Vera C. Rubin Observatory
Data Management

LVV-P128: LDM-503-19 (All P1a and 1b DM requirements verified) Test Plan and Report

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DMTR-441

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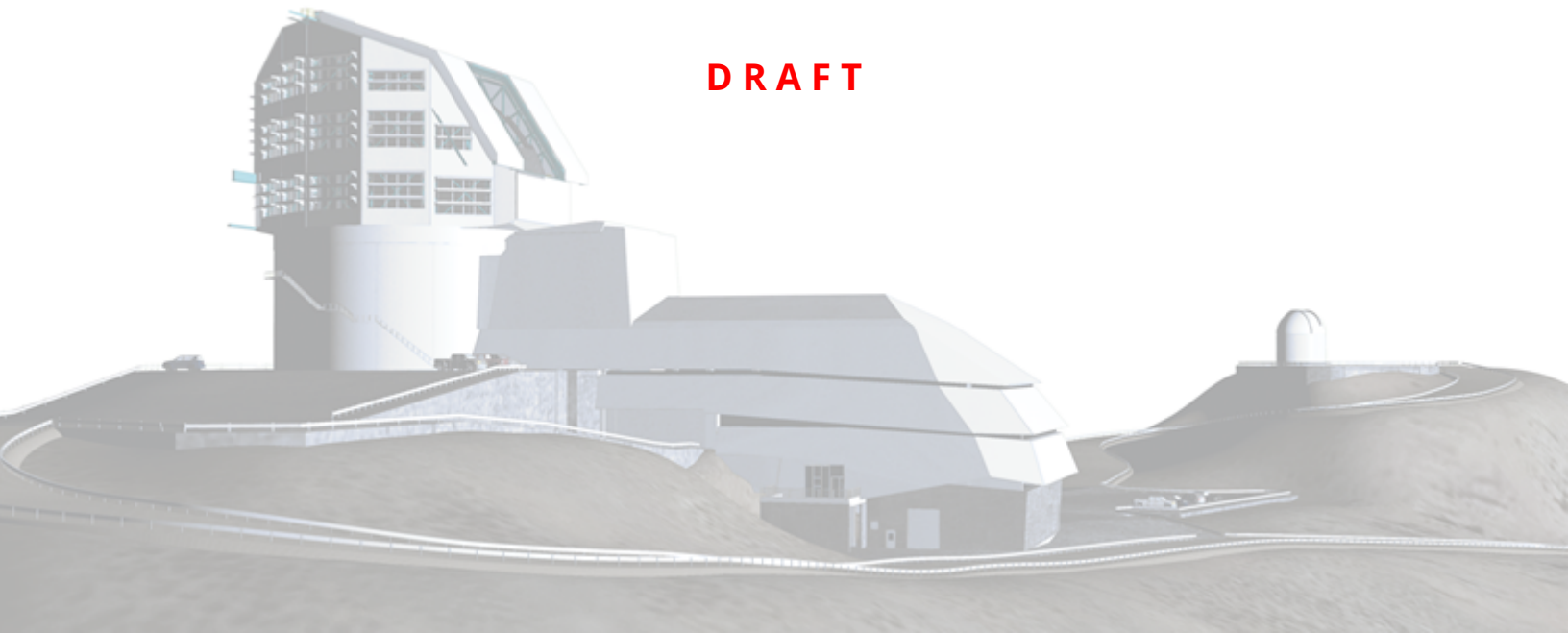

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Abstract

This is the test plan and report for **LDM-503-19 (All P1a and 1b DM requirements verified)**, an LSST milestone pertaining to the Data Management Subsystem.
This document is based on content automatically extracted from the Jira test database on 2025-10-13 . The most recent change to the document repository was on 2025-10-13.

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Change Record

Version	Date	Description	Owner name
	2024-11-08	First draft	Jeffrey Carlin

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1 Introduction

1.1 Objectives

This DM acceptance test campaign will verify all DM priority 1a and 1b requirements that have not been verified as part of prior testing and milestones.

1.2 System Overview

This test campaign is intended to verify that the DM system satisfies all of the priority 1a and 1b requirements outlined in the Data Management System Requirements (DMSR; LSE-61), ensuring that we are progressing toward readiness for LSSTCam on-sky observing. Additional DMSR requirements (priorities 2 and 3) will be verified in later Acceptance Test Campaigns.

