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Handout

Los Alamos County Fire Department

LAFD: TA-55 RLUOB/CUB Facility Familiarization Tour

OJT #55265

Revision 0.2

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TITLE PAGE

Course Title	**LAFD: RLUOB/CUB Familiarization Tour for Firefighters**
Course Number	**55265**
Computer File Name	**Student Handout, LAFD_Tour_RLUOB-CUB_HO_55262,R0.1**
Course Length	**Estimated 2 Hours**
Authors and Contributors: (alphabetically)	**Josh Miller,** **Victor Rutherford**
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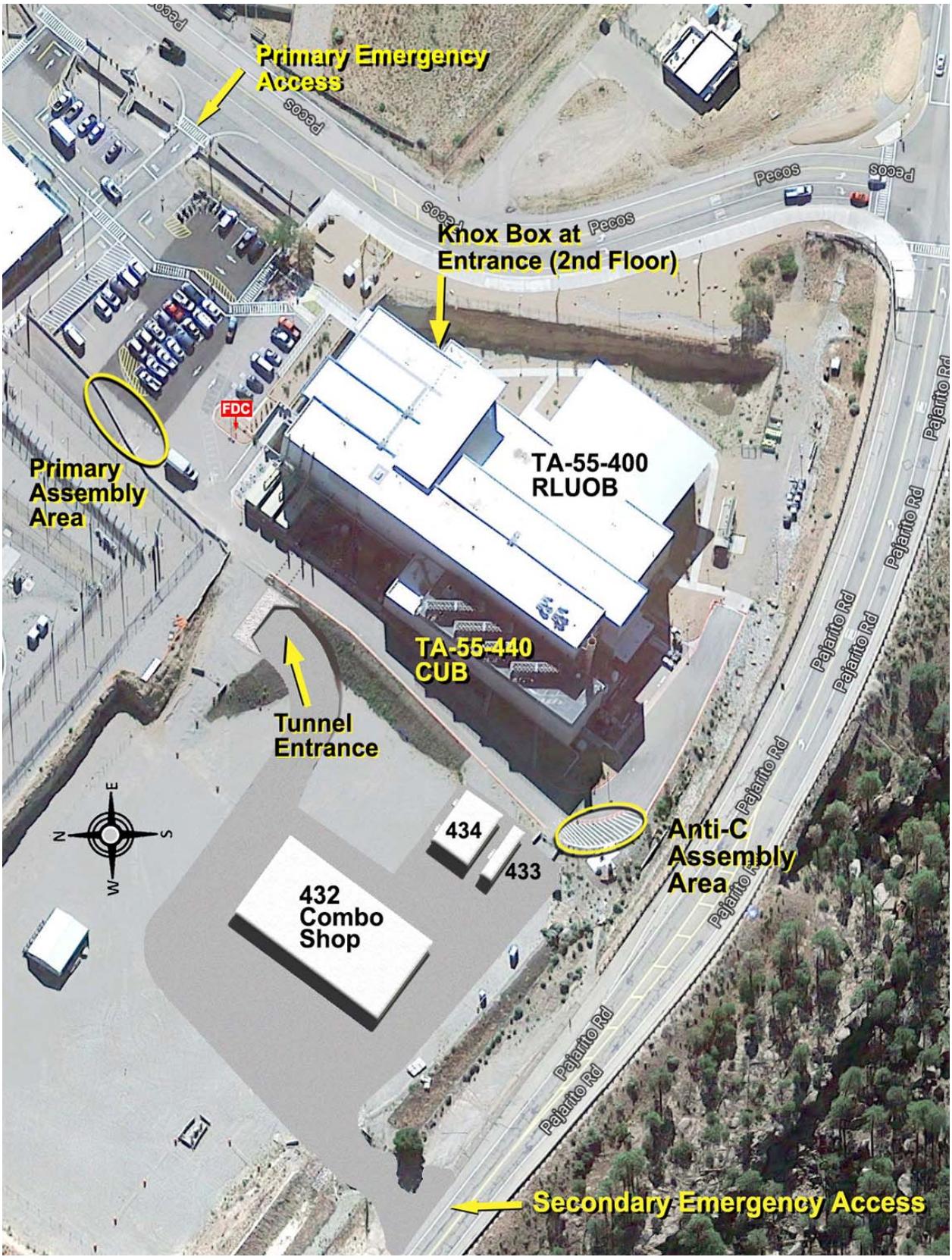
Training Setting	**Facility Tour**
Target Audience	**Los Alamos Fire Department Response Personnel**
Optimum Training Location	**Onsite**

RLUOB/CUB Site Map (including Assembly Areas)



Introduction

Los Alamos National Laboratory (LANL) conducts familiarization tours for personnel of the Los Alamos County Fire Department (LAFD) at the RLUOB/CUB, technical area (TA)-55, 400/440, facility, Radiological Laboratory Utility Office Building (RLUOB)/Central Utility Building (CUB). These familiarization tours are official LANL business; the purpose of these tours is to orient LAFD firefighters to the facility so that they can respond efficiently and quickly to a variety of emergency situations. This orientation includes, among other topics, the ingress and egress of the area and buildings, layout and organization of the facility, evacuation procedures and assembly points, and areas of concern within the various buildings at the facility. LAFD firefighters have the skills and abilities to perform firefighting operations and other emergency response tasks that cannot be provided by other LANL personnel who have the required clearance level.

