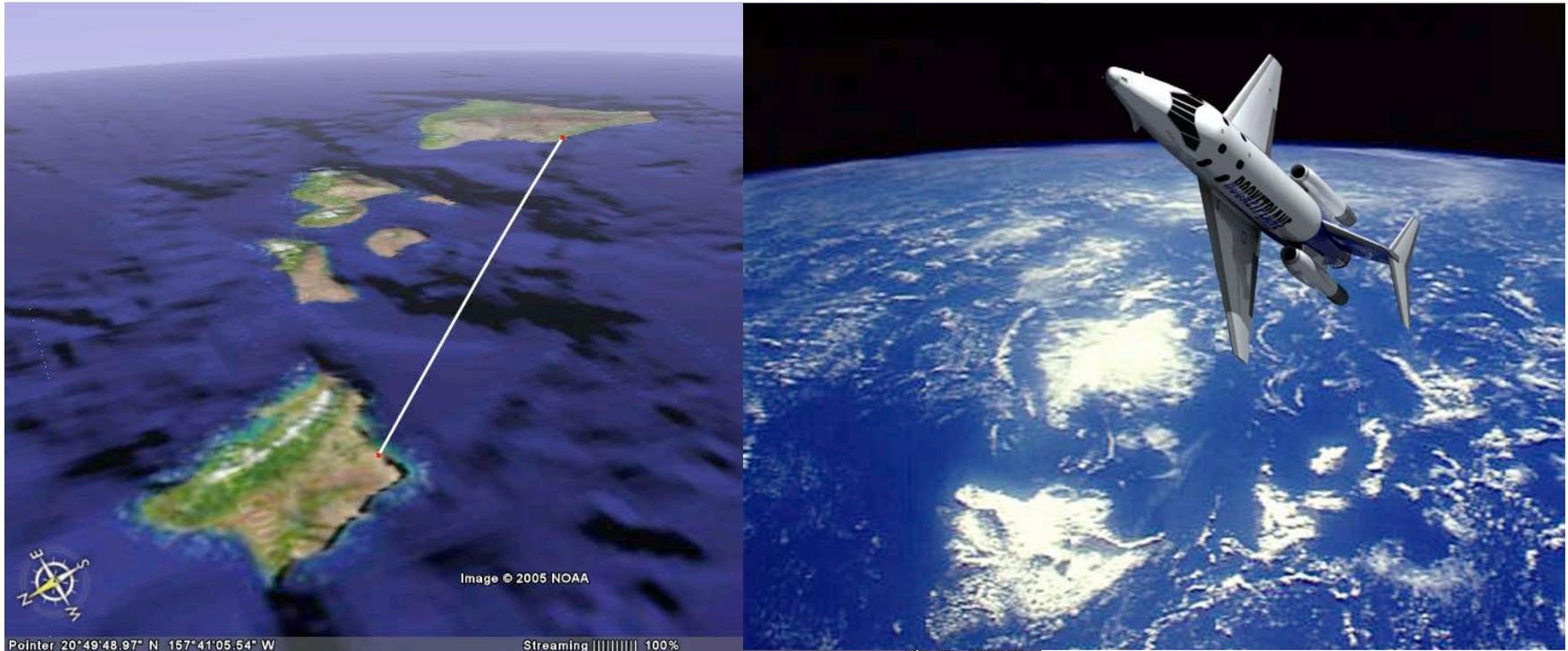


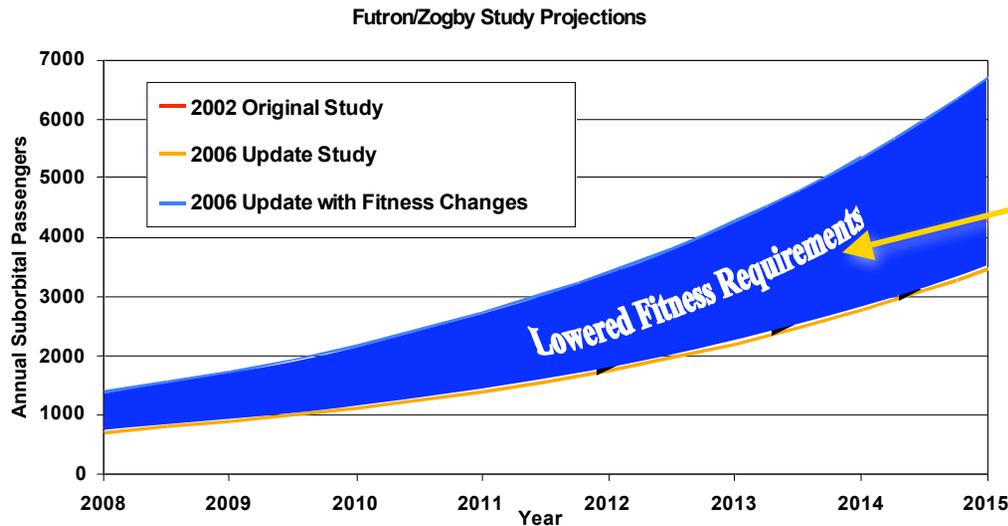
SPACEPORT HAWAII



**A Rocketplane XP Suborbital
Flight Operations Base with
Related Space-themed Tourist
Attraction Developments**

**ROCKETPLANE
ROCKETPLANE
GLOBAL**

Market Predictions Are Strong



