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LAUNCH SERVICES PROGRAM

NASA
LAUNCH SERVICES PROGRAM

EXPLORERS MISSION CONCEPT STUDIES KICKOFF MEETING
OCTOBER 18, 2011

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Launch Services Program Relationships (NASA/HEO)

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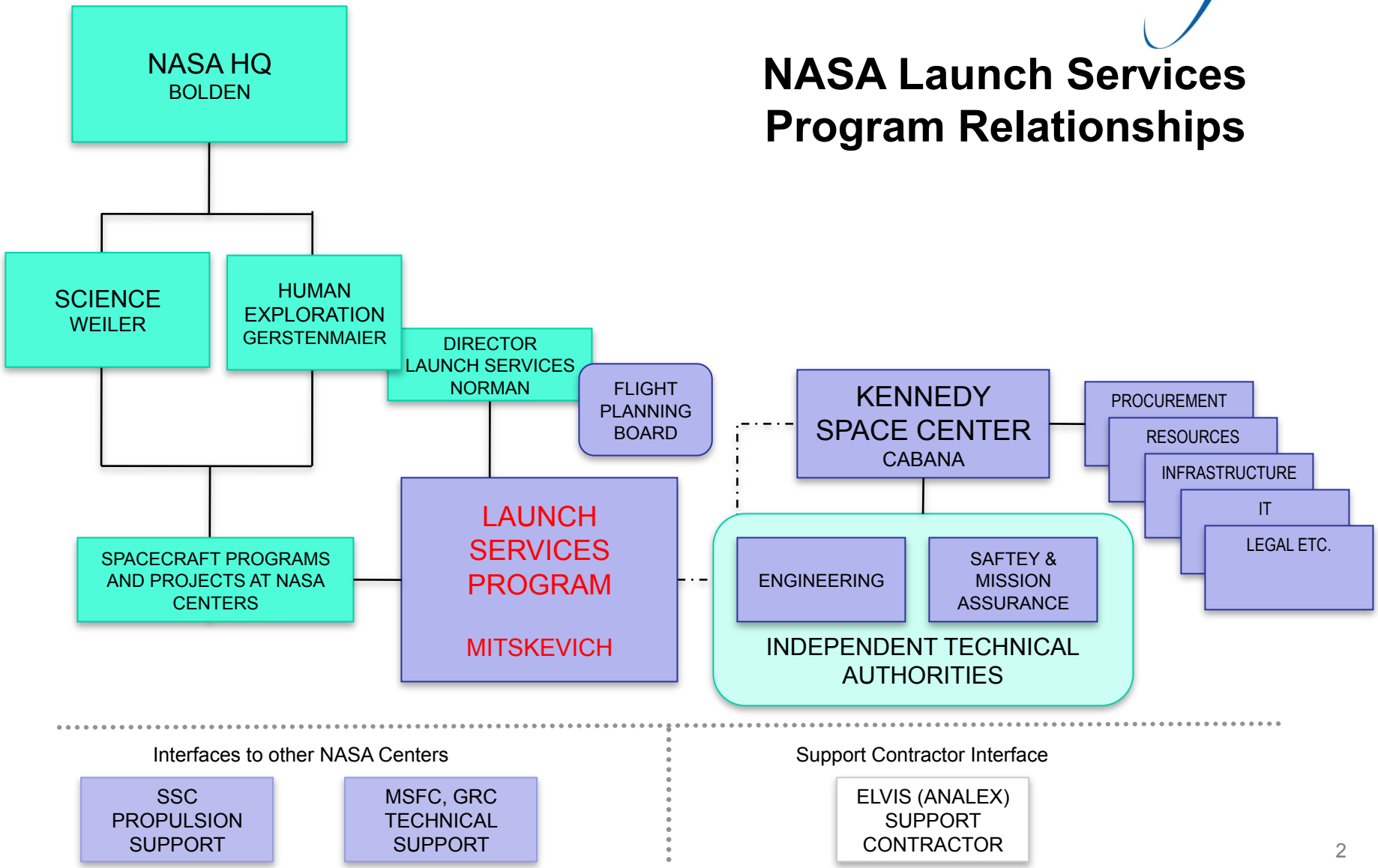
NASA Launch Services Program Relationships



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Launch Services Program

The Launch Services Program provides management of the launch service, technical oversight of the launch vehicle production/test, coordinates and approves mission-specific integration activities, provides mission unique launch vehicle hardware/software development, provides payload-processing accommodations, and manages the launch campaign/ countdown.

