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LAUNCH SERVICES PROGRAM

NASA
LAUNCH SERVICES PROGRAM

2021 ASTROPHYSICS MIDEX/MO
PHASE-A KICK-OFF

September 29, 2022

Shaun Daly/Chuck Tatro

LSP Flight Projects Office

Launch Services Program Relationships (NASA HQ/SOMD/KSC)

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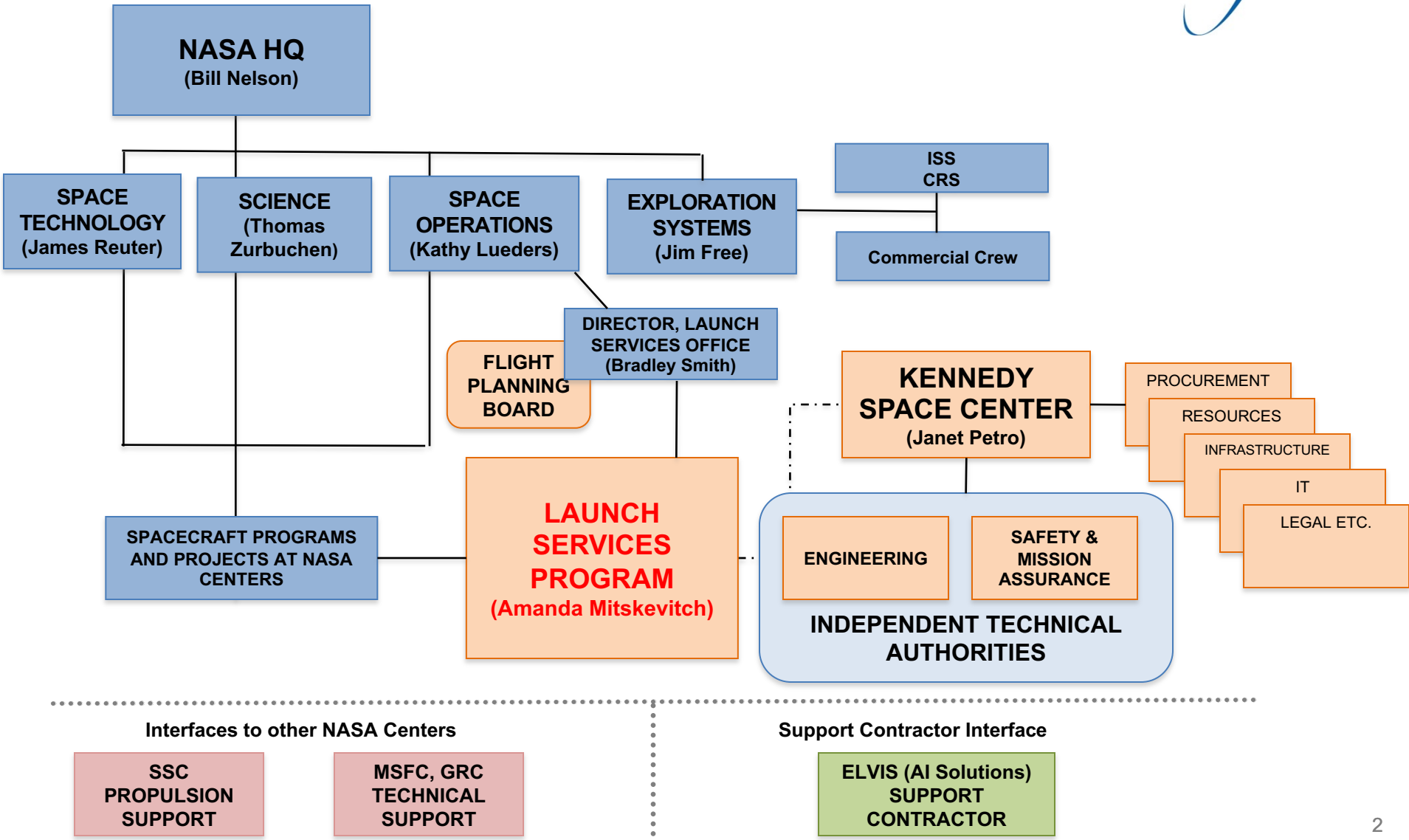

LSP Organizational Structure

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LAUNCH SERVICES PROGRAM
Amanda Mitskevich
Albert Sierra

