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NASA – Comprehensive Master Planning

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Cape Canaveral Spaceport Commercialization Land Use Planning Efforts

B. Renee' Ponik

NASA – Comprehensive Master Planning
John F. Kennedy Space Center

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Cape Canaveral Spaceport Commercialization Land Use Planning Efforts

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Abstract

As the federal government moves into the commercialization of space, the Kennedy Space Center and the Cape Canaveral Air Station must together examine the historic land use and plan for the best use of both pieces of real estate to establish the future of a united Cape Canaveral Spaceport. In addition, the federal entities must involve the State of Florida, through Spaceport Florida Authority, in the decision making which has long-term effects on Florida's economic development.

This paper explores the ongoing joint planning within the local National Aeronautics and Space Administration (NASA), the Air Force (AF), and Spaceport Florida Authority (SFA) for current land use development. Specific new land development, including a public access commerce park and a secured hazardous commercial processing area, as well as redevelopment schemes for the existing industrial and South Gate areas, will be explored. In addition, several public outreach initiatives will be addressed. Finally, challenges facing the land use of the federal property will be approached, including collaboration and cooperation opportunities, dealing with the rules restricting federal decisions, as well as infrastructure reinvestment options.

Introduction

The Air Force has had a presence at Cape Canaveral Air Station (the Cape) longer than NASA, but the two have worked together since NASA's inception in several key areas, such as range control and monitoring. While cooperating, both federal entities have had different objectives and goals for the programs they hosted at the Cape. Until recently, a unified space alliance of the two agencies was not a concept even considered. However, with a growing interest in commercialization of space, reduced operating budgets for both federal entities, and the state of Florida's interest in economic growth through technology development, space industry planning has emerged as a leading topic in the aerospace field.

The Cape is still one of the premiere launch sites in the world. However, customer surveys reveal a reluctance to do business with either federal entity, largely based on the bureaucratic process imposed on them. This paper can not begin to address all the issues associated with that process; however, land use planning has begun on both sides of the river and with consideration of the interest of the federal, state and local governments, as well as industry and academia. This paper will take a look at the historical and current land use, as the two federal entities move toward a common shared landmass, and commercial customers attain a sense of "certainty" for the future of the Cape Canaveral Spaceport.

Historical Land Use

NASA had operated on the Atlantic Missile Range (Cape Canaveral) under the management of the Air Force prior to the Apollo Program. In 1961 NASA bought land north and west of the Cape Canaveral Missile Test Annex. It was at this point that master planning for the two pieces of land divided¹. While some functions remained common, each federal entity created separate base operations to support the various programs each sponsored. As a result, both properties hosted launch facilities, support facilities, industrial areas, airfields, etc. The Air Force (AF) has retained the “fuel farms” and added a deep-water port, while NASA created a barge docking and railroad facility. In other words, each has created as much autonomy as possible.

As the shuttle program matured and the “cold war” subsided, military and civil launches saw a decreased demand. The new federal administration was pushing for less government involvement in day to day operations, military bases were being closed, and visible government programs were being questioned, resulting in operating budgets that affected both sides of the Banana River being downsized. Meanwhile, private industry was showing a growing interest in the economic potential from launching commercial satellites into space. Initial efforts began with the 1958 Space Act². More recent legislation (1994) was enacted, mandating the commercialization of the space industry³ (Commercial Space Launch Activities Legislation).

Then in the middle 1990’s, Air Force and NASA joined together once more, for mutual benefit. The concept of a joint base operations contractor was conceived. In October 1998, a Joint Base Operations Service Contractor (JBOSC) was awarded operational work on both sides of the river. A joint management office was formed with both Air Force and NASA representation to oversee the contract.

Concurrently, the State of Florida recognized the potential economic strength of the space industry and formed the Spaceport Florida Authority (SFA) in 1989⁴. Their offices are now located at the Southgate area of the Cape, for visibility and interface opportunities with private, local and federal entities. In 1999, the State of Florida recognized the Cape Canaveral Spaceport as a space transportation node⁵, enabling funding from transportation sources to meet the growing demands for infrastructure development of the real estate.