LSP Functional Structure

- **LSP procures/provides a Launch Service**
  - **Its more than the basic launch vehicle**
  - **We don't buy a tail number**
  - **This is a commercial FFP procurement with additional insight and oversight**
- **To enable this, LSP has two functional sides**
  - **Mission integration**
    - » **Mission Integration team assigned to each mission**
    - » **Manages mission specific procurement, integration, and analysis**
    - » **Includes launch site integration and processing**
  - **Fleet management**
    - » **Personnel assigned to each contracted rocket**
    - » **Includes resident offices within the production facilities of all active providers**
    - » **We watch the production and performance of entire fleet – we certify the manufacture's production line, not just a particular unit (tail number)**
    - » **We have a say in any change/upgrade/anomaly**
    - » **Big stick – no-go for launch**
- **Interface with Safety and Mission Assurance**
  - **Safety**
  - **Quality**

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LSP Organizational Structure

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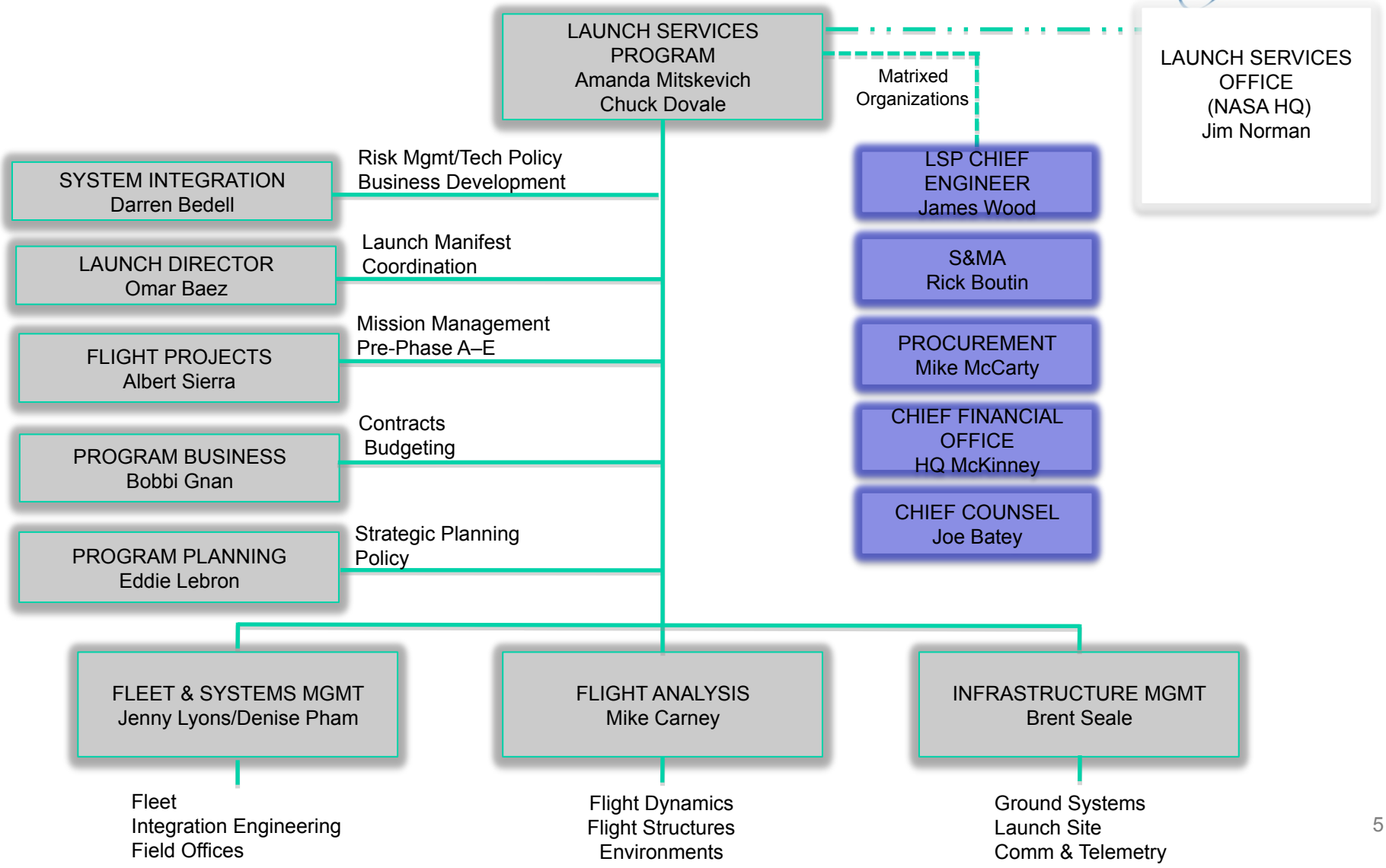

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Technical Information flow into the MIT