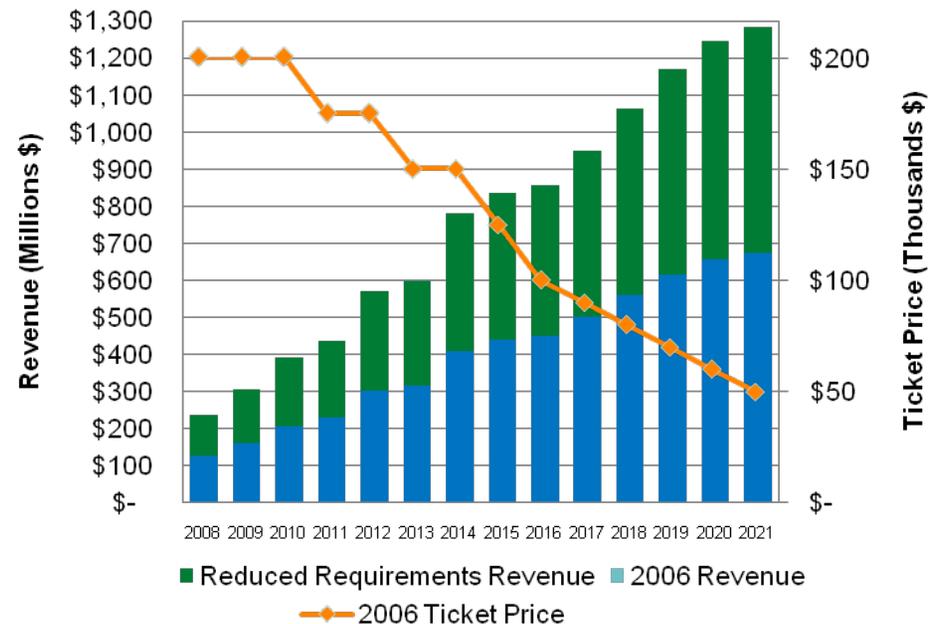
Rocketplane Vehicle Addresses Increased Market

- Fitness Requirements (low Gs)
- Number of Passengers (5 vs. 2)

Market Size

- ~\$1 Billion Thru 1st 5yrs
- ~\$2 Billion Thru 1st 5yrs
 - (1.9X) w/ Relaxed Fitness Requirements
 - Rocketplane Market Leader