NASA began a strategic move toward research and development under the leadership of Dan Goldin⁶ in 1996. Kennedy Space Center’s Center Director, Mr. Roy Bridges, followed this initiative with a center-wide “road map” for meeting the strategic initiatives laid out by the agency⁷. The establishment of KSC as a center of excellence for launch and payload processing systems, followed by clear goals and guiding principles eventually led to the understanding of the center’s Core Business, “To provide space systems processes, test, and launch techniques and develop associated technologies”. Mr. Bridges realigned government personnel in 2000, to correspond with the center’s move toward a Spaceport Technology Center⁸.

¹ Benson, Charles D. and Faherty, William Barnaby, *Moonport, A History of Apollo Launch Facilities and Operations*, published by Scientific and Technical Information Office, NASA, Washington, D.C., 1978

² 42USC Section 2541(ET SEQ), *Aeronautics and Space Act*, 1958.

³ Title 49, Chapter 701, *Commercial Space Launch Activities*, 1994.

⁴ Spaceport Florida Authority, *Chapter 331, Part Two, Florida Statutes*, 1989

⁵ Florida Senate Bill 2540, *Commercial Space Industry Act* 1999.

⁶ Goldin, Dan, *NASA Strategic Plan*, 1996

⁷ Bridges, Roy D., *Kennedy Space Center Implementing NASA’s Strategies*, 1998, KDP-KSC-S-2000

⁸ Bridges, Roy D., *Briefing to employees concerning KSC2000 personnel realignment*, 1999

Beginning with the Air Force's 45th Space Wing Commander Brigadier General Randall Starbuck, and continuing with Brigadier General Donald P. Pettit, NASA (Mr. Bridges) and AF created a strong alliance for the good of the Spaceport, the federal government, and the commercial space lift industry. Both acknowledge this alliance must also include strong working relationships with the community, state, industry and academia⁹.

Current Planning

Based on the strategic direction of the federal agencies and the opportunities for commercialization, AF, NASA, and the new joint base operations contractor, Space Gateway Support (SGS) saw great potential for joint master planning. An Integrated Product Team (IPT) was established with members from each federal entity, SGS, other base contractors, SFA, and most recently the Naval Ordnance Test Unit (NOTU). The team established a policy based approach to planning and a performance based approach to land use. The intent was to utilize widely recognized planning and development procedures, as well as standards and requirements, while streamlining the process. The end result is to assist all customers (both internal and external) in making informed planning decisions, using integrated uniform information from a web based Geographical Information System (GIS), thus creating "certainty" for future development customers.

In this effort, basic goals and objectives were established in a working group. Additionally, 5, 10 and 50+ year zoning maps were introduced for comments from the team. These discussions led to the realization of the need for hazard zones. For example, many operational activities are impacted by the hazardous operations imposed by the various vehicles. Thus a line was drawn depicting the known (or established) "launch impact zone" (see Figure 1: General Land Use Map, last page of report). The next zone was created for "operational hazards" associated with launch processing. It should be noted that two areas did not fall within the best "hazard" zone. The CCAS industrial area was divided between the two highest hazard zones. Indeed launches often impact the non-hazardous worker in these areas, mandating evacuation from the site. Likewise, the KSC hazardous payload processing area, located south of the KSC industrial area, fell outside the "operational hazard" zone. In fact, the processing area fell into the next zone of lesser hazard restrictions, the industrial area. Finally, a public access zone was created near the existing KSC Visitor's Complex, with minimal or negligent hazardous impact to personnel in this zone.

The team continued planning, depicting basic development areas, based on current performance use. Both airstrips were considered for specific airfield development as horizontal launch and landing opportunities increase. Like the airstrips, the deep-water port was considered a significant developmental asset for both the federal and local port interests it serves. Partially due to the inquiry of commercial entities, a hazardous operational development area was chosen on the KSC property inside the newly established zone for such hazardous processing. Finally, public outreach initiatives were considered from a general planning perspective. These initiatives include not only outreach to the interested public visitor, but also the academic, scientific, and technological visitor. Thanks to the keen interest of the State of Florida in creating a link between the federal government, academia, and industry, a research or commerce park was also considered in this public zone, the least hazardous area.