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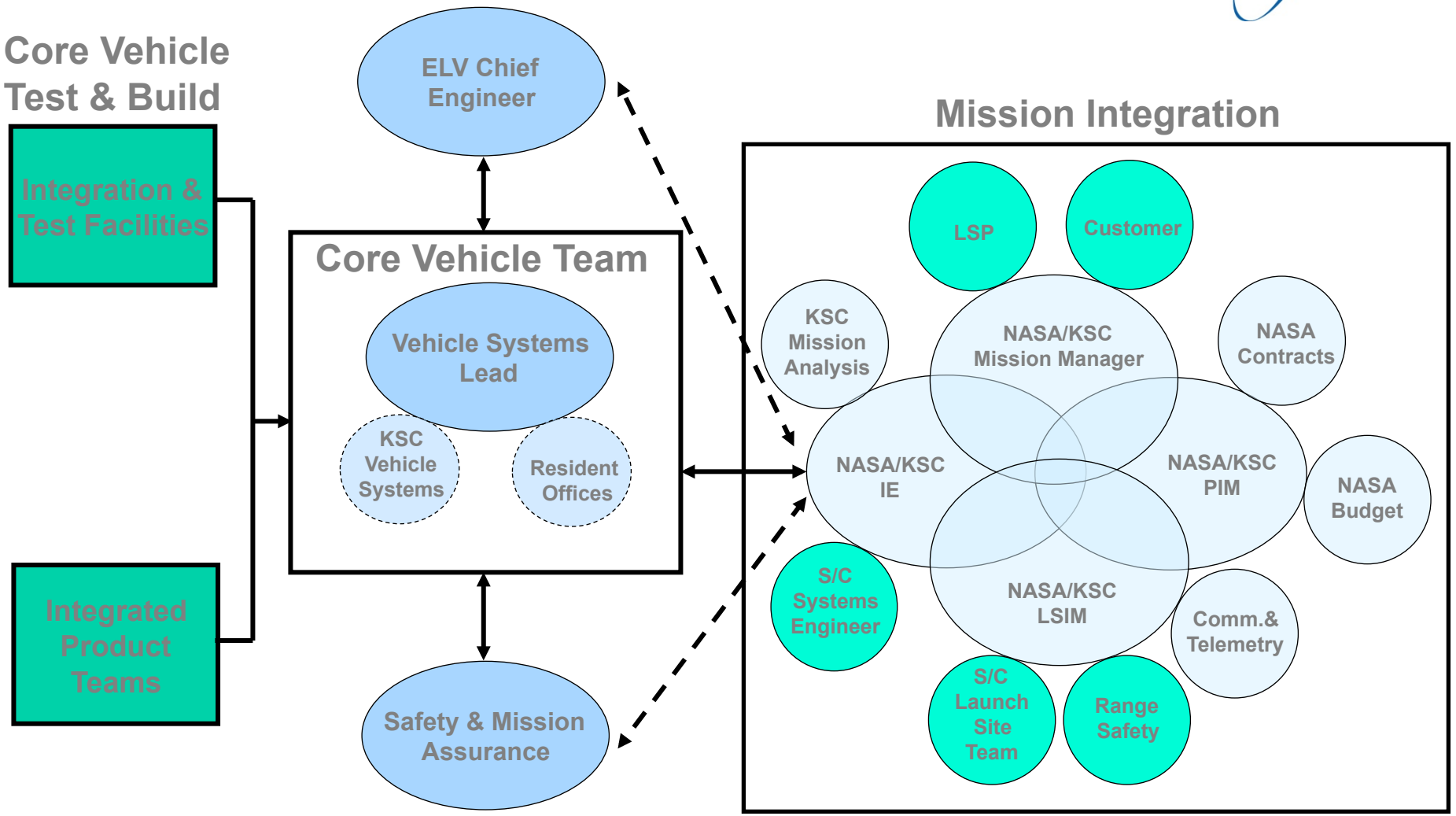


NLS II Contracts Overview

- LSP's primary method to acquire all classes of Category 2 and Category 3 commercial launch services for spacecraft customers
- 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
- NLS II On-Ramp promotes existing and new launch service providers to compete for future requirements and enables incumbent launch service providers to introduce launch vehicles not available at the time of the award of the initial contract. This On-Ramp period is offered annually each August
- NLS II Off-Ramp allows discontinuation of a launch vehicle product line in the event that launch vehicles under NLS II are no longer economically viable or available. Any LSTO (s) already under contract are unaffected.
- Allows LSP to turn on a Task Assignment or Non-Standard Service at any time for analyses

