CHAPTER 7

LAUNCH SITE

This chapter describes general information on the facilities and services provided by Jiuquan Satellite Launch Center (JSLC).

JSLC is subordinated to China Satellite Launch and Tracking Control General (CLTC). JSLC is mainly used for conducting LEO and SSO missions. JSLC is located in Jiuquan region, Gansu Province, Northwestern China. **Figure 7-0** shows the location of Jiuquan, as well as the layout of JSLC.

Jiuquan is of typical inland climate. The annual average temperature is 8.7ºC. There is little rainfall and thunder in this region.

Dingxin Airport is 75 km southwest to JSLC. The runway of Dingxin Airport is capable of accommodating large aircraft. The Gansu-Xinjiang Railway and the Gansu-Xinjiang Highway pass by JSLC. There are a dedicated railway branch and a highway branch leading to the Technical Centers and the Launch Centers of JSLC.

By using of cable network and communications network, JSLC provides domestic and international telephone and facsimile services for the user.

JSLC consists of headquarter, South Launch Site, North Launch Site, Communication Center, Mission Center for Command and Control (MCCC), Tracking System and other logistic support systems. The North Launch Site is composed of North Technical Center and North Launch Center, which is dedicated for launching Two-stage LM-2C, LM-2C/CTS and LM-2D. The South Launch Site is composed of South Technical Center and South Launch Center, which is mainly used for launching Two-stage LM-2E and LM-2E/ETS, as well as LM-2C.

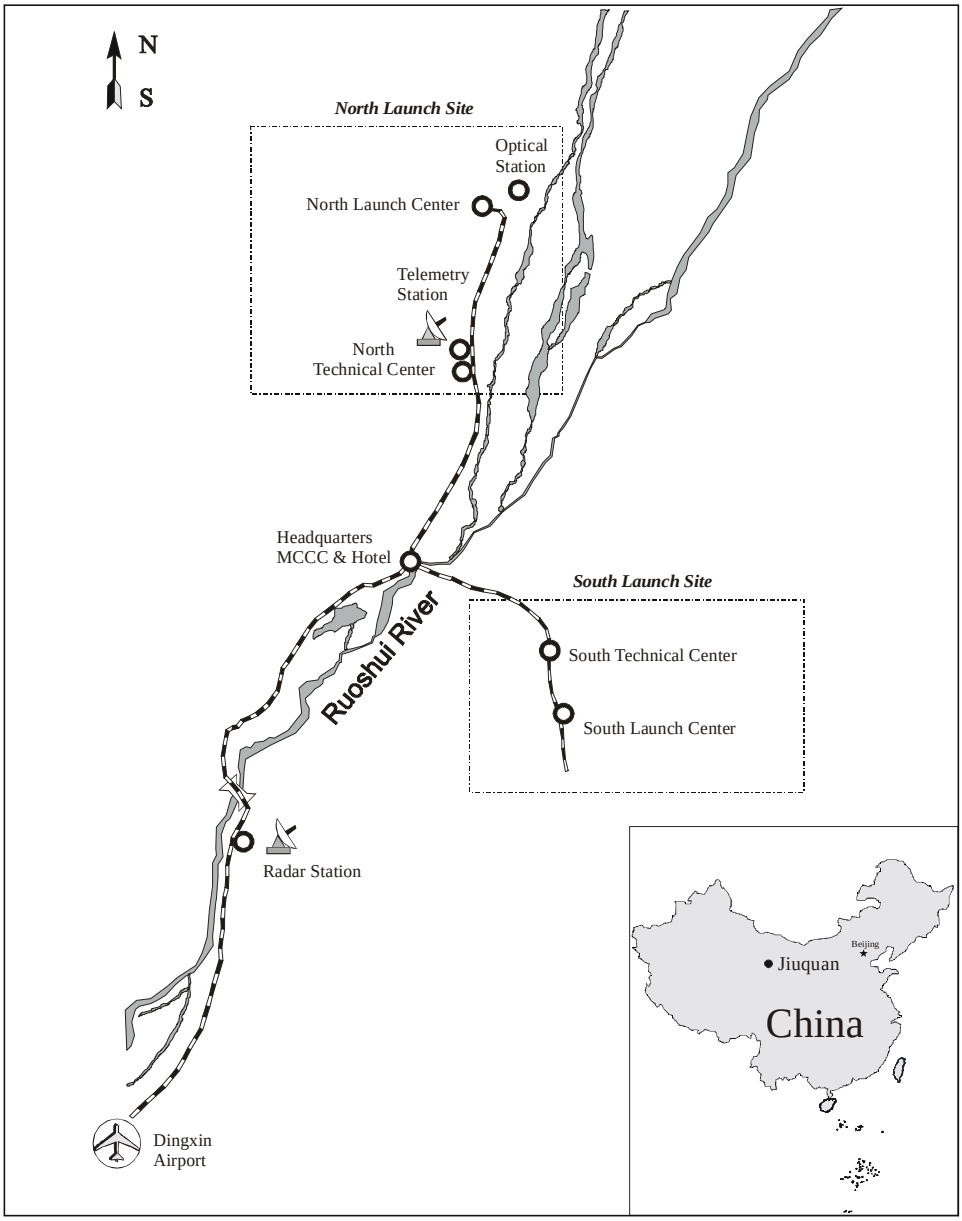

Figure 7-0 JSLC Map

Part A: North Launch Site

A7.1 North Technical Center

The North Technical Center includes LV&SC Processing Building (BLS), Solid Rocket Motor (SRM) Checkout and Processing Building (BM) etc. The LV and the SC will be processed, tested, checked, assembled and stored in North Technical Center. Refer to **Figure A7-1**.

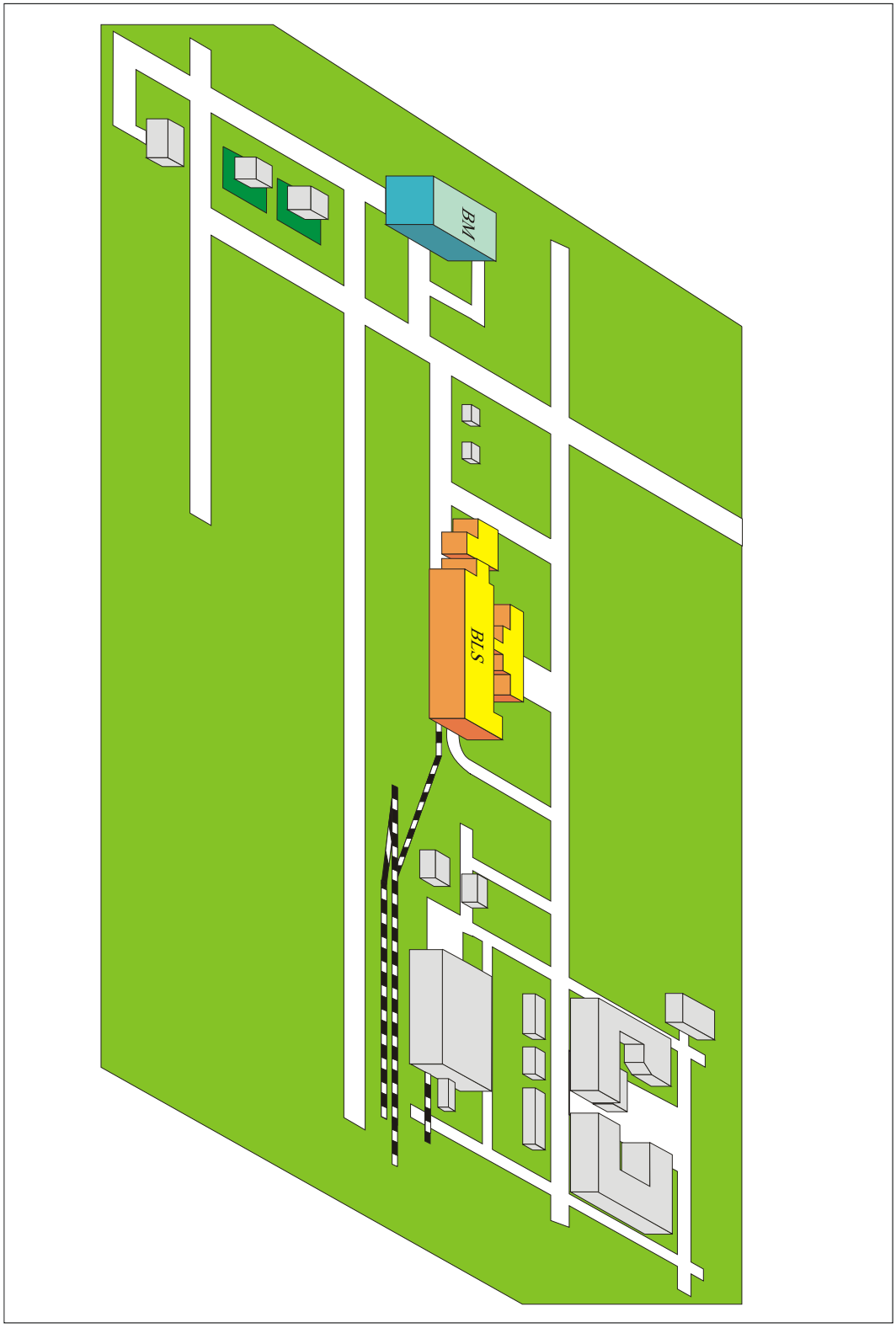

Figure A7-1 JSLC North Technical Center

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A7.1.1 LV&SC Processing Building (BLS)

BL1 is mainly used for transiting the LV, the SC and relevant ground equipment, as well as LV processing, SC processing & fueling, etc. It mainly includes processing hall (BL & BS2), SC fueling hall (BS3), unit testing rooms, and power-supply, gas-supply, air-conditioning and firing alarm & protection systems, etc. The BLS is 140 meters long with total area of 4587 m^2. See **Figure A7-2** for BLS layout.