The remainder of this paper will explore these areas and the activity that is occurring as more and more customers and programs approach the spaceport for opportunities to utilize the unique real estate called the Cape Canaveral Spaceport.

⁹ Bridges, Roy D. and Pettit, Brigadier General Donald P., *5th Annual Florida Space Launch Symposium, Panel Session 1, "The Cape Canaveral Spaceport: The Way Ahead" Government Perspective*, November 1999

Redevelopment

The Kennedy Space Center is located on the Merritt Island Wildlife Refuge. In addition, the Canaveral National Seashore occupies the northern portion of the coastline of the center. While this arrangement may seem to create inherent conflict, the working relationship has provided benefits to all parties. The Spaceport receives added security and a “built-in” safety buffer from populated areas with our ever present wildlife, most notably the 3000 plus alligators. The wildlife enjoys open and relatively undisturbed land on which they’re protected, and thus can thrive. It is this balance of technology and environment that guides the development of the resources at the Spaceport. Therefore, redevelopment is always preferred over new development in undisturbed pristine areas.

While redevelopment of any current developed real estate is possible, the most prominent redevelopment should probably occur on Cape side, in the industrial area. Currently, some non-operational personnel are located there. As large commercial vehicles begin launching, the current industrial area may fall within launch impact zones, placing these personnel in the highest hazard zone. If the projected launch capacity at the Cape is increased, these individuals will either need to move westward, toward the KSC industrial area, or southward toward Patrick Air Force Base or, as a minimum, toward the port operations.

However, the port embodies unique facilities and operational opportunities that may not be best utilized by administrative personnel. The Spaceport claims the only five modal transportation node, including rail, road, sea, air and space. The deep-water port is another transportation node that may be further explored and developed as commercial entities further utilize the Spaceport. Future planning will consider the unique attributes the deep-water port offers.

Likewise, both the CCAS Landing Field (Air Force airfield) and the Shuttle Landing Facility (NASA airfield) will be redeveloped or more fully developed. The KSC airfield currently can only host one cargo plane at a time. It is also limited by shuttle activities. Therefore, enhancement of this air node infrastructure is currently underway with state and federal collaboration. The AF’s airfield may become more valuable as launch vehicles progress from vertical launches toward horizontal launches. Realignment and expansion may be needed at both airfields to accommodate future cargo and launch activities.

Both federal entities continue to work together as illustrated by the use of the Air Force’s evolved expendable launch vehicle (EELV) at Launch Complex 41 (a NASA property), and NASA’s use of Launch Complex 37 for it’s EELV program (an AF property). AF continues the redevelopment of the existing launch complexes, while NASA investigates the dual or changing uses of its launch complexes as new requirements drive multi-program use, modernization and reactivation.

New Developments

Two significant new development areas have emerged since joint planning began. One of these, as mentioned before, came as a result of the interest by commercial aerospace companies in performing hazardous satellite processing on site. The government prior to committing any real property established a number of policies for commercial use of the land. The request needed to meet at least one of the following criteria for consideration:

- Hazardous operations that are a clear threat to public safety

- Final assembly of large space vehicles and payloads that exceed shipping constraints
- Dependency on close proximity to launch or landing operations
- Research and development activities that integrate Academia, Industry, and Government entities for the advancement of launch and landing technologies and science, which require access to federal scientists, operations, or facilities.

