower cost than is associated with design and construction of new infrastructure.

PRIVATE CAPITAL AND REVENUE SOURCES

Space Florida's vision is to create a value proposition to enable private and commercial investors to operate from the CCS, similar to NASA/USAF, thus increasing the revenue streams. In order to entice the private/commercial space industry, the CCS needs to operate similar to an airport. The CCS needs to have a streamlined process for requirements associated with development, design, security, permitting, operations, and maintenance. This will help eliminate or reduce the hassle and misconception the private/commercial space industry partners may have regarding the operations and business economics within the limits of CCS.

SPACE TRANSPORTATION MARKET ASSESSMENT

SPACE FLORIDA

Ready for Launch

Source: ULA

05
SPACE TRANSPORTATION MARKET ASSESSMENT

It has proven consistently difficult to forecast the timing and extent of global demand in new markets of space products and services. Yet an unprecedented number of new and planned ventures are being launched internationally. These ventures are deploying new approaches to serving traditional but expanding markets, or developing capabilities to meet markets which are unproven but nonetheless enticing.

Global trends in civil and commercial space activities are dynamic and offer signposts to a near-term future where global space commerce – dominated by the delivery on Earth of space-based services and products – could grow from the present annual value of $330 billion to some $600 billion by 2024. A 2015 study of these trends was conducted by the Science and Technology Policy Institute of the Institute for Defense Analysis (IDA) in Washington, D.C.

The IDA assessment of global trends concludes that the United States remains the locus of space entrepreneurship, leading decisively in the number of "new space" firms established since 2000.

All end-user markets for space-based products and services depend on availability of reliable and competitively affordable space transportation capabilities, which in turn require the availability of responsive, efficient Spaceport facilities that enable those providers to compete for and meet customer needs.

Given the current state of the space industry together with its evolving technologies and business models, the future market landscape is ever more difficult to predict. Therefore the challenge and opportunity confronting CCS – and its competitors -- is not in being able to accurately forecast demand requirements of the multi-sector user base it supports, but to sustain an adaptive capacity to effectively grow with the global marketplace it must face and serve.

This 2017 update of the CCS Master Plan focuses on broad trends and market developments that must necessarily drive its planning for future development and prioritization of Spaceport capital improvements to modernize, redevelop, and acquire needed assets for 21st Century leadership in global space commerce.

5.1 SPACE TRANSPORTATION MARKETS

Services enabling access to and from high-value destinations in space are provided by a space transportation industry increasingly commercial in operation, and highly diversified in carrier systems to meet the tailored needs of its customers.

More forms and variants of launch vehicles in all classes exist worldwide today than ever before. New systems are in development continually, pursuing design improvements to lower costs of space access for targeted markets, and provide increasing reliability, safety, and operability. Innovations in vehicle propulsion, cargo and human carrier systems, reusability, and flight capacity are stimulating increased levels of competition both in the United States and internationally.

In 2015, there were 86 total orbital launches by service providers in seven countries, with Russia, the U.S. and China conducting all but 10. Of the 22 commercial launches, U.S. providers captured a 36% market share (8 launches) valued at an estimated $617 million, according to the FAA Office of Commercial Space Transportation's Annual Compendium of Space Transportation, 2016.

The number of orbital launches worldwide has steadily increased annually since 2004. China's government launch activity reached a peak of 19 launches in 2012, and its Great Wall Industry Corporation pursues international business by marketing deals to both manufacture and launch satellites for other countries. These are not competed opportunities, so they are not classified by FAA as commercial.

The FAA's 2015 Commercial Space Transportation Forecasts project a stable annual average of 17 commercial geosynchronous launches over a three-year outlook (2015-2017) and an average commercial demand for just over 13 launches annually to non-geosynchronous orbits (e.g. the ISS in low earth orbit). These launches in the next 10 years are predominantly commercial crew and cargo missions to the ISS, and 91% of all of the non-geosynchronous missions will require launch by medium to heavy class vehicles.

First Launch of Russia's Vostochny Cosmodrome
Source: Sputniknews.com

China's Long March 7 Rocket
Source: gbtimes.com Courtesy of China Aviation News

Ariane 5 Rocket
Source: European Space Agency (ESA)

5.2 COMPETING WORLD SPACEPORTS

Spaceports are proliferating worldwide (**Figure 2.4**). While the defense sectors of many emerging spacefaring nations are driving much of this proliferation, the planet's expanding but as yet unconnected network of Spaceports are increasingly focusing on civil and commercial space exploration and resource development, while competing for a global market of users that will close or improve the business case for government and private investments.

Just as space launch systems compete by size class and market niches, so do Spaceports. Consider airports, for example, where various niches of air traffic are served by facilities ranging from expansive international jetport hubs to small-airfield regional airports. Ports serving maritime traffic range from deep-water seaports serving ocean-going freighters to inland waterway barge ports and pleasure boat marinas. There is a spectrum of Spaceport types which can be generally defined by the size and characteristics of the transportation systems they have capacity and location to support.

To frame an assessment of competition among the world's Spaceports, and even among the Spaceports of the U.S. and Florida, it is appropriate to view Spaceport capacity and market capabilities in terms of aggregate annual space-lift capacity (i.e. how much metric tonnage going to or returning from space can the Spaceport site support), and what high-value destinations in space can operations from that location reach efficiently (i.e. various Earth orbits, suborbital trajectories, and space waypoints or celestial bodies beyond Earth orbit).

This assessment is discussed below in terms of Spaceports that are predominantly, though not exclusively, characterized by either orbital or suborbital space transportation activities.

5.2.1 ORBITAL SPACEPORTS DEVELOPMENT

The world's inventory of major Spaceports continues to grow, with the addition in 2016 of two new orbital space launch centers, the Vostochny Cosmodrome in Russia and China's Wenchang Satellite Launch Center. For assessing the market position of CCS, "major" is defined as a Spaceport site that has existing or planned development capacity for launch systems that can annually lift 50 metric tons or more into Low Earth Orbit (LEO) and which can support destinations in Geostationary Orbit (GEO), or inject payloads into trajectories extending beyond orbit.

The eastern Russia Spaceport has been planned for extensive future development to ease or replace Russia's dependence on its now leased site of Baikonur in Kazakhstan, which remains the CCS's most formidable rival in potential launch capacity. The current Vostochny capability is limited to a single complex supporting Soyuz, but an additional pad planned in the near-term would support the in-development Angara launch vehicle.

China's new Spaceport on Hainan Island is designed to support two new versions of the Long March launch vehicle. A medium-class Long March 7 is expected to be the first vehicle launched from the facility, sometime before the end of 2016. The heavy-class Long March 5, with a lift capacity of 20 metric tons to LEO on each flight, will be launched from Wenchang. These two vehicles will form the core capability for China's expansion of human spaceflight in orbital platforms and missions to the Moon. A tourist attraction themed to lunar exploration, resource utilization, and eventual settlement is planned to draw visitors to Wenchang.

At Europe's launch center in French Guiana, three launch vehicle systems are presently conducting orbital missions. The upgraded Ariane 6 is planned to achieve a higher launch tempo of 12 missions per year as competition for the global satellite market intensifies with the success of SpaceX.

Domestically, Georgia's proposed Spaceport Camden located approximately 50 miles northeast of Cecil Spaceport and 30 miles northeast of Jacksonville International Airport is a site that could join the list of the world's major Spaceports. An environmental analysis was initiated in 2016 to support Camden County's application to the FAA for a launch site license, based on a Falcon 9-class of medium launch vehicle that would support a lift capacity of more than 150 metric tons annually.

The privately-operated SpaceX commercial launch site planned at Boca Chica Beach in southeast Texas has completed the FAA's environmental impact evaluation and is in development with FAA licensing still in progress for SpaceX to operate the site. It too would become a major orbital Spaceport with capacity permitted to support more than 150 metric tons of space-bound cargo annually.

Neither CCS nor any other element of the current Florida Spaceport System are capable of efficiently serving the user market for polar orbiting satellites or platforms, and therefore do not compete for that business. That is true for most of the world's other major Spaceports as well due to the requirement to minimize overflight of populated land masses for such missions.

But for all other orbital markets and destinations beyond Earth orbit, CCS is positioned to dominate the global marketplace as it grows, providing an existing site capacity to support launch of more than 400 metric tons of cargo to space annually. CCS is the only U.S. Spaceport and one of only two on the planet offering active or potential sites that can currently support that level of lift. It can support every vehicle weight class, and every system configuration that has been developed or currently imagined – both vertical and horizontal.

Still, to fully realize this physical capacity, CCS must aggressively pursue both its strategic and real property visions to ensure sustained leadership throughout the 21st Century.

Spaceport Camden Conceptual Launch Complex
Source: Camden County

SpaceX at Boca Chica (artist concept)
Source: AmericaSpace.com

5.2.2 SUBORBITAL SPACEPORTS DEVELOPMENTS

The world's inventory of suborbital Spaceports also has seen an accelerated proliferation in the past few years, driven by expectations for a still emergent space adventure tourism industry for brief spaceflight experiences just beyond the widely accepted boundary of space – 100 kilometers. Also driving this growth of suborbital Spaceports are dreams for global point-to-point transportation by hypersonic flight between the Earth's continents, and accelerating innovation in small satellites that can be deployed by aircraft-assisted launch systems or small reusable suborbital launch vehicles.

The majority of new suborbital Spaceports are co-locating with existing airports that already serve various markets of air transportation.

At the close of 2015, the FAA Office of Commercial Space Transportation had issued launch site licenses to ten U.S. sites, six of these targeting the markets served by horizontal suborbital launch and suborbital/orbital reentry operations. These include the latest entrants to the U.S. Spaceport inventory – Midland International Airport and Ellington Airport, both in Texas. They join Florida's Cecil Spaceport, California's Mojave Air and Spaceport, New Mexico's Spaceport America, and the Oklahoma Spaceport.