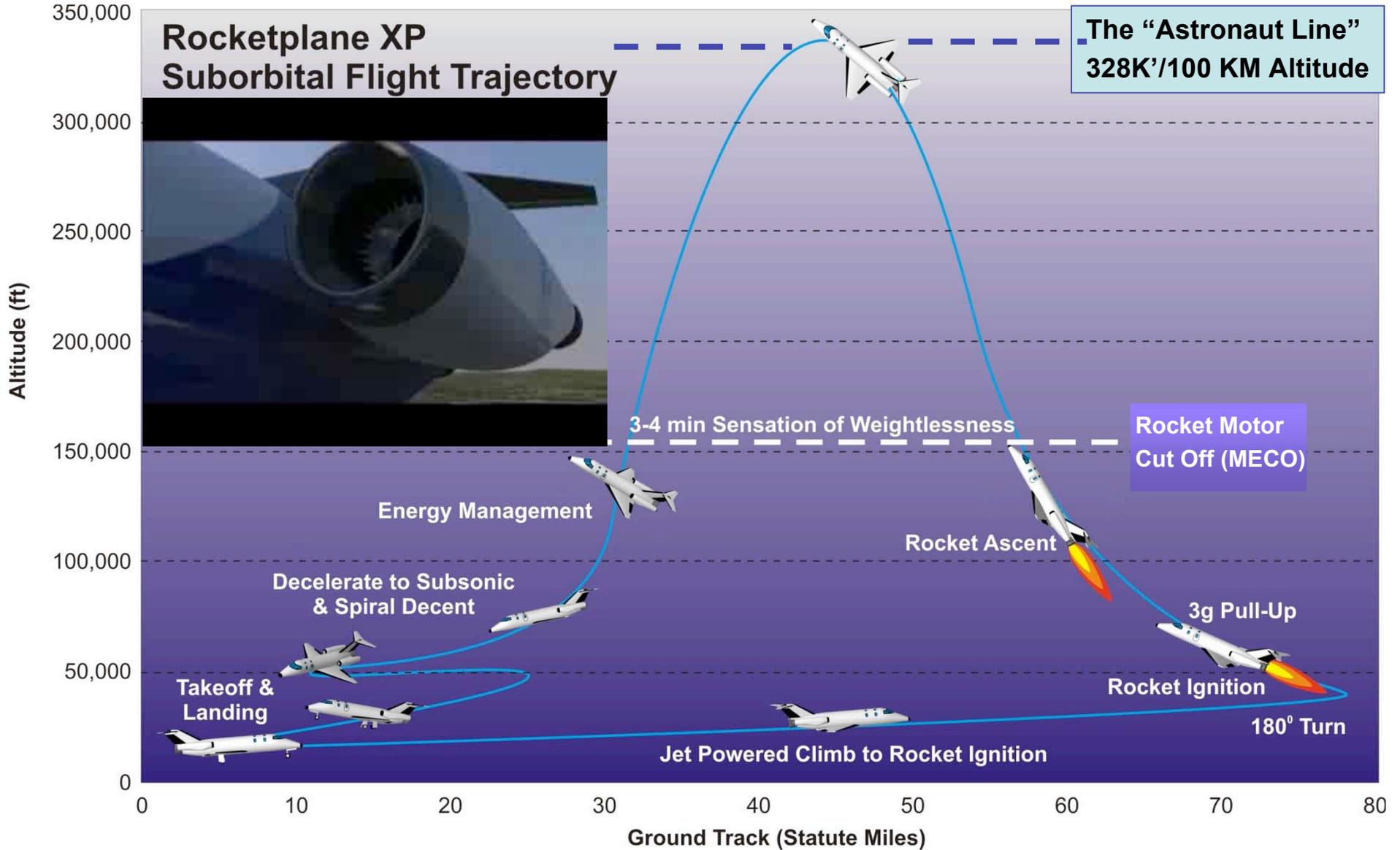
Suborbital Tourism Revenue Forecast



Development Program

- 2 XP Spaceplanes
- 1 Zero G Parabolic Aircraft
- 2 Jet Fighter Training Aircraft (L-39/59, F-104)
- Luxury lodging for XP suborbital customers at existing 5 star resort developments on Oahu and Kohala Coast
- Interactive Space Museum & Starport Café
 - 2,000 to 3,000+ visitors per day attendance goal
- VR Full Motion Space Flight Simulators – high fidelity Earth, Moon and Mars experiences
- Telerobotic links to lunar rover tests at PISCES facilities
- IMAX Theater
- Astronomy program tie-in with UH / Hilo and Hayden Planetarium
- 1-5 day on-site Space Camp Programs
 - Local school day trip destination & summer programs
 - Parent / child experiences & joint learning packages

