

LSST Baseline Configuration-  
December 2007

System

Comments/Notes/Source

Science Missions	1. Dark energy 2. Solar system map 3. Optical transients 4. Galactic map	From SRD Document-4196
System first light schedule	Fall 2015	System with fully populated science camera; Post CoDR debrief with NSF
Telescope first light schedule	Spring 2014	
Sky coverage	20,000 degrees <sup>2</sup> (General Survey)	3-mirror telescope with commissioning camera From SRD Document-4169
Standard cadence (per visit)	15+1 s expose/shutter + 2 s read + 15+1 s expose/shutter + 5 s slew/read = 39 s total	From MREFC Proposal and Cadence Simulation Studies Note: For a 1 second shutter open/close time 16 seconds of elapsed time is required for a 15 second exposure.
Etendue (AΩ)	319 meter <sup>2</sup> degrees <sup>2</sup>	v3.1 LSST Baseline Optical Design (Collection-886)
Field of View	3.5 degrees (9.6 square degrees)	Document-456 (Optical Design History)
Effective clear aperture (On-Axis)	6.68 m (adjusted for obscuration)	v3.1 LSST Baseline Optical Design (Collection-886)
Wavelength coverage (Full response)	320nm to 1080nm	MREF Proposal (Figure 2-2)
Number of active filters in camera	Five	From SRD Document-4169
Initial filter set (FWHM points - nm)	u: 330 - 403 nm g: 403 - 552 nm r: 552 - 691 nm i: 691 - 818 nm z: 818 - 922 nm y3: 970 - 1015 nm	Re-optimized filter transmission functions Collection-TBD
Link to Science Req'd Document	<a href="#">Document-4169</a>	From SRD Document-4169
Link to LSST Public Site	<a href="http://www.lsst.org">http://www.lsst.org</a>	

Telescope and Site

Optical Configuration	3-mirror modified Paul-Baker with 3 element refractive corrector	v3.1 LSST Baseline Optical Design (Collection-886)
Final f-ratio	f/1.234	v3.1 LSST Baseline Optical Design (Collection-886)
Plate scale	50.9 microns/arcsec	v3.1 LSST Baseline Optical Design (Collection-886)
Image diameter at focal plane	64 cm	v3.1 LSST Baseline Optical Design (Collection-886)
Mount configuration	Alt - Azimuth	MREFC Proposal (Figure 4-11)
Primary mirror diameter (physical)	8.40 m	MREFC Proposal (Figure 4-16)
Primary mirror optical aperture	8.36 m	v3.1 LSST Baseline Optical Design (Collection-886)
Secondary mirror diameter	3.40 m	v3.1 LSST Baseline Optical Design (Collection-886)
Tertiary mirror diameter	4.96 m	v3.1 LSST Baseline Optical Design (Collection-886)
Overall system length	6.39 m	v3.1 LSST Baseline Optical Design (Collection-886)
First camera refractive lens diam	1.55 m	v3.1 LSST Baseline Optical Design (Collection-886)
Residual design aberrations (mean 80% encircled energy diameter for each filter band)	u: 0.26 arcsec g: 0.26 arcsec r: 0.18 arcsec i: 0.18 arcsec z: 0.19 arcsec Y: 0.20 arcsec	v3.1 LSST Baseline Optical Design (Collection-886) Includes diffraction

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Time between Visits ( <i>average, shutter close to shutter open at new sky position, includes filter changes, telescope settling, optical alignment, etc.</i> )	<10 seconds	From Cadence Simulator Studies (Collection-536)
Atmospheric dispersion corrector	Not required	Trade study 8/04 ( <a href="https://www.lsstcorp.org/docushare/dsweb/View/Collection-894">https://www.lsstcorp.org/docushare/dsweb/View/Collection-894</a> )
Candidate sites	Cerro Pachon, Chile	LSST Board Approval of Selection Committee Recommendation ( <i>need ref</i> )
Link to Optical Design	<a href="https://www.lsstcorp.org/docushare/dsweb/View/Collection-886">https://www.lsstcorp.org/docushare/dsweb/View/Collection-886</a>	
Link to Telescope Figures	<a href="#">Document-3784</a>	CoDR plenary presentation

**Camera (includes focal plane, electronics, refractive corrector lenses, shutter, filters, filter mechanism, dewar, body)**

Pixel count	3.2 Gpixels	90% fill of 10 sq deg FOV with 10 micron pitch pixels
Pixel pitch	10 microns	MREFC Proposal & Camera Requirements (Document-1153)
Readout time	2 sec	From detector spec ( <i>need ref</i> )
Dynamic range	16 bits	MREFC Proposal & Camera Requirements (Document-1153)
Nominal exposure time	15 seconds	From SRD Document-4169 (Single Visit Depth, D1) & LSST Exposure Time Calculator
Focal plane temperature	-100 °C	MREFC Proposal & Camera Requirements (Document-1153)
Camera rotation range	±90 degrees	From SRD Document-4169
Focal plane device configuration	4-side buttable, >90% fill factor	MREFC Proposal & Camera Requirements (Document-1153)
Filter change time	120 seconds	From SRD Document-4169
Link to Camera Figures	<a href="#">Document-4072</a>	CoDR plenary presentation

**Data Management**

Real-time alert latency	60 seconds	From SRD Document-4169
Nightly data generation rate: Raw pixel data from camera (24 hrs) Image through pipelines Archived images + metadata Catalogs (transient phenomena)	15 TB (16 bit) 30 TB raw science (32 bits) + 108 TB (32 bit) intermediate images 15 + 1 TB (32 bits compressed to 16 bits) 2 TB (32 bit compressed to 16 bits)	Estimated baseline values
Data release volume (average per release): Source Catalog Deep Object Catalog	500 TB 60 TB	Estimated baseline value
Yearly data archive rate (average): Images Catalogs Metadata	5.6 PB 0.6 PB 0.6 PB	Estimated baseline value
Total digital storage Summit / Telescope site La Serena Base Facility Archive center (Catalogs) Archive center (Images) Archive Center Cache and Spare Data Access Centers (data replication)	100 TBytes (4 nights + spare capacity, fixed over 10 yrs) 200 TBytes (4 nights + spare capacity, fixed over 10 yrs) 14 PBytes (1 catalog release per year (2 in yr 1) over 10 yrs w/indices) 56 PBytes (total image archive) 5 Pbytes (total over 10 yrs)	Estimated baseline values

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Nominal computational req'mnt At telescope site At base site At archive center At data access centers for users	<1 Tflop 25 Tflop 100 Tflop 44 TFLOPS (total all DACs)	Estimated baseline values
Communications Bandwidth Telescope to base site Base site to archive Archive to Data Access Centers Data Access Centers to end users	10 Gbits / sec 2.5 Gbits/sec avg, 10 Gbits/sec burst 10 Gbits/sec (total) 16 Gbits/sec (total)	Estimated baseline values
Link to Data Management figures	<a href="#">Document-4007</a>	CoDR plenary presentation