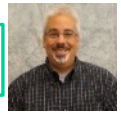
Matrixed Organizations

LAUNCH DIRECTOR
Omar Baez/Tim Dunn

Launch Manifest Coordination

Risk Mgmt/Tech Policy Business Development

LAUNCH SERVICES DEVELOPMENT AND RISK MANAGER
Jorge Piquero



FLIGHT PROJECTS
Diana Calero

Mission Management
Pre-Phase A–E

FLIGHT ANALYSIS
Mike Carney

Flight Dynamics Flight Structures and Environments

PROGRAM PLANNING
Lisa Haber

Strategic Planning
Policy

VSFB PROGRAM REP
John Demko

VSFB Resident Office Chief
Program Support Coordination

LSP CHIEF ENGINEER
James Wood

ENGINEERING
Bob Mott

CHIEF SAFETY OFFICER
Joe Dant

SMA
Jessica Williams

Technical Authority

PROCUREMENT
Terry Crowley

CHIEF FINANCIAL OFFICE
HQ McKinney

CHIEF COUNSEL
Joe Batey

Center Support

FLEET & SYSTEMS MGMT
Denise Pham
Lori Ulrich

Fleet
Integration Engineering
Field Offices

PROGRAM BUSINESS
Brian Smith
Lety Gomez

Contracts
Budgeting

INFRASTRUCTURE MGMT
Ralph Mikulas

Ground Systems
Launch Site
Comm & Telemetry

Launch Services Program

The Launch Services Program (LSP) provides:

- Management of the launch service
- Technical oversight of the launch vehicle production/test
- Coordination and approval of mission-specific integration activities
- Mission unique launch vehicle hardware/software development
- Payload-processing accommodations
- Launch campaign/countdown management

Launch Service for this AO

- **NASA provided primary launch service**
  - **Launch services expected to be provided under NLS II Contract**
  - **Domestic launch vehicle certified as category 1, 2 or 3 per NPD 8610.7D**
  - **Charges against PI-Managed mission costs for any service beyond standard launch service offered** *(Astro MIDEX 2021 AO, Launch Services Program Information Summary, Pages 21-22*
  - **Alternative Access to Space arrangements are NOT available under this AO** *(Astro MIDEX 2021 AO, Launch Services Information Summary, Page 1)*

- **Awarded MIDEX missions are Class C**
- **Mission of Opportunity (MO) is Class D risk tolerance and therefore may be assigned a launch service under the LSP VADR (Venture-Class Acquisition of Dedicated and Rideshare) contract or launched as a rideshare payload to GTO on an ESPA Grande or similar payload carrier.**

NASA/Explorers Program Launch Service Budget

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- **Under a NASA provided Launch Service for this AO, a standard launch service includes:**
  - **The launch vehicle, engineering, analysis, and minimum performance standards and services provided by the contract.**
  - **Mission integration**
  - **Launch Site Payload Processing**
  - **Range Support**
  - **Down Range Telemetry support (launch vehicle only)**
  - **Standard Mission Uniques – items typically necessary to customize the basic vehicle hardware to meet spacecraft driven requirements. Already budgeted for are items like:**
    - » **Pre-ATP studies such as coupled loads and/or trajectories analysis**
    - » **Payload isolation system**
    - » **GN2 pure air purge prior to T-0**
    - » **Class 100,000 integration environment**

NASA Launch Services

- **The NLS II Contract is LSP's primary method to acquire all classes of Category 2 and Category 3 commercial launch services for spacecraft customers**
  - **The VADR Contract is LSP's new tool to contract Category 1 commercial launch services for more risk tolerant Class D missions (Would apply to Astro MO missions, but not MoonBEAM as an ISS hosted instrument.)**
- **NLS II Provides NASA with domestic launch services that are safe, successful, reliable, and affordable**
- **Provides services for both NASA-Owned and NASA-Sponsored payloads through multiple Indefinite Delivery Indefinite Quantity (IDIQ) Launch Service Task Order (LSTO) contracts with negotiated Not To Exceed (NTE) Prices**
- **Provides services on a Firm-Fixed-Price (FFP) basis**
  - **Incorporates best commercial practices to the maximum extent practical**
  - **Includes Standard and Non-Standard services**
  - **Mission unique modifications**
  - **Special studies**
- **Allows LSP to turn on a Task Assignment or Non-Standard Service at any time for analyses**