The Rocketplane Flight



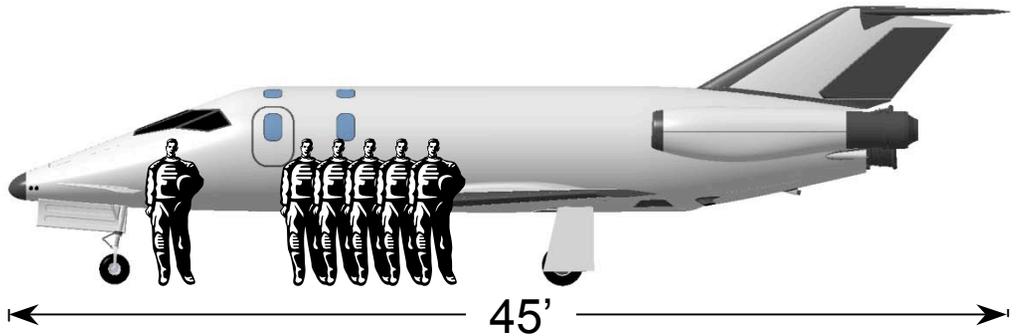
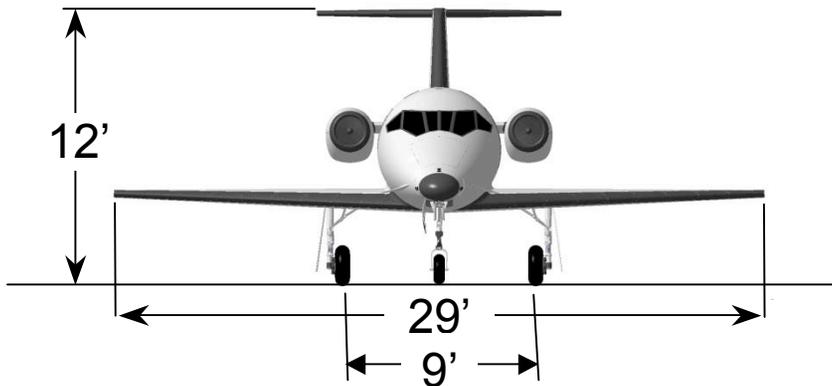
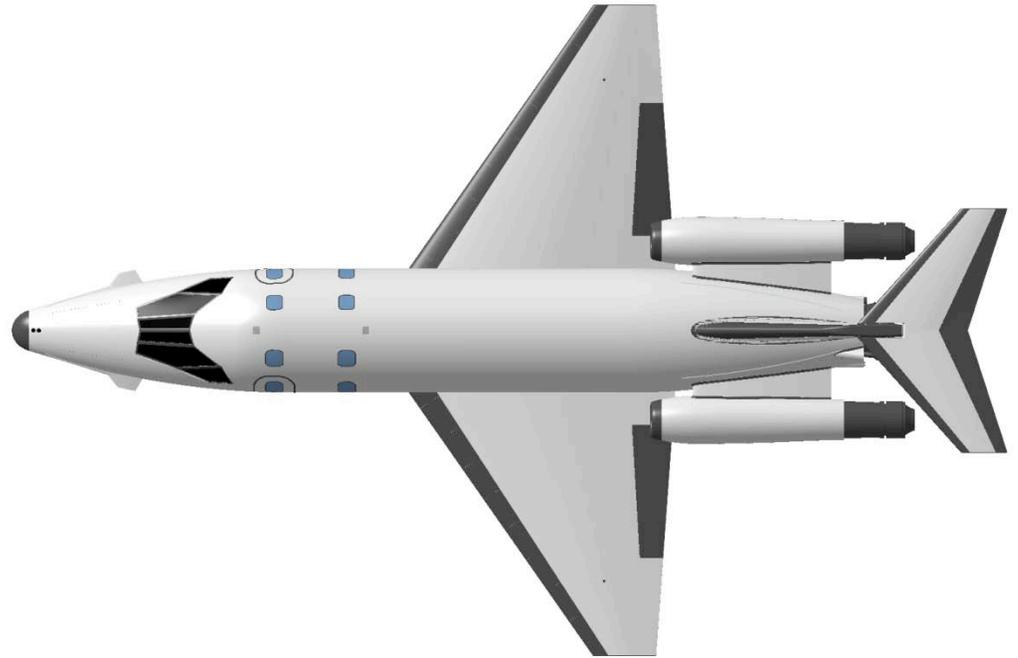
Spaceport Hawaii Flight Corridor

- First proposed FAA licensed point-to-point space flight route
- Establishes Hawaii as a global hub for future Mach 10 trans-Pacific flights

