

Standard Operating Procedure –#COE-SOP-0005

Roof Access

Facility: NMSU College of Engineering Laboratories

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Scope: This SOP describes requirements for work area labeling, chemical inventory and housekeeping as well as training required to work in a hazardous chemicals laboratory

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Introduction:

This procedure describes the requirements to access any building roof in the College of Engineering. These requirements include using established pathways, never being or working alone on a roof, awareness of weather situations and understanding requirements for roofs without fall protection.

These requirements are in conjunction with the COE Chemical Hygiene Plan. Training requirements are as assigned by the Department, Environmental Health and Safety (EH&S) and the COE Safety Specialist. Adherence to other policies include COE Working Alone or In Isolation.

Standard Operating Procedure Details:

Outline of Requirements in this document are as follows. See farther down for details and checklists:

1. Introduction
2. Definitions
3. Established Pathways
4. Working Alone – Buddy System
5. Weather Awareness
6. Equipment Hazards - Solar Panels, Antennas, etc.
 - a. Moving Objects
 - b. Facilities – Electrical, Ventilation, Drainage
7. Antennas, Guy Wires and RF Energy
8. Requirements for Roofs without Fall Protection
 - a. Fall Protection – Required Distance from Exposure
 - b. Falling Objects

1. Introduction

- a. First and foremost the College of Engineering (COE) strives to provide a safe and healthy work environment for students, faculty and staff. We understand that research projects and experiments can require access to the roof of a building. This policy provides guidance on the behaviors allowed for access to roof areas.
 - i. This policy applies to roofs with established access routes (paths, walls, handrails, doors, hatches etc. provided by architecture of the building.
 - ii. This policy gives information on the requirements for accessing areas off of existing paths or onto roof areas with no protection. A safety evaluation and additional training are required for this activity.

2. Definitions:

- a. Roof: The exterior surface on the top of a building.
- b. Working Alone: Performance of any work by an individual who is not directly supervised by another person, or within audible or visible range of another individual and where assistance is not immediately available in the event of an injury, illness or emergency. This applies any time of day or night.
- c. Work: Means physical or mental effort or activity directed toward the production or accomplishment of something, regardless of employment status.
- d. Hazard: A situation, condition or object that may be dangerous to the safety or health of a person.
- e. Work Area: Any location where COE conducts business, academic projects or research is performed and considered part of the work area. This includes traditional business, classroom, and physical plant environments, field locations, collaborative sites, shops, studios, labs or other off-site work locations
- f. Fall hazard means any condition on a walking-working surface that exposes an employee to a risk of harm from a fall on the same level or to a lower level. *
- g. Fall protection means any equipment, device, or system that prevents an employee from falling from an elevation or mitigates the effect of such a fall. *
- h. Guardrail system means a barrier erected along an unprotected or exposed side, edge, or other area of a walking-working surface to prevent employees from falling to a lower level. *
- i. Handrail means a rail used to provide employees with a handhold for support. *
- j. Designated area means a distinct portion of a walking-working surface delineated

by a warning line in which employees may perform work without additional fall protection. *

- k. Unprotected sides and edges mean any side or edge of a walking-working surface (except at entrances and other points of access) where there is no wall, guardrail system, or stair rail system to protect an employee from falling to a lower level. *
- l. Walking-working surface means any horizontal or vertical surface on or through which an employee walks, works, or gains access to a work area or workplace location. *
- m. Warning line means a barrier erected to warn employees that they are approaching an unprotected side or edge, and which designates an area in which work may take place without the use of other means of fall protection. *

3. Established Pathways

- a. Established pathways are those routes designated by the architect or engineer allowing personnel to walk on the roof without potential damage. These paths are generally reinforced to allow foot traffic and sometimes equipment movement without damage the underlying roof membrane structure
 - i. Always stay on these pathways unless specifically given approval otherwise from NMSU Facilities
 - ii. Do not ever penetrate the roof membrane by mounting supports or equipment without specific approval from NMSU facilities
- b. Example Photos