CCS is seeking to join the domestic Spaceports serving this market niche through licensing (in progress) as a launch and reentry site via its horizontal launch and landing facility, the former NASA SLF. A FAA launch site operator license application is also in process for nearby Space Coast Regional Airport, which would become the third FAA-licensed site in the Florida Spaceport System.

Spaceport capacity to support the emerging and still unproven markets for suborbital flight services continues to outpace the current demonstrated needs of an industry still in development, but the competition to secure an entry position in this new phase of commercial human spaceflight is motivating many additional aspirants in both the United States and abroad, despite the uncertainties of business case.

A major new development in 2016 impacting the future of suborbital spaceflight was the successful demonstration by Blue Origin of the vertical launch, powered vertical landing, and reusability of its New Shepard suborbital vehicle at its West Texas test facility under FAA-issued permits.

These developments in the proliferation of both orbital and suborbital Spaceports stress the resources of FAA licensing and regulatory functions. They also add complexity to the already daunting challenges of integrating space transportation into the national airspace system, NextGen air traffic management, and a new architecture for management of space traffic management.

5.3 SPACE-BASED PRODUCTS AND SERVICES

Industries like global positioning satellite applications and direct-to-home satellite television did not even exist 15 years ago. They are now key components of a $330 billion global space industry. The demand for expanding global networks and access will further increase the value of space-based assets and the requirements for space transportation.

The IDA assessment of global trends, offers this synopsis: "Better and cheaper technology, especially in the commercial and IT sectors, has led to the development of newer and lower-cost space applications, products, and services which, in turn, have accelerated space investment globally."

There are three primary consequences described as follows in the IDA assessment:

i. Portions of the space sector are transitioning to a more globalized mainstream sector

ii. Governments, especially in emerging countries, are leapfrogging traditional development with an objective to reach parity with the world's major space faring nations

iii. Growing space-based activity is generating new challenges for the global space community, both on the ground and in space.

5.4 ADVENTURE TOURISM AND HYPERSONIC TRAVEL

The market for adventure tourism in suborbital spaceflight may soon move beyond "flight reservations" to a flights taken era. Advances in systems development and flight testing by Virgin Galactic, Blue Origin, XCOR Aerospace, and others may finally enable the actual emergence of commercial operations over the next few years.

At the same time, the potential for orbital adventure tourism flights is being pursued by American companies, some of which are hoping to leverage their development of capabilities for NASA's commercial crew and cargo business.

A more elusive view of the future remains for the dream of fast flights between Spaceports continents apart, enabled by hypersonic flights which venture out of the atmosphere only long enough to reach their destination across the planet. Most experts believe the technologies that will support human transport of this type are at least a decade away, though some innovative approaches to high-value cargo delivery could accelerate the beginnings of this point-to-point industry.

Source: Space Florida

5.5 BEYOND TRADITIONAL MARKETS: A CIS-LUNAR ECONOSPHERE

Unprecedented commercial space activities planned by American and international companies are driving a new sense of urgency for U.S. commercial space policy and licensing frameworks to keep up. In a 2016 report to Congress, the White House Office of Science and Technology Policy (OSTP) identified the following current and proposed near-term commercial non-governmental activities in space which collectively are referred to as the Cis-lunar econosphere illustrated in **Figure 5.1**:

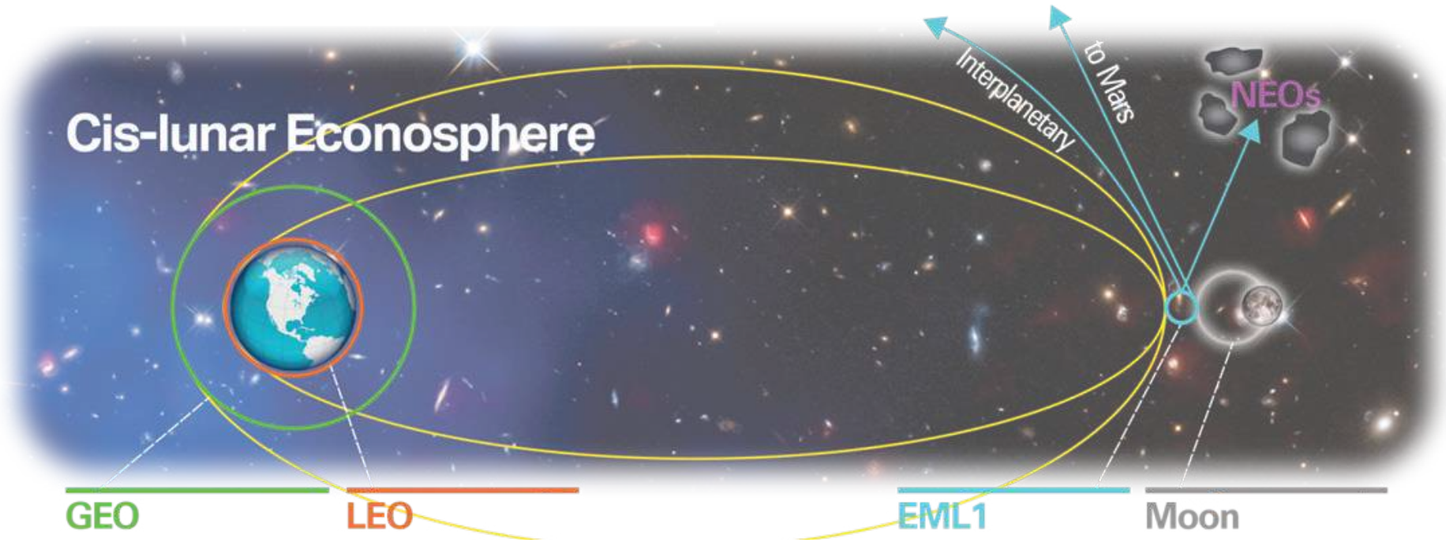


Figure 5.1. Cis-lunar Econosphere
Source: AECOM

PRIVATE MISSIONS BEYOND EARTH'S ORBIT

- Multiple American companies have announced plans for commercial missions to the Moon, including transportation of commercial payloads to the lunar surface. One such company has indicated that it has a launch contract for a technology demonstration mission to the Moon, which would involve maneuvers on the lunar surface.
- One American company has announced plans for commercial missions to Mars in the near future.
- One American company has announced plans to operate a commercial lunar habitat.

NEW ON-ORBIT ACTIVITIES

Several American companies have announced plans for new on-orbit activities, with start-up time horizons ranging from one year to decades, including:

- End-of-life extension modules, which attach to a satellite to aid in station-keeping or transfer to a graveyard orbit;
- Satellite repair utilizing robotic arms;
- Satellite refueling utilizing fuels launched from Earth;
- Satellite refueling utilizing fuels derived from space resources; and,
- Commercial orbital habitats.

SPACE RESOURCE UTILIZATION

American companies have announced long-term plans to extract resources, such as rare-earth elements from the Moon or asteroids, for use on Earth or in space as a means of supporting deeper exploration and a longer-term human presence in space.

The activities identified by OSTP were responding to a reporting requirement included in the Commercial Space Launch Competitiveness Act signed into law on November 15, 2015. That landmark law provided property rights for American citizens engaged in commercial recovery of resources extracted from asteroids or other bodies, including the right to possess, own, transport, and sell the resources they may obtain.

Conceptual NASA Moon Resource Prospector Mission
Source: NASA

The law further provides that the U.S. Government shall facilitate commercial exploration and recovery of space resources by U.S. citizens, discourage government barriers to such industries, and promote the rights of U.S. citizens to engage in exploration and commercial recovery of space resources in accordance with international obligations of the United States.

Conceptual Asteroid Mining Operation
Source: Explaining the Future.com

As the home of America's lunar exploration and landing missions of Apollo, and NASA's future deep space explorations that could benefit from such commercial activities, CCS is uniquely positioned to enable the types of commercial activities envisioned in the OSTP assessment.

DEVELOPMENT PLAN

Source: SpaceX

SPACE FLORIDA

Out There and Back Again

06
DEVELOPMENT PLAN

The CCS Development Plan provides the capital improvement planning for the infrastructure necessary to address the needs of the space transportation market. Moreover, this plan satisfies the requirements set forth in Florida Statute 331.360 which requires Space Florida to develop a master plan for the expansion and modernization of space transportation facilities at CCS for inclusion in the statewide system. The master plan shall contain recommended projects to accommodate current and future commercial space transportation requirements. These projects include Space Florida initiatives to support the emerging market needs as well as eligible Spaceport discretionary capacity improvement projects specifically requested for matching funds from the FDOT.

FDOT may fund space transportation projects per Florida Statute 331.360, Subsections:

(3) Space Florida shall submit the master plan for Spaceport territories [system plan] to the Department of Transportation, and such plan may be included within the department's 5-year work program of qualifying aerospace discretionary capacity improvement under subsection (4). The plan shall identify appropriate funding levels and include recommendations on appropriate sources of revenue that may be developed to contribute to the State Transportation Trust Fund.

(4) Subject to the availability of appropriated funds, the department may participate in the capital cost of eligible Spaceport discretionary capacity improvement projects. The annual legislative budget request shall be based on the proposed funding requested for approved Spaceport discretionary capacity improvement projects.

Leveraging the strengths and opportunities of the existing facilities and infrastructure, the Development Plan identifies recommended projects intended to realize the planning vision and satisfy the Florida Statutory requirements. However, in order to so, it is essential to consider recent industry developments which impact planning.