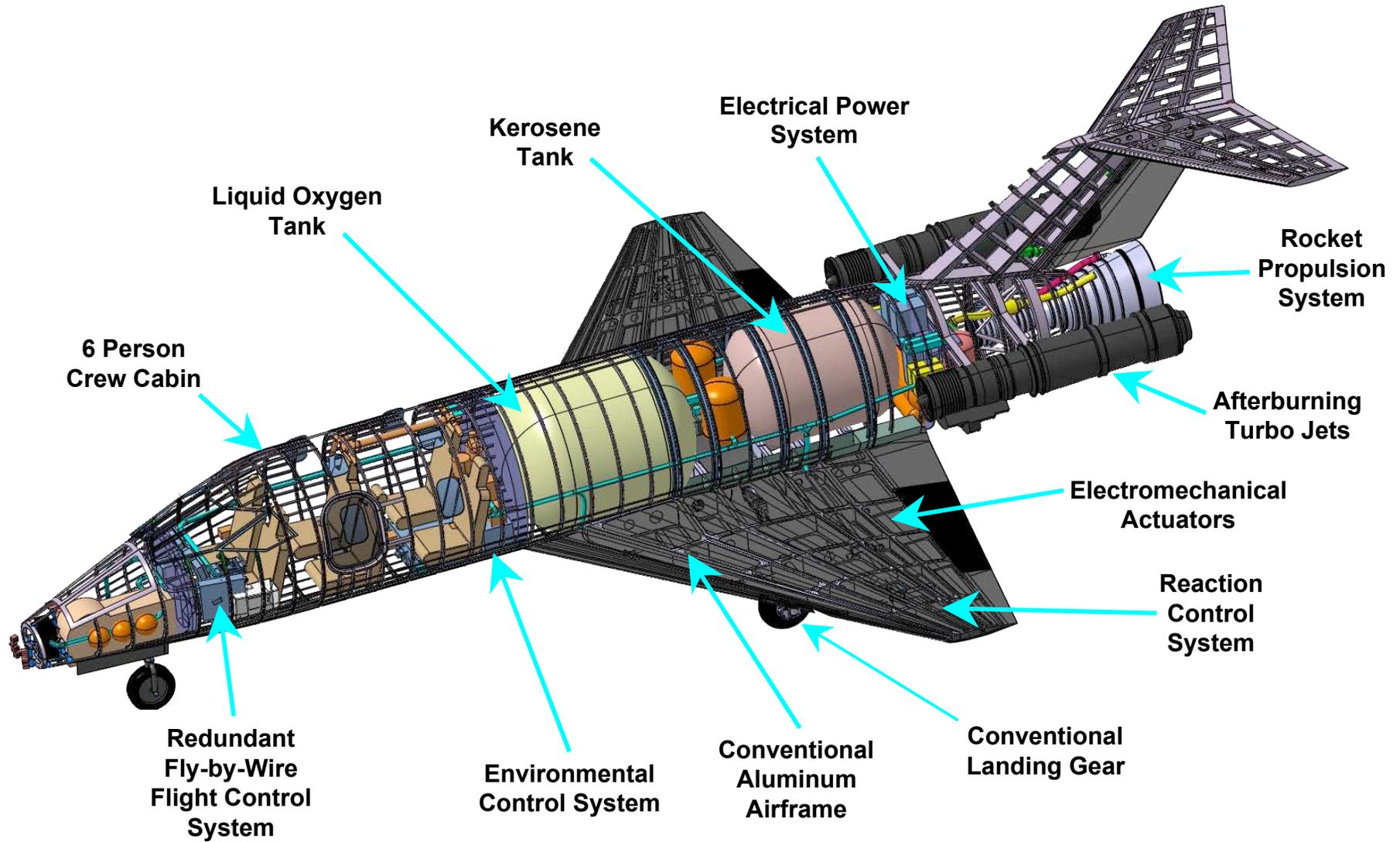


Rocketplane Specifications

Cockpit Crew	1
Seating Capacity	5
Takeoff Field	Kona International
Landing Field	Kalaeloa Airport
Max. Altitude	340,000 ft (104 km)
Mission Time (μG Time)	45 min (3+ min)
Jet Engine Type	GE J-85 w/ AB
Rocket Engine Type	Polaris AR-36
Max T/O Weight	22,750 lb (12,570 kg)
Normal Landing Weight	11,271 lb (5105 kg)

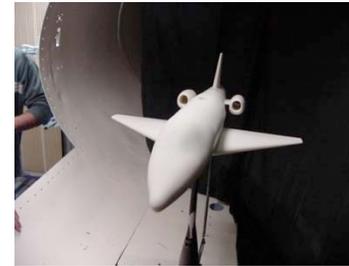


Low Risk Technologies



XP Aerodynamic Testing

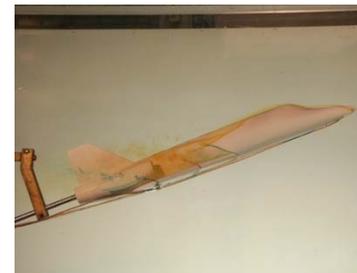
- Experienced Wind Tunnel Testing Team
 - Built 6 different models
 - About 500 hrs of wind tunnel testing completed on the XP program
- Wind Tunnel Facilities Used
 - Low Speed
 - LA Comp Subsonic Wind Tunnel, University of Oklahoma
 - Walter H. Beech Wind Tunnel, NIAR, Wichita State University
 - High Speed
 - NASA Marshall 14" x 14" Supersonic Wind Tunnel
- Water Tunnel
 - NIAR Flow Visualization Laboratory