Applicable Documents:
LSE-61: Data Management System (DMS) Requirements
LDM-503 Data Management Test Plan
LDM-639: Data Management Acceptance Test Specification

Tests in this campaign will use data products and artifacts from Data Preview 0.2, which consists of DESC Data Challenge 2 (DC2) simulated data reprocessed using the LSST Science Pipelines, on-sky data from auxTel and LSSTComCam imaging campaigns, precursor data from Subaru+HyperSuprime-Cam (HSC), and camera test-stand data, when appropriate.

1.3 Document Overview

This document was generated from Jira, obtaining the relevant information from the LVV-P128 Jira Test Plan and related Test Cycles (LVV-R293).

Section 1 provides an overview of the test campaign, the system under test (Acceptance), the applicable documentation, and explains how this document is organized. Section 2 provides

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additional information about the test plan, like for example the configuration used for this test or related documentation. Section 3 describes the necessary roles and lists the individuals assigned to them.

Section 4 provides a summary of the test results, including an overview in Table 2, an overall assessment statement and suggestions for possible improvements. Section 5 provides detailed results for each step in each test case.

The current status of test plan LVV-P128 in Jira is **Approved** .

1.4 References

[1] **[DMTN-140]**, Comoretto, G., 2021, *Documentation Automation for the Verification and Validation of Rubin Observatory Software*, Data Management Technical Note DMTN-140, NSF-DOE Vera C. Rubin Observatory, URL https://dmtn-140.lsst.io/

[2] **[DMTN-178]**, Comoretto, G., 2021, *Docsteady Usecases for Rubin Observatory Constructions*, Data Management Technical Note DMTN-178, NSF-DOE Vera C. Rubin Observatory, URL https://dmtn-178.lsst.io/

[3] **[LSE-61]**, Dubois-Felsmann, G., Jenness, T., 2019, *Data Management System (DMS) Requirements*, Systems Engineering Controlled Document LSE-61, NSF-DOE Vera C. Rubin Observatory, URL https://lse-61.lsst.io/, doi:10.71929/rubin/2587200

[4] **[LDM-639]**, Guy, L., Wood-Vasey, W., Bellm, E., et al., 2022, *LSST Data Management Acceptance Test Specification*, Data Management Controlled Document LDM-639, NSF-DOE Vera C. Rubin Observatory, URL https://ldm-639.lsst.io/

[5] **[LDM-142]**, Kantor, J., 2017, *Network Sizing Model*, Data Management Controlled Document LDM-142, NSF-DOE Vera C. Rubin Observatory, URL https://ls.st/LDM-142

[6] **[LDM-503]**, O'Mullane, W., Swinbank, J., Juric, M., et al., 2023, *Data Management Test Plan*, Data Management Controlled Document LDM-503, NSF-DOE Vera C. Rubin Observatory, URL https://ldm-503.lsst.io/

[7] **[LSE-160]**, Selvy, B., 2013, *Verification and Validation Process*, Systems Engineering Con-

trolled Document LSE-160, NSF-DOE Vera C. Rubin Observatory, URL https://ls.st/LSE-160

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2 Test Plan Details

2.1 Data Collection

Observing is not required for this test campaign.

2.2 Verification Environment

Most testing will be performed using the Rubin Science Platform (RSP) and the development cluster at the USDF. All tests will use the most recent available version of the Pipelines.

2.3 Entry Criteria

None

2.4 Exit Criteria

None

2.5 Related Documentation

Docushare collection where additional relevant documentation can be found:

- None

2.6 PMCS Activity

Primavera milestones related to the test campaign: None

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3 Personnel

The personnel involved in the test campaign is shown in the following table.

	T. Plan LVV-P128 owner:	**Jeffrey Carlin**	
	T. Cycle LVV-R293 owner:	**Jeffrey Carlin**	
Test Cases	**Assigned to**	**Executed by**	**Additional Test Personnel**
LVV-T194	Jeffrey Kantor	Cristián Silva	Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LVV-T193	Jeffrey Kantor	Cristián Silva	Josh Hoblitt (Rubin Obs), Renata Frez (FIU/AmLight), Matt Kollross (NCSA)
LVV-T188	Jeffrey Kantor	Cristián Silva	Jeff Kantor (LSST)
LVV-T186	Jeffrey Kantor	Cristián Silva	Ron Lambert (LSST), Guido Maulen (LSST)
LVV-T185	Jeffrey Kantor	Cristián Silva	Ron Lambert (LSST)