6.1 RECENT INDUSTRY DEVELOPMENTS

Several recent developments dramatically impact the planning environment for and will have a lasting influence on future development of the CCS. While the two foundational Goals of the 2013 Master Plan remain unchanged, an updated set of objectives have been crafted to pursue those Goals in a Development Plan context changed by:

Source: Blue Origin

- Industry-driven Site Selection Criteria
- Industry Technology Advances
- New Legislation and Regulatory Policy
- Global and Domestic Competitive Challenges

The broadened objectives and strategies included in this 2017 update will support a flexible, competitive response to the needs of a rapidly evolving industry. The Development Plan will continue to be updated annually by Space Florida to enable measurable progress towards implementing the new vision of what CCS can become as it adapts to face the future.

6.1.1 INDUSTRY-DRIVEN SITE SELECTION CRITERIA

A private-investor supported commercial space transportation industry is sharpening the business model for successfully-competitive launch and turnaround operations. It is unconstrained by the distributive politics of major federally funded, federally managed programs. The industry's customers – both government and commercial – demand safe, reliable, and responsive access to space, supplied as a transportation service provided at the most affordable cost.

With a growing set of options as to where a commercial provider may serve their customer markets, industry-driven site selection criteria are decidedly different from those which drove Government launch and manufacturing site deliberations in the past.

Source: SpaceX

Coupled with the challenges of competitive sites are new opportunities for the co-location of manufacturing and refurbishment operations to enable efficiencies of scale and workforce. This is evident in the recent siting decisions by Blue Origin, OneWeb/Airbus, and SpaceX.

Industry-driven site criteria to support a commercial environment can be summarized as follows:

For a Spaceport site:

i. Unencumbered access

ii. Commercial standards and codes

iii. Availability of reliable, commercially provided utilities, commodities, support services

iv. Consistent regulatory environment under appropriate jurisdictional authorities (e.g. application of state and local building codes)

v. Financeable and insurable by private markets

For a Launch Range supporting the Spaceport:

i. Ready when needed

ii. Capability to accommodate high-tempo throughput

iii. Capacity to support concurrent operations

iv. Availability of affordable support services

v. Flexibility in scheduling and mission sequencing

Source: SpaceX

6.1.2 INDUSTRY TECHNOLOGY ADVANCES

A highly-competitive transformation of the global space marketplace is being accelerated by technology and operational capabilities of the commercial space transportation industry. This is already evident in the success of companies like SpaceX and Blue Origin, Virgin Galactic and Sierra Nevada, Bigelow Aerospace and Moon Express.

Commercial capabilities are bringing lower costs, higher reliability, greater capacity, and service dependability to the marketplace. New technology is enabling commercial systems to reduce and potentially eliminate reliance on traditional Government range tracking and control functions.

The prevailing operational paradigm will be launch, return/reentry, refurbishment, and repeat. To optimize their operational autonomy, control, and schedule flexibility, commercial launch providers are requiring user-dedicated vertical launch sites, or dedicated user processing facilities accessing a shared horizontal-launch and recovery runway.

Over the next 10 years, CCS will grow as the most diverse and capable space transportation and operations center in the world.

It will be home to a fleet of many types of space-faring vehicles, with all Other policy initiatives needed to respond to the dynamic global market will continue to be identified and advanced by Space Florida and its industry stakeholders. The Development Plan must remain aligned with these policy and regulatory developments just as it must adapt to advances in technology and innovative business practices.

Source: Respective Owners

6.1.3 NEW LEGISLATION AND REGULATORY POLICY

CCS will be influenced for years to come by U.S. commercial space legislation and regulatory policy actions that occurred in 2015. The November 25, 2015 Commercial Space Launch Competitiveness Act contained provisions of particular significance to the Spaceport:

- Reaffirmed the role of the U.S. Secretary of Transportation to promote commercial space launches and reentries by the private sector; and to facilitate Government, State, and private sector involvement in enhancing U.S. launch sites and facilities;
- Directed the Secretary to review and evaluate multiple agency launch rules and regulations for commercial launch operations at CCS and other U.S. Government launch and reentry sites to "streamline commercial space launch activities";
- Granted private property rights for U.S. companies planning a range of new, unprecedented commercial activities in space, including the extraction, transport, and sale of space resources from the Moon, asteroids, and other bodies; and
- Extended the current Government indemnification and commercial launch liability regime until 2025, directing new evaluations of how insurance requirements should be determined and how state and local government-owned space transportation assets should be most appropriately addressed in the liability and indemnification regime.

Additional legislation to address an identified regulatory gap in meeting U.S. international treaty obligations is likely in the near future to remove a potential bureaucratic obstacle to commercial activities in Earth orbit and beyond. The "streamlining" review may also lead to additional clarification of roles and responsibilities at CCS.

Source: GettyImages

6.1.4 COMPETITIVE CHALLENGES

It is widely recognized that commerce in space is increasingly congested, contested, and competitive. The same can be said for the ground-based assets that enable space transportation – Spaceports and their component launch pad complexes.

Since the 2013 Master Plan, two major new world Spaceports have become active in Russia and China, and in the United States, two more are in the site development and FAA licensing process on the southeast coasts of Texas and Georgia. In addition, two new suborbital Spaceports have been licensed to operate in Texas, and the list of potential new entrants into this Spaceport niche continues to grow.

Within the CCS itself, the assignment of available developed or previously developed launch pad sites suitable for today's market needs is resulting in a Cape that has become more operationally-congested, more operationally-competitive, and nearing the limit of existing site capacity for medium and heavy-lift systems. New and potential future complex sites in previously undeveloped areas of the Spaceport face a contested application of land use values.

6.2 GOALS AND OBJECTIVES

The Development Plan is designed to implement the CCS Master Plan strategic and planning visions as well as the four updated Goals, which are aligned with the statewide Florida Spaceport System Plan and the 10-year Space Florida corporate performance expectations adopted by Space Florida's Board of Directors.

The purpose of these Goals and Objectives is to guide investment strategies and annual updates to on-going or proposed projects funded under FDOT's Spaceport Improvement Program and other capital fund sources including federal and industry partner contributions.

The Master Plan Goals are intended to be long-range, while objectives to fulfill those goals are intended to be near and mid-term, industry driven, and adaptable to the changing marketplace. Required updates to the objectives to address changing market needs will be published with each year's call for projects and funding under the Spaceport Improvement Program.

Space Florida may also identify strategies and initiatives under each objective to further assist in evaluating the prioritization of proposed projects recommended for various avenues of investment participation by Space Florida and FDOT.

The following objectives are adopted in this update of the 2013 CCS Master Plan based on the revised goals. Projects currently on-going, identified and programmed, as well as recommended future projects all align with these Goals and Objectives and are summarized in Section 6.5

GOAL 1: GLOBAL SPACE COMMERCE

Enable global space commerce by facilitating continuous multi-functional horizontal, vertical, and integration activities and missions.

Objective 1.1 Enable growth in commercial medium-lift and heavy-lift launch infrastructure and operations supporting identified markets of domestic or global demand.

Objective 1.2 Support commercial crew and cargo delivery to and return from Cis-Lunar destinations.

Objective 1.3 Attract new emerging space transportation and space development systems.

Objective 1.4 Expand horizontal launch and landing capacity and support capabilities.

Objective 1.5 Incentivize and facilitate co-location at CCS of manufacturing, assembly, integration, mission operations, and refurbishment activities.

Objective 1.6 Attract and support collaborative advanced aerospace technology research and development projects from all three CCS- supported sectors involving inter-sector and international partnerships.

GOAL 2: MODERN, EFFICIENT, AND ADAPTABLE FACILITIES AND INFRASTRUCTURE

Encourage development of buildings, facilities, infrastructure, and gathering areas that are adaptable and allow for a variety of uses and functions over time.

Objective 2.1 Adopt design guidelines and development standards to guide project planners and developers.

Objective 2.2 Maintain up-to-date needs inventory of required infrastructure enhancements and facility capabilities which can be incorporated into or considered in project development for future repurposing.

Objective 2.3 Establish collaborative planning among the CCS land owners, managers, developers, operator and regulators through establishment of a Spaceport Planning Council to seek balanced and flexible land use policies and practices throughout the CCS.

GOAL 3: INTERCONNECTED COMMERCE AND MISSION ZONES

Provide safe, convenient, and comfortable transportation networks promoting clear way-finding that leverages the multi modal transportation opportunities at CCS.

Objective 3.1 Work with federal partners at KSC and CCAFS to define and establish Space Commerce Zones with appropriate flexibility of uses and application of concurrent jurisdiction.

Objective 3.2 Support modernization and necessary capacity improvements to existing roadway, bridge, rail, and marine transportation networks.

Objective 3.3 Identify and support reconfiguration of existing access control points on major Spaceport arterial networks to improve commercial access to established space commerce zones without compromising necessary security and general public access controls.

Objective 3.4 Enable and support safe, reliable, and concurrent multi-sector integration and mission activities including launches, reusable element returns, and reentries.

GOAL 4: IDENTITY AND QUALITY OF LIFE

Invest in amenities, services, and facilities while maximizing resources through creation of commerce opportunities to enhance the Spaceport community.

Objective 4.1 Leverage opportunities for commerce to attract private capital investment in amenities, services, and facilities supporting the Spaceport community.

Objective 4.2 Identify and implement opportunities to physically establish Cape Canaveral Spaceport's brand and multi-sector user areas through entry features and way-finding signage.

Objective 4.3 Identify and actively recruit commercial partners for development of professional, academic, and for during and after-work gathering places tailored to the needs of the Spaceport community providers, customers, and visitors.

6.3 SPACE COMMERCE ZONES

In order to be the global leader in enabling space commerce, CCS must have a Development Plan based on the foresight and agility required to serve a diverse, competitive and demanding marketplace of the future. As a key capability to realize that future, this Master Plan Update proposes the establishment of Space Commerce Zones which are intended to serve as designated areas for commercial development and enable CCS as the hub of global space commerce. The concept presented here builds on NASA KSC's initial definition in its Center Master Plan of Commercial Operating Zones as a form of performance zoning, and seeks to mature and expand it across CCS. Moreover, KSC has worked aggressively over the last several years to implement the multi-user spaceport concept.