OU, LSWT



MSFC, ARF2458



NIAR, Water Tunnel



MSFC, ARF2458



NIAR, Wind Tunnel



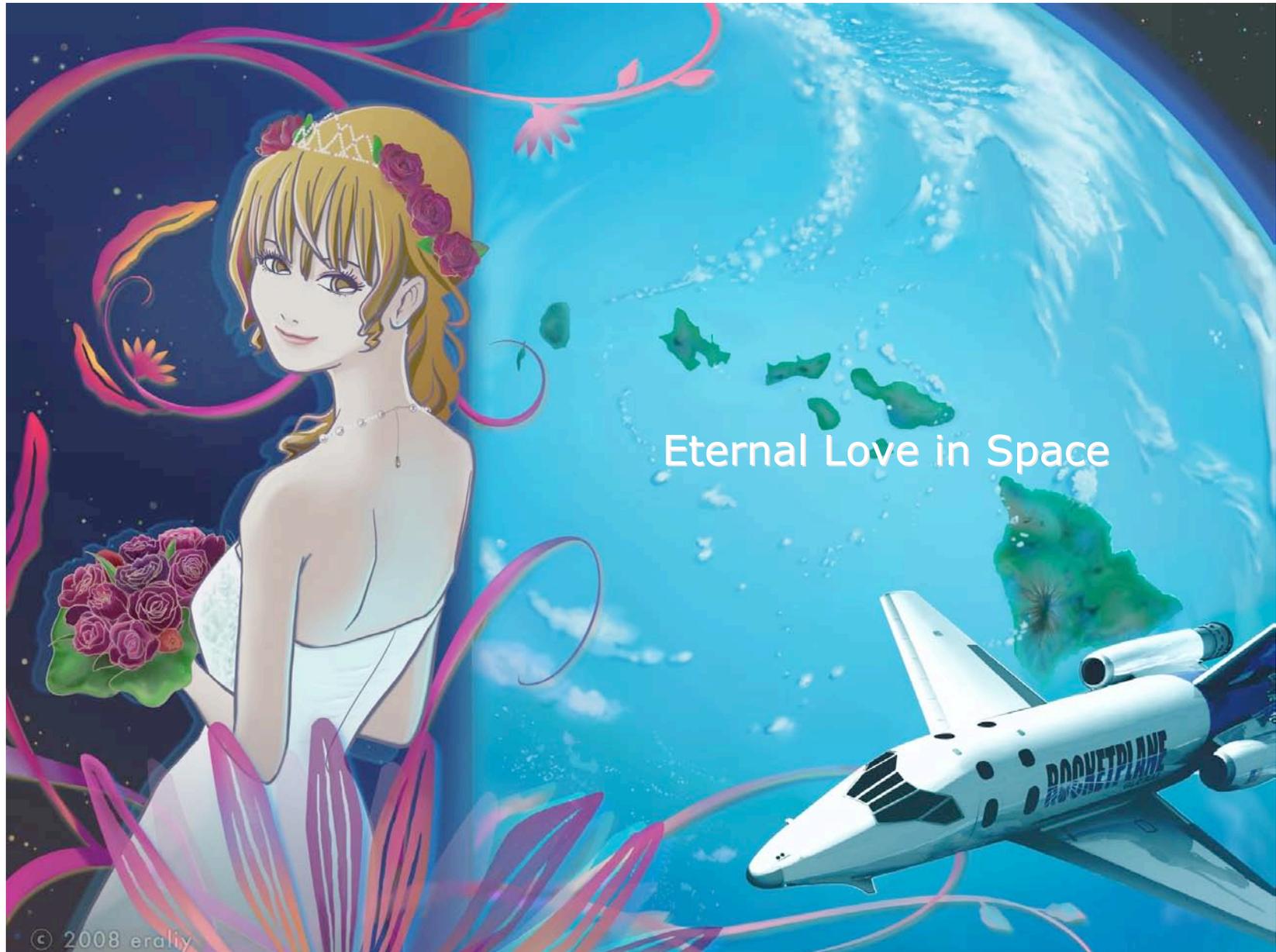
MSFC, TWT2518

Flight Station & Crew Cabin



Interior Designed by Frank Nuovo
•Chief of Design for Nokia
•Design Director for BMW/Designworks

Specialty Charter Flights



Non-tourist Suborbital Applications

- **1. Fundamental physics.**
- **a. Complex plasmas and dust particle physics:**
 - Cold atoms and quantum fluids.
 - Energy transport.
 - Aerosol particle motion.
 - Frictional interaction of dust and gas.
 - Plasma physics.
 - Aggregation phenomena.
- **2. Biology.**
- **a. Plant physiology:**
 - Gravitropism/graviperception
 - Gravireceptors.
 - Statolith movement.
- **b. Cell and developmental biology:**
 - Animal physiology.
 - Ageing processes.
 - Electrophysiological and morphological properties of human cells.
 - Osteoblast cells.
 - Gravitaxis/gravikinesis.
 - Graviperception.
 - Signal transduction pathways.
 - Cytoskeleton.
 - Gene expression.
 - Metabolism.
 - Selforganisation of molecules.
 - Evolutionary biology.
 - Reproduction.
 - Normal development functions.
 - Cell morphology.
 - Unicellular and multicellular organisms.
- **c. Biotechnology:**
 - Protein crystal growth.
 - Electrophoresis.
 - Electrofusion.
- **3. Human physiology.**
- **a. Integrated physiology:**
 - Cardiovascular function.
 - Respiratory function.
 - Body shift fluid.
 - Central venous pressure system.
 - Digestive function.
 - Endocrinology.
- **b. Muscle and bone physiology:**
 - Skeletal system.
 - Blood lactate studies.
 - Body mass tests.
 - Human locomotion.
 - Posture.
 - Bone models.
- **c. Neuroscience:**
 - Neurobiology.
 - Vestibular function.
 - Spatial orientation
 - Motion sickness.
 - Motor skills.
- **4. Fluid and combustion physics.**
- **a. Combustion:**
 - Droplet and spray combustion.
 - Soot concentration.
 - Laminar diffusion flames.
 - Fuel droplet evaporation.
 - Ignition behavior.
 - Permixed gas flames.
 - Gaseous diffusion flames.
 - Flame spreading.
 - Combustion synthesis.
 - Liquid fuel sprays and droplets.
 - Fuel particles and dust clouds.
 - Smouldering combustion.

