NGAO Functional Requirements

Key	Name	Sect	Cat	Priority	WBS	Description	Rationale	Traceability	Status	Version	Verification	Originator	Last Modified
FR-1223	laser enclosure size	Optical	Functional	Essential	2.1	The size of the laser electronics enclosure shall be axbxc mm	Needed to design the support structure.	-	Draft	1.0	Inspection	Viswa Velur	Mar 6, 2009 10:17 AM
FR-1283	Enclosure temperature	Overall	Functional	Essential	2.1	Enclosure temperature (A/C requirement)	This capability is standard in the current AO systems	Engineering decision by JC and VNV	Draft	1.0	Demonstration	Viswa Velur	Mar 6, 2009 10:18 AM
FR-1287	Mass constraint	Overall	Functional	Essential	2.1	LSE : Mass constraint ()	Observatory requirement.	TBD	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:19 AM
FR-1288	size constraint	Overall	Functional	Essential	2.1	LSE size constraint (a,b,c mm)	Observatory requirement for new instrumentation	TBD	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:22 AM
FR-1290	Ventilation	Overall	Functional	Essential	2.1	LSE: Ventilation air (xxx cuft/min)	Observatory requirement for new instrumentation	TBD	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:23 AM
FR-1291	Heat dissipation	Overall	Functional	Essential	2.1	LSE: Heat dissipation into environment (W)	To set limits on dome seeing	TBD	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 11:45 AM
FR-1292	Doors	Overall	Functional	Essential	2.1	LSE: Doors, Access and covers (will add specifics based on laser)	Personnel access	TBD	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:25 AM
FR-1293	Gycol cooling	Overall	Functional	Essential	2.1	LSE shall use facility glycol-water mix. The glycol pressure is 45-100 psi at -5 to 5 degrees. @ xx l/min flow rate	Observatory glycol specification	TBD	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 10:29 AM
FR-1294	weight load on floor	Overall	Functional	Essential	2.1	LSE shall be able to support 40 lbs/in^2 floor load	Observatory safety standard?	Engineering decision by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:30 AM
FR-1295	point load	Overall	Functional	Essential	2.1	LSE shall be able to support xxx lbs/in^2 point load.	Observatory safety standard?	Engineering decision by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:31 AM
FR-1296	AC Power format	Overall	Functional	Essential	2.1	LSE shall have sufficient power for the laser, laser electronics, diagnostics, lights, internal HVAC equipment to maintain routine operation. The power shall be 3 ph. 208 VAC.	Power supply requirement	Engineering decision by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:32 AM
FR-1297	AC Power	Overall	Functional	Essential	2.1	LSE shall provide xx KW.	Power supply requirement	Engineering decision by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:18 AM
FR-1298	Access	Overall	Functional	Essential	2.1	The LSE shall provide sufficient space for maintenance of the laser. Such space shall also include area for auxiliary equipment such as computer monitors and keyboards. This	Storage and ease of maintenance	Engineering decision by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:32 AM