4. Working Alone

- a. Do not access, or perform work on, a roof alone.
 - i. A roof is an isolated area where people do not regularly go. So if something happens to you while you were alone up there, it might be a very long time before someone comes looking for you.
 - ii. Always work with a buddy
 - iii. Always let someone else know that you are working on the roof

5. Weather Awareness

- a. Lightning
 - i. Lightning is the 2nd most frequent cause of death for people performing outdoor activities.
 - ii. Lightning can strike from a storm up to 35 miles away. And storms always produce lightning so when you hear thunder, it's time to get off the roof and go inside.
 - iii. Tall objects are likely targets for lightning to strike. And things like antennas, poles, guy wires etc. are all great lightning attractors



b. Heat Related Issues

- i. It can get very hot on the roof of a building since no shade is generally available.
 1. Take breaks frequently when conditions are hot
 2. Take a supply of drinking water with you when working for long periods of time
 3. Watch your buddy for signs of heat illness since the person affected frequently does not know they have a problem. Some heat illness symptoms are shown below.



6. Equipment Hazards

a. Moving Objects

- i. Some equipment, like antennas, will move automatically when operating. Since personnel are not normally present on the roof, barriers or guarding may not be present. When accessing a roof, take inventory of surrounding equipment and use caution when working around it. Be especially careful of distractions from things like wind noise and hot conditions.



b. Facilities

i. Electrical

1. Building electrical should be protected from random contact and be secured in conduits and junction boxes. Do not tamper or touch any wiring without specific permission from NMSU Facilities
2. Any electrical cords, cables and associated equipment for any experiment must be secure so it will not present a falling object or a trip hazard. Consult COE Safety or NMSU EHS for information this.

- a. Remember that you cannot penetrate the roof without specific permission from NMSU Facilities

ii. Ventilation and Fire Protection

1. A roof contains several items that support building environmental control some of which include air handling units, vents, exhaust

fans, fire protection water risers, etc.

2. Do not to tamper with or modify any of this equipment without specific permission from NMSU Facilities. This includes securing your experimental equipment to them. This can damage or change the configuration so that facilities will not operate as designed and cause problems for the building.
- 3.

7. Antennas, Guy Wires and RF Energy Hazards

- a. Antenna hazards include protruding objects and movement of the framework. Always use caution and situational awareness when working around an antenna. Many antennas have mains and laterals that stick out like tree branches. These can poke or scratch when an unaware person enters their path, potentially injuring eyes, and skin. The antenna can also be in moving as a result of control from a remote source. You may not have insufficient warning when the antenna starts moving which can injure you and also damage the antenna.
- b. Many antennas and masts are supported by guy wires or anchors. Again situational awareness is the key to not tripping or hurting yourself when working. Some anchors and wires will have colorful warning tape or pennants attached, but do not rely on that being available. Always survey an antenna mast to determine how it is supported and perform work with caution around it.
- c. RF Energy can be dangerous at very high power levels (see IEE Standard C95.2-1999 or FCC OET Bulletin 65 or OSHA 1910.97). Generally the antennas in use here at NMSU COE do not radiate harmful power levels.

8. Requirements for Roofs without Fall Protection
 - a. Fall Protection is required when working 4 feet above a lower level, for General Industry Applications per OSHA in 29 CFR 1910 Subpart D, and 6 feet above a lower level for Construction Applications per OSHA in 29 CFR 1926 Subpart M
 - b. A person can be no closer than 6 feet from an unprotected roof edge (i.e. without guard railing, hand railing, walls, etc.). The zone between the roof edge and 6 feet is the Designated Area. Working between the Designated Area and the roof edge requires Fall Protection Training and special equipment such as harnesses, lanyards, personal fall arrest systems.
 - c. Some roofs have a painted warning line that delineates the extent of the Designated Area and may include exclusion zones for equipment such as antennas. Do not cross the warning line, if so marked, without special permission.
 - d. Falling Object Protection – Do not drop or throw anything from a roof onto the lower level such as the ground. People walking or working below can be injured by objects falling from above. If you have a reason to drop items from a roof, you need an approved safety plan which will include barricading the area below from personnel access.