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4 Test Campaign Overview

4.1 Summary

T. Plan LVV-P128:	**LDM-503-19 (All P1a and 1b DM requirements verified)**			Approved
T. Cycle LVV-R293:	**LDM-503-19 (All P1a and 1b DM requirements verified)**			In Progress
Test Cases	**Ver.**	**Status**	**Comment**	**Issues**
LVV-T194				
Execution	LVV-E3833	Pass	None	
LVV-T193				
Execution	LVV-E3834	Pass	None	
LVV-T188				
Execution	LVV-E3835	Pass	None	
LVV-T186				
Execution	LVV-E3837	Pass	None	
LVV-T185				
Execution	LVV-E3838	Pass	None	

Table 2: Test Campaign Summary

4.2 Overall Assessment

None

4.3 Recommended Improvements

None

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5 Detailed Test Results

5.1 Test Cycle LVV-R293

Open test cycle *LDM-503-19 (All P1a and 1b DM requirements verified)* in Jira.

Test Cycle name: LDM-503-19 (All P1a and 1b DM requirements verified)
Status: In Progress

Test campaign supporting milestone LDM-503-19 -- all P1a and 1b requirements verified.

5.1.1 Software Version/Baseline

Not provided.

5.1.2 Configuration

Not provided.

5.1.3 Test Cases in LVV-R293 Test Cycle

5.1.3.1 LVV-T194 - Verify implementation of Base to Archive Network Availability

Version **1.0(d)**. Status **Draft**. Open *LVV-T194* test case in Jira.

Verify the availability of the Base to Archive Network communications by demonstrating that it meets or exceeds a mean time between failures, measured over a 1-yr period of MTBF > baseToArchNetMTBF (180[day])

Preconditions:

1. Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with

simulated or pre-cursor data, running on end node computers that are the production hardware or equivalent to it.
2. Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network, running on end node computers that are the production hardware or equivalent to it.
3. At least 6 months of historical monitoring data on this link is available.
4. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Execution status: **Pass**
Final comment:
None

Detailed steps results LVV-R293-LVV-E3833-1319223103:

Step LVV-E3833-1 Step Execution Status: **Pass**

Description
Transfer data between base and archive over uninterrupted 1 week period.

Test Data
LATISS, ComCAM, or FullCAM data.

Expected Result
Data is successfully transferred during the entire week.

Actual Result
Data has been successfully transfered from Summit to USDF for several weeks.

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Step LVV-E3833-2 Step Execution Status: **Pass**

Description

Analyze monitoring/performance data, compare to historical data, and extrapolate to a full year, average and peak throughput and latency.

Test Data

NA

Expected Result

Extrapolated network availability meets baseToArchNetMTBF = 180[day]. Note that this is for complete loss of transfer service (all paths), not a single path failure with successful fail-over.

Actual Result

Since the installation of the perfsonar at SLAC (May 2024) and up to December 2024, there has been no complete loss of transfers.

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5.1.3.2 LVV-T193 - Verify implementation of Base to Archive Network

Version **1.0(d)**. Status **Draft**. Open *LVV-T193* test case in Jira.

Verify that the data acquired by a DAQ can be transferred within the required time, i.e. verify that link is capable of transferring image for prompt processing in oArchiveMaxTransferTime = 5[second], i.e. at or exceeding rates specified in LDM-142.

Preconditions:

1. Archiver/Forwarders are configured at Base, connected to REUNA DWDM, loaded with simulated or pre-cursor data, running on end node computers that are the production hardware or equivalent to it.

2. Archiver/Forwarder receivers or other capability is on configured at LDF, connected to Base - Archive Network, running on end node computers that are the production hardware or equivalent to it.
3. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Execution status: **Pass**
Final comment:
None

Detailed steps results LVV-R293-LVV-E3834-1319223104:

Step LVV-E3834-1 Step Execution Status: **Pass**

Description
Transfer data between base and archive while monitoring the network over uninterrupted 1 day period (with repeated transfers on normal observing cadence).

Test Data
LATISS, ComCAM, or FullCAM data.

Expected Result
Data transfers occur without significant delay or frequent latency spikes.

Actual Result
Summit has been regularly sending ComCam data to USDF. The following is the transfer rate of the LHN link during the first week of November 2024
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Step LVV-E3834-2 Step Execution Status: **Pass**

Description

Analyze the network logs and monitoring system to determine average and peak latency and packet loss statistics.

Test Data

None

Expected Result

Data can be transferred within the required time, i.e. verify that link is capable of transferring image for prompt processing in oArchiveMaxTransferTime = 5[second]. Verify transfer of data at or exceeding rates specified in LDM-142 at least 98% of the time.