This handout provides details of the information, along with maps and diagrams, to be presented during the familiarization tours. The handout is distributed to the trainees at the time of the tour; a corresponding checklist is also used as guidance during the familiarization tours to ensure that all required information is presented to LAFD personnel.

LAFD Familiarization Escorts and Training Coordinators

The escorts and training coordinators (trainers) for the LAFD familiarization tours of the RLUOB/CUB facility may include subject matter experts from the RLUOB facility and/or Security and Emergency Operations-Emergency Preparedness (SEO-EP). The contact information for trainers of course #55265 is

- Andrea Romero, 500-2360, adromero@lanl.gov
- Stephen Fischer, 500-2053, sfischer@lanl.gov

Elements of the Familiarization Tour

Introduction in the RLUOB Atrium (Second Floor)

1a. To initiate the familiarization tour, meet at the RLUOB facility command (FC). Handouts will be distributed to each LAFD trainee; trainees will sign both a RLUOB facility accountability roster and a training roster.

1b. Verify that none of the LAFD personnel are carrying prohibited or controlled articles. Prohibited articles are those not permitted on Laboratory property, including parking lots, unless approved in advance by the Associate Directorate for Mission Assurance, Security, and Emergency Response-Security Incidents & Occurrence Investigations (ADMASER-IP). If a prohibited article is found, LANL may treat it as a reportable incident. The following articles are prohibited:

- any dangerous weapons, explosives, or other dangerous instrument or material likely to cause substantial injury or damage to persons or property;
- alcoholic beverages, including unopened bottles or cans;
- controlled substances (e.g., illegal drugs and associated paraphernalia, but not prescription medicine); and
- other items prohibited by law.

1c. Provide an escort for those personnel who do not have the appropriate clearance level, using the following criteria:

- The escort must have the appropriate level of security clearance, be aware of facility-specific escort procedures, and be trained in Laboratory escort procedures.
- There shall be no more than five escorted individuals per qualified escort at any given time.
- The escort must maintain control of the escorted individuals at all times.
- Escorted individuals must sign out of the facility at the completion of the tour.

The Mission and Scope of Work within RLUOB

1d. RLUOB provides capabilities formerly located in the Chemistry and Metallurgy Research (CMR) facility, including actinide chemistry, materials characterization, and actinide research and development missions; secure special nuclear materials, information, and property. RLUOB contains approximately 19,500 ft^2 of radiological laboratory space and a utility building that supports

- office space for 350 personnel;
- a facility operations (OPS) center that monitors and controls the operational functions of utility systems and processes;
- an FC center facilitating early control of facility emergencies;
- a site training center, which is to include office space for 46 training personnel, training classrooms, and simulated laboratory training rooms;
- a vault-type room (VTR) for classified computing and storing classified information;
- radiological laboratories housed on the first floor;
- a nondestructive assay (NDA) measurement lab in the basement;
- staging rooms/areas, and
- a utility building that supports RLUOB.

RLUOB is normally occupied Monday through Friday, 6:30 am to 5:30 pm; however, the building may occasionally be occupied on weekends and in the evenings for special projects and construction projects as needed. The building is locked when not occupied.

1e. RLUOB (55-400400) is a five-story structure including a basement. This building is fully equipped with wet-pipe sprinklers and a Class I automatic standpipe system for fire suppression. A retaining wall that protects the Radiological Laboratory from external events, such as design basis winds and pressure waves, is located at the

north end of this building so that the International Building Code (IBC)-compliant occupancy laboratories may be on the first floor, with office occupancies on the upper floors.

The radiological laboratories are located on the first floor. Programmatic laboratory support functions are located in the windowless basement and are serviced by a separate elevator. Airlocks are the primary entrances and exits to the laboratories. However, because code-required emergency egress doors are to be no more than 100 feet from any laboratory, additional exit-only alarmed doors are provided around the perimeter.

The laboratory walls are constructed of full-height steel stud walls, with gypsum wallboard, easy-to-decontaminate coating systems on the floor and walls inside the laboratories, and painted gypsum wallboard in the lab corridors. Firewalls will segregate the laboratories into three zones.

The RLUOB facility and office spaces are located within the same structure. Both the Radiological Laboratory and the office spaces are split into limited (requiring security clearance) and uncleared spaces. The limited portion houses the operations center and the FC. The uncleared portion also houses the training facility and support personnel who do not work with classified information.

The CUB (TA-55-0440) abuts the RLUOB and is separated from it by two separate cast-in-place concrete walls with a 12-inch airspace between them. This separation serves to separate the hazards of natural gas for heating from the RLUOB. The external walls of the basement and first floor of the RLUOB are 3-hour firewalls. The external walls of the CUB are 1-hour firewalls. Functions in the CUB include the production, delivery, and control of chilled water, heating water, potable water, nonpotable water, compressed air, and specialty gases. This building provides exterior space for tube trailers, gas cylinder storage, cooling-system heat-rejection equipment, and loading dock space for support of equipment replacement; it houses electrical distribution equipment for facilities/equipment located outside the security area, an electric fire pump, and fire protection risers for facilities located outside the security area.

Safe Approach Route, Standoff Points, and Assembly Areas

1f. The RLUOB primary assembly area is located on the northwest side of the parking area at the front of the building. The anti-C assembly area is located in the south corner. Each location is designated by a white sign with red lettering.