In addition, other considerations were given to requests meeting the following criteria:

- Directly related to federal government Missions
- Strategically aligned with KSC Roadmap and AF objectives
- Partnering initiatives with industry or academia that are mutually beneficial to NASA or other federal agencies, AF or other military disciplines, and the State of Florida

After the government determined the commercial entity had indeed met the above criteria with their request for a hazardous satellite processing facility, two pieces of real estate were determined appropriate for development. Redevelopment of land in the CCAS industrial area, or new development in the “operational hazard” zone south of the Vehicle Assembly Building. This second area proved favorable to both the government and the commercial operator. The real estate lay within the “operational hazard” zone, and was within close proximity to the launch pad, and several modes of transportation (airfield, barge, road, and rail) forecasted as necessary for cargo delivery.

Consequently, the commercial operator chose to do business with an existing satellite processing company; however, the government continues to plan for the development of this area, with continued interest by the commercial community for development of hazardous operations. This planning includes establishing Quantity Distances (QDs) arch’s, both for combustible debris impact and air-born toxins, utility and transportation corridors, as well as infrastructure capacity information for the area.

Due to similar interest by the state, a public commerce area has been planned south of the KSC Visitor Information Center (VIC). This area would bring together industry, academia, and local, state and federal governments. Concurrence and cooperation with the Wildlife Refuge was sought in the selection of this new development as well as the previously discussed hazard development. Because of the environmental degradation of the citrus groves already located on this real estate, this property was slated for new development. In addition, the land lay inside the public access zone. Finally, the potential for opening up a 24-hour access through the Spaceport, linking the communities of Titusville and Merritt Island, was considered favorable.

As a result, this real estate has been targeted for Fast Track money from the State of Florida for development of a public access road to another state funded facility, the Space Experiments and Research Processing Lab (SERPL) adjacent to State Road 3 (SR3). This facility will host as its main tenant, NASA. The facility’s excess capacity will be leased to other academic, industry, or government research scientists. This unique partnership with the state is a precedent for future development and cooperation between the state and federal entities for the development and expansion of the Spaceport.

Public Outreach Initiatives

The planning team discovered an opportunity to consolidate future public outreach efforts. The current NASA Visitor Complex contractor is eager to proceed with a long-term master plan for their facilities. In joint discussions, agreement was made for the boundaries of the Visitor Complex expansion. This includes land both east and west of the current facilities, as well as, citrus land south of the current facility. The Visitor Complex expects to increase attendance from its current 3 million guests to over 8

million within the next 10 years. The biggest constraint is access and parking. To provide 24-hour access, they will construct a highway linking the state funded SERPL access to State Road 406 (NASA Causeway), thus providing public access to the Center and the Visitor Complex 24 hours a day, 365 days a year, with little or no operational impact. This new road also sets the boundaries for the Visitor Complex.

The Air Force would like to relocate their Visitor Welcome Center to the South Gate to accommodate the history prior to creation of NASA. This early launch history is being preserved and carried on by several retired military personnel. Fortunately, the NASA concessionaire embraces the significance of this piece of aerospace history and is working with the AF to determine how best to showcase these activities.

Some connectivity may occur from an outside transportation source. A local company with the help of the Federal Rail Administration, is proposing a magnetic high-speed rail system linking Port Canaveral (and possibly the AF Visitor Center), the KSC Visitor Information Complex, and the Titusville Airport. With federal grants, this company hopes to demonstrate the economic feasibility of such a venture. Several routes have been proposed with no firm commitment by the government yet to this project. Yet once again, a collaboration effort may bring the federal government and industry together for the long-term good of the Spaceport.

Finally, in a joint, yet not completely coordinated effort, the AF and NASA are both seeking improved launch viewing for guests, including the press, family members, scientists, or interested citizens. NASA has an established “press site” located in the LC-39 area. There are preliminary designs to expand these facilities. However, further discussions are needed to join or address the launch viewing options for both federal entities. Even in this endeavor, both entities will be able to enhance the others abilities to accommodate the public outreach of such spectacular launch events.

Challenges of Future Planning

The planning of the Spaceport is quite exciting. The era of cooperation and collaboration has allowed many joint ventures to come to fruition. The internal cooperation between the two federal entities is still solidifying as civil and military personnel realign to the new tasks before them. However, as with all change, some comes fast, some comes slow, but most all comes with some trepidation. This trepidation, while frustrating for some will actually prove to be prudent as the government moves the Spaceport into commercial operations.