NLS II Contracts Overview – Cont'd

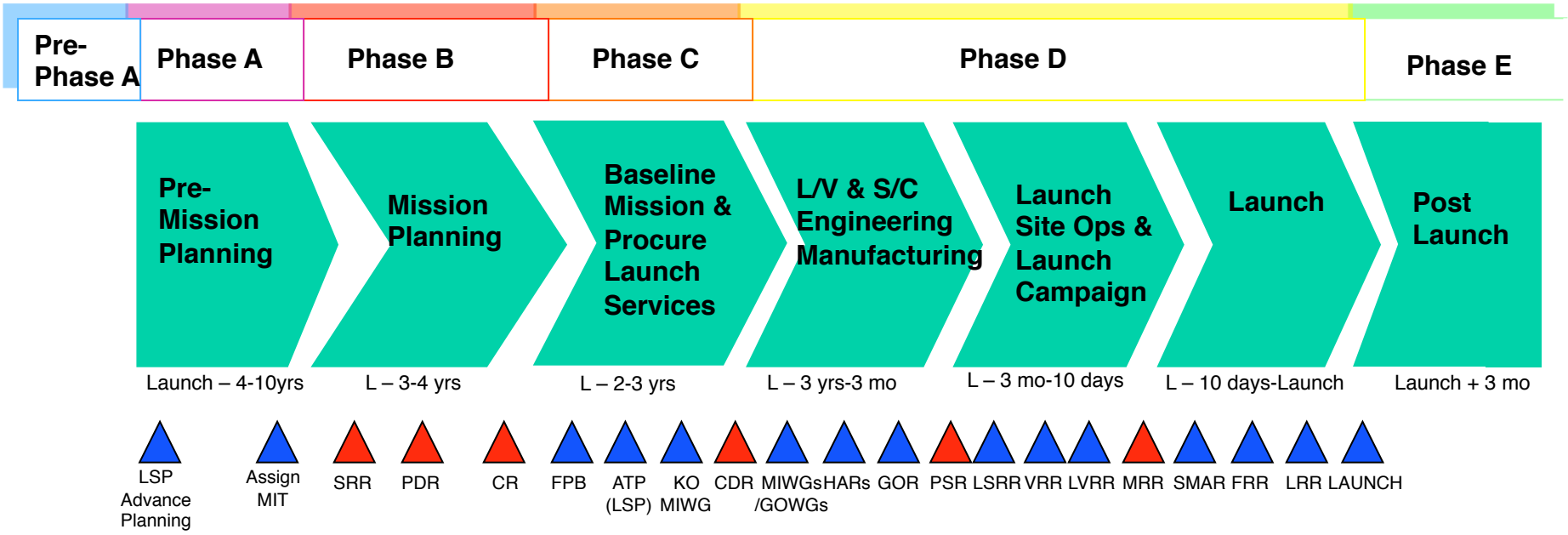
- **Launch Services Risk Mitigation Policy for NASA-owned and/or NASA-sponsored Payloads/Missions can be found under NPD 8610.7D. Document can be found at http://nodis3.gsfc.nasa.gov**
  - **Risk Category 1: Low complexity and/or low cost payloads-Classified as Class D payloads pursuant to NPR 8705.4**
  - **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 Payment, Milestone & Completion Criteria**
  - **Authority to Proceed (ATP) concurrent with Task Order Award**
  - **Cumulative payment of 10% due at L-30**
  - **Nominal Mission Integration begins at L-30 months, with quarterly milestone payments**
    - » **NTE will be based on the L-30 date, not the LSTO order year**
    - » **Includes the capability to begin payments at L-33 or L-27 months with no change to Firm-Fixed-Price**
  - **Each NLS II Contract has standardized work plans tied to the milestone payment. Each work plan varies based on unique vehicle configuration differences.**
    - » **In the event a contractor completes a milestone ahead of the completion date, the contractor may submit an invoice for Government consideration**
  - **Modified payment schedule may be negotiated through bilateral agreement**

NLS II Contracts Overview – Cont'd

- **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**
- **150 days of grace at ATP through L-24 to 7 days of grace at L-10 days for both Contractor and NASA delays**

LSP and SC Phases

- The LSP will competitively select a launch service provider for these missions based on customer requirements and NASA Flight Planning Board (FPB) approval.



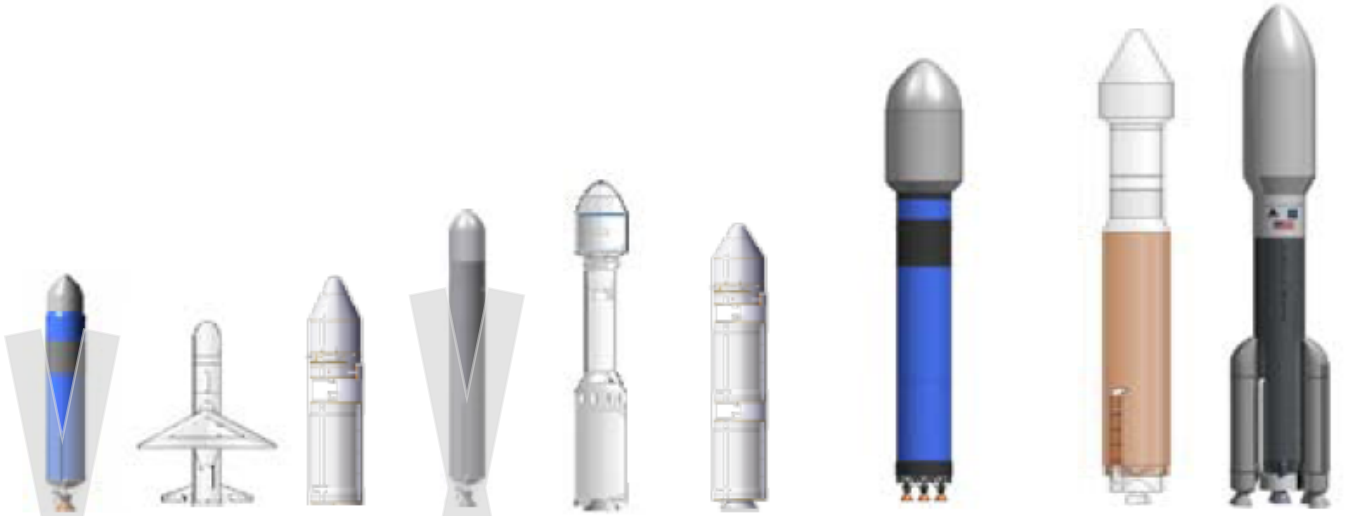
Spacecraft reviews shown in red.