Space commerce in all its forms, more than just commercial space launch activity, is an increasingly important economic engine for the CCS of the future. Space Florida's advocacy combined with market demand for commercial space activities at the CCS has already brought positive developments from both NASA and the USAF on their respective properties to improve commercial accessibility and streamline federal agency approvals and requirements. Going forward, the requirement to streamline further toward a shared vision of an operating environment tailored to commercial activities, must be accelerated in order to keep up with global space commerce market needs.

Space Commerce Zones are defined in this Master Plan Update as overlay districts of the CCS that remain federally-owned property but within which business is empowered to function as it would on any other commercial site not situated on federal land. Commercial services and infrastructure will grow and extend to support these zones. However, it is also intended that these zones will include adequate areas for open space features and other environmental protection attributes that will enhance the overall identity and quality of life at CCS.

Similar to other forms of governmental zoning, establishment of Space Commerce Zones with well-defined characteristics and rules will provide a level of certainty to the business environment. To the extent possible, application of concurrent legislative jurisdiction principles should allow State and local laws to be in force as they would be on non-federal land and eliminate federal requirements that would not be applicable on non-federal sites.

Land use policies should allow these zones to expand in boundary as needed to accommodate the capacity requirements and logistical support requirements of businesses operating within them.

Designation of property currently under Space Florida management offers an appropriate near-term starting point as an initial phase as depicted in **Figure 6.1.**

Also depicted as potential designated zones in the initial phase are currently assigned commercial vertical launch complexes on KSC as well as those assigned or planned on the CCAFS. In addition, four potential or proposed vertical launch complex sites on KSC – the Space Florida-proposed Shiloh Launch Complex, Notional Launch Complexes 48 and 49 identified by NASA, and the Commercial Vertical Launch Complex (CVLC) site identified and studied by NASA in 2008 – are also shown as areas that could be included in a Space Commerce Zone.

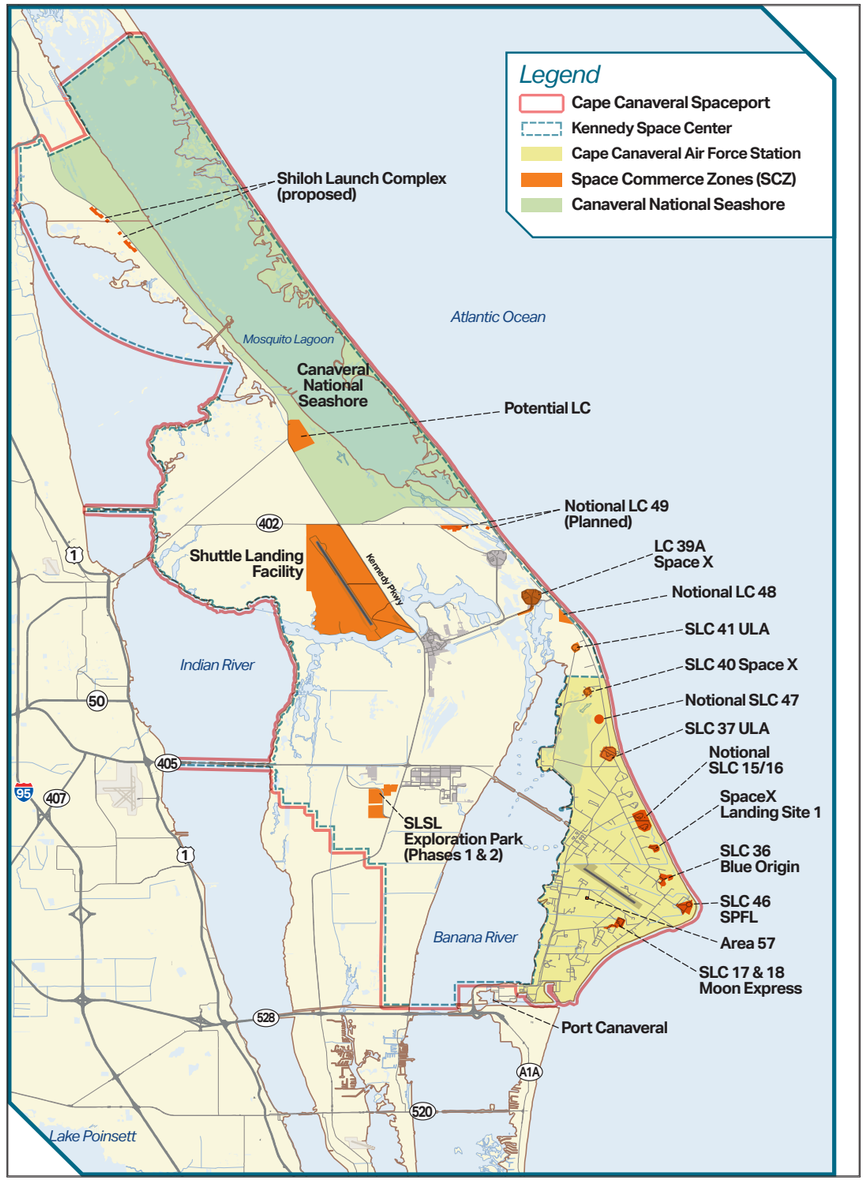


Figure 6.1. Space Commerce Zones - Initial Phase
Source: AECOM

A notional extended phase could enable a more contiguous and interconnected series of commerce and mission zones on KSC, followed by a future Integrated Phase that extends into CCAFS and provides connectivity and access to all Space Commerce Zones on the CCS.

6.3.1 EXTENDED PHASE

Building upon the initial phase, the Extended Phase of the Space Commerce Zones implementation involves a potential expansion of Exploration Park to the north and south. The expansion is primarily anticipated to occur along Kennedy Parkway (SR 3).

The southern expansion could extend to the CCS property boundary where Kennedy Parkway turns into North Courtenay Parkway.

The northern extension begins with development along the existing alignment of Space Commerce Way and continues north of SR 405 and eventually along the western edge of SR 3. In this phase the first interconnected commerce and mission zone is created by connecting the existing and future functions of Exploration Park with the SLF. Providing uninhibited public access to this area as well as providing sufficient open spaces is a key component to realizing the planning vision.

While NASA's preferred Future Land Use Plan identified areas within the proposed extended phase for renewable energy land uses, it has been recommended by Space Florida that a more generalized land use classification be defined for 'Commercial/Industrial" that would not preclude renewable energy but would allow for a broader range of commercial and industrial uses supporting the Spaceport. Other areas of KSC outside of proposed Space Commerce Zone property could be utilized for renewable energy purposes if needed.

Also possible for inclusion in this phase is a small parcel of land at the southeast corner of the SR 3 and SR 405 intersection which is currently part of the KSC industrial complex.

6.3.2 INTEGRATED PHASE

Over time, it is envisioned that a fully integrated phase of Space Commerce Zones will extend to more areas of KSC and CCAFS that are not reserved for Government activities. These would be contiguous where practical.

These proposed areas could also include future vertical launch or landing sites that are re-developed from existing launch areas or combinations thereof to accommodate larger lift-class vehicles.

At this point, it is anticipated that this network of commercial zones is fully connected by roadways accessible by commercial users and their customers and suppliers without requirement of Government controls. General public access will continue to be limited and controlled to ensure industrial security and safety.

6.4 INFRASTRUCTURE DEVELOPMENT

Implementation of the planning vision includes multiple strategies and objectives which enable a successful development plan and create a commercial environment conducive to attracting industry and private capital investment. In parallel with efforts to establish Space Commerce Zones, a Spaceport Planning Council, and improved processes for development activity, it is essential to continue the on-going and planned initiatives for infrastructure design and development. While development of physical infrastructure is dependent upon the actual demand for it, it is imperative to establish the basis for successful and relatively expedient development of physical infrastructure as the demand arises.

New infrastructure development will primarily occur within the Space Commerce Zones as an expansion or redevelopment of features within the three key destinations previously described: Launch Complexes, SLF, and Multi-Function Support Areas. Projects currently identified through Space Florida's Space Transportation Infrastructure Matching Fund or "Call for Projects" process provide a baseline for near-term to mid-term development plans and are included as part of the infrastructure development plan for each destination.

6.4.1 LAUNCH COMPLEXES

One of the strengths of CCS is the number of existing LCs which contributes to the general vertical launch capacity of CCS. However, due to safety and operational constraints, including impacts from hazardous operations and current limitations on range support services, the actual throughput capacity is less. Many of the existing LC's on CCAFS are in relatively poor condition, and too close in proximity to each other or active sites to be used in support of today's larger launch systems. A combinations and redevelopment of some former sites can improve capability and potential for re-use for future operations.