and more Suborbital Applications

- **b. Structure and dynamics of fluids and multiphase systems:**
 - Thermophysical properties.
 - Chemo-hydrodynamics pattern formation.
 - Dynamics and stability of fluids.
 - Pool boiling.
 - Evaporation.
 - Multiphase flow and heat transfers.
 - Bubble/drop nucleation.
 - Boiling with/without electric fields.
 - Colloids.
 - Magneto-rheological fluids.
 - Foams.
 - Granular systems.
 - Fluid spreading.
 - Wetting phenomena.
 - Critical point studies.
 - Liquid drop dynamics.
 - Gas bubble dynamics.
 - Capillarity.
 - Magneto/electro hydrodynamics.
 - Surface driven bulk flows.
- **5. Material science.**
- **a. Thermophysical properties:**
 - Thermophysical properties of melts.
- **b. New materials, products and processes:**
 - Aggregation phenomena.
 - Physical chemistry.
 - Granular matter.
 - Morphological stability and microstructures.
 - Solutal diffusion in metals and alloys.
 - Composites.
 - Solidification interfaces in metals and alloys.
 - Multiphase and multicomponent solidification.
 - Reaction kinetics and in glasses and ceramics.
 - Phase separation in glasses and ceramics.
 - Nucleation in glasses and ceramics.
 - Crystal growth from solution and melt.
 - Vapor crystal growth.
 - Semiconductors.
 - Undercooling.
 - Metallic foams.
 - Zeolites.

Even More Suborbital Applications

- **6. Technologies in human spaceflight.**

- ISS experiment validation.
- Phase separation technologies – biological fluids.
- Metal halide lamps.
- Crew in-flight syringes.
- Crew foot restraint.
- Crew exercise devices.
- Urine monitoring system.

- **7. Planetary sciences.**

- Formation and interaction of planetary particles and aggregates.
- Impact cratering.
- Aeolian processes.
- Planetary materials – properties and processes.
- Lithospheric modeling.

- **8. ???**

SPACEPORT HAWAII Visitor's Center

- *“Where REAL space meets the Virtual World”*
 - All rides and experiences will be based on actual vehicles (existing or in development) and space destinations, with HD and 3D/HD imagery
 - Accurate space science depicted throughout
 - All aspects of spaceflight represented
 - Suborbital spaceflight from six different spaceports
 - Orbital spaceflight to the ISS and Bigelow Sundancer 1
 - Lunar Rovers to Apollo sites and Future Polar Stations
 - Spaceflight *to* Mars and flights *on* Mars
 - Hayden Planetarium Solar System Tour
 - **High fidelity space experiences become available to everyone at an affordable price**

XP Full Motion HD Suborbital Flight Simulators

- Four minute ride version of actual 45 minute suborbital space flight
- 2 person cab – Pilot & Mission Specialist
- Programmable – riders select Spaceport & Mission
 - SPACEPORTS: Hawaii (Kona to Oahu), Oklahoma, Florida, Hokkaido, Spain, Dubai to Doha
 - MISSIONS: Fun Flight, Microgravity Science, Remote Sensing, Small Satellite Launch

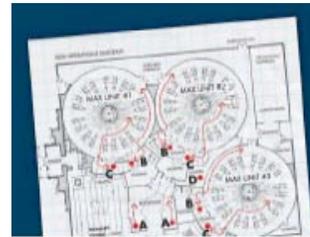


Spaceflight G Force Simulators

- High volume mass-market G Force spaceflight rides
 - peak level of 2.5G's and 4DOF movement
- High fidelity G Force trainer for actual spaceflight training and premium customers
 - peak level up to 9 G's and 6DOF movement
 - accurate G force profiles for suborbital and orbital flights in a variety of spacecraft