Key	Name	Sect	Cat	Priority	WBS	Description	Rationale	Traceability	Status	Version	Verification	Originator	Last Modified
						will depend on the maintenance requirements of the laser.							
FR-1299	Auxiliary equipment	Overall	Functional	Essential	2.1	The LSE shall provide auxiliary equipment such as dry nitrogen for cleaning of optical components or vacuum equipment rated with the proper filters.	Power supply requirement	Engineering decision by JC	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 10:33 AM
FR-1300	Environmental Controls	Overall	Environmental	Essential	2.1	The LSE shall have the following control points: Laser bench area temperature and laser bench area relative humidity	laser vendor specs for Gemini and K1 laser	K1 and Gemini documentation	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 11:39 AM
FR-1301	Environmental monitoring	Overall	Environmental	Essential	2.1	The LSE shall have the following monitor points: Laser room particulates, bench area temperature, bench area RH, gowning area temperature, Gowning area RH	laser vendor specs for Gemini and K1 laser	K1 and Gemini documentation	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 11:39 AM
FR-1302	Exterior laser status lights	Overall	Safety	Essential	2.1	The LSE shall provide status indicators on the outside of the enclosure. These indicators are for personnel to determine the laser status prior to entry. The indicators shall be momentary if any light source is used to not contaminate the environment.	Safety, laser status.	K1 and Gemini documentation	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 11:39 AM
FR-1303	Access for laser installation into enclosure	Overall	Environmental	Essential	2.1	The LSE shall provide the proper environment allowing the installation of the laser. This will dependent on the laser. The environment may include removable ceilings, floor contact points or supports as required by the laser manufacturer.	Laser installation ease, logistics	Engineering decision made by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 11:40 AM
FR-1304	Output for laser beam	Overall	Functional	Essential	2.1	The LSE shall provide a proper output for the laser beam as required by the laser manufacturer.	needed to meet laser BTO throughput requirements based on prescription by the laser vendor	Engineering decision made by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:40 AM
FR-1305	Auxiliary equipment	Overall	Functional	Essential	2.1	The LSE shall provide any additional auxiliary equipment such as pneumatics or dry nitrogen as required by the laser.	access to dry nitrogen for cleaning, positive pressure etc., extra infrastructure	Engineering decision made by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:40 AM
FR-1306	Vibration transmitted to observatory	Overall	Functional	Essential	2.1	The design of the LSE shall use best engineering practices in order to minimize vibrations that may be transmitted to the telescope. In particular, the design of the LSE shall vibration isolate any active components such as fans, pumps, and motors.	Observatory standards	WMKO documentation	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:41 AM
FR-1307	Fit and finish	Overall	Functional	Essential	2.1	The LSE shall be fabricated to remove all sharp edges. The fit and finish shall comply to TBD standards.	Observatory standards	WMKO documentation	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:42 AM
FR-1308	Network communication	Overall	Functional	Essential	2.1	Network communications: The LSE shall provide a minimum of TBD network ports for operation of the laser and auxiliary equipment.	Internet access, computing infrastructure	Engineering decision made by JC	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 10:42 AM
FR-1309	telephone	Overall	Functional	Essential	2.1	Phone communications: The LSE shall provide a telephone	Phone access, safety (radio signals interfere with	Engineering decision made by JC	Draft	1.0	Demonstration	Jason Chin,	Mar 6, 2009 10:43 AM

Key	Name	Sect	Cat	Priority	WBS	Description	Rationale	Traceability	Status	Version	Verification	Originator	Last Modified
						line for operation of the laser	modelockers and other RF devices in the laser).					Viswa Velur	
FR-1310	lighting	Overall	Safety	Essential	2.1	Lighting: The LSE shall provide lighting at a minimum of 2 watts / sq ft.	Safety and ergonomics	Engineering decision made by JC	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 11:41 AM
FR-1311	Exterior laser status lights	Overall	Safety	Essential	2.1	Hardware Status: The LSE shall provide status on doors, access ports, emergency stops in a suitable format to the laser safety system for interlocking the laser beam.	Safety requirement	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:41 AM
FR-1312	Electrical outlets	Overall	Functional	Essential	2.1	Electrical Outlets: The LSE shall provide TBD outlets for the laser and auxiliary equipment.	Efficient use of LSE space, minimizing electrical cords.	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:44 AM
FR-1314	Cable routing	Overall	Functional	Desireable	2.1	Cable routing: The LSE may provide cable chases to support cable and wire routing.	Observatory standards	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:45 AM
FR-1315	Fall restraints	Overall	Safety	Essential	2.1	Mechanical: The LSE shall provide restraint railings to meet OSHA requirements.	Safety, Observatory standards	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 11:42 AM
FR-1316	Yield strength	Overall	Safety	Essential	2.1	Mechanical: The LSE shall be designed and constructed to a minimum safety factor of 4 on yield strength for all structural elements.	Safety, Observatory standards	Engineering decision made by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 11:42 AM
FR-1317	Ladder	Overall	Functional	Essential	2.1	Mechanical: The LSE shall provide a ladder to the roof if access to the roof of the LSE is necessary. The ladder may require additional caging to protect personnel during ascent and descent if deemed necessary by the Safety Officer.	Safety, Observatory standards	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:47 AM
FR-1318	Weight load on roof	Overall	Functional	Essential	2.1	Mechanical: The roof of the LSE shall be able to support 2 personnel and its environmental controller such as HVAC as necessary.	Safety, Observatory standards	Engineering decision made by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 10:47 AM
FR-1320	Light tight	Overall	Functional	Essential	2.1	Class IV laser: The LSE shall be light tight to contain a class IV laser environment.	Safety, Observatory standards	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:48 AM
FR-1321	Interior finish	Overall	Functional	Essential	2.1	Class IV laser: The inside of the LSE shall be a surface to suitable for a Class IV Laser.	Safety, Observatory standards	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 10:50 AM
FR-1322	Emergency lighting	Overall	Safety	Essential	2.1	Electrical: The LSE shall have emergency lighting for egress in case of power failure.	Safety, Observatory standards	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:43 AM
FR-1323	Emergency laser stop	Overall	Safety	Essential	2.1	Electrical: The LSE shall provide emergency stop buttons to terminate laser light.	Safety.	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:43 AM
FR-1324	Smoke detectors	Overall	Safety	Essential	2.1	Environmental: The LSE shall provide smoke detectors with an audible alert located on the exterior of the LSE. The	Fire safety	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:43 AM