Actual Result

Link is capable of sending data below the 5 seconds mark. The following is a benchmark of 10 nodes sending 25 files each of 20MB.

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5.1.3.3 LVV-T188 - Verify implementation of Summit to Base Network Ownership and Operation

Version **1.0(d)**. Status **Approved**. Open *LVV-T188* test case in Jira.

Verify Summit to Base Network Ownership and Operation by LSST and/or the operations entity by inspection of construction and operations contracts and Indefeasible Rights.

Preconditions:

1. As-built documentation for all of the above contracts and IRUs is available.

Execution status: **Pass**

Final comment:

None

Detailed steps results LVV-R293-LVV-E3835-1319223105:

Step LVV-E3835-1 Step Execution Status: **Pass**

Description

Examine contracts with REUNA and telefonica for fiber ownership and maintenance terms.

Test Data

None

Expected Result

Rubin Observatory is owner of fibers on AURA property and Summit - Base DWDM and has 15-year IRU for use of fibers on all segments. REUNA is owner of LS - SCL DWDM on AURA property and in Santiago, and is operator on all fibers and DWDM. Telefonica is contracted to maintain fibers not on AURA property.

Actual Result

Contract CH2015-314 named ”Contrato por servicio Redes de fibra óptica” , Annex 1 specifies the following : ”Un IRU de un enlace con ruta diversa al canal de fibra optica de por lo menos 40Gbps por un periodo de 15 años desde 30 de Nov. de 2019 al 30 de Sept. de 2034.....”

In the point ”Octavo” , Reuna is defined as the single responsible for the operation and maintenance of the link.

5.1.3.4 LVV-T186 - Verify implementation of Summit to Base Network Reliability

Version **1.0(d)**. Status **Draft**. Open *LVV-T186* test case in Jira.

Verify the reliability of the summit to base network by demonstrating reconnection and recovery to transfer of data at or exceeding rates specified in LDM-142 following a cut in network connection, within MTTR specification. The network operator will provide MTTR data on links during commissioning and operations.

Preconditions:

1. PMCS DMTC-7400-2400 Complete
2. As-built documentation for Summit - Base Network is available.

NOTE: After the initial test, the corresponding verification elements will be flagged as “Requires Monitoring” such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Execution status: **Pass**
Final comment:
None

Detailed steps results LVV-R293-LVV-E3837-1319223109:

Step LVV-E3837-1 Step Execution Status: **Pass**

Description
Disconnect fiber cable at an endpoint location on the base side of the Summit - Base fiber.

Test Data

- LATISS, ComCAM, or LSSTCam data

Expected Result
Fiber is disconnected and the fault is detected by the network monitoring system.

Actual Result
Fiber cut was detected and reported
”• Fecha y Hora de inicio: 09:04 (GMT-3), Viernes 16 de Febrero de 2024. (Fecha del mensaje Viernes 16 de febrero de 2024, 10:06 AM)
• Mensaje N°: 01

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• Descripción del problema: Informamos que detectamos una **falla** en el Enlace Principal Santiago - La Serena, en el tramo **La Serena - Vicuña**. Ya hemos tomado contacto con proveedor para generar un caso, saber las causas del evento y obtener una pronta solución a este inconveniente"

Step LVV-E3837-2 Step Execution Status: **Pass**

Description

Measure the cable with the OTDR to locate the distance from the end point. Diagnose that it is a break.

Test Data

NA

Expected Result

OTDR shows the fiber is disconnected (break).

Actual Result

Location of the fiber cut was identified

"• Fecha y Hora de inicio: 09:04 (GMT-3), Viernes 16 de Febrero de 2024. (Fecha del mensaje Viernes 16 de febrero de 2024, 12:25 PM)

• Mensaje N°: 04

• Descripción del problema: Informamos que el proveedor nos indica que hay un corte de fibra aproximadamente 20kms de La Serena , se deben reemplazar 400 mts de fibra un ETR de 18 hrs."

Step LVV-E3837-3 Step Execution Status: **Pass**

Description

Elapse time to simulate the following:

- Go to the most inaccessible place which would mean carrying all the tools/splicer/generator/tent equipment some metres.
- Erect a tent to make the splice
- Start the generator
- Do a splice on some random piece of cable
- At an end point measure the cable again to ensure it is break free.
- Take down and reinstall an isolated pole (not in the actual fiber path)
- Put the cable on the pole.

Test Data

NA

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Expected Result

Wall clock advances by 24 hours.

Actual Result

Fiber cut was detected in this location, hence a temporary tent was built to fusion the fiber.