In addition, recent and ongoing planning is in progress on new sites for possible future development to support needs for increased launch capacity. As previously noted, commercial space enterprises searching for an operating location will strongly consider the capacity throughput of a site as well as the readiness of an available LC. A few existing LCs on the CCAFS site are in relatively poor condition and require significant improvements to become mission ready. Similarly, several existing LCs are in close proximity to one another which limits their potential future uses and reduces overall throughput capacity. Accordingly, it is recommended that the existing LCs are evaluated to assess the feasibility of consolidating two or more existing LCs and preparing developable sites for future operators. While physical infrastructure development at each LC will be largely dependent on the needs of a future operator, preliminary preparation such as environmental mitigation and permitting will increase the attractiveness of CCS to potential users. LC improvement projects currently in process or identified for near-term implementation include:

1. Renovation of LC 39A for SpaceX Falcon Heavy
2. Renovation of SLC 36 for Blue Origin (**Figure 6.4**)
3. SLC 46 renovations for Orbital Alliant Techsystems (ATK) and NASA Ascent Abort 2 Test Mission
4. Shiloh Launch Complex, a heavy and medium-lift class LC with two pads, one in Volusia County and one in Brevard County (**Figure 6.2**)
5. Notional LC 49 (**Figure 6.3**)
6. Notional LC 48

General LC development projects proposed as part of this Master Plan include:

- Facility Assessment of existing LCs
- Feasibility study on potential consolidation for new LCs
- Preparation of existing LCs for future uses
- Advanced medium-lift and heavy-lift infrastructure
- Heavy Lift Crew Access Tower
- Reusable Launch Vehicle Landing Site Improvements
- Orbital Launch Site Improvements
- Commercial Crew Access Tower
- Commercial launch zone and processing facility improvements

Figure 6.2. Preparation of SLC 36 for Redevelopment to Support Blue Origin
Source: Pictometry

Figure 6.3. Proposed Shiloh LC Conceptual Layout
Source: AECOM / Google Earth

Figure 6.4. Notional LC49 Conceptual Layout
Source: AECOM / Google Earth

6.4.2 SHUTTLE LANDING FACILITY

The SLF is, in effect, a separate operational area/asset within the CCS. Development of the SLF is a key component in the successful implementation of the planning vision.

Future development will resemble a traditional airport as the SLF will primarily serve horizontal takeoff and landing (HTOL) operations at CCS, including space tourism and hypersonic travel among others. As such, the development plan for the SLF includes improvements within the three primary functional areas of a traditional airport: landside, terminal, and airside. However, additional parcels are preserved for environmental preservation to promote CCS's environmental stewardship and enhance the identity and quality of life at its facilities.

LANDSIDE

Access to the SLF is currently provided from Astronaut Road via Kennedy Parkway. However, existing security Gates 4 and 2 restrict public access to the site. In order to provide public access and enable key commercial operations at the SLF, Gate 4 is proposed to be relocated just south of Astronaut Road but prior to access to the Apollo Saturn V facility. The location will allow public access to the SLF while still restricting access to NASA and other secure facilities. Additionally, it is recommended that Gate 2 be relocated to a site which will allow a public access connection from the SLF to future Exploration Park facilities in designated Space Commerce Zones along Kennedy Parkway. Relocation of Gate 2 will allow multiple access points to the SLF but will likely require a new bypass road around the Apollo Saturn V and VAB areas.

TERMINAL/TRANSITION

The terminal/transition is the junction between the non-secure landside functions and the secure airside functions. Infrastructure utilized for this transition is typically in the form of a passenger terminal for commercial passengers or private hangar facilities. Given that the general public's utilization of the SLF will most likely involve horizontal operations conducted for space tourism or hypersonic travel purposes, a new terminal or spaceflight operations center (SOC) is needed to serve as the "front door" for the SLF. The SOC should represent a new, highly recognizable and iconic landmark within CCS, one in which passengers have access to the various amenities typical of a passenger terminal at an airport or large rail station. A parcel directly adjacent to the SLF entrance at Sharkey Road (Phase 4a - Figure 6.5) is reserved for a future SOC when the demand for such a facility materializes.

Space is also preserved for future development of private hangars to support various HTOL support functions, including but not limited to manufacturing, suborbital operations, and processing facilities.

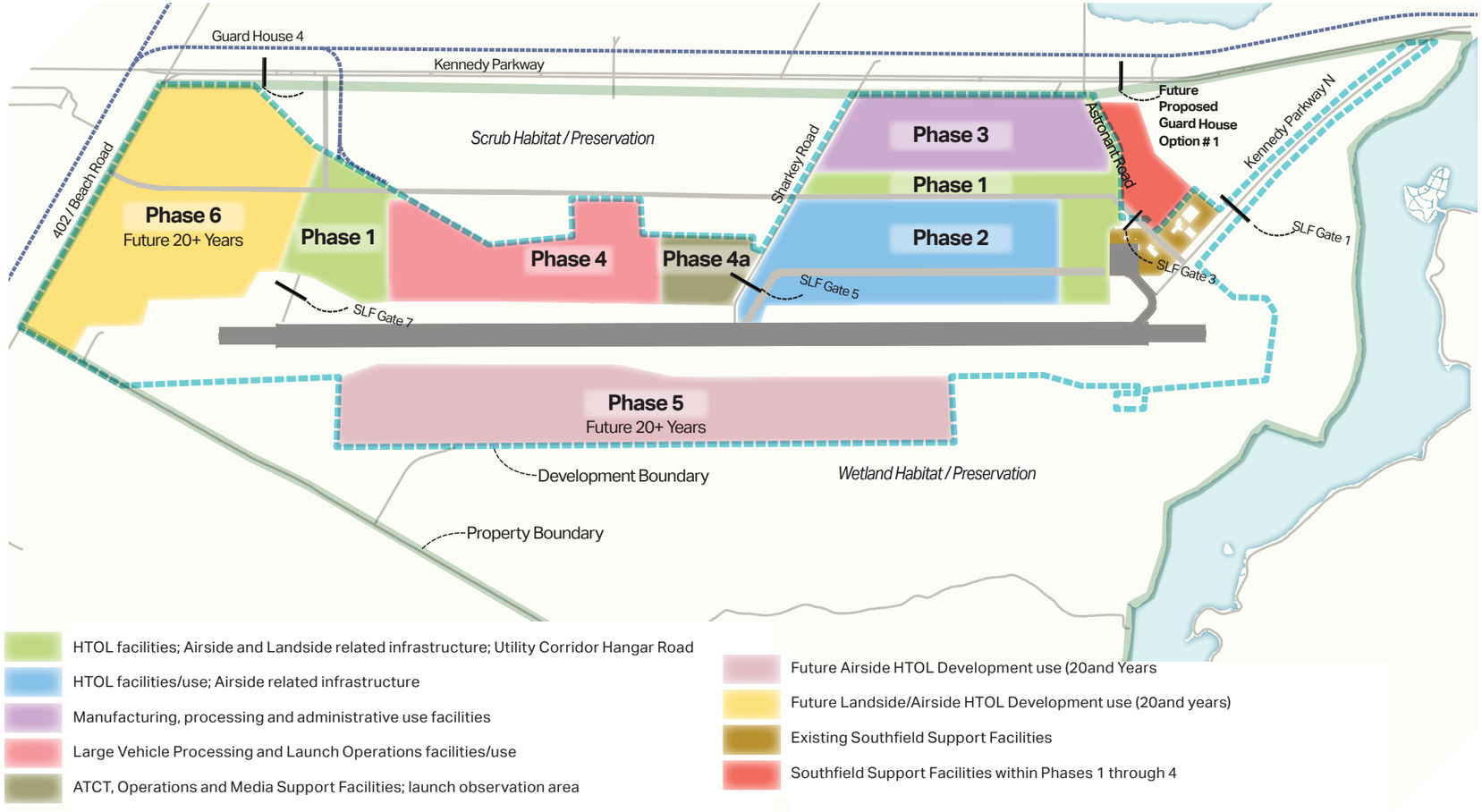


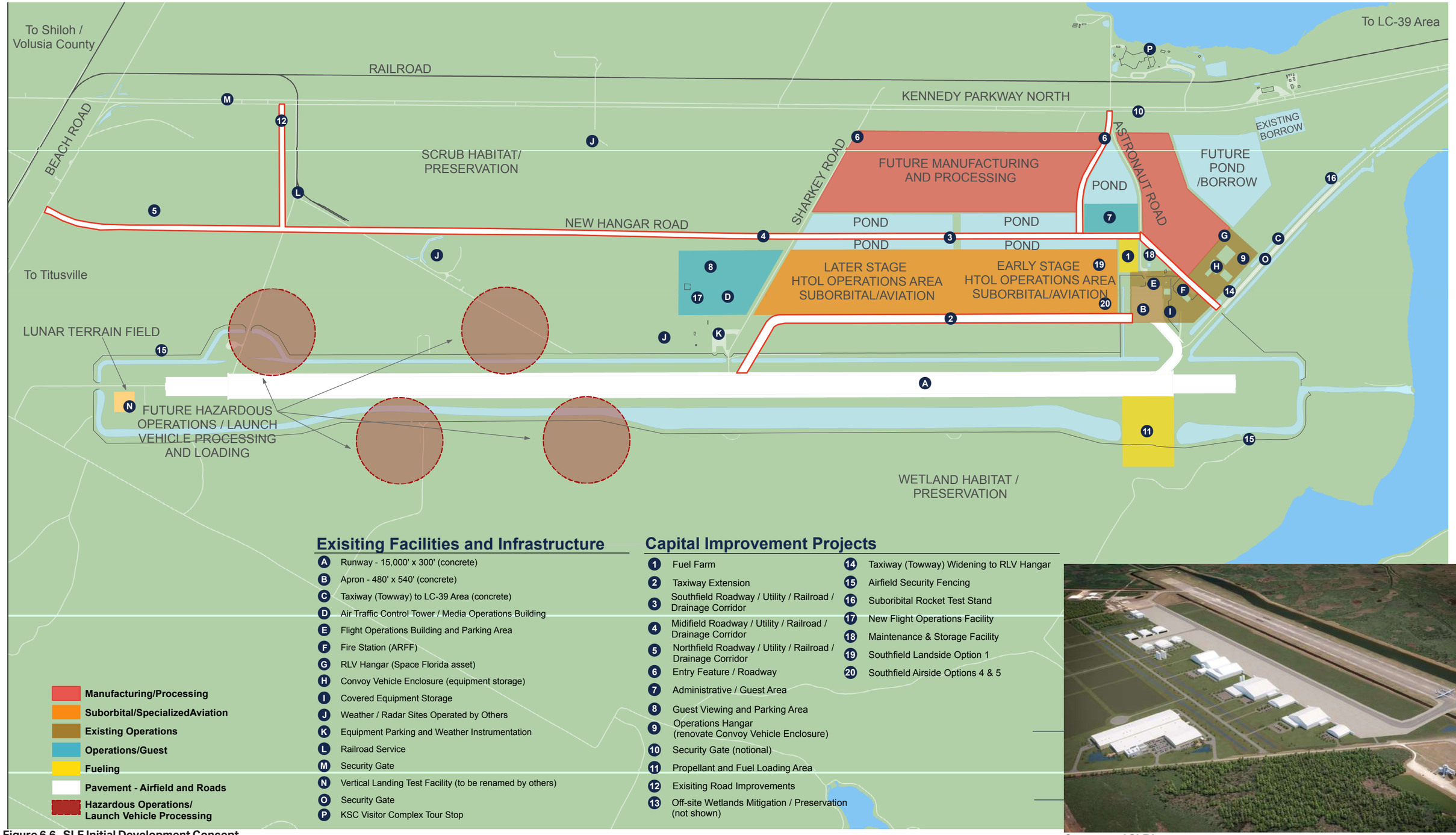
Figure 6.5. Proposed SLF Future Land Use and Development
Source AECOM