NASA Launch Services (Cont'd)

- **Launch Services Risk Mitigation Policy for NASA-owned and/or NASA-sponsored Payloads/Missions can be found under NPD 8610.7. Document can be found at http://nodis3.gsfc.nasa.gov**
  - **Risk Category 1: Low complexity and/or low cost payloads-Classified as Class D payloads pursuant to NPR 8705.4**
  - **Risk Category 2: Moderate complexity and/or moderate cost payloads-Classified as Class C payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4**
  - **Risk Category 3: Complex and/or high cost payloads-Classified as Class A payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4**
- **NLS II Launch Service Schedule and Costs**
  - **Acquisition process typically begins at approximately L-36 months**
  - **Authority to Proceed (ATP) concurrent with Task Order Award at approximately L-30 months**
  - **Explorers Program will provide a single expendable launch vehicle as GFE (outside of PI-Managed Mission Cost) including all standard and some mission unique launch service costs.**
  - **Examples of costs not covered by the Explorers Program include:**
    - » **Payload-caused launch delay costs**
    - » **Some mission unique services such as a custom payload adapters, auxiliary propulsion, or costs due to a requirement for a unique launch site may require additional funding (See Attachment 2 of SMEX 2019 LSP Info Summary)**

Launch Delays

- **Each Provider has their own unique Launch Delay Table**
  - Delay terms are identical for both parties (Contractor/NASA)
  - No-fault Launch delays
    - » Include: range constraints, floods, acts of God, strikes and other conditions
    - » No adjustment made to mission price
    - » No limit on number of days

- **For the remaining delay cases grace days are based on sliding scale for both Contractor and NASA delays**
  - 150 days of grace at ATP through L-24
  - Sliding down to 7 days of grace at L-10 days

- **For limited launch periods (i.e., Planetary), there are no grace days available and delays outside of the defined launch period are subject to equitable adjustment**

Examples of Non-Standard Services/ Mission Unique Costs

Additional Options	Launch Date NLT	Total ($M)
Mission Unique Adapter	12/2025	0.5
Multiple Spacecraft Deployment Launch Vehicle Analyses	12/2025	0.75
Deployable Spacecraft telemetry tracking asset (ocean vs airborne vs ground)*	12/2025	1.4 – 4.0*
Supplemental Propulsion**	12/2025	Contact LSP POC

* Cost depends on locations of spacecraft separation(s) and type of asset required (Contact LSP POC for cost for your specific configuration)

** Due to the multiple launch vehicle configurations within the launch vehicle class, supplemental propulsion systems must be defined and described by the proposer to meet mission requirements. The system proposed and the spacecraft shall remain within the fairing envelopes provided.

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Launch Vehicle Acquisition

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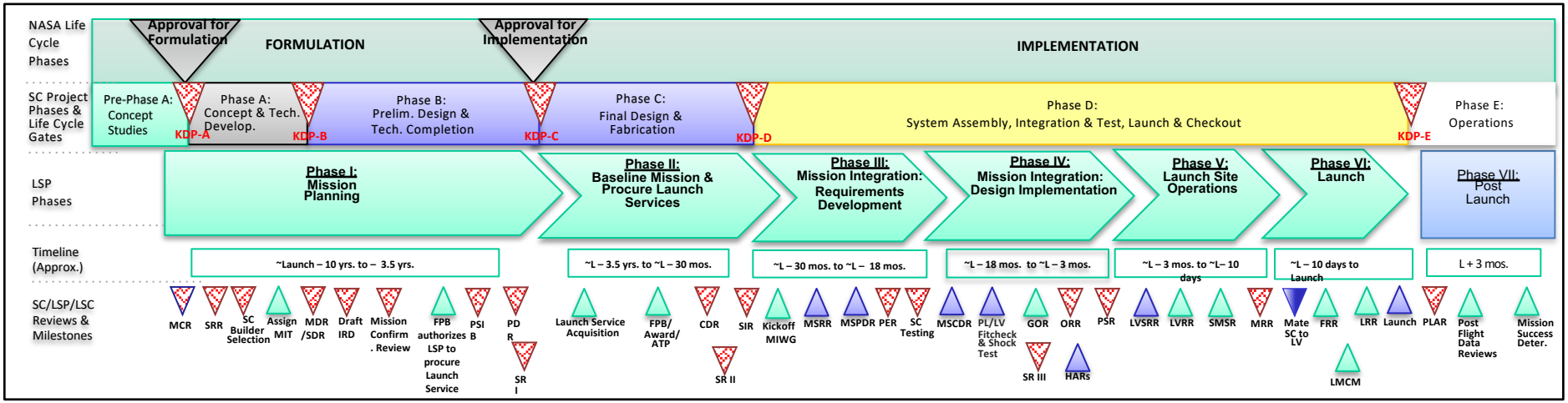
- **The acquisition of a NASA-provided domestic expendable launch vehicle proposed for this AO will be procured and managed by the NASA/Launch Services Program (LSP) via the NASA Launch Services II (NLS II) contract.**
- **The LSP will competitively select a launch service provider for these missions based on customer requirements and NASA Flight Planning Board (FPB) approval.**
- **Astro Program Exec will request launch service authorization at NASA FPB.**