1g. When responding to a fire or a rescue operation at the RLUOB/CUB facility, firefighters should recognize that there is a potential hazard in the smoke or release plume and should avoid responding to RLUOB/CUB from a downwind location. A windsock at TA-48 Gamma Ray Road can be seen from Pajarito Road when responding from the northwest and one at TA-46 that can be seen when approaching from the southeast. A facility representative will provide information regarding the potential hazards in the building before firefighters enter. If a facility representative is not present, fires may be fought from a safe upwind location, and any rescue operations will be at the direction of the incident commander.

1h. Currently, during an evacuation, the primary assembly area is located in the northeast corner of the facility, in front of the building. The anti-C assembly area is located in the south corner of the facility. Both assembly areas are marked as such

with white signs with red lettering. The shelter-in-place locations are indicated in the emergency evacuation maps posted throughout the facility.

1i. The Knox box that houses the facility keys is located at the main entrance of RLUOB in the second-floor atrium. The Knox box holds the exterior door key "RLB 4" and "RLB 5," the key for the interior access to the roof for both roof access hatches. Additionally, LAFD battalion commanders (BCs) maintain a VIDEX security key.

1j. The fire panel is located inside RLUOB's main entrance, second-floor atrium, adjacent to the FC, Room 2100.

1k. A sprinkler and standpipe fire department connection (FDC) for RLUOB is located in the parking lot island on the northwest side of the facility.

RLUOB—Second Floor

2a. The FC is located in a protected area (cleared) adjacent to the operations center. The FC, which can accommodate as many as 25 facility personnel, is responsible for the early command and control of TA-55 facility emergencies. FC duties include, but are not limited to the following tasks:

- establishing early command and control of facility emergencies;
- ensuring that emergency notifications are made;
- ensuring that all building (or wing, as appropriate) occupants are accounted for after the building or area has been evacuated;
- establishing incident priorities;
- identifying problems and analyzing hazards;
- integrating into and supporting incident command that is established by off-facility responders; and
- participating in facility recovery.

2b. The RLUOB Operations Center (OC), located on the second floor of the RLUOB building, provides operator interface and monitoring capability for the RLUOB building. The OC monitors systems, responds to alarms, and develops and maintains instructions for response to facility emergencies. The OC is furnished with eight operator consoles dedicated to RLUOB operations. An 80-ft^2 room is located adjacent to the OC for operations records.

2c. Elevators for the facility are located in both the uncleared and cleared areas. Elevators 1 and 2 are in the uncleared areas, and elevators 3 and 4 are in the cleared areas.

2d. Eight stairwells are to be used for egress. Because of the cleared/uncleared aspect of the RLUOB facility, some stairwells do not access certain floors. (Refer to RLUOB floor maps, pages 15–19.)

2e. Emergency exits from the second floor of the RLUOB include stair #1 (east—main entrance), stair #2 (west), stair #3 (west), stair #4 (southeast side—exit on first

floor), and stair #7 (east side—exit first floor). (Refer to RLUOB Second-Floor Map, page 17.)

RLUOB Basement

3a. Emergency exits from basement. (Refer to RLUOB Basement Map, page 15.)

3b. Class I standpipe hose connections are located in all interior stairwells of the RLUOB and CUB. Stair #7, located on the outside of RLUOB, is the obvious exception.

3c The classified media library (CML) is a VTR in the basement of the facility that is used for storage and classified media and is used to access records through a library system. The CML is located on the east side of the basement, Room B201.

3d. Elevator mechanical rooms are located on the west side of the basement.

3e. The ventilation system supply plenum room is located on the east side of the basement, Room B500.

3f. The exhaust plenum high-efficiency particulate air (HEPA) filter deluge systems are located on the south side of the basement, in Rooms B300 and B301.

3g. The ventilation system intake is on the south side of the basement.

3h. The uninterruptible power supply (UPS) is located in the northeast corner of Room B402. The RLUOB UPS system provides reliable power to sensitive and safety-related equipment.

3i. Electrical substations B and C are located in Room B400.

3j. The radiological crafts staging area is located on the north side of the basement, Room B104.

3k. The radiological bonded storage room is located in B101.

3l. The NDA measurement lab is located in B103.

3m. The RLUOB radioactive liquid waste (RLW) system, located on the east side of the basement, Room 302, is the primary disposal system for radioactively contaminated wastewaters that may also contain inorganic acids and bases meeting LANL RLW Treatment Facility (RLWTF) waste acceptance criteria. The liquid waste is collected by gravity from RLUOB lab equipment, the wet vacuum system, janitorial sinks (in radiological areas), personnel decontamination area showers, lavatories, and floor drains on the first floor and carried by gravity flow to a set of aboveground collection/sampling tanks before being pumped to the site RLW system. The isolation/diversion valves are used to manually direct all of the RLW flow to one of the two collection/sampling tanks. The personnel decontamination area shower, lavatory, and radiological area janitorial sink waste water in the basement is pumped overhead to the main set of collection/sampling

tanks. The collection piping and storage tanks are vented to the Rad Lab Zone I exhaust system.

3n. The freight elevator is located on the southwest side of the basement.

3o. The freight elevator equipment room is located in Room B011, which includes a 400-gal. hydraulic oil system. Precautions and knowledge of hazards in this specific area should be noted with respect to injury in the area or fire and hydraulic oil hazard.

3p. The electrical forklift storage and charging area is located on the south side of the basement. Hazards may be encountered that are associated with energized electrical charging gear and forklift batteries.

Note: The mezzanine level is controlled as a radiological control area (RCA) and radiological buffer area (RBA).