- Processing Hall (BL&BS2)

The processing hall is 90 meters long, 8 meters wide. The processing hall is the common place for LV and SC testing, the east side is the LV processing hall (BL), and the west is the SC processing hall (BS2). The processing hall is equipped with following facilities:

- ✧ A crane with maximum lifting capability of 16t/3.2t/10m;
- ✧ 380V/220V/50Hz and 110V/60Hz power supply;
- ✧ Air-conditioning system:

  The corresponding environment parameters are:
  - ✓ Temperature: 20±5°C;
  - ✓ Relative humidity: 35%~55%;
  - ✓ Cleanness (class): 100,000.
- ✧ Grounding System;
- ✧ Fire alarm & protection system.

- SC Fueling Hall (BS3)

The SC fueling hall (BS3) is 24 meters long, 8 meters wide. It is equipped with following facilities:

- ✧ An explosion-proof crane with maximum lifting capability of 16t/8m;
- ✧ 380V/220V/50Hz and 110V/60Hz power supply;
- ✧ Air-conditioning system:

  The corresponding environment parameters are:
  - ✓ Temperature: 20±5°C;
  - ✓ Relative humidity: 35%~55%;
  - ✓ Cleanness (class): 100,000.
- ✧ Grounding System;
- ✧ Fire alarm & protection system;

- ✧ SC propellant leak detection room;
- ✧ SC fueling equipment;
- ✧ Shower Room;
- ✧ Rinsing Device;
- ✧ Gas-leaking Alarm;

- Unit-testing Rooms

There are 25 unit-testing rooms along the processing hall. They are mainly used for performing LV and SC unit-testing and also used for storage of the test equipment.

- Clean SC Test Room

A clean room is provided only to the user for SC testing. The temperature inside the room is 20±5°C, relative humidity 35%~55%, and cleanness 100,000 class.

- Other Support Systems

BLS also provides following support systems:

- ✧ 380V/220V/50Hz and 110V/60Hz power supply;
- ✧ Air-conditioning system;
- ✧ Communication system;
- ✧ Fire alarm & protection system;
- ✧ Grounding system;
- ✧ Watch room, offices, conference room and infirmary;

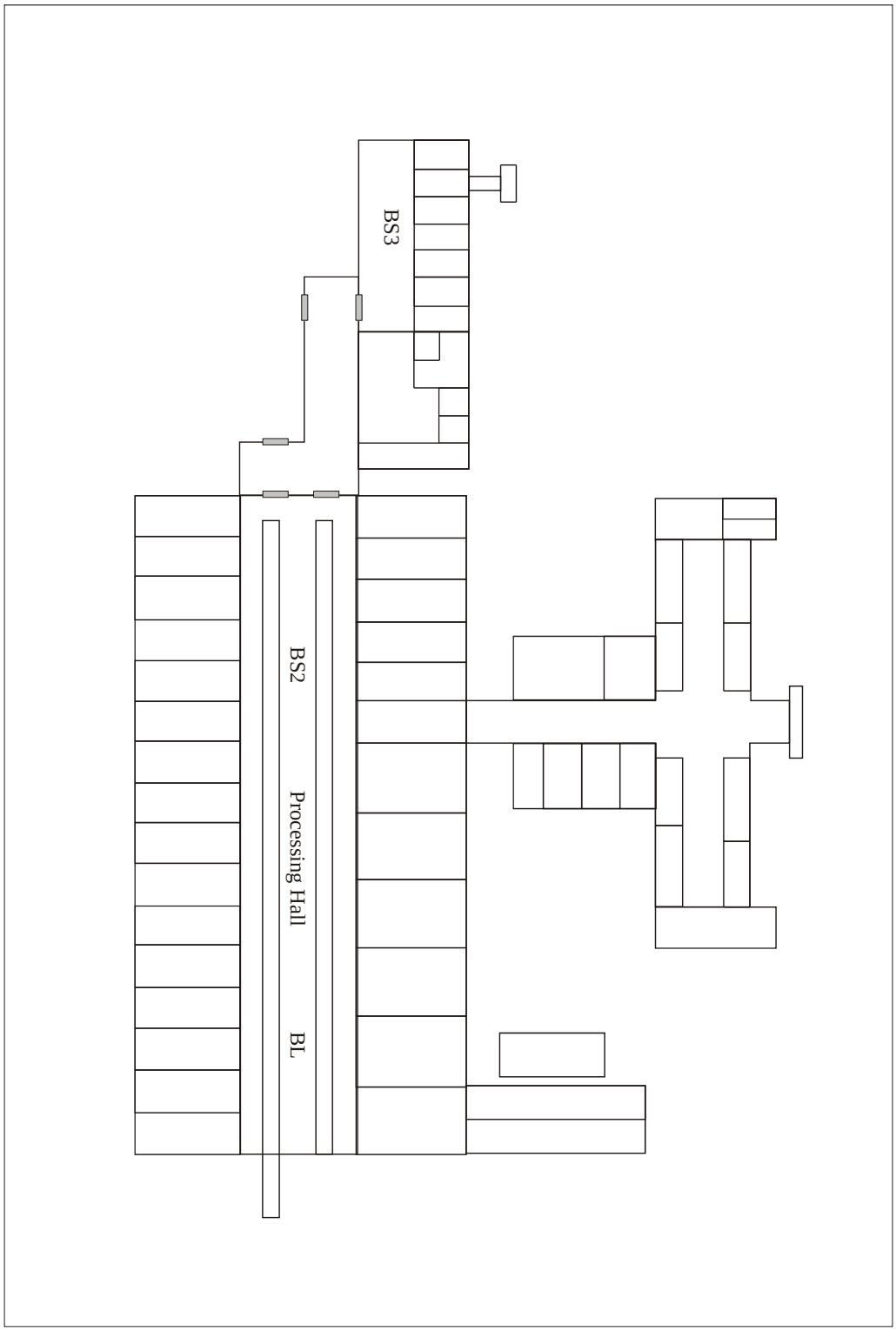

Figure A7-2 Layout of BLS

7-6

A7.1.2 Solid Rocket Motor (SRM) Checkout and Processing Building (BM)

BM is mainly used for SRM assembly, testing and short-time storage. The BM includes SRM processing hall, SRM storage room, testing rooms, and air-conditioning, power-supply, fire protection & alarm, telecommunication systems. See **Figure A7-3** for BM layout.

- SRM Processing Hall

The SRM processing hall is 24 meters long, 12 meters wide. It is equipped with following facilities:

- ✧ An explosion-proof double-speed crane with maximum lifting capability of 16t/3.2t/10m;
- ✧ 380V/220V/50Hz and 110V/60Hz power supply;
- ✧ Air-conditioning system:

  The corresponding environment parameters are:
  - ✓ Temperature: 20±5°C;
  - ✓ Relative humidity: 35%~55%;
  - ✓ Cleanness (class): 100,000.
- ✧ Grounding System;
- ✧ Fire alarm & protection system.

- SRM Storage Room

The total area of the SRM storage room is 36 m^2, the temperature is 20±5°C, and the relative humidity is 35%~55%.

- Testing Rooms

There are 3 testing rooms inside the BM.

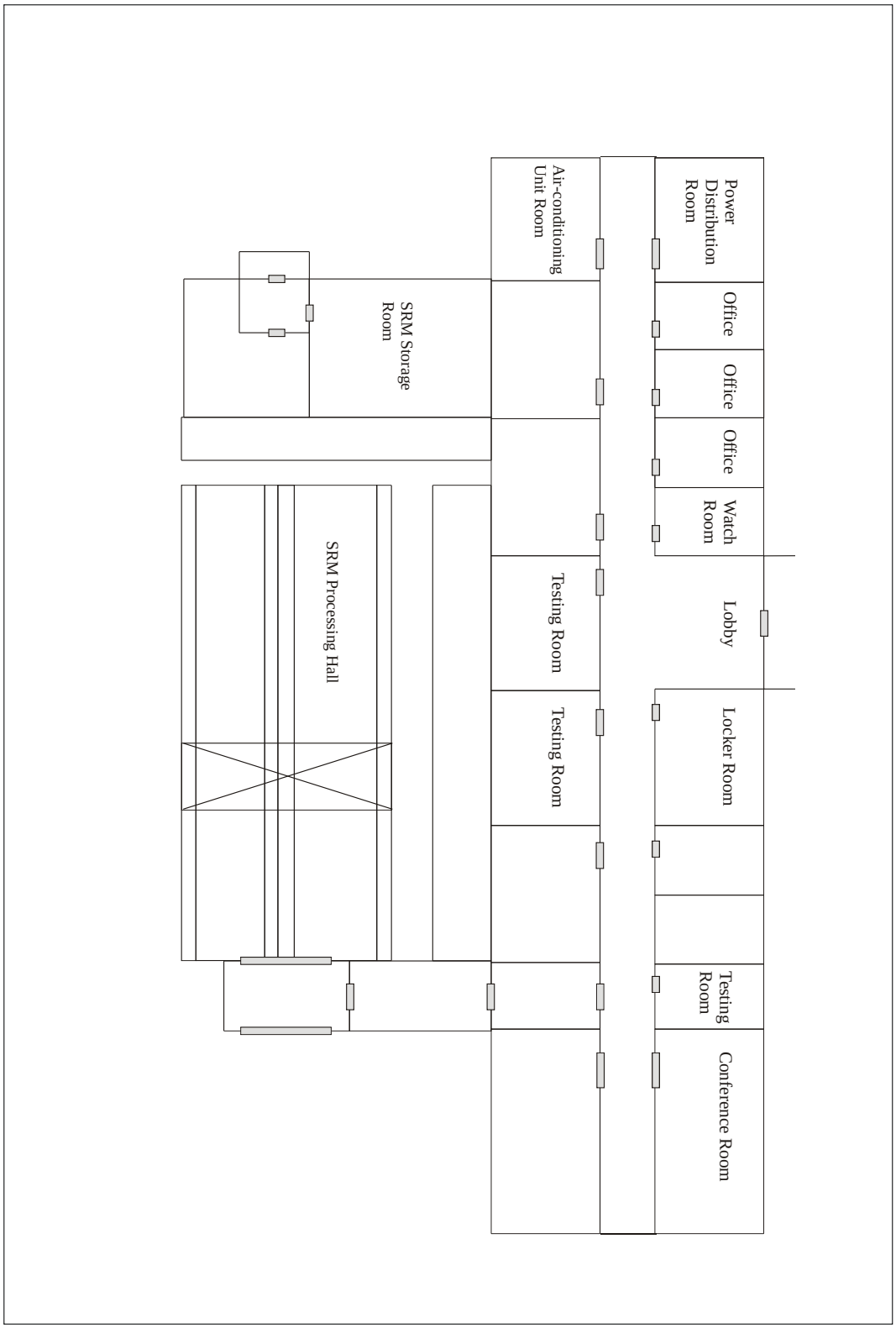

Figure A7-3 Layout of BM

7-8

A7.2 North Launch Center

A7.2.1 General

Coordinates of the Launch Tower for LM-2C:

Longitude: 100°17.4'E,
Latitude: 40°57.4'N
Elevation: 1073m

Facilities in the north launch center are umbilical tower, moveable service tower, launch pad, launch control center (LCC), fuelling system, power-supply system, gas-supply system, fire protection and alarm system, communication system, etc. Refer to **Figure A7-4**.

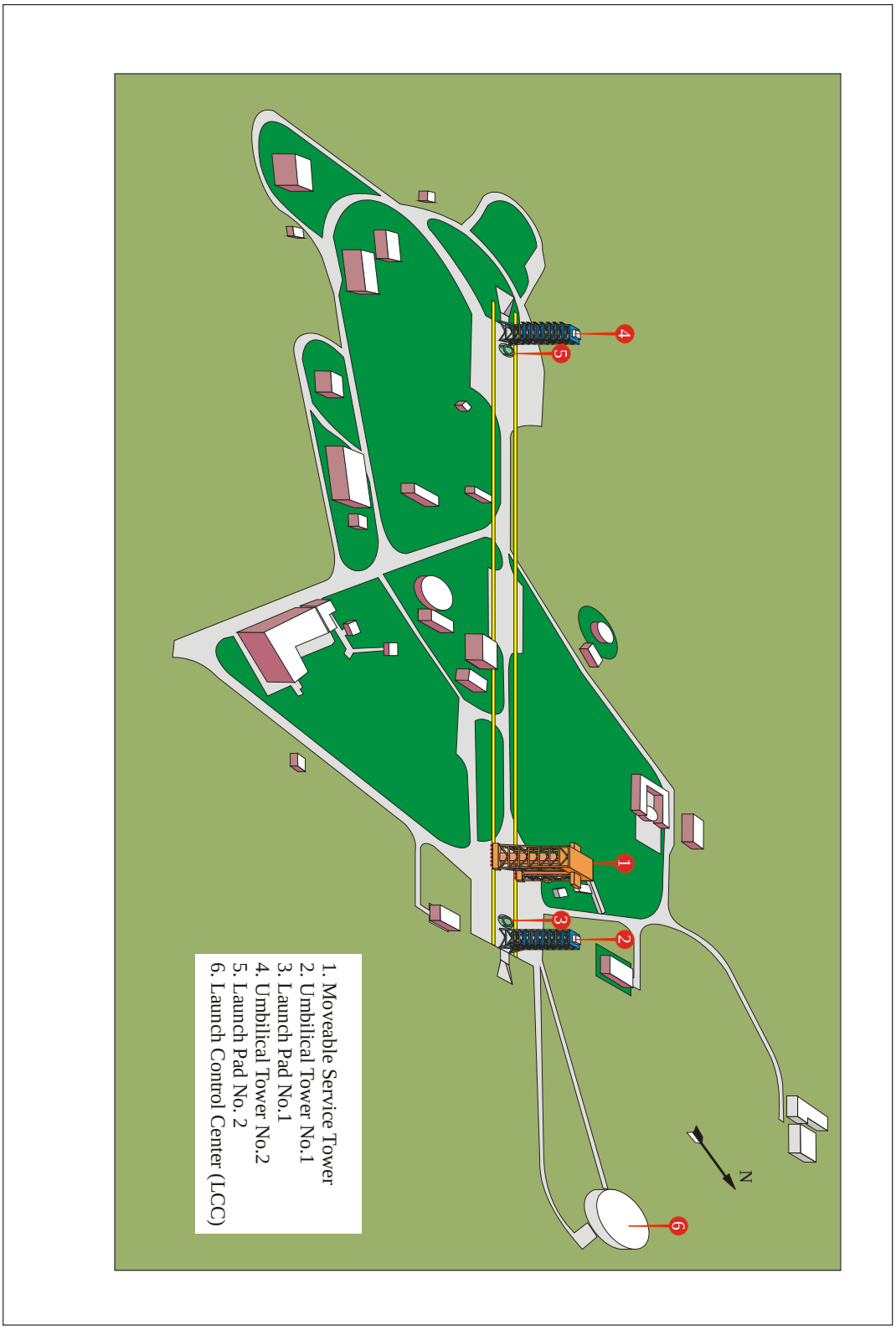

Figure A7-4 JSLC North Launch Center

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A7.2.2 Moveable Service Tower

The moveable service tower provides operating platform and environment dedicated for LV erection, LV and SC integration. It is composed of tower body, gantry crane, elevator, operating platform, SC working room, etc. Refer to **Figure A7-5**.

The tower body is an 11-floor fixed steel structure with height of 55.23 m, length of 30.52 m, and width of 20.9 m. The lifting capability of the gantry crane is 15 ton (main hook)/5 ton (subsidiary hook), and the lifting height is 44.5m. There are two elevators with load capability of 500 kg at two sides of the tower body. There are totally 6 floors of operating platform on the tower body. The SC working room is located at height of 29 m to 42 m inside the tower body, and the cleanness of the room is 100,000 class.

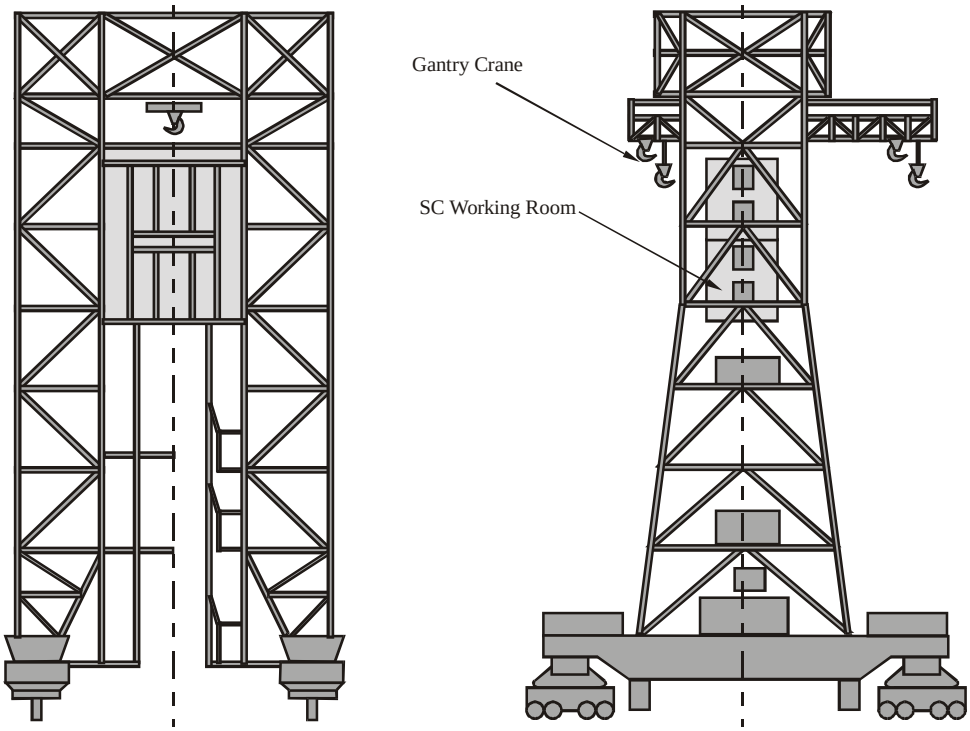

Figure A7-5 Moveable Service Tower

A7.2.3 Umbilical Tower

The umbilical tower provides operating platform and environment dedicated for LV fueling, LV and SC checkouts. It is mainly composed of tower body, operating platform, umbilical silo, swinging arm for umbilical, fueling system, gas-supply system, fire protection & alarm system, and elevator etc.

The umbilical tower is 45 m in height, 7.8 m in length and 7.8 m in width. It is equipped with an elevator with load capability of 1000 kg, 5 floors of rotating platforms and 2 floors of roll-over platforms. See **Figure A7-6**.