Available Vehicles

- NLS II has provided additional LV to be considered
- Most likely candidate vehicles for Explorer missions that are available on the NLS II contract are
  - Pegasus XL
  - Falcon 1/e
  - Taurus XL
  - Athena I/II
  - Other vehicles have the option to bid if they choose
- Bidders must remain compatible with vehicles that provide their performance requirements
- LSP uses the NLS II contract and not the launch vehicle providers users guides when determining LV configurations and performance.

Available Vehicles – Cont'd

What are the available vehicles under NLS II contract?



Launch Vehicle	Falcon 1	Pegasus	Athena I	Falcon 1e	Taurus XL	Athena II	Falcon 9 Blk1	Falcon 9 Blk2	Atlas V 401	Atlas V 551
Offeror	SpaceX	OSC	LMSSC	SpaceX	OSC	LMSSC	SpaceX	SpaceX	ULS	ULS
Perf @ 600 km Sun Synch	175 kg	240 kg	320 kg	505 kg	950 kg	1175 kg	6490 kg	7540 kg	6640 kg	14280 kg
Certification Cat	n/a	Cat 3	n/a	n/a	Cat 2	n/a	n/a	n/a	Cat 3	Cat 3
Launch Sites	RTS	CCAFS WFF RTS VAFB	CCAFS KLC WFF	RTS	CCAFS WFF VAFB	CCAFS KLC WFF	CCAFS VAFB	CCAFS VAFB	CCAFS VAFB	CCAFS VAFB
	Small					Medium		Intermediate		

NLS II Launch Service Task Order (LSTO) Process

- Launch service selection is the responsibility of the LSP
- The Task Order Selection Official (TOSO) is the LSP Program Manager
- LSP initiates the LSTO process upon direction from the NASA Flight Planning Board (FPB)
- The LSTO process provides NLS II contractors an opportunity to be considered for task orders based on specific mission requirements
- Nominal schedule for an LSTO is 6 months; from RLSP release to LSTO award and ATP
  - Draft RLSP adds 2 to 3 weeks to 6 month schedule
- LSTO award is based on a best-value assessment, considering technical capability/risk, price, and past performance
  - The relative importance of these evaluation factors is established in the RLSP
- Upon completion of the evaluation the LSTO Manager will present findings to the FPB
- The FPB will provide input to the TOSO
- The TOSO makes the launch service selection
- The LSTO is awarded and ATP'ed

Nominal LSTO Schedule

• Final RLSP Release	4 weeks
• Proposal(s) Due	11 weeks
• Proposal(s) Evaluation complete	1 week
• Final Proposal(s) Requested (FPR)	4 weeks
• Presentation to TOSO	1 week
• Presentation to FPB	1 week
• LSTO Selection by TOSO	1 week
• ANOSCA and Press Release Issued	1 week
• Award and ATP of LSTO	

Launch Service Budget

- **With the exception of the options noted in the next chart, the launch services cost will be held by the Explorers Program.**
- **The launch service includes:**
  - **The launch vehicle, engineering, analysis, and minimum performance standards and services provided by the contract.**
  - **Launch Site Processing**
  - **Range Support**
  - **Down Range Telemetry support (launch vehicle only)**
  - **Standard Mission Uniques – these are 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, a GN2 or pure air purge prior to T-0 and 10,000 Class integration environment.**
  - **Budget does not include launch delays.**

Option Costs

Non-standard services and options that proposers must account for:

Additional Options:	Launch Date NLT	Total ($M)
Mission Unique Adapter	12/16	1.0
Payload Isolation System*	12/16	1.5
Supplemental Propulsion**	12/16	proposer provided
Additional Options	**Launch Date NLT**	**Total ($M)**
Mission Unique Adapter	12/17	1.04
Payload Isolation System*	12/17	1.56
Supplemental Propulsion**	12/17	proposer provided
Additional Options	**Launch Date NLT**	**Total ($M)**
Mission Unique Adapter	12/18	1.08
Payload Isolation System*	12/18	1.63
Supplemental Propulsion**	12/17	proposer provided

* Bidders may choose to provide their own isolation system.
** Due to the multiple launch vehicle configurations within this launch vehicle class, supplemental propulsion systems must be defined and provided by the proposer to meet mission requirements. The system proposed and the spacecraft shall remain within the fairing envelopes provided.