RLUOB Mezzanine

4a. The mezzanine ceiling is low and always requires a hardhat to be worn when on this level. American National Standards Institute (ANSI) signs have been posted. Caution the LAFD regarding the hazard.

4b. The laboratory process vacuum system supplies wet-process and dry-process vacuum services (Rooms M004 and M005) to the RLUOB laboratory modules by means of skid-mounted vacuum systems located in the RLUOB basement mezzanine. The skids are located in isolation rooms to contain any radioactive material that is collected by the systems. Both the wet and dry systems are vented to the Zone 1 exhaust, and the wet system has containment on the floor to prevent spills from leaving the room. Breathing air is supplied locally in the event that personnel entering the isolation rooms require supplied-air respirators.

4c. The RLUOB laboratory design includes safety features commonly found in nuclear facilities, such as a three-zone confinement ventilation system, HEPA filtration on laboratory exhaust, and stack radiation monitoring.

4d. The deionized water system is centrally located in Room M006.

4e. The airborne radiation detection system/health physics vacuum (HPV) subsystem supports the first-floor laboratory modules and the laboratory support areas [i.e., the radiological bonded storage room (B101), the radiological waste staging room (Bl02), the NDA measurement lab (B103), and the radiological crafts staging room (B104)]. The HPV system is located in Room M006.

RLUOB First Floor

5a. The loading dock is located on the south end of the building.

5b. The laboratories are serviced by a limited area freight elevator and loading dock located at the south end of the building. The freight elevator is rated for 20,000 lb.

5c. The classified laboratories are located on the south end of the first floor.

5d. The unclassified laboratories are located on the north end of the first floor.

Note: During normal operation, the laboratories are used to perform analyses or other processes for the mission of the module involved. Laboratory mission areas include chemical, metallurgical, and research activities on radiological and nonradiological, classified and unclassified properties and materials. All radiological materials are contained in the modules and module support rooms in the cleared area. Laboratory activities are performed within glove boxes, transfer boxes, and open-front fume hoods. Please make note of postings within the area.

5e. Each lab module is 12.5 ft wide by 60 ft long, providing an area of 750 ft^2. Each module has all the same utilities, ventilation, and process gasses. There are 26 modules in RLUOB, and changes can be made in the ratio of limited and unclassified modules.

5f. The heating, ventilation, and air conditioning (HVAC) system for the RLUOB Radiological Laboratory consists of three levels of confinement barriers, identified as Zone 1, Zone 2, and Zone 3. The flow of air is from areas of lower to higher contamination potential (i.e., Zone 3 to Zone 1). The zones are defined as follows:

Zone 1—primary confinement system, which includes the glove box enclosures and their associated exhaust system
Zone 2—secondary confinement system, which includes the walls, floor, ceiling, and doors of laboratories, including the fume hoods and open front boxes
Zone 3—additional confinement barrier, which includes the walls, floors, ceilings, and doors of the corridor or space that surrounds the laboratory

5g. The entry control facility (ECF) includes a tunnel connection from the RLUOB building to a future facility to the west; it currently provides an access point to grade that is being used for construction activities.

5h. The hazardous chemicals temporarily stored in Room E100 include flammable sealers and primers. These hazards are included in the “Building Hazard Run Sheet” for the facility.

5i. Emergency exits from the first floor (refer to RLUOB First-Floor Map, page 16).

Note: Portions of the first floor are controlled as radiological areas on the south side of the floor.

Note: Stair #1 is a radiological stairway and goes to the basement.

RLUOB Third Floor

6a. All unclassified offices are located on the north side of the third floor.

6b. All classified offices are located on the south side of the third floor.

6c. To move from the uncleared to the cleared side of the third floor, personnel must go to the second floor and pass through security.

6d. The roof access to the exhaust air sampling area is located on the southwest side, in stairwell #8.

RLUOB Fourth Floor

7a. The training center is located in the uncleared portion of the office building on the fourth floor and is easily accessed from the main building entrance. The training center includes office space for personnel, classroom space, and special "hands-on training" space for the nuclear laboratory facilities. As many as 100 trainees per day use the training space.

7b. The roof access for the RLUOB building is stair #2.

7c. The roof access (third-floor roof) is located next to the simulated labs (Room 4306) on the east side.

7d. The air intake for the office area is located on the west side.

7e. The air exhaust for the office area is located on the southwest side, Room 4023.

7f. The entire floor is an uncleared area; there is no access from the fourth floor to any of the limited-area stairs (stairs #3 and #4), and the limited area elevators (Elevators #3 and #4) do not stop at this floor. However, the limited elevator shaft does extend to the fourth floor for flexibility should a future remodel change the usage of the south portion of the fourth floor from an uncleared area to a limited area. A separate uncleared exit-only stair (#8), with an alarmed door, is provided for egress of the training and assembly occupant loads.

CUB Second Floor

The CUB is intended to house and deliver the following functions:

- produce, deliver, and control heating and chilled water;
- produce, deliver, and control potable and nonpotable water;
- produce, deliver, and control demineralized water;
- produce, deliver, and control compressed air;
- deliver and control specialty gases [helium, argon, nitrogen, and regeneration (Regen)];
- provide secured exterior space for tube trailers;
- provide loading dock space for maintenance, support, and replacement of equipment;
- provide exterior space for gas cylinder storage;
- provide exterior space for cooling system heat-rejection equipment;
- provide space for electrical distribution equipment for facilities/equipment outside the security area;

- provide fire booster pump and fire protection risers for the RLUOB facility; and
- provide facility monitoring.