AIRSIDE

The airside is the primary operational area for aerospace vehicles. The main component of the airside is Runway 15-33 but also includes supporting infrastructure to maximize operational efficiency such as connecting taxiways and aircraft parking aprons. Airside safety requirements can directly impact the development of terminal and landside facilities by limiting the locations, orientation, and size of the facilities depending upon the land area available. Accordingly, development zones within the SLF have been identified to account for these safety requirements and maximize the capabilities of the remaining developable parcels.

Existing development within the SLF is primarily at the southeastern quadrant of the Runway. As illustrated in **Figure 6.5**, future development will utilize some of the existing infrastructure and continue development to the north up to the predefined boundary of the SLF. An additional development area has been identified west of the runway; however, this parcel will require a new access point from SR 402.

Figure 6.6 provides more detail on the initial development concept for Phase 1, 2, 3, and 4a.



Exisiting Facilities and Infrastructure

- A Runway - 15,000' x 300' (concrete)
- B Apron - 480' x 540' (concrete)
- C Taxiway (Towway) to LC-39 Area (concrete)
- D Air Traffic Control Tower / Media Operations Building
- E Flight Operations Building and Parking Area
- F Fire Station (ARFF)
- G RLV Hangar (Space Florida asset)
- H Convoy Vehicle Enclosure (equipment storage)
- I Covered Equipment Storage
- J Weather / Radar Sites Operated by Others
- K Equipment Parking and Weather Instrumentation
- L Railroad Service
- M Security Gate
- N Vertical Landing Test Facility (to be renamed by others)
- O Security Gate
- P KSC Visitor Complex Tour Stop

Capital Improvement Projects

1. Fuel Farm
2. Taxiway Extension
3. Southfield Roadway / Utility / Railroad / Drainage Corridor
4. Midifield Roadway / Utility / Railroad / Drainage Corridor
5. Northfield Roadway / Utility / Railroad / Drainage Corridor
6. Entry Feature / Roadway
7. Administrative / Guest Area
8. Guest Viewing and Parking Area
9. Operations Hangar (renovate Convoy Vehicle Enclosure)
10. Security Gate (notional)
11. Propellant and Fuel Loading Area
12. Exisiting Road Improvements
13. Off-site Wetlands Mitigation / Preservation (not shown)
14. Taxiway (Towway) Widening to RLV Hangar
15. Airfield Security Fencing
16. Suboribital Rocket Test Stand
17. New Flight Operations Facility
18. Maintenance & Storage Facility
19. Southfield Landside Option 1
20. Southfield Airside Options 4 & 5

Figure 6.6. SLF Initial Development Concept
Source: AECOM

Conceptual SLF Layout
Source: AECOM

6.4.3 MULTI-FUNCTION SUPPORT AREAS

The facilities which encompass multi-function support areas are scattered around the CCS at KSC, and the CCAFS. Areas offering broad types of commercial Spaceport functions may grow around the SLF and in portions of KSC or CCAFS already being used or proposed for commercial space support activities. However, Exploration Park is viewed as the nucleus of a future inter-connected community for the purposes of this Master Plan.

Potential uses within the existing and expanded Exploration Park area can include a mulitude of functions such as:

- Aerospace contractors and commercial space service providers supporting U.S Government and private space initiatives
- Bio-technology and life/environmental sciences
- Clean energy research, development, and demonstration
- Advanced technology for automation, robotics, and micro-electronics
- Spacecraft fabrication, assembly, and component manufacturing
- IT, cyber security, and homeland security
- Education/university high-tech research

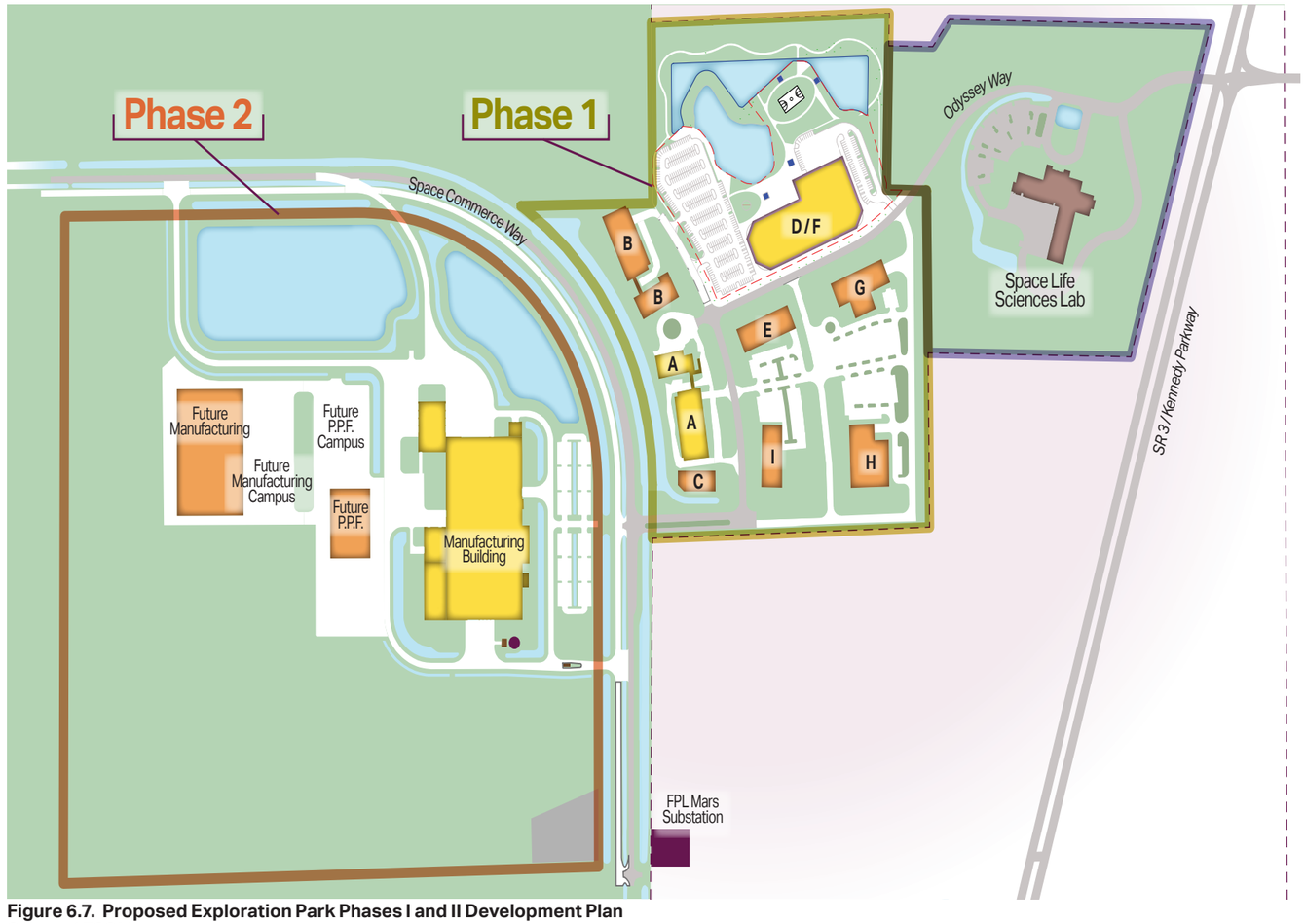


Figure 6.7. Proposed Exploration Park Phases I and II Development Plan
Source: AECOM

The conceptual site layout for Exploration Park in Phases 1 and 2 are depicted in **Figure 6.7** through **Figure 6.9**. Property just south of the Phase 2 development area has also been identified for future development as Phase 3, but a site layout has not yet been created.

Existing development projects within the current boundaries of Exploration Park include:

- Satellite Integration Facility for OneWeb/Airbus (**Figure 6.8**) as part of the Phase 1 development
- Orbital Launch Site manufacturing Facilities for Blue Origin in Phase 2. (**Figure 6.9**)

Figure 6.8. Conceptual Exploration Park Phase I
Source: AECOM

Figure 6.9. Conceptual Blue Origin Facility - Exploration Phase II
Source: Blue Origin

6.5 RECOMMENDED IMPROVEMENT PROGRAM

The primary recommendation of this 2017 CCS Master Plan Update is to transition CCS from a federally owned and operated facility to an Independent Spaceport Authority with a focus on commercial development to enable CCS as the global hub of space commerce. However, as previously noted, Space Florida annually requests input from federal and state partners, industry, and its various stakeholders to implement the goals and objectives of the CCS Master Plan. This annual "Call for Projects" enables Space Florida to position infrastructure investment and enable its mission to foster the growth and development of a sustainable and world-leading space industry in Florida. This 2017 CCS Master Plan Update includes projects identified as part of this process. Per Florida Statutes, state infrastructure investment into these projects will "meet current and future commercial, national, and state space transportation requirements" (Sec. 331.360 Florida Statues). As summarized in **Table 6.1**, Space Florida has identified the following five infrastructure investment areas:

i. Advance Commercial Heavy Lift

ii. Support Commercial Crew and Cargo

iii. Attract New and Emerging Space Systems

iv. Expand Horizontal Launch and Landing Capacity

v. Expand Space Launch Capacity Statewide.