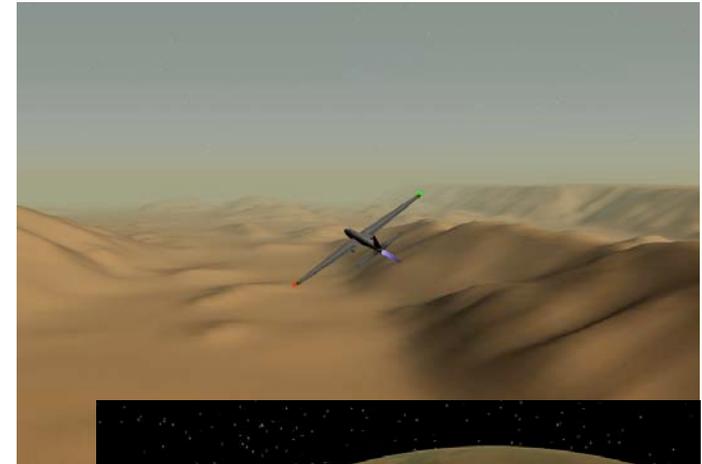


EnTCO

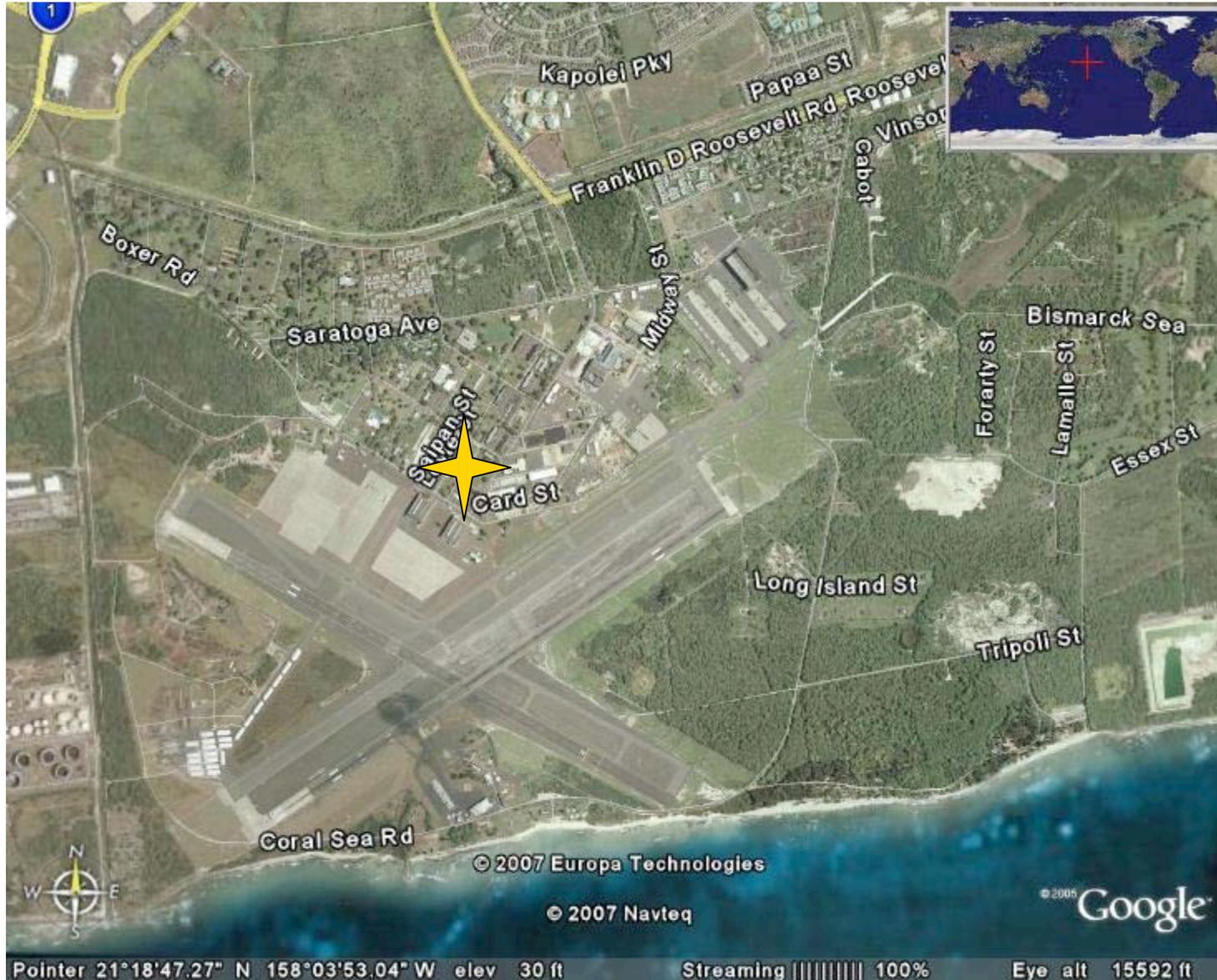


Mars Canyon Racers

- X Plane Mars Rocketplane
 - Accurate flight physics & gravity
- NASA Mars Terrain Maps
- Full Motion Flight Simulators
 - 2 person Crew Cab
 - HD Screen Displays
 - Functional Flight Controls
- Racing Leagues
- Tie-in to worldwide market through online competitions



Spaceport Hawaii Area Map



Kalaeloa Airport Redevelopment Plan

KALAELOA MASTER PLAN -- PREFERRED LAND USES