8a. Roof access is located at stair #5 (north side of the CUB) in the CUB. The key (RLB 5) to the interior roof access hatch is located in the Knox box on the second floor of RLUOB.

8b. The loading dock is located on the north side and can be used for emergency egress.

8c. A flammable storage cabinet is located on the south side, adjacent to the secondary heating water pumps. Hazards inside the cabinet include spray paint, acetone, and paint thinner. These hazards are included in the "Building Hazard Run Sheet" for the facility.

8d. Boilers and the gas and diesel supplies for them are located on the north side of the CUB, Room U20. The gas shutoff is on the south side of the RLUOB facility (see RLUOB/CUB Site Map, page 3 of this handout).

8e. Glycol pumps are located on the south side of the CUB, Room U200.

Note: The emergency exit from the second floor of the CUB is from stair #5 (north side of CUB). Stairs #5 and #6 provide internal passage between floors. Both stairways are 2-hour, fire-rated concrete masonry construction with 90-minute, fire-rated door assemblies.

CUB First Floor

9a. The automatic fire suppression system is located on the south side of the CUB.

9b. A fire booster pump is located on the south side of the CUB.

9c. Air compressors are centrally located on the first floor of the CUB.

9d. The compressed air receiver is centrally located on the first floor.

9e. The demineralized water system is located on the south side of the CUB.

9f. The chilled water system is located on the north side of the CUB.

9g. The emergency diesel automatic switch gear is located on the north side of the CUB, Room U103.

Note: The emergency exit from the first floor of the CUB is from stair #6 (south side of CUB). Stairs #5 and #6 provide internal passage between floors. Both stairways are 2-hour, fire-rated concrete masonry construction with 90-minute, fire-rated door assemblies.

CUB Basement Floor

10a. Potable water tanks (22,200-gal. capacity) are located on the north side of the CUB.

10b. Ice storage tanks are centrally located on the CUB basement floor; they contain a backup cooling (ice) heat transfer mechanism for the plant's chilled water system. There are no special hazards with this system. Note that the emergency response area of this part of the facility contains large tanks and relatively small spaces between and behind the tanks.

Note: Emergency exits from the basement floor of the CUB include the stair #5 exit on the first floor and stair #6 exit on the second floor.

RLUOB/CUB Outside

11a. The emergency generator system consists of three diesel-powered generators that provide 480-V, 3-phase power. The generators are connected for parallel operation to a dedicated switchboard in the CUB. Power is distributed from this switchboard to transfer switches near the equipment required to be supplied by the emergency generators throughout the facility. When normal power is lost on the supply side of a transfer switch, an activation signal is sent to the generators. Once steady power has been established on the generator bus, the transfer switches operate to supply power from the generators to the load. The diesel-powered generators are located on the west side of the facility.

11b. Compressed gas tanker truck access areas are located on the west side of the facility, adjacent to the diesel generators. Specialty gases are argon (Ar), helium (He), nitrogen (N_2), and Regen gas in compressed gas cylinders.

11c. Two tanks (argon and nitrogen) are located on the south side of the RLUOB by the loading dock.

11d. The outdoor diesel storage tank on the south side of the facility is currently empty.

Relative Risks

Biological Hazards: The RLUOB facility is categorized as nonbiological because no biological material is stored or used in activities.

Explosive Hazards: The RLUOB facility is categorized as nonexplosive because no explosives are stored or used in activities.

Pressurized Gas Cylinders: A variety of pressurized gases are used at the RLUOB facility. The hazards associated with pressurized gas cylinders are based on the gas contained in the cylinder, which may be toxic, flammable, or an asphyxiation hazard. In a fire, the gas in the cylinders expands and can rupture the cylinder, causing an explosion and creating a missile.

Cryogenic Hazards: The RLUOB facility uses argon and nitrogen. The following six principal hazards are associated with cryogens:

- Displacement of oxygen, resulting in asphyxiation

- Freezing of eyes and skin from exposure to extremely cold solids, liquid, and boil-off vapors and particularly equipment exposed to the cryogens
- Explosions due to pressure buildup in confined geometries
- Accumulation of liquid oxygen condensed from the surrounding air
- Acute respiratory problems
- Breakage of fragile glass Dewars and contact with the broken glass

Radiological: Some of the laboratories on the cleared side of the first floor are designated as radiological areas. Please make note of postings and requirements within the area.