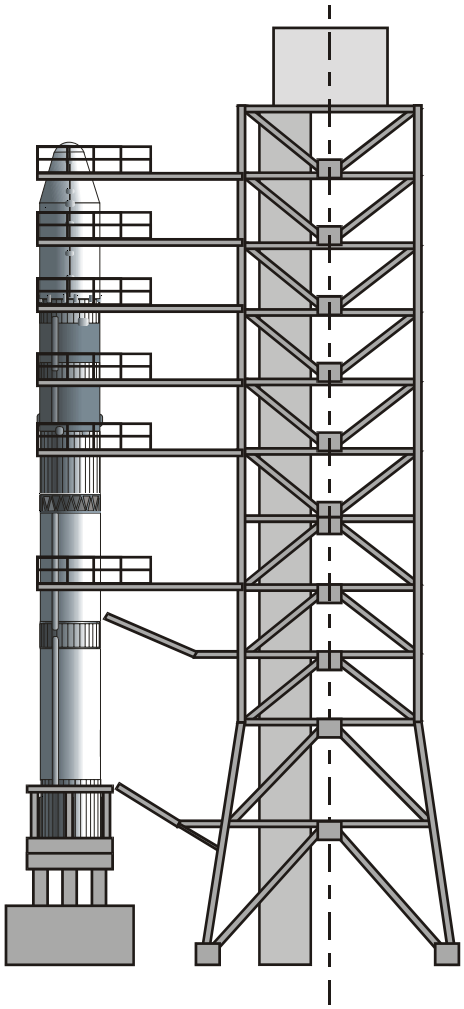

Figure A7-6 Umbilical Tower

A7.2.4 Launch Control Console (LCC)

Launch Control Console (LCC) is an underground rounded fortress. The LCC mainly consists of control room, SC testing rooms, LV testing rooms, power-supply system, air-conditioning system, and communication system. Refer to **Figure A7-7**. LCC is of following main functions:

- ✧ Commanding and coordinating LV system and SC system to conduct comprehensive checkouts and launch;
- ✧ Remote control on LV pre-launch process, fire-protecting system of the launch tower;
- ✧ Common and testing communications between North Technical Center and North Launch Center;
- ✧ Launch Monitoring and Controlling;
- ✧ Medical Assistance and Weather Forecast.

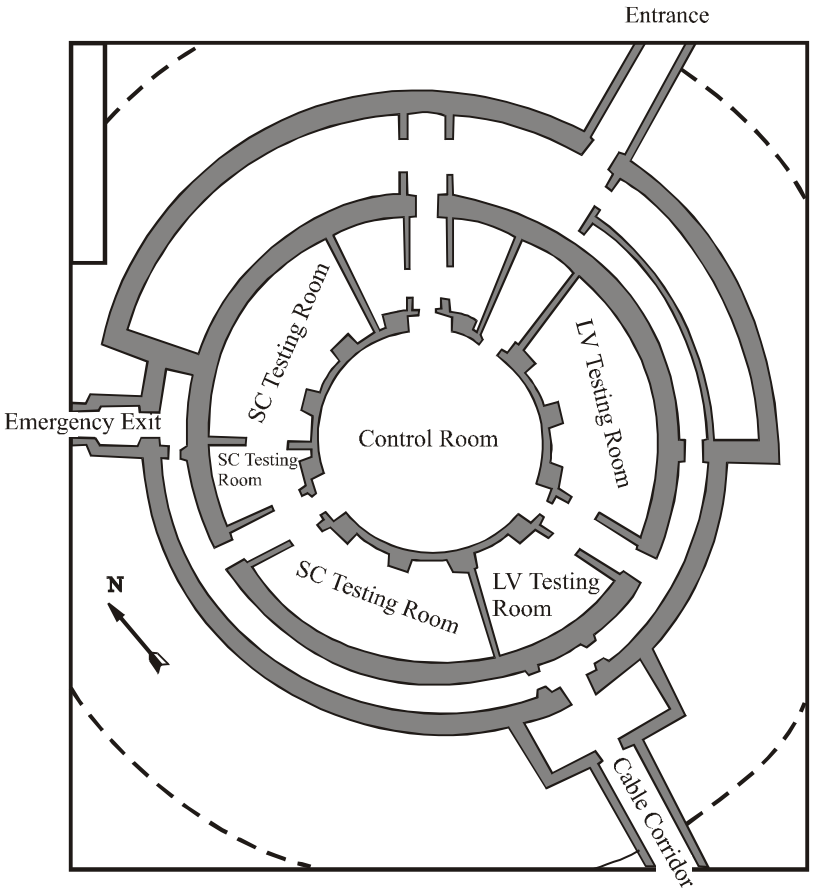

Figure A7-7 Launch Control Center

A7.2.5 Mission Command & Control Center (MCCC)

MCCC includes command and control hall, computer room, internal communication room and offices, etc. **Figure A7-8** shows the layout of MCCC.

MCCC is of following main functions:

- ✧ Command all the operations of the tracking stations and monitor the performance and status of the tracking equipment;
- ✧ Perform the range safety control after the lift-off of the launch vehicle;
- ✧ Gather the TT&C information from the stations and process these data in real-time;
- ✧ Provide acquisition and tracking data to the tracking stations and Xi'an SC Control Center (XSCC);
- ✧ Provide display information to the SC working-team console;
- ✧ Perform post-mission data processing.

The Configuration of MCCC is as follows:

- ✧ Real-time computer system;
- ✧ Command and control system.
- ✧ Monitor and display for safety control, including computers, D/A and A/D converters, TV display, X-Y recorders, multi-pen recorders and telecommand system.
- ✧ Communication system.
- ✧ Timing and data transmission system.
- ✧ Film developing and printing equipment.

Figure A7-9 MCCC Layout

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A7.3 Tracking, Telemetry and Control System (TT&C)

The TT&C system of JSLC and TT&C system of Xi'an SC Control Center (XSCC) form a TT&C net for the mission.

The TT&C system of JSLC mainly consists of:

- ✧ MCCC;
- ✧ Radar Stations;
- ✧ Optical Tracking Stations;
- ✧ Mobile Tracking Stations.

The TT&C system of XSCC mainly includes:

- ✧ Weinan Tracking Station;
- ✧ Nanning Tracking Station;
- ✧ Mobile Tracking Stations.

Main Functions of TT&C are described as follows:

- ✧ Recording the initial LV flight data in real time;
- ✧ Measuring the trajectory of the launch vehicle;
- ✧ Receiving, recording, transmitting and processing the telemetry data of the launch vehicle and the SC;
- ✧ Making flight range safety decision;
- ✧ Computing the SC/LV separation status and injection parameters.

Part B: South Launch Site

B7.1 South Technical Center

South Technical Center includes LV Vertical Processing Building (BLS), LV Horizontal Transit Building (BL1), SC Non-hazardous Operation Building (BS2), SC Hazardous Operation Building (BS3), Solid Rocket Motor (SRM) Checkout and Processing Building (BM) and Pyrotechnic Storage and Processing Building (BP1, BP2). The LV and the SC will be processed, tested, checked, assembled and stored in South Technical Center. Refer to **Figure B7-1**.

B7.1.1 LV Horizontal Transit Building (BL1)

BL1 is mainly used for transiting the LV and relevant ground equipment. It mainly includes LV horizontal processing hall, transit room and unit testing rooms.

LV horizontal processing hall is 78 meters long, 24 meters wide. It is mainly used for LV horizontal processing. There are three steel tracks and a moveable overhead crane inside the hall.

The transit room, which is 42 meters long, 30 meters wide, is equipped with a moveable overhead crane with the maximum height of 12 meters. The gate of the transit room is 8 meters wide, 8 meters high.

B7.1.2 LV Vertical Processing Building (BLS)

BLS is mainly used for LV integration, LV & SC integration, LV vertical checkouts, LV & SC combined checkouts. BLS includes two high-bays and two vertical-processing halls.

Each vertical-processing hall is 26.8 meters wide, 28 meters long, 81.6 meters high, and it is equipped with following facilities:

- ✧ 13-floor moveable platform;
- ✧ A crane with maximum lifting capability of 50t/30t/17m;
- ✧ 380V/220V/50Hz and 110V/60Hz power supply;
- ✧ Air-conditioning system;

The corresponding environment parameters inside BLS are:

- ✓ Temperature: 20±5°C;
- ✓ Relative humidity: 35%~55%;
- ✓ Cleanness (class): 100,000.

✧ Grounding System;

✧ Fire alarm & protection system.

See **Figure B7-2**.