Spacecraft reviews in red.

Scenarios 1 & 2 Reference Orbits Performance [kg]

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Scenario 1 - Performance Capability at Reference Orbits

Reference Orbit		Performance [kg]	Volume
LEO	700 km, Sun-Synch	3385	PLF Scenario 1
L2	C_3 = -0.5 km^2/s^2	1695	PLF Scenario 1
Lunar	C_3 = -1.8 km^2/s^2	1750	PLF Scenario 1

Scenario 2 - Performance Capability at Reference Orbits

Reference Orbit		Performance [kg]	Volume
LEO	700 km, Sun-Synch	5620	PLF Scenario 2
L2	C_3 = -0.5 km^2/s^2	1810	PLF Scenario 2
Lunar	C_3 = -1.8 km^2/s^2	1925	PLF Scenario 2

Reference: Astro MIDEX 2021 AO, Launch Services Program Information Summary

For mission specific information, utilize the LSP performance website or contact the LSP POC

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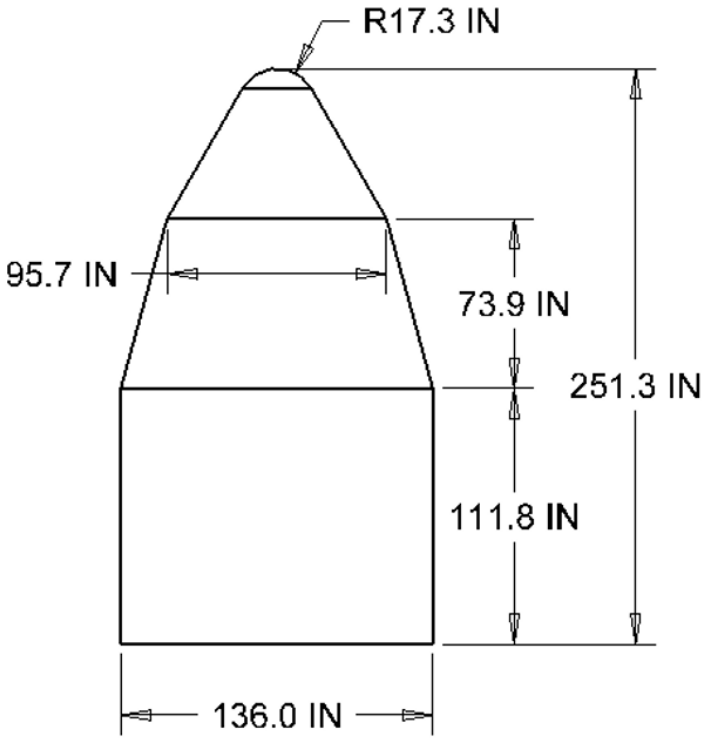
Scenario 1 - PLF Static Envelope (inches)

- Candidate Launch Vehicles include: Falcon9 Full Thrust, Antares 231
- Figure has been reduced by 1.5" to account for a typical payload isolation system. If the proposer is providing own isolation system, or one is not needed, 1.5 inches may be added to overall height shown.