Key	Name	Sect	Cat	Priority	WBS	Description	Rationale	Traceability	Status	Version	Verification	Originator	Last Modified
						smoke detectors shall be tied to safety system to terminate the laser.							
FR-1325	Fire extinguishers	Overall	Safety	Essential	2.1	Environmental: The LSE shall provide appropriate fire extinguishers inside and outside of the laser room.	Fire safety	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 11:43 AM
FR-1326	Oxygen deficiency alarms	Overall	Safety	Essential	2.1	Environmental: The LSE may have a standalone oxygen monitor unit to alert personnel of a low oxygen environment. The notifier shall be on both the inside and outside of the LSE when the oxygen level is lower than 19.5%. The determination will be made by the Safety Officer based on confined space criteria.	Personnel safety	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:44 AM
FR-1327	Video Camera	Overall	Safety	Essential	2.1	Environmental: The LSE may provide a camera inside the LSE to be viewed remotely if deemed necessary by the Safety Officer.	Personnel safety	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:44 AM
FR-1328	Gycol fittings	Overall	Functional	Essential	2.1	Mechanical: The LSE shall use Parker Hannifin series FS quick disconnects for glycol fitting.	Observatory standards	Engineering decision made by JC	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 11:23 AM
FR-1329	pneumatic fittings	Overall	Functional	Essential	2.1	Mechanical: The LSE pneumatic connections shall be TBD.	Observatory standards	Engineering decision made by JC	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 11:24 AM
FR-1330	Electical panel	Overall	Functional	Essential	2.1	Electrical: The LSE shall have a single electrical panel on the outside of the LSE for all power entering the LSE. This panel shall provide the properly sized breakers for individual connections within the LSE.	-	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:25 AM
FR-1331	Network cables	Overall	Functional	Essential	2.1	Electrical: The LSE shall have a CAT5 cable with RG45 connections for network access.	Observatory standards for Ethernet communication	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 11:32 AM
FR-1332	Phone connection	Overall	Functional	Essential	2.1	Electrical: The LSE shall have a TBD phone connection that is standardize with the observatory environment.	Observatory standard for phone line	Engineering decision made by JC	Draft	1.0	Test	Jason Chin, Viswa Velur	Mar 6, 2009 11:34 AM
FR-1333	Maintenance	Overall	Reliability	Essential	2.1	Service and maintenance requirements: The LSE shall be designed to minimize the effort required to maintain the LSE. An acceptable level of effort is defined as not to exceed 4 hours of maintenance / month by 2 personnel.	Service personnel allocation	Engineering decision made by JC	Draft	1.0	Analysis	Jason Chin, Viswa Velur	Mar 6, 2009 11:34 AM
FR-1334	calibration oxygen sensor	Overall	Reliability	Essential	2.1	Service and maintenance requirements: 1. Calibration service of the Oxygen Sensor (Quarterly: 1 Hr)	Service personnel allocation	Engineering decision made by JC	Draft	1.0	Demonstration	Jason Chin, Viswa Velur	Mar 6, 2009 11:35 AM
FR-1339	Operational lifetime	Overall	Reliability	Essential	2.1	Reliability: All components of the LSE shall have a lifetime of 10 years except for consumables. The list of consumables	Reliability, MTBF	Engineering decision made by JC	Draft	1.0	Inspection	Jason Chin, Viswa Velur	Mar 6, 2009 11:38 AM

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						and their individual lifetime must be provided as part of documentation.							