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Step LVV-E3837-4 Step Execution Status: **Pass**

Description

Clean fiber connections. Restore connection (e.g. reconnect cable). Cycle equipment as necessary to confirm fiber is connected.

Test Data

NA

Expected Result

Network recovers and resumes sending data.

Actual Result

Network was recovered

"• Fecha y Hora de inicio: 09:04 (GMT-3), Viernes 16 de Febrero de 2024. (Fecha del correo de finalizacion, sabado 17 de Febrero 2024, 10:43 PM)

• Fecha y Hora de término: 17:23 (GMT-3), Viernes 16 de Febrero de 2024

• Tiempo estimado de solución: Pendiente

• Motivo: Pendiente

• Mensaje N°: 08

• Descripción del problema: Proveedor informa que trabajos de reparación finalizaron, por lo tanto, no se esperan nuevas interrupciones en el servicio.

Saludos cordiales desde REUNA."

Step LVV-E3837-5 Step Execution Status: **Pass**

Description

Measure with OTDR to ensure back to normal state.

Test Data

Draft

NA

Expected Result
OTDR indicates normal state.

Actual Result
Service was restored
"• Fecha y Hora de inicio: 09:04 (GMT-3), Viernes 16 de Febrero de 2024. (Fecha del correo de finalizacion, sabado 17 de Febrero 2024, 10:43 PM)
• Fecha y Hora de término: 17:23 (GMT-3), Viernes 16 de Febrero de 2024
• Tiempo estimado de solución: Pendiente
• Motivo: Pendiente
• Mensaje N°: 08
• Descripción del problema: Proveedor informa que trabajos de reparación finalizaron, por lo tanto, no se esperan nuevas interrupciones en el servicio.
Saludos cordiales desde REUNA."

5.1.3.5 LVV-T185 - Verify implementation of Summit to Base Network Availability

Version **1.0(d)**. Status **Draft**. Open *LVV-T185* test case in Jira.

Verify the availability of Summit to Base Network by demonstrating that the mean time between failures is less than summToBaseNetMTBF (90 days) over 1 year.

Preconditions:

1. PMCS DMTC-7400-2400 Complete.
2. 6 months of historical availability data for this link is available.
3. perSonar installed in Summit and publishing statistics to MadDash.
4. As-built documentation for all of the above is available.

NOTE: After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified

but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Execution status: **Pass**
Final comment:
None

Detailed steps results LVV-R293-LVV-E3838-1319223110:

Step LVV-E3838-1 Step Execution Status: **Pass**

Description
Monitor summit to base networking for at least 1 week

Test Data
LATISS, ComCAM, and/or Full Camera data.

Expected Result
Summit - base network is operational for 1 week and monitoring data is collected.

Actual Result
Link meets the condition
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Step LVV-E3838-2 Step Execution Status: **Pass**

Description
Extrapolate annual availability, compare with at least 6 months of historical data on the link.

Test Data
Historical and current logs

Expected Result
The mean time between failures (MTBF) is projected to be less than summToBaseNetMTBF (90 days) over 1 year.

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Actual Result

Link meets the condition, during the last 6 months, there was only 1 outage. The rest are temperature related, and not the link

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A Documentation

The verification process is defined in LSE-160. The use of Docsteady to format Jira information in various test and planing documents is described in DMTN-140 and practical commands are given in DMTN-178.

B Acronyms used in this document

Acronym	Description
AURA	Association of Universities for Research in Astronomy
DAQ	Data Acquisition System
DC2	Data Challenge 2 (DESC)
DESC	Dark Energy Science Collaboration
DM	Data Management
DMS	Data Management Subsystem
DMSR	DM System Requirements; LSE-61
DMTN	DM Technical Note
DWDM	Dense Wave Division Multiplex
FIU	Florida International University
GMT	Giant Magellan Telescope
HSC	Hyper Suprime-Cam
IRU	indefeasible right to use
LATISS	LSST Atmospheric Transmission Imager and Slitless Spectrograph
LDF	LSST Data Facility
LDM	LSST Data Management (Document Handle)
LHN	long haul network
LSE	LSST Systems Engineering (Document Handle)
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
LSSTCam	LSST Science Camera
LSSTComCam	Rubin Commissioning Camera
LVV	LSST Verification and Validation
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair

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NCSA	National Center for Supercomputing Applications
PM	Project Manager
PMCS	Project Management Controls System
REUNA	Red Universitaria Nacional
RSP	Rubin Science Platform
SLAC	SLAC National Accelerator Laboratory
USDF	United States Data Facility

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