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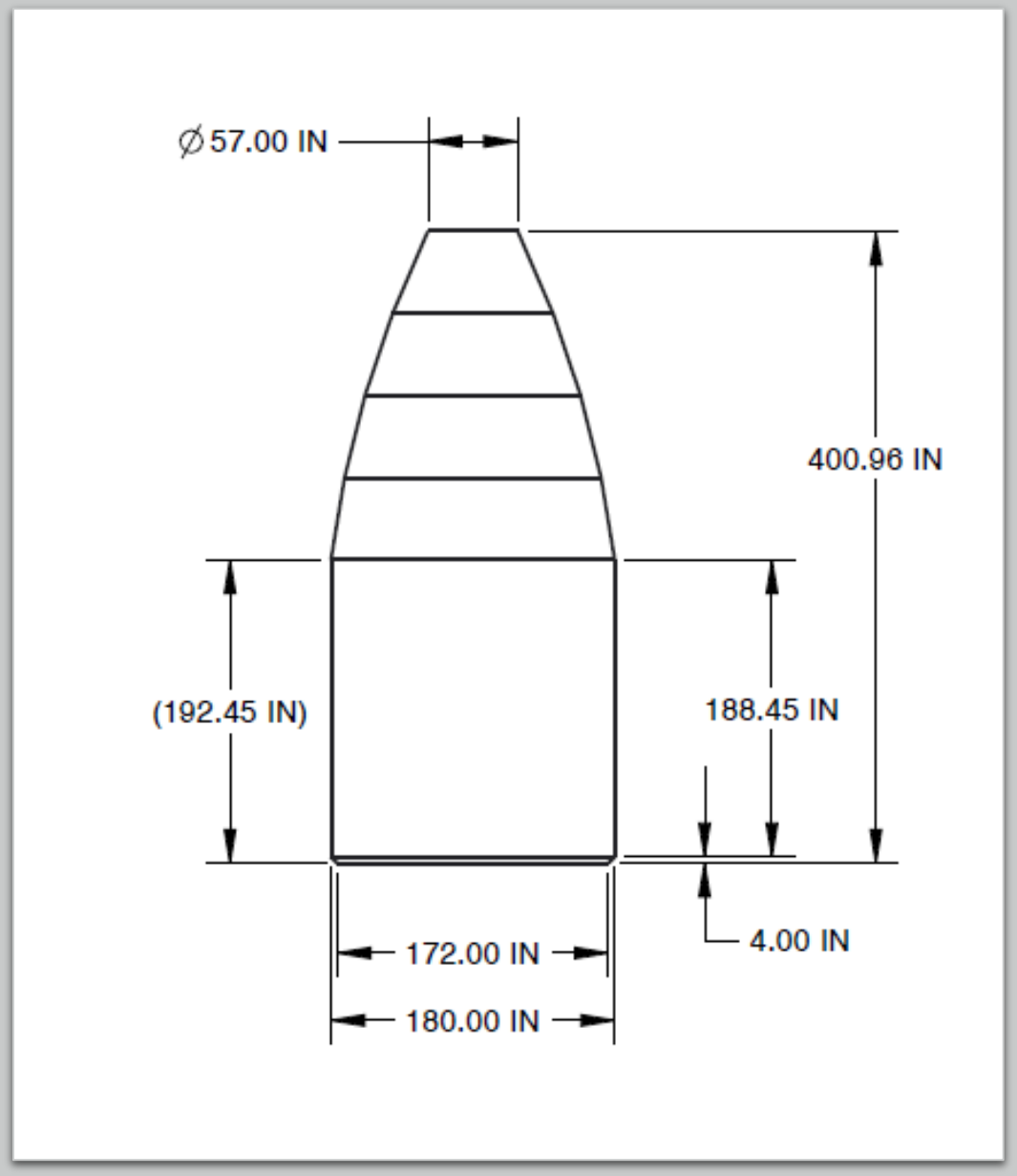
Scenario 2 – PLF Static Envelope (inches)

- Candidate Launch Vehicles Include: Falcon9 Full Thrust, Antares 232, Vulcan/Centaur0, & Vulcan/Centaur2

- Figure has been reduced by 1.5" to account for a typical payload isolation system. If the proposer is providing own isolation system, or one is not needed, 1.5 inches may be added to overall height shown.



Summary

It is the Launch Service Program's goal to ensure the highest practicable probability of mission success while managing the launch service technical capabilities, budget and schedule.

LSP POCs for Astro MIDEX 2021 AO and MO:

Shaun Daly - Mission Manager
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or

Chuck Tatro – Alternate for Shaun until JPSS-2/LOFTID launch - Nov 2022)
NASA Launch Services Program – Flight Program Office (Code VA-C)
Kennedy Space Center

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