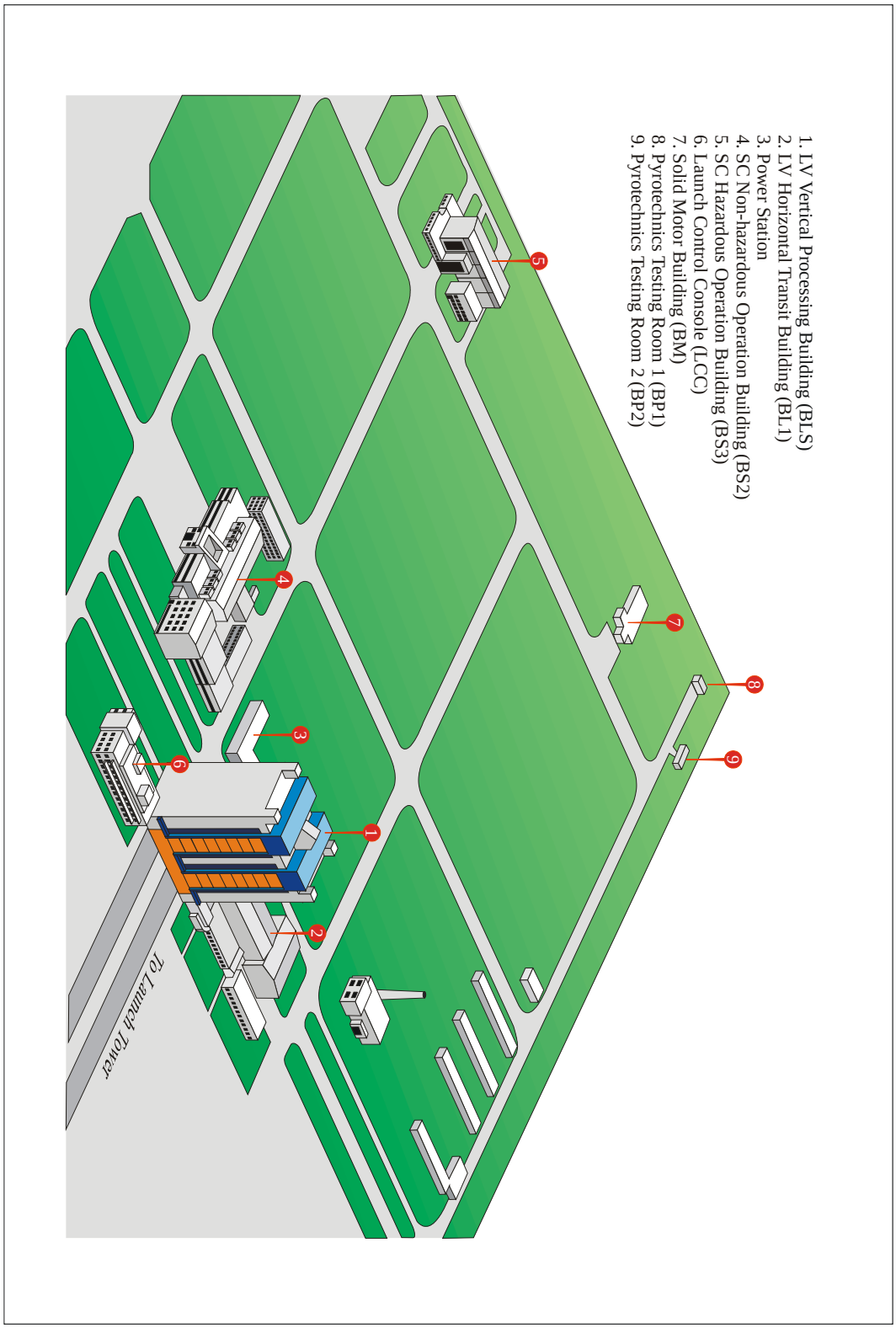

Figure B7-1 South Technical Center

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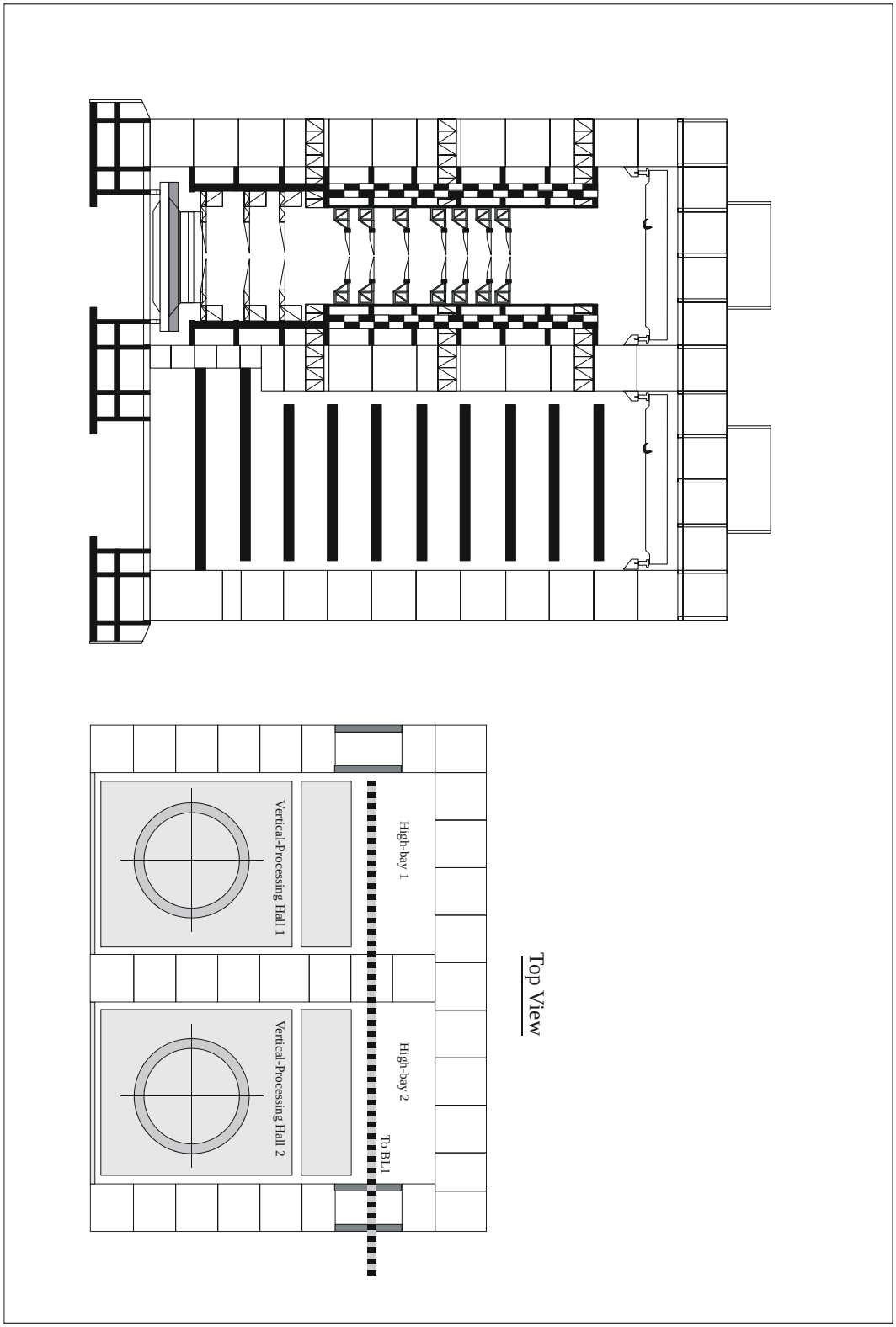

Figure B7-2 LV Vertical Processing Building (BLS)

B7.1.3 SC Non-hazardous Operation Building (BS2)

The SC Non-hazardous Operation Building (BS2) is a clean area for SC testing and integration. BS2 consists of the following parts:

- ✧ BS2 Transit Hall: (Crane Lifting Capability: 32t/10t/17m);
- ✧ SC Testing Hall: (Crane Lifting Capability: 32t/10t/17m);
- ✧ Air-drench Rooms;
- ✧ System Test Equipment (STE) Rooms;
- ✧ Unit-level Test Rooms;
- ✧ Control Room;
- ✧ Equipment Storage Rooms;
- ✧ RF Room;
- ✧ Offices etc.

Refer to **Figure B7-3** and **Table B7-1**.

Table B7-1 Room Area and Environment in BS2

Room	Usage	Dimension		Environment		
		L×W (m× m)	Area (m^2)	T (°C)	Humidity (%)	Cleanness (Class)
01	BS2 Transit Hall	30×24	720			
02	SC Testing Room	72×24	1728	23±5	35~55	100,000
03	Locker Room for Men	12×6.5	78			
04	Locker Room for Women	9×6.5	58.5			
05	Air-drench Room	12×6.5	78			
06	Air-drench Room	6×6.5	39			
07	System Test Equipment Room	18×6.5	117	15~25	35~55	100,000
08	Unit-level Test Room	12×6.5	78	15~25	35~55	100,000
09	Unit-level Test Room	18×6.5	117	15~25	35~55	100,000
10	Unit-level Test Room	12×6.5	78	15~25	35~55	100,000
11	Control Room	18×6.5	117	20~25	35~55	100,000
12	Equipment Storage Room	6×6.5	39	20~25	35~55	100,000
14	RF Room	18×6.5	117	20~25	35~55	100,000
15	Equipment Storage Room	6×6.5	39	20~25	35~55	100,000

In addition, BS2 is equipped with gas-supply, grounding, air-conditioning, fire alarm & protection and cable TV systems. It also provides 380V/220V/50Hz and 110V/60Hz power-supplies.