There is a need for a testbed for new launch vehicles. This real estate is vital to the nation’s development of these new vehicles. Both NASA and AF are extremely aware of the need to protect the public, while making available this land for commercial development. Initiatives to explore the use of the land as a National Spaceport Testbed are being considered at this time¹⁰. Continued dialog between the local municipalities, the state, academia, industry, and other federal entities will increase the collaborative effort begun at the Spaceport planning level.

To aid in this endeavor, NASA with cooperation and funding from SFA and AF will hire an Architecture and Engineering (A&E) firm to perform specific task concerning a long-term plan for the Spaceport. The nation has seen the commercialization of airports, and it is desired that the Architecture and Engineering firm selected will bring this experience with them, as well as the perspective that international airports provide them. Likewise, the firm will work with local, state, industry, academic,

¹⁰ Brown, Kevin R., and McCleskey, Carey M., *National Spaceport Testbed*, May 2000, 37th Space Congress

and federal interest to provide a plan that is as encompassing as possible for the community affected by the activities of the Spaceport.

The government is working the legalities of commercialization, and ways to account for the impact of commercial entities on the infrastructure of the total Spaceport. Thus, reinvestment allowances are being considered on actual expenditures (operational and maintenance costs), as well as infrastructure development costs. As the state and federal government form legal agreements, these issues will be addressed. In addition, with the guidance of airports before us, the commercialization legalities will be addressed in a prudent yet progressive way.

Conclusion

Finally, a personal perspective about the future of the landmass identified in this paper as the Cape Canaveral Spaceport. My family moved to the area when I was three and my father went to work for the Gemini program. NASA was a young agency, with much enthusiasm and support by the administration and public. I didn't know what my father did really, but I knew he went to work early, and when I did see him, he was watching the news intently, taking us to church, or heading to bed early. My mother pleaded for my father to move away from the space coast and so we moved west of Orlando; we saw even less of my father. We learned to love my Dad's work, and I didn't miss a single Apollo launch, and when the Shuttle came along, I drove thirteen hours from college to see the initial launch. It seemed only natural that I would work in the space industry after graduation, and so I did, first with a contractor and then with NASA, in a number of organizations.

I give you this history, to help you understand my perspective. I love working for this agency, I love being a part of the most defining industry of Florida. My son often speaks of going to Mars, and my daughter recently asked if she could be an engineer too - of course she can. This pride is not built on what I have done, but what thousands before me have laid out for me to enjoy and build upon. The Spaceport is at a turning point. My children will not see the same systems, the same landscape, and the same programs, to which I have spent a lifetime contributing. But they will see more launches, more programs, more entities and less and less government.

I envision pleasure trips originating all over the world, culminating at the Spaceport via a local airport connected to the Spaceport via a high-speed rail system. Guests will stay in local or on-site hotels as they prepare for launch to space getaways located on the moon or just above our atmosphere. This traffic will be mingled with scientists and engineers bustling to get to the latest experiments in outer space laboratories. Much like an airport, the passengers' will all process through common gates and be whisked to their destinations via local transit systems. Friends and family will be able to watch (from the comfort of an air-conditioned terminal) as loved ones leave this atmosphere.

Vehicles will launch and land vertically and horizontally. Payload assembly will move to the area in support of the processing on-site. On-site laboratories and storage, fueling, and maintenance facilities will grow as launch activities increase. Vehicles will be processed in hangars with multiple users in each. Utilization of space will be very efficient as commercial entities are charged for the space they occupy or use. Aesthetics will be paramount. Wildlife will continue to be treasured and protected, for the visual and environmental pleasure they provide the guests.

This is my vision. The beauty of planning is that my vision is tempered and enhanced with those of all the other parties that, too, have a history and a passion for this industry. I look forward to the continued planning effort of the Cape Canaveral Spaceport.

Figure 1: General Land Use Map