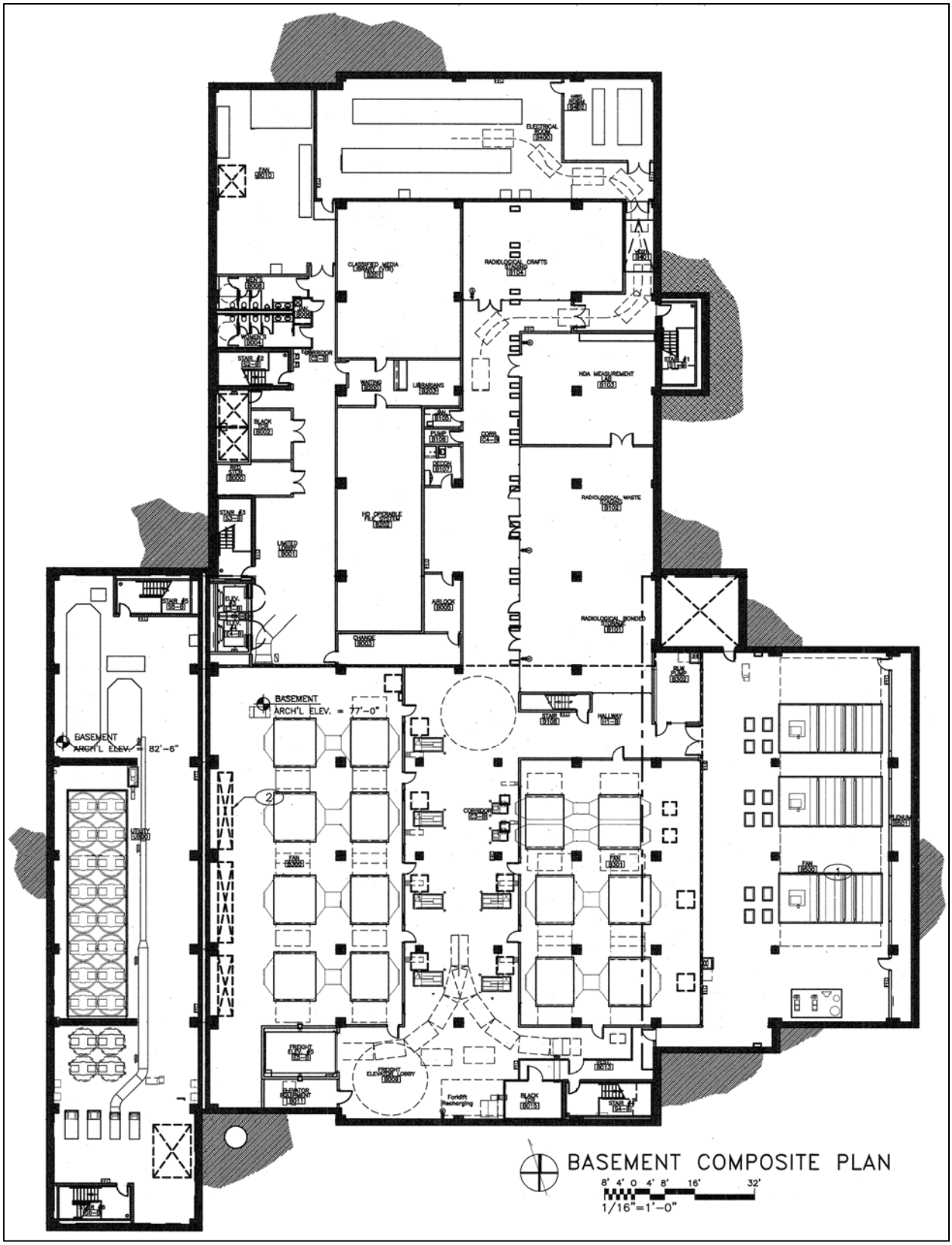
Construction Hazards: Several laboratories are now under construction with the installation of laboratory equipment, glove boxes, transfer boxes, and chemical fume hoods. Typical construction hazards may exist.

Controls

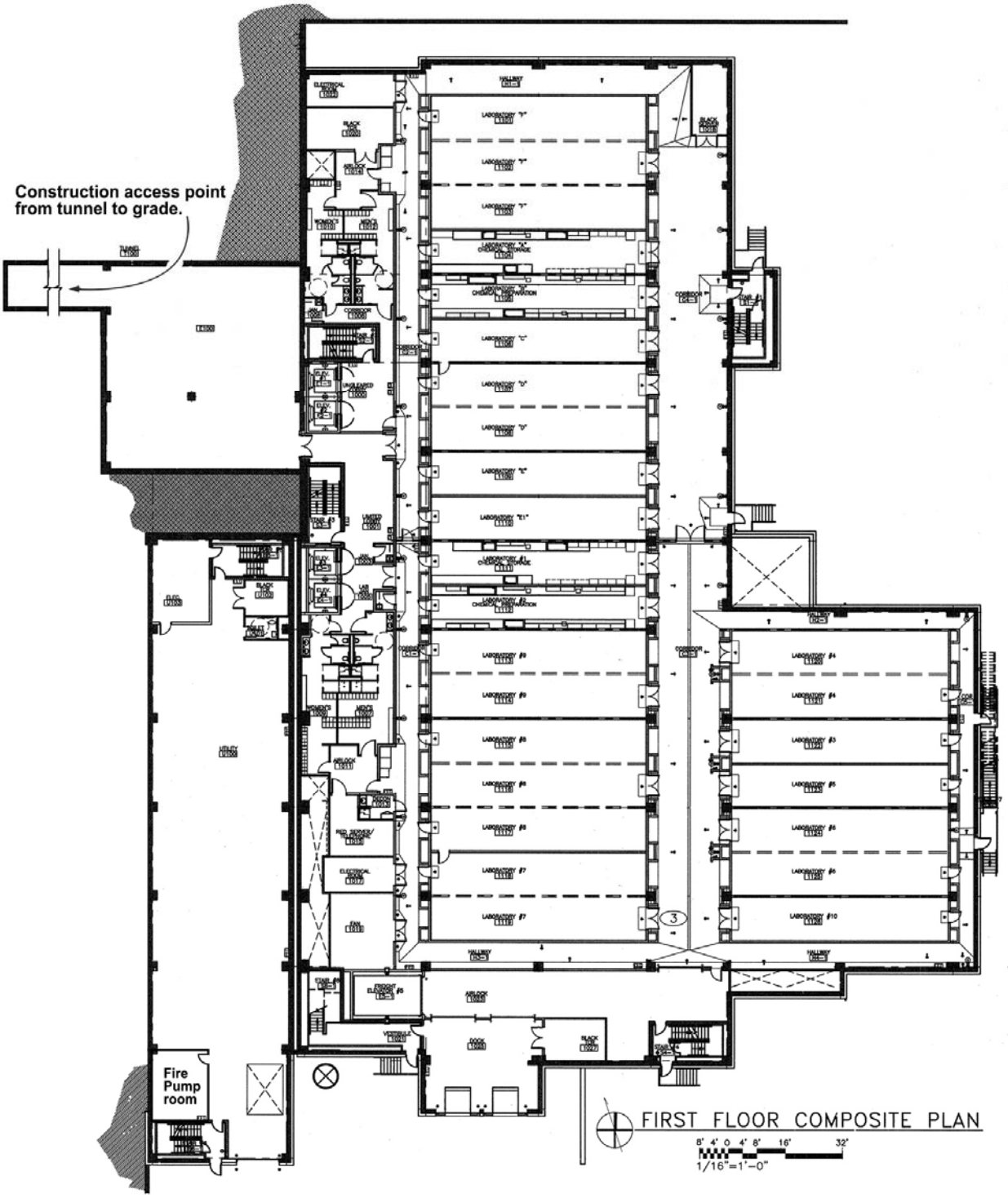
The following controls are in place to reduce the risk of accidents that would cause personnel or responders to be exposed to biological hazards. In addition, numerous engineered and administrative controls in the processing systems prevent accidents or limit the consequence should an accident occur:

- *Combustible Loading:* The facility operates with levels of combustible materials that make the risk of an interior catastrophic fire low.
- *Facility Structure–Firewalls:* The facility structure outer walls are of substantial construction and are firewalls that prevent the spread of the fire into the facility.
- *Pressure Safety Program:* This program mitigates specific hazards that pressure presents (e.g., explosions, release of contents, and mechanical injury).
- *Radioactive Inventory Control Program:* The radioactive inventory control program limits the amount of radioactive material in any location. The expected inventory for RLUOB is very low.
- *Quality Management Program–Training and Qualification Program:* Workers are trained and qualified on security, safety, containment, and sample transfer requirements for working with biological materials.
- *Fire Suppression System:* Minimizes the spread of fires and lowers temperatures.
- *Gas Cylinder Safety Program:* The gas cylinder safety program includes procedures for handling cylinders and the requirement to restrain gas cylinders used in the facility.
- *Postings:* Postings are as usual LANL operating areas. RLUOB does have a blue light indicator that is indicative of security-related access information and other light indicators indicative of radiological operations controls.
- *PPE:* Personal protective equipment (PPE) is required as the last line of defense to further protect workers from hazards. In the spirit of the Occupational Safety and Health Administration (OSHA) Regulation 1910.132, *General Requirements for PPE,* guidelines for PPE will be determined during the Integrated Work Management process.
- *Integrated Work Management:* An integrated work document (IWD) is required for all moderate- or high-hazard work.