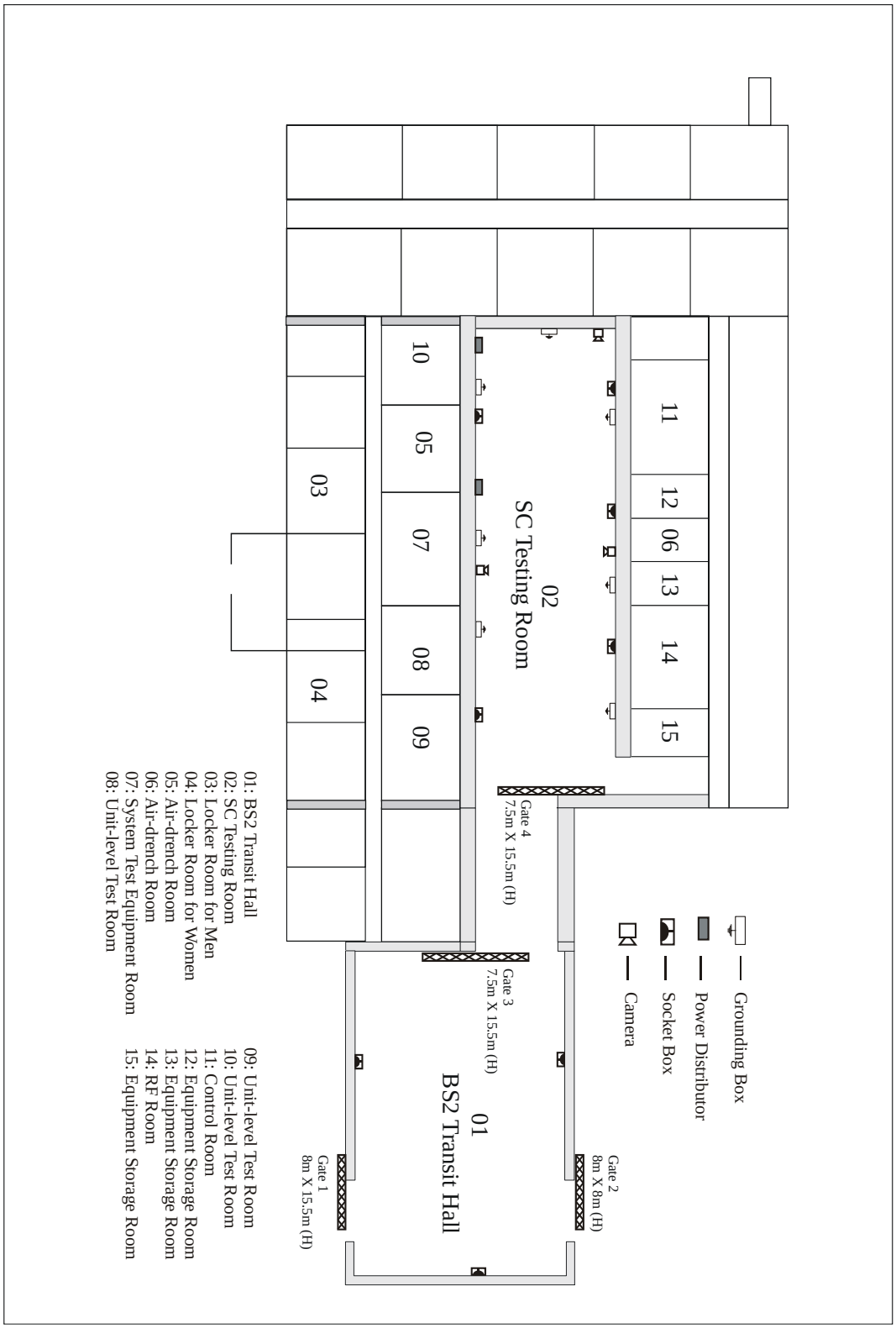

Figure B7-3 Layout of First Floor of BS2

7-22

B7.1.4 SC Hazardous Operation Building (BS3)

The SC hazardous operation building (BS3) is a clean area for SC's hazardous assembly, mono-propellant or bi-propellant fueling, the integration of the SC and the Fairing, spinning balance and weighing. BS3 mainly consists of the following parts:

- ✧ BS3 transit hall: (Crane Lifting Capability:16t/3.2t/17m);
- ✧ SC fueling hall: (Crane Lifting Capability: 16t/3.2t/17m);
- ✧ SC assembly hall: (Crane Lifting Capability: 16t/3.2t/18m);

Refer to **Figure B7-4** and **Table B7-2.**

Table B7-2 Room Area and Environment in BS3

Room	Usage	Dimension		Environment		
		L×W (m× m)	Area (m^2)	T (°C)	Humidity (%)	Cleanness (Class)
01	BS3 Transit Hall	24×15	360			
02	SC Fueling Hall	12×18	216	15~25	35~55	100,000
03	Testing Room	7.5×6	45	15~25	35~55	100,000
04	Testing Room	6×6	36	15~25	35~55	100,000
05	Locker Room	6×6	36			
06	Testing Room	6×6	36	15~25	35~55	100,000
07	SC Assembly Hall	36×18	648	15~25	35~55	100,000
08	Fuel-filling Room	6×6	36	15~25	35~55	100,000
09	Fuel-filling Room	7.3×6	43.8	15~25	35~55	100,000
10	Office	4.3×6	25.8			
11	Air-drench Room	3×6	18			
12	Oxidizer-filling room	6×6	36	20~25	35~55	100,000
13	Room of Air-conditioning Unit					
14	Power Distribution Room					

In addition, BS3 is equipped with electronic weighing, gas-supply, air-conditioning, grounding, fire alarm & protection and cable TV systems. It also provides 380V/220V/50Hz and 110V/60Hz power-supplies.

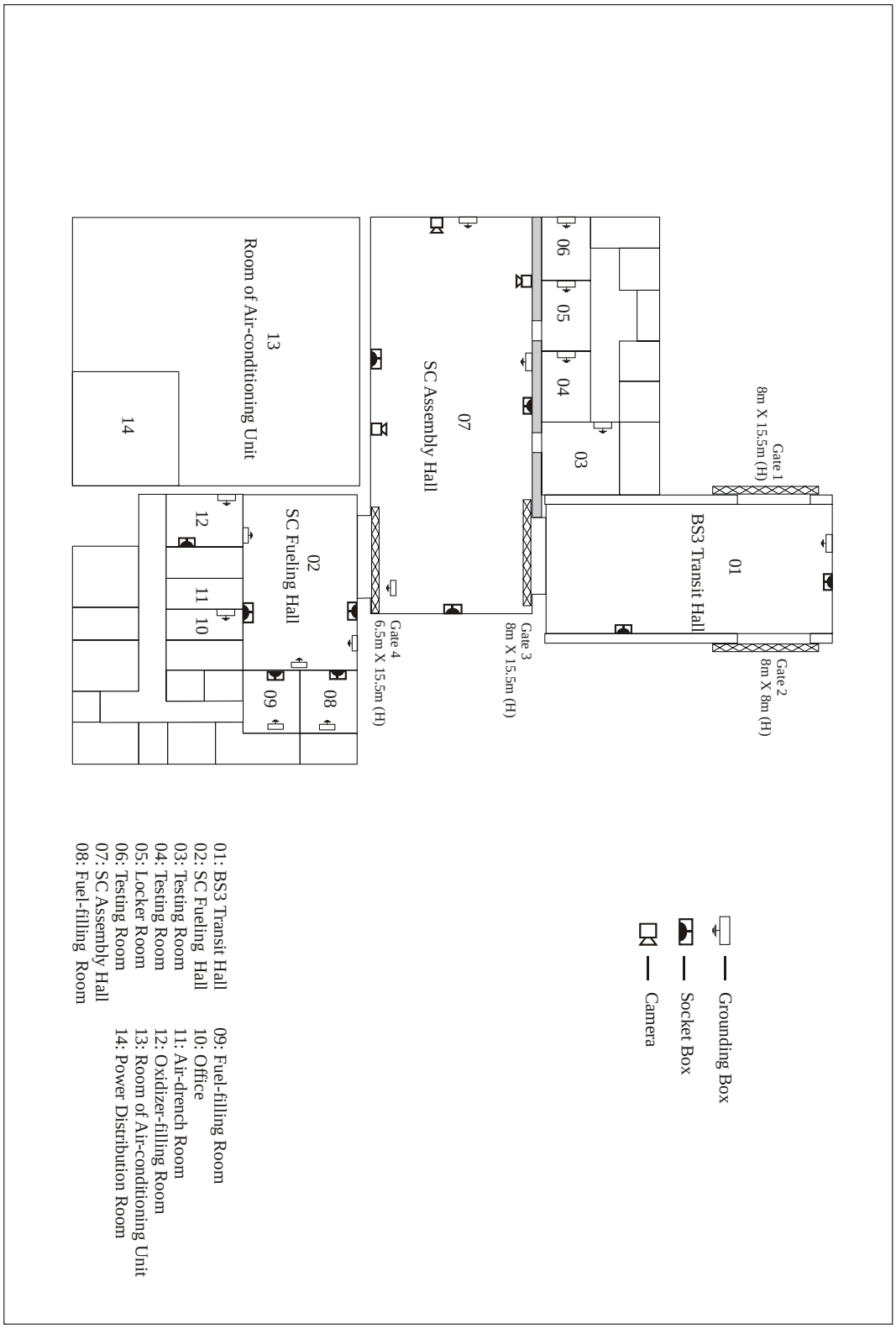

Figure B7-4 Layout of First Floor of BS3

B7.1.5 SRM Checkout and Processing Building (BM)

The SRM Checkout and Processing Building (BM) is used for the storage of the SRM, SRM assembly, pyrotechnics checkout, X-ray checkout of SRM, etc.

BM mainly consists of following parts:

- ✧ SRM Processing Hall;
- ✧ SRM Storage Room;

Refer to **Figure B7-5**. The area and environment are listed in **Table B7-3**.

Table B7-3 Room Area and Environment in BM

Room	Usage	Measurement		Environment		
		L×W (m× m)	Area (m^2)	T (°C)	Humidity (%)	Cleanness (Class)
01	SRM Processing Hall	24×15	360	18~28	35~55	100,000
02	SRM Storage Room	6×6	36	18~28	35~55	100,000
03	Locker Room	3.3×5	16.5			
04	Power Distribution Room	3.3×5	16.5			
05	Meeting Room	3.3×5.1	16.83			
06	Testing Room	3.3×5.1	16.83	18~28	40~60	100,000
07	Data-processing Room	6.6×5.1	33.66			
08	Testing Room			18~28	40~60	100,000

A series of anti-thunder, anti-static measures have been adopted in BM. BM is equipped with air-conditioning and fire alarm & protection systems. It also provides 380V/220V/50Hz and 110V/60Hz power-supply.