Table 6.1. Recommended Projects

STRATEGIC OBJECTIVES	PLANNING PERIOD (FISCAL YEARS)				
	2011-2015	2016	2017-2021	2018-2022	2022
	FDOT FUNDING ACTUAL *(5 YEARS)*	FDOT FUNDING ACTUAL *(1 YEAR)*	FDOT FUNDING PROGRAMMED *(5 YEARS)*	PLANNED FUNDING REQUIREMENTS *(5 YEARS)*	PROPOSED 5TH YEAR PLANNED FUNDING REQUIREMENTS *(1 YEAR)*
Advance Commercial Heavy Lift Capability	**$5,000,000** LC39A **$700,000** CCS	**$16,400,000** LC36	**$24,500,000** Launch Complex Improvements and Commercial Crew/Cargo	**$638,500,000** Launch Complex Improvements and Commercial Crew/ Cargo	**$64,000,000** Launch Complex Improvements and Commercial Crew/Cargo*
Support Commercial Crew and Cargo	**$5,000,000** LC40 **$20,000,000** C3PF **$6,150,000** LC41				
Attract New Emerging Space Systems	**$5,000,000** LC46 **$9,000,000** OPF 1 and 2 **$250,000** LC 17/18	**$1,600,000** Robotic Lander Rocket Engine Development Facilities	**$25,000,000** Processing and Range Facility Improvements	**$114,100,000** Processing and Range Facility Improvements	**$11,000,000** Processing and Range Facility Improvements*
Expand Horizontal Launch/Land Capability	**$322,500** SLF Easement		**$37,000,000** SLF / Horizontal Improvements	**$142,700,000** Horizontal Launch / Landing Facilities	**14,000,000** Horizontal Launch / Landing Facility Improvements
State of Florida Common-Use Spaceport Infrastructure			**$10,500,000****	**$82,900,000****	**$17,000,000****
TOTAL	$51,422,500	$18,000,000	$97,000,000	$978,200,000	$106,000,000
ANNUAL AVERAGES (Excluding Match)	$10,284,500	$18,000,000	$19,400,000	$195,640,000	$68,500,000

* Assumes 50% Match ** Assumes no match for State Common Use infrastructure

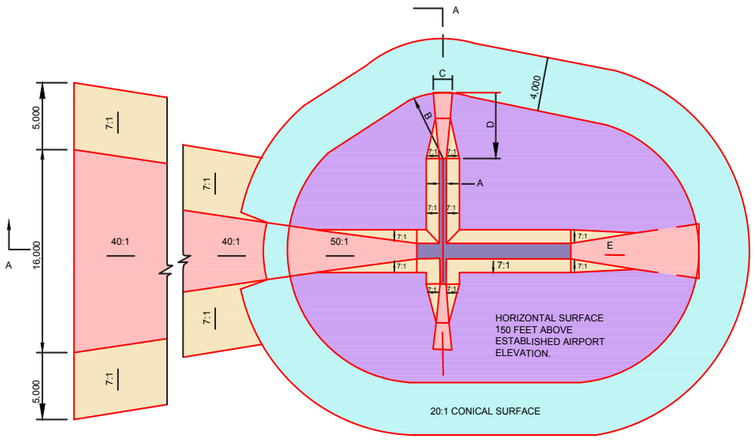
APPENDICES

SPACE FLORIDA

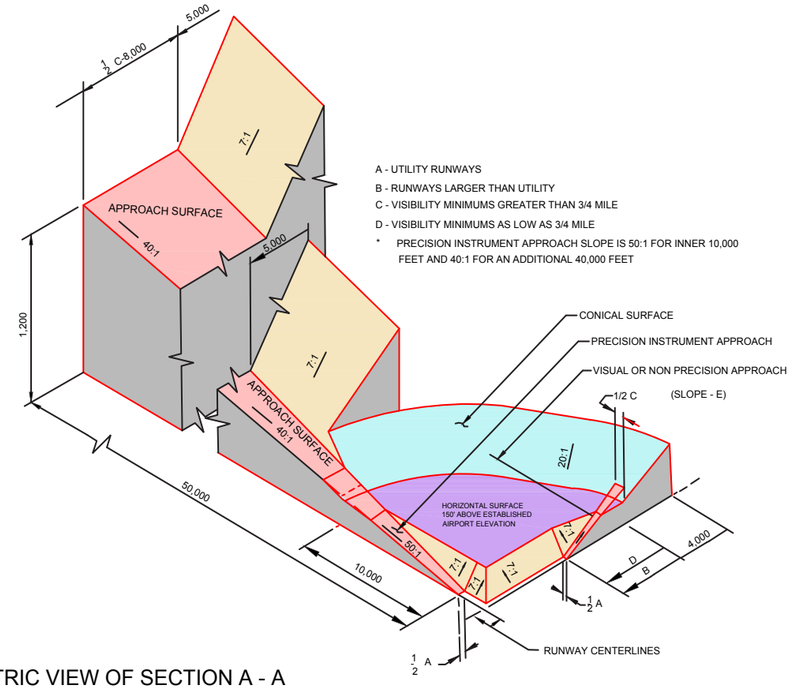
The Place for Space

Source: NASA

DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPRAOCH
				A	B		
		A	B		C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

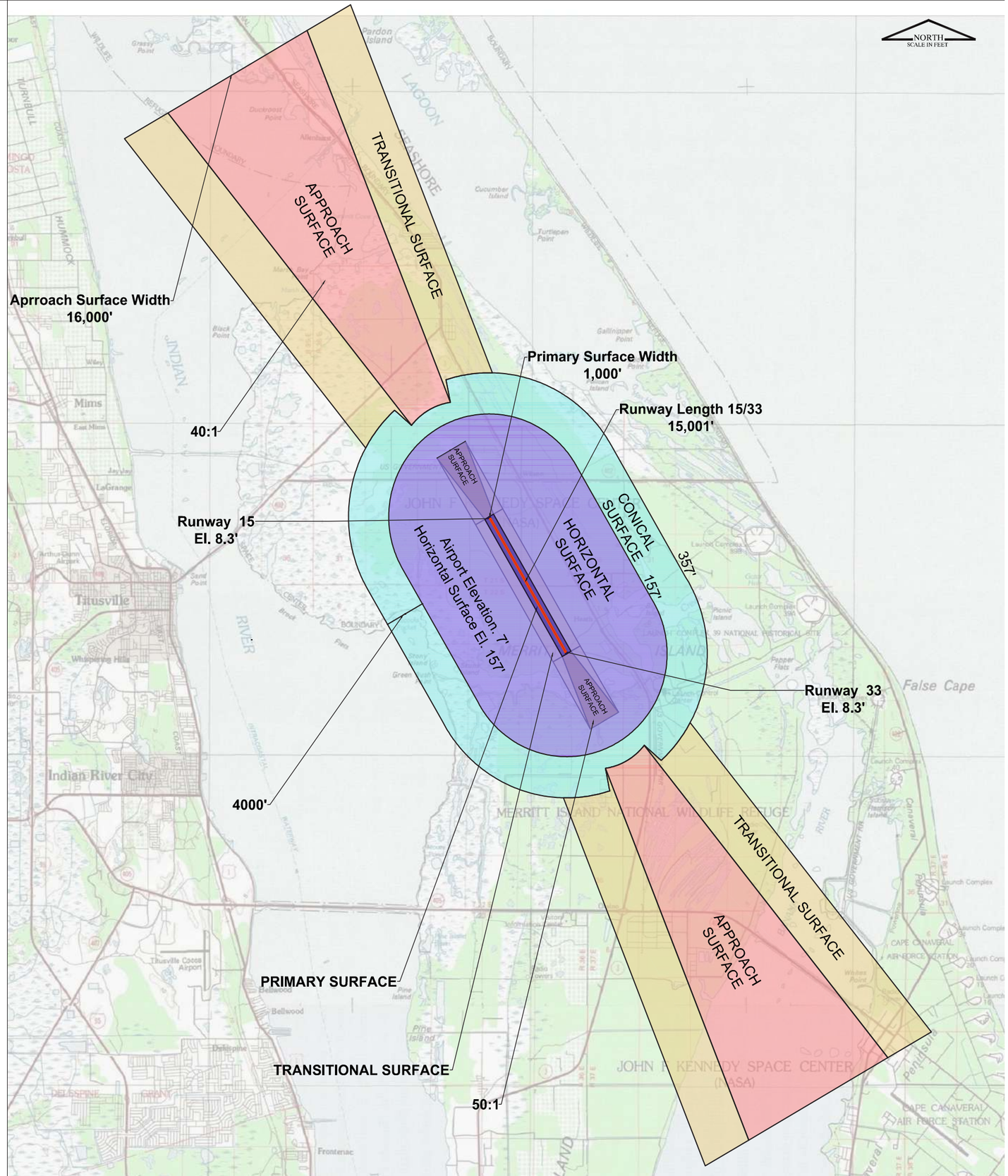


TWO DIMENSIONAL GRAPHICAL DEPICTION



ISOMETRIC VIEW OF SECTION A - A

Source: 14 CFR Part 77 - Objects Affecting Navigable Airspace



SHUTTLE LANDING FACILITY

FEDERAL REGULATION 49 CFR PART 77

A

RECOMMENDED FORWARD WORK AND PLANNING ANALYSES

In the course of preparing this 2017 update of the CCS MP, the Planning Team identified a number of items of forward work and further required planning analyses that were beyond the scope and timing of this update.