Performance by Launch Site
Option A

Range	Assumed Inclination - Degrees	Altitude Range km	Max Performance kg
Cape Canaveral Air Force Station, CCAFS	28.5˚ - 51.6˚	200 - 2000	1585
Vandenberg Air Force Base, VAFB	60˚- 90˚, SunSynch	200 - 2000	1390
Wallops Flight Facility, WFF	45˚	200 - 2000	1435
Kodiak Launch Complex, KLC	70˚ - 90˚, SunSynch	200 - 2000	1640
Reagan Test Site, RTS	0˚ - 90˚, SunSynch	200 - 2000	855

- This performance does not include the effects of orbital debris compliance, which must be evaluated on a mission-specific basis. This could result in a significant performance impact for missions in which launch vehicle hardware remains in Earth orbit.
- Guidance reserves account for 3-sigma flight performance.
- Performance is for baseline configuration; non-standard, mission-unique hardware will require additional assessment.
- 38-inch (0.96-meter) separation system.
- Mass of entire separation system is book-kept on the launch vehicle side.
- Listed performance is for separated spacecraft mass.

Performance by Launch Site
Option B

Range	Assumed Inclination - Degrees	Altitude Range km	Max Performance kg
Cape Canaveral Air Force Station, CCAFS	28.5˚ - 51.6˚	200 - 2000	700
Vandenberg Air Force Base, VAFB	60˚- 90˚, SunSynch	200 - 2000	375
Wallops Flight Facility, WFF	45˚	200 - 2000	425
Kodiak Launch Complex, KLC	70˚ - 90˚, SunSynch	200 - 2000	535
Reagan Test Site, RTS	0˚ - 90˚, SunSynch	200 - 2000	465

- This performance does not include the effects of orbital debris compliance, which must be evaluated on a mission-specific basis. This could result in a significant performance impact for missions in which launch vehicle hardware remains in Earth orbit.
- Guidance reserves account for 3-sigma flight performance.
- Performance is for baseline configuration; non-standard, mission-unique hardware will require additional assessment.
- 38-inch (0.96-meter) separation system.
- Mass of entire separation system is book-kept on the launch vehicle side.
- Listed performance is for separated spacecraft mass.

Launch Vehicle Compatibility Information

- **Mission Studies should contain the following information in order for a proper assessment to be made for Launch Vehicle compatibility.**
  - **Launch period and window**
  - **Orbit requirements**
  - **Supplemental Propulsion requirements (SC or LV provided)**
  - **Mass (dry and wet)**
  - **Spacecraft dimensions and any intrusions into Payload Fairing envelope**
  - **Interface Adapter (standard/custom)**
  - **Any Mission Unique services**
    - » **Instrument T-0 GN2 Purge**
    - » **T-0 S/C Battery Cooling**
    - » **Planetary Protection Requirements**
    - » **Contamination Control Requirements/Cleanliness Level (PLF and LV adapter)**
    - » **Unique processing requirements (Pad and Processing Facility)**
    - » **Payload Isolation System**
  - **Schedule Allocation**
    - » **Launch Service Integration**
    - » **S/C Environmental Testing**
    - » **S/C Ship Date**
    - » **S/C to LV Integrated Operations**
  - **Any LV modifications required for Safety or Launch approval**

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Static Envelopes
Option A

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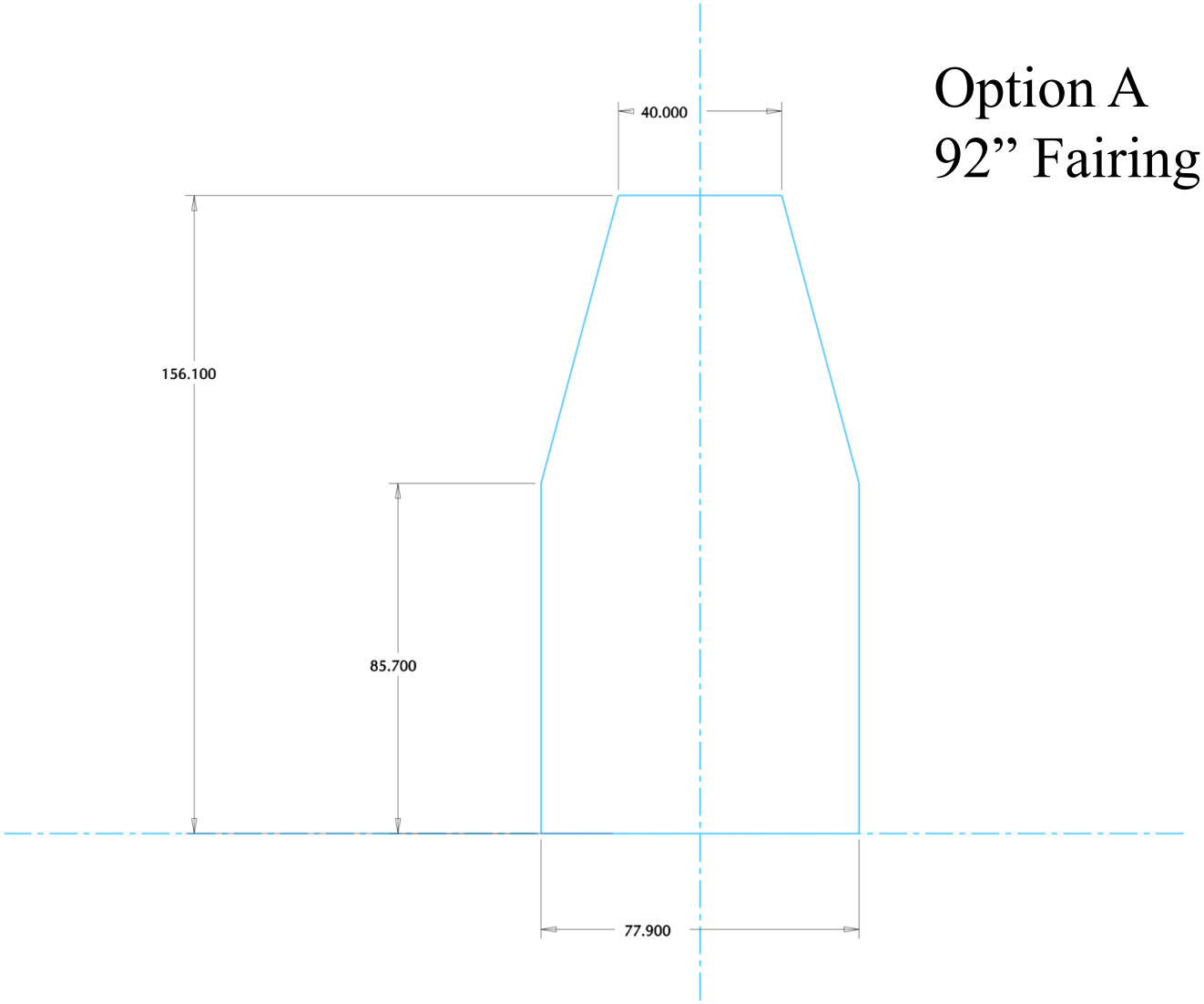