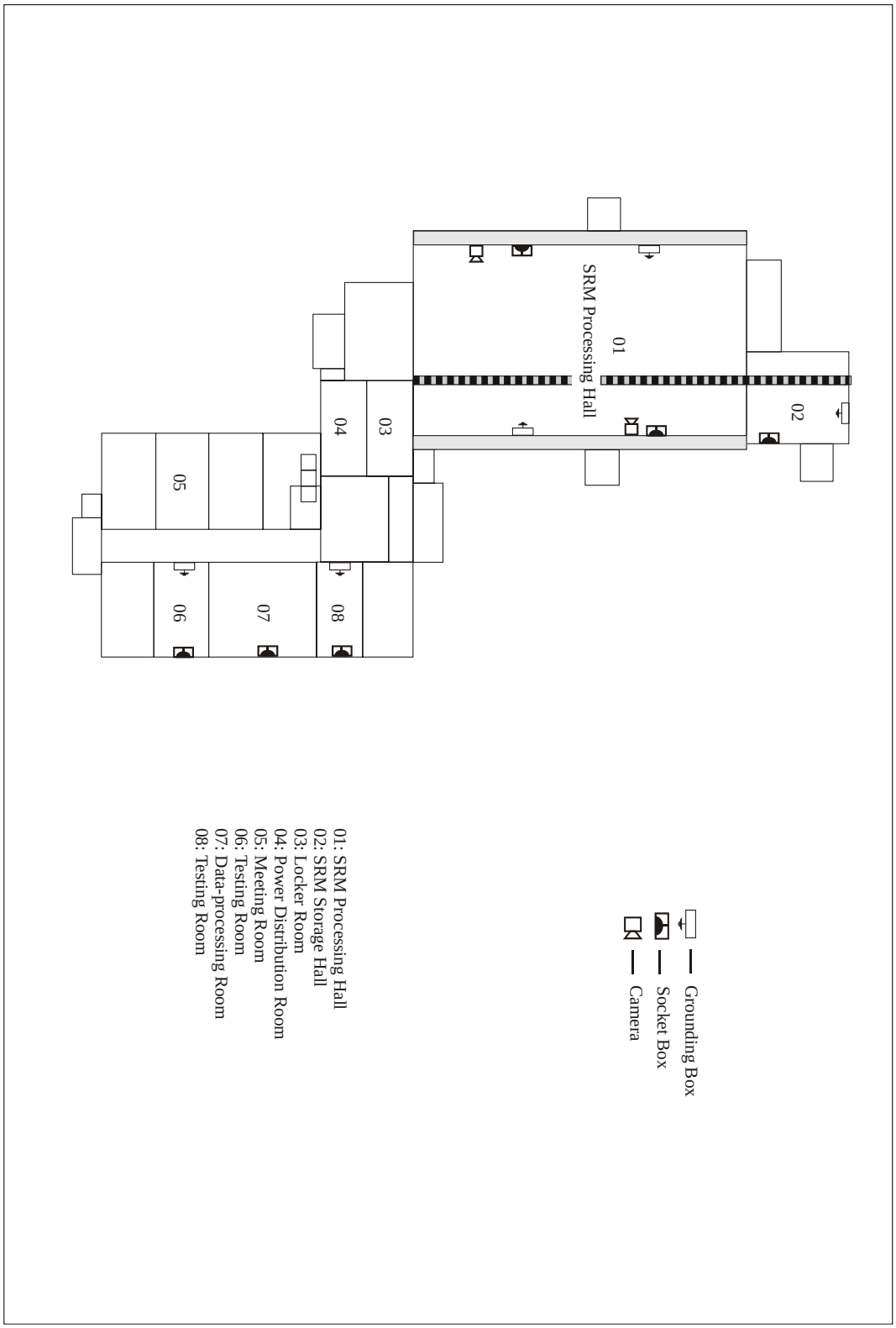

Figure B7-5 BM Layout

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B7.1.6 Launch Control Console (LCC)

Launch Control Console (LCC) is located beside BLS. LCC is electrically connected with Launch Tower and BS2 via cables and radio frequency. LCC is of following main functions:

- ✧ Commanding and coordinating LV system and SC system to conduct comprehensive checkouts and launch;
- ✧ Remote control on LV pre-launch process, fire-protecting system of the launch tower;
- ✧ Common and testing communications between South Technical Center and South Launch Center;
- ✧ Launch Monitoring and Controlling;
- ✧ Medical Assistance and Weather Forecast.

The LCC mainly consists of following parts:

- ✧ LV Control Room;
- ✧ SC Control Room;
- ✧ Checkout & Launch Command Room;
- ✧ Communication Center;

Refer to **Figure B7-6 and Table B7-4**.

Table B7-4 Room Area and Environment in LCC

Room	Usage	Dimension		Environment		
		L×W (m× m)	Area (m^2)	T (°C)	Humidity (%)	Cleanness (Class)
01	SC Control Room	13.2×19	237.6	18~26	40~70	
02	Checkout & Launch Command Room	13.2×19	237.6	18~26	40~70	
03	LV Control Room		118.8	18~26	40~70	
04	Locker Room					
05	Meeting Room	8×6	48			
06	Anteroom	3.3×5.1	16.83			
07	Testing Room	6 ×5	30	18~26	40~70	
08	Testing Room	8×6	48	18~26	40~70	
09	Testing Room	4×6	24	18~26	40~70	

Figure B7-6 Layout of the Second Floor of LCC

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B7.1.7 Pyrotechnics Storage & Testing Rooms (BP1 & BP2)

BP1 and BP2 are used for the storage & testing of LV and SC pyrotechnics. BP1 and BP2 are equipped with power-supply, anti-lightning & grounding and fire-extinguish systems.

B7.1.8 Power Supply, Grounding, Lightning Protection, Fire Alarm & Protection Systems in the South Technical Center

- **Power Supply System**

Two sets of 380V/220, 50Hz power supplies are provided in the south technical center, which spare each other. The power supply for illumination is separate to that. In addition, all of the sockets inside BS2 and BS3 are explosion-proof.

- **Lightning Protection and Grounding**

In technical areas, there are three kinds of grounding, namely technological grounding, protection grounding and lightning grounding. Some advanced lightning protection and grounding measures are adopted in all the main buildings and a common grounding base is established for each building. All grounding resistance is lower than 1Ω. Grounding copper bar is installed to eliminate static in the processing areas.

- **Fire Alarm & Protection System**

All the main buildings are equipped with fire alarm & protection system. The fire alarm system includes ultraviolet flame sensors, infrared smoke sensors, photoelectric smoke sensors, manual alarm device and controller, etc. The fire protection system includes fire hydrant, powder fire-extinguisher etc.

B7.2 South Launch Center

B7.2.1 General

Coordinates of the Launch Tower:

Longitude: 100°17.4'E,
Latitude: 40°57.4'N
Elevation: 1073m

The launch site is 1.5 km away from the South Technical Center. Facilities in the launch area are umbilical tower, moveable launch pad, underground equipment room, fuel storehouse, oxidizer storehouse, fuelling system, power-supply system, gas-supply system, communication system, etc. Refer to **Figure B7-7**.

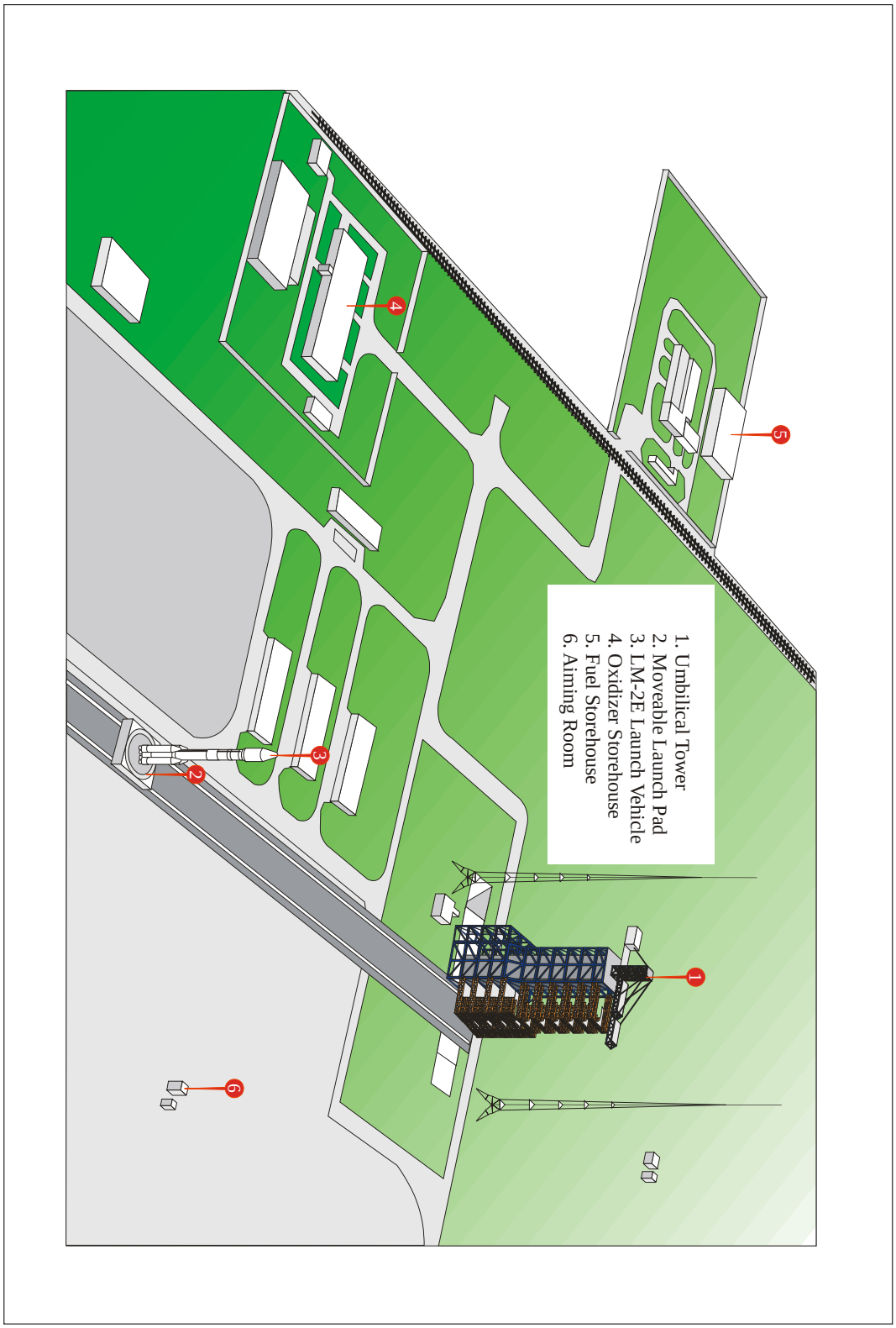

Figure B7-7 South Launch Center

B7.2.2 Umbilical Tower

The umbilical tower is an 11-floor fixed steel structure with height of 75m. The tower is to support electrical connections, gas pipelines, liquid pipelines, as well as their connectors for both SC and LV. The umbilical tower has a rotating-platform system, whose load-bearing capability is 15kN for each single platform. There is also a rotary crane on the top of the umbilical tower. See **Figure B7-8**.