As identified in the Executive Summary and throughout this update, the plan is a living document requiring continuous adjustments and adaptation of specific strategies and objectives in order to meet its long range goals and strategic vision.

Specific examples of issues with the CCS's core infrastructure – both in terms of its age condition and capacity to support commercial growth – have highlighted the need for a comprehensive assessment of the entire CCS to identify needs that should become part of a near term and long-range Capital Improvements Program (CIP). New studies should validate previous work, if available, on Government installed infrastructure. In addition, models for Spaceport capitalization and sustainment are needed to support the evolution towards an Independent Spaceport Authority.

It is recognized that critical infrastructure that must support operations at CCS include regional assets like Port Canaveral and the Strategic Intermodal System connectors that permit CCS to readily access the technology and supply chain resources of the Cape Canaveral Technologies Triangle region and the statewide capabilities beyond.

In addition, evolving industry and user needs driven by technology and market forces can dictate trajectory corrections, as can changes in sector priorities, resources, and relevant national and state space transportation policies. A more extensive assessment of space commerce marketplace and industry needs to support it is required to augment the qualitative assessment of space transportation and markets included in this update.

Table A.1 provides a list of recommended future studies and/or planning analyses that will assist CCS in becoming the global hub of space commerce, which includes the following deemed to be of critical importance to the next update of the CCS Master Plan and its on-going implementation:

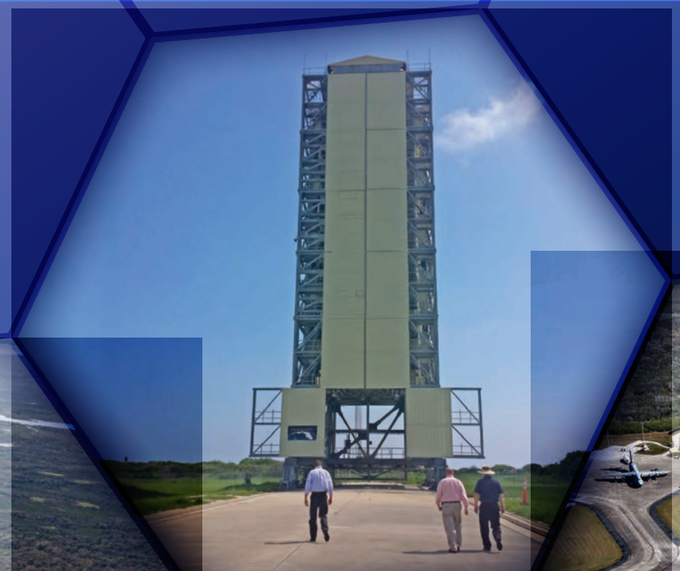
- Comprehensive assessment of the existing CCS core infrastructure and critical SIS connectors and assets
  - º Collection and independent assessment of existing Government CIP programs and conditions evaluations on roads, bridges, rail, seaport, utilities, commodities distribution lines, and other common-use systems
  - º Gap analysis of current capacities with anticipated commercial user growth projections
  - º SIS connector study to identify and define opportunities for enhanced multi-modal connections to regional and statewide assets
- Adaptable capacity analysis for the siting of future vertical launch complexes supporting medium and heavy launch systems employing reusable system elements
  - º Definition of re-development potential of single or combined former sites on CCAFS
  - º Definition of potential future development sites throughout the CCS
  - º Notional enveloped requirements to support adaptability of sites using limiting factors analysis
- Analysis of Space Commerce Zone establishment and capacity for future growth and connectivity
  - º Further definition of candidate areas, initial boundaries, and potential for expansions
  - º Definition of physical access networks and industrial and government security considerations
  - º Definition of concurrent jurisdiction opportunities and governance models to facilitate maximum application of a non-federal commercial site operating environment
- Optimum land use policies for balancing space transportation requirements with environmental stewardship and conservation objectives
- Analysis of Spaceport common infrastructure operating requirements and sustainment models
  - º Spaceport utilities and commodities commercial service models and options
    - – Current capacities of propellants, gases, and other critical commodities
    - – Future needs and supply chain analysis
    - – Options for commercial service models that enable provider sustainment of support infrastructure
  - º Roads and bridges sustainment requirements and models
  - º Cost-sharing models for allocating infrastructure operations and maintenance
  - º Opportunities for accessing private capital markets and required structures to secure and retire debt financing of Spaceport common infrastructure
- Modeling and "Best Practices" analysis supporting the formal near-term establishment of unified planning and management of the CCS under an Independent Spaceport Authority by 2025, including models for a transitional Spaceport council as a bridge to the future

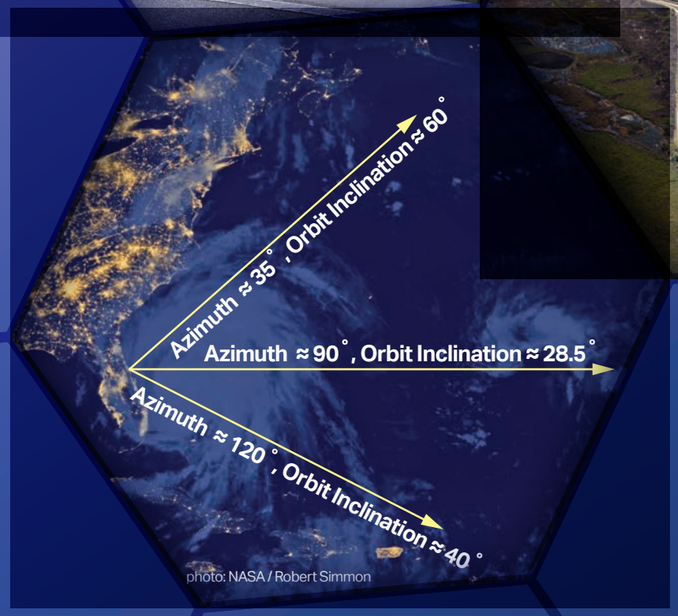
Conceptual SLF Layout
Source: AECOM

Conceptual Exploration Park Layout
Source: AECOM

Table A.1. Recommended Studies and Planning Analyses

ITEM	STUDY/REPORT NAME
1.0	MANAGEMENT AND OPERATIONS
A	CCS Governance Transition
B	Business and Marketing Plan
C	Potential Customer Qualification and Accommodation Process
D	Operations Plan and Procedures
E	Range Safety Plan and Procedures
F	Security and Life Safety Procedures
G	Real Estate Appraisals
H	Rates and Charges Study for Services
I	NASA KSC & USAF Documents Database
J	Insurance Study/ Insurance Requirements and Costs
K	Simultaneous Launch Capabilities and Impacts Study
L	Investment Strategy/Project Delivery Method
M	Cost Feasibility analysis for Spaceport Authority O&M / Development
N	NOTU 50 Year Plan Study
O	Modeling and "Best Practices" analysis
P	Spaceport common infrastructure requirements and sustainment models
2.0	INFRASTRUCTURE
A	Planimetric Base Map
B	CCS Base Map
C	SLF Security Gate siting - Alternate Analysis
D	SLF Capacity and Capabilities Analysis
E	Roadway Infrastructure Documentation, Inspections, Capacity, and Improvements
F	Bridges Infrastructure Documentation, Inspections, Capacity, and Improvements
G	Railroad Infrastructure Documentation, Inspections, Capacity, and Improvements
H	Intermodal Transportation Infrastructure Documentation, Capacity, and Improvements
I	Utility Infrastructure Documentation, Inspections, Capacity, and Improvements
J	Commodities Infrastructure Documentation, Inspections, Capacity, and Improvements (in progress)
K	Launch Complex Infrastructure Documentation, Inspections, and Improvements
L	Processing Facilities Infrastructure Documentation, Inspections, and Improvements
M	Security and Life Safety Infrastructure Documentation, Inspections, and Improvements
N	Support Infrastructure Documentation, Inspections, and Improvements
O	Developable land inventory: launch integration, manufacturing, support facilities
2.0	INFRASTRUCTURE (CONT.)
N	Environmental Land Inventory
O	CCS Payload Transportation and Storage
P	CCS Weather Station Infrastructure Documentation, Inspections, Capacity, and Improvements
Q	SIS connector Study - Regional and Statewide
R	Communications Infrastructure
3.0	ECONOMICS / MARKET ANALYSIS
A	Commercial Launch trends and forecasts
B	Government Launch demand forecasts
C	Integration Facilities demand forecasts
D	Manufacture Facilities demand forecasts
E	Tourism
F	Insurance Requirements and Costs
G	Financing and Investment Strategies
H	Tourism and Concessions
I	Existing Facilities Capability Reviews
J	Supply Chains and Cargo/Commerce
4.0	DEVELOPMENT PLAN
A	Master Plan
B	Environmental Base Map
C	Noise Analysis
D	Airspace Capacity and Obstructions Analysis
E	Land Use Policy and Planning
F	Transportation Plan
G	Utilities Plan
H	Commodities Plan
I	Security and Life Safety Plan
J	Explosive Siting Limits and Guidance
K	Development Manual/Design Criteria Manual
L	Competition and Market Assessment
M	Space Commerce Zone establishment and capacity of future growth and connectivity
N	CCS Security Access Control and Badging
O	FY2017 Smart Studies (Spaceport Services)
P	FY2018 Smart Studies (Spaceport Services)
Q	FY2019 Smart Studies (Spaceport Services)
R	Communications Commercialization Study
S	Range Safety Planning





SPACE FLORIDA

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