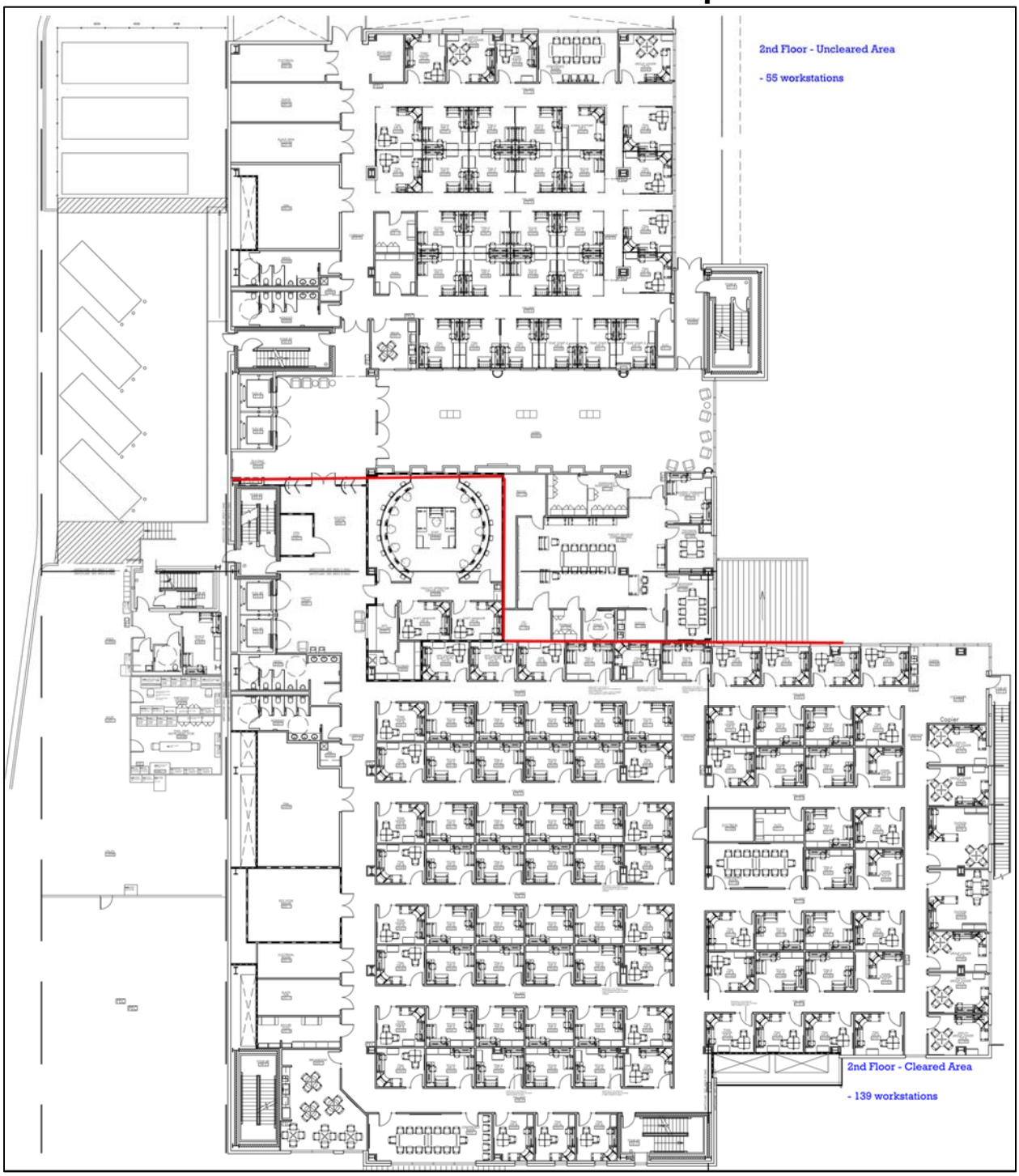
RLUOB Basement Map



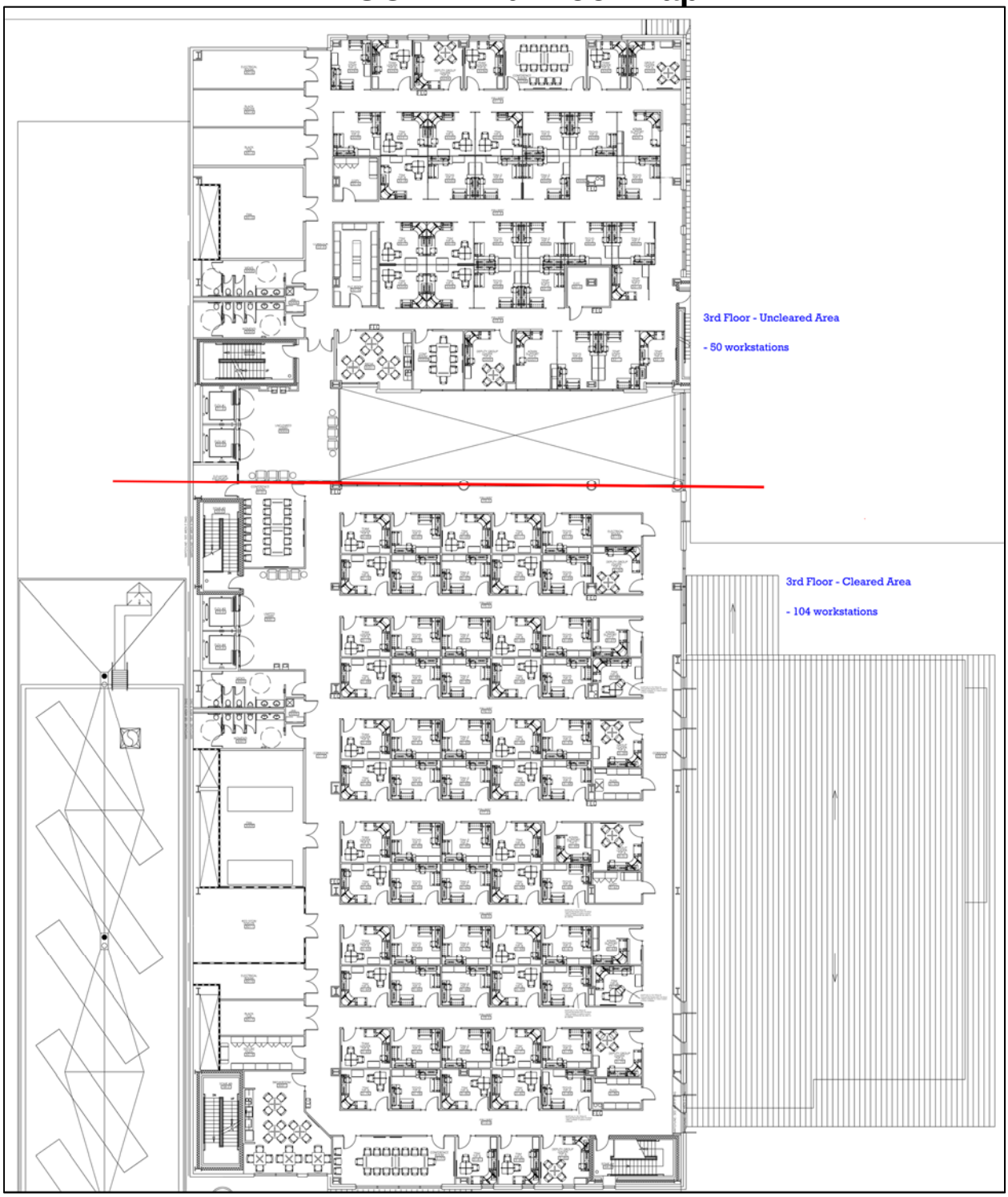
RLUOB First-Floor Map



RLUOB Second-Floor Map



RLUOB Third-Floor Map



RLUOB Fourth-Floor Map