The umbilical tower provides an air-conditioned SC operation area, in which the temperature, humidity and air cleanliness can be guaranteed. The area is well grounded, the grounding resistance is less than 1Ω.

The umbilical tower is equipped with hydrant system and powder fire extinguishers.

A common elevator and explosion-proof elevator are available in the umbilical tower, of which carrying speeds are 1.75m/s and 1.0m/s respectively. The maximum load-bearing capability of the elevators is 1000kg.

The umbilical tower has a sealed cable tunnel, in which the umbilical cables connect the LV, SC and underground equipment room. The resistance of each cable is less than 1Ω.

B7.2.3 Moveable Launch Pad

The moveable launch pad is mainly used for performing LV vertical integration and checkouts in BLS, transferring the LV from BLS to the launch area vertically, and locating and locking itself beside the umbilical tower. The moveable launch pad can also vertically adjust the position of the launch vehicle to make the preliminary aiming. The ignition flame can be exhausted through the moveable launch pad.

The moveable launch pad is 24.4m long, 21.7m wide, 8.34m high, and weighs 750t. It can continuously change its moving speed in 0~28m/min., and the moving acceleration is less than 0.2m/s. It takes the moveable launch pad, carrying the LV, about 40 minutes to move from BLS to umbilical tower (1.5km).

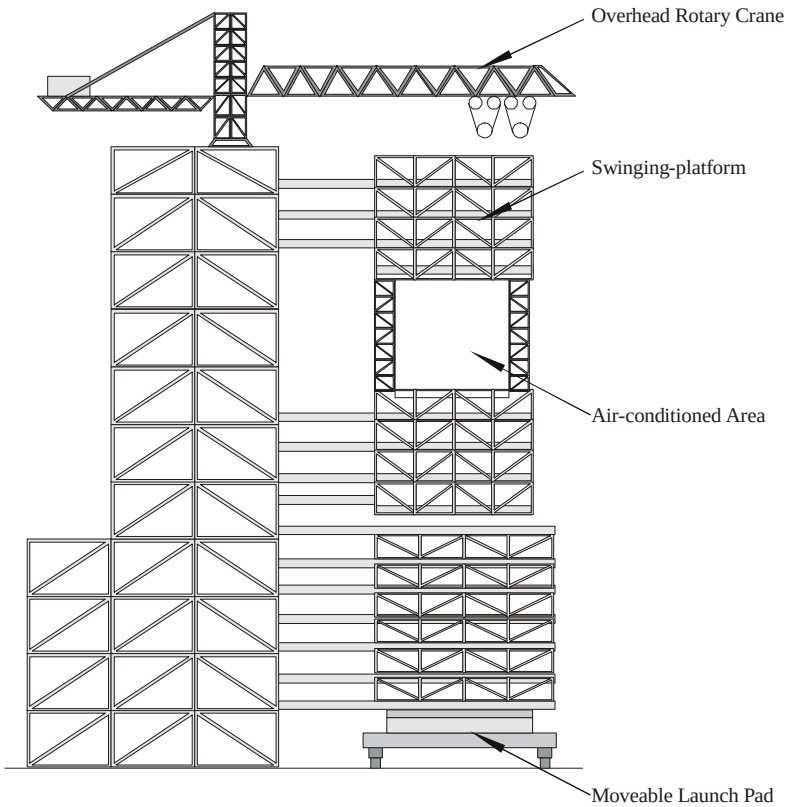

Figure B7-8 Umbilical Tower

B7.2.4 Underground Equipment Room

The underground equipment room is located under the umbilical tower, whose construction area is 800m^2. It mainly includes power-supply room, equipment rooms, power distribution room, optic cable terminal room, room of air-conditioning unit, etc. The underground equipment room is air-conditioned, the internal temperature is 20±5°C and relative humidity is not greater than 65%. The equipment room is well grounded with resistance less than 1Ω. A 3-ton crane is equipped inside the equipment room.

B7.2.5 Mission Command & Control Center (MCCC)

MCCC includes command and control hall, computer room, internal communication room and offices, etc. **Figure B7-9** shows the layout of MCCC.

MCCC is of following main functions:

- ✧ Command all the operations of the tracking stations and monitor the performance and status of the tracking equipment;
- ✧ Perform the range safety control after the lift-off of the launch vehicle;
- ✧ Gather the TT&C information from the stations and process these data in real-time;
- ✧ Provide acquisition and tracking data to the tracking stations and Xi'an SC Control Center (XSCC);
- ✧ Provide display information to the SC working-team console;
- ✧ Perform post-mission data processing.

The Configuration of MCCC is as follows:

- ✧ Real-time computer system;
- ✧ Command and control system.
- ✧ Monitor and display for safety control, including computers, D/A and A/D converters, TV display, X-Y recorders, multi-pen recorders and telecommand system.
- ✧ Communication system.
- ✧ Timing and data transmission system.
- ✧ Film developing and printing equipment.

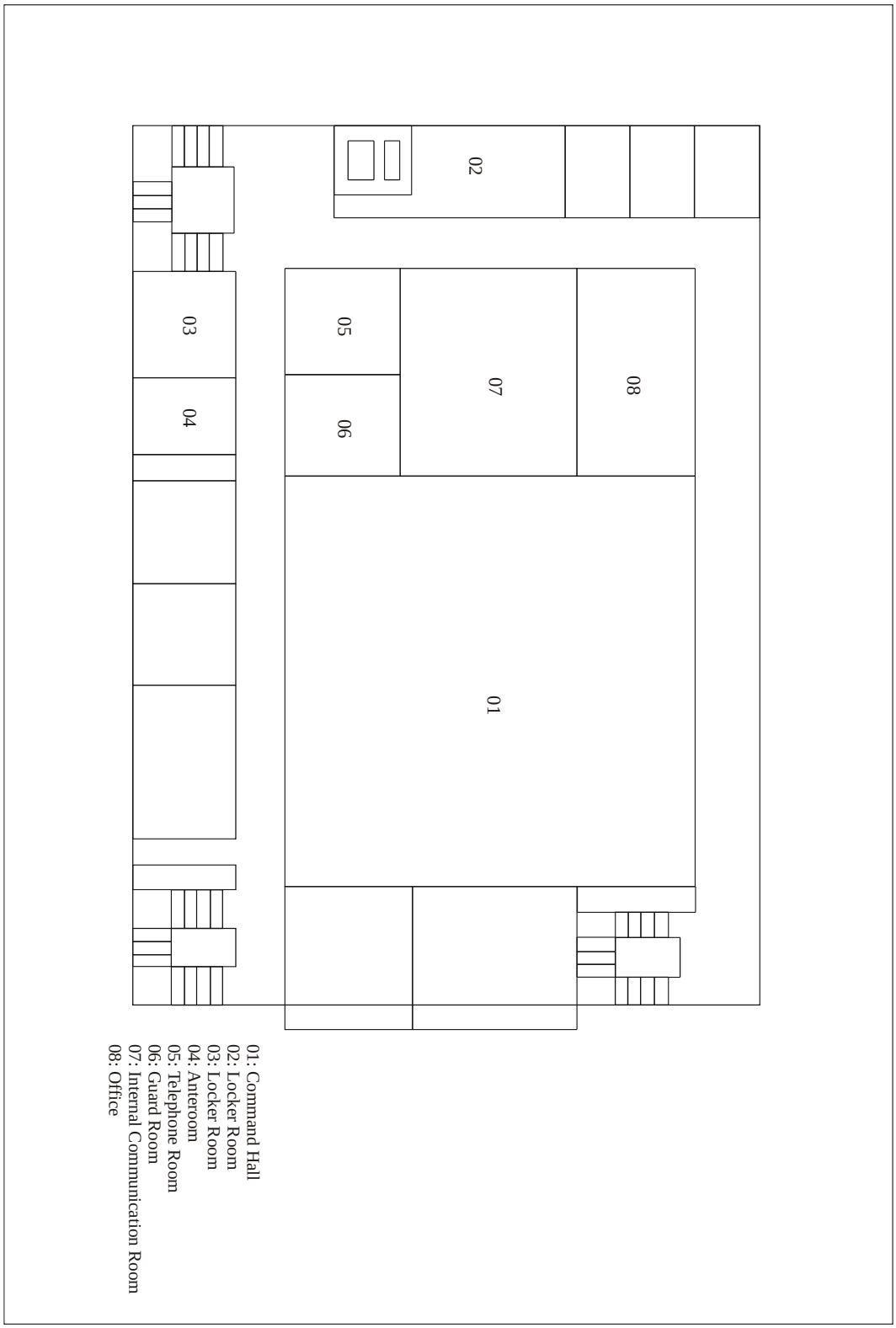

Figure B7-9 MCCC Layout

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B7.3 Tracking, Telemetry and Control System (TT&C)

The TT&C system of JSLC and TT&C system of Xi'an SC Control Center (XSCC) form a TT&C net for the mission.

The TT&C system of JSLC mainly consists of:

- ✧ MCCC;
- ✧ Radar Stations;
- ✧ Optical Tracking Stations;
- ✧ Mobile Tracking Stations.

The TT&C system of XSCC mainly includes:

- ✧ Weinan Tracking Station;
- ✧ Nanning Tracking Station;
- ✧ Mobile Tracking Stations.

Main Functions of TT&C are described as follows:

- ✧ Recording the initial LV flight data in real time;
- ✧ Measuring the trajectory of the launch vehicle;
- ✧ Receiving, recording, transmitting and processing the telemetry data of the launch vehicle and the SC;
- ✧ Making flight range safety decision;
- ✧ Computing the SC/LV separation status and injection parameters.