Option A
92” Fairing Envelope

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Static Envelopes
Option A

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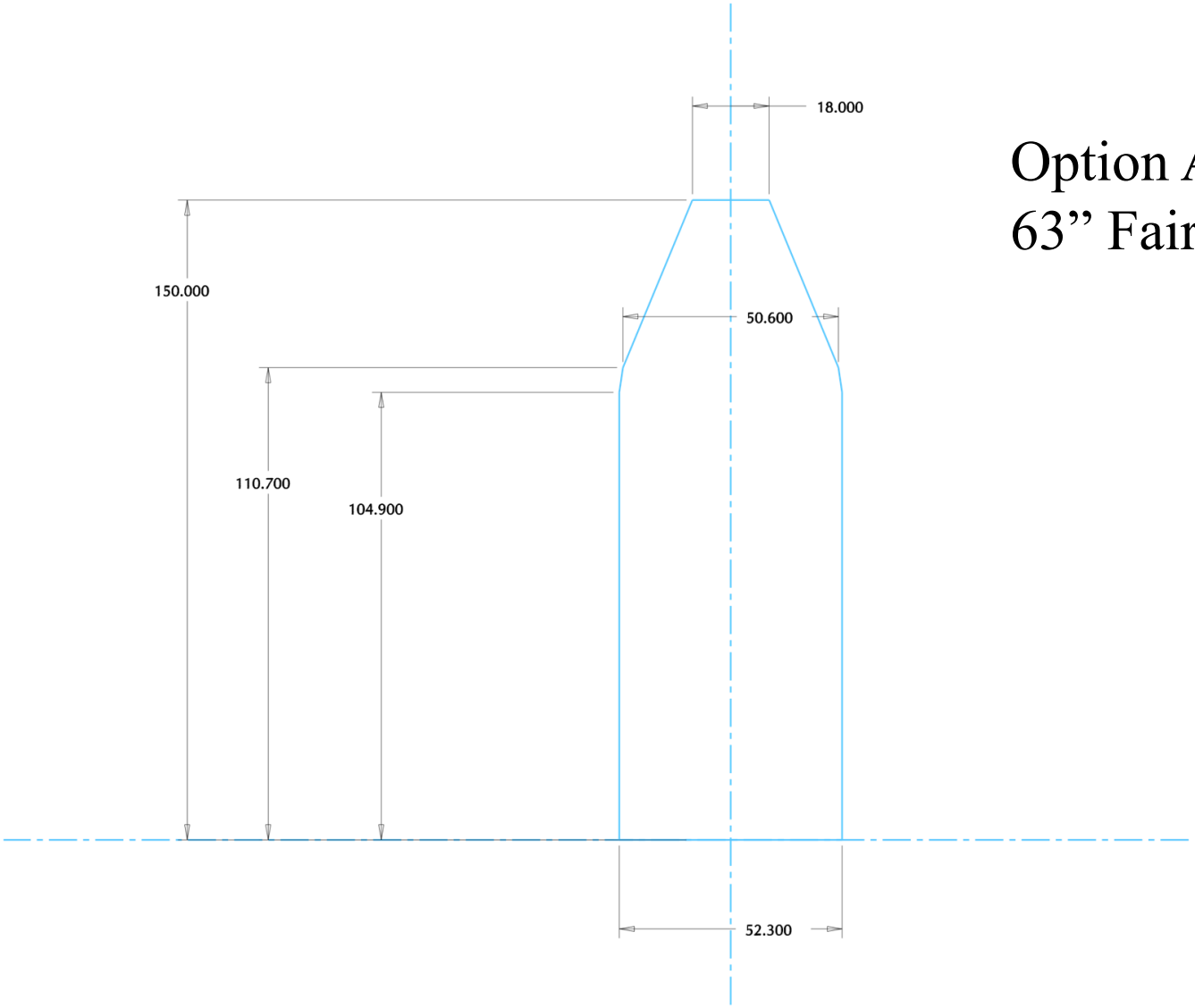
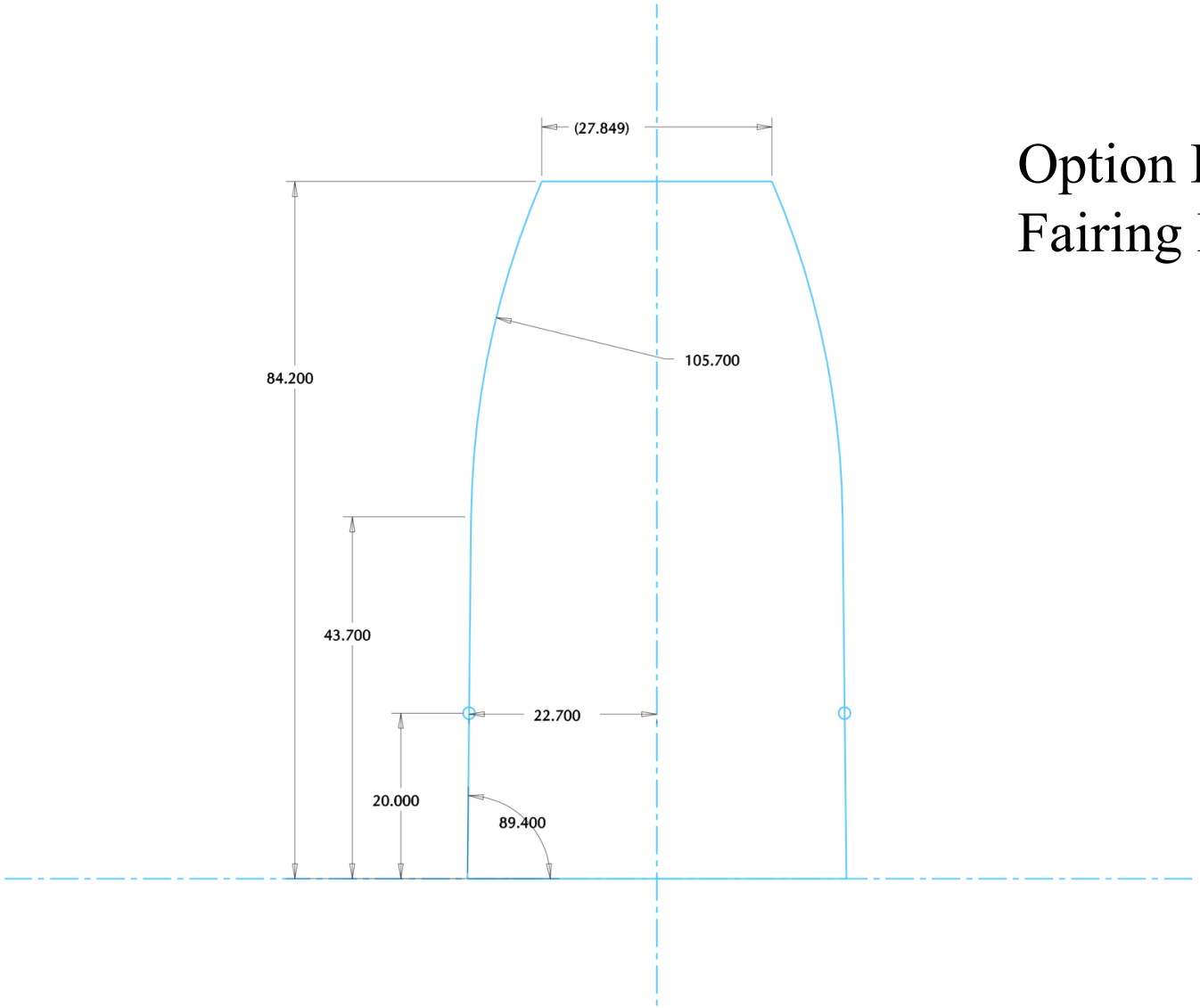


Option A
63” Fairing Envelope

Static Envelopes
Option B



Option B
Fairing Envelope

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.**
- **Questions should be submitted to diana.m.calero@nasa.gov; LSP will gladly respond as quickly as possible.**