Rooftop Safety for the Climate & Space Research Building

UM Environment, Health and Safety Dept
& CLaSP Safety Committee

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This Presentation

- Serves as basic safety training for anyone going onto the CSRB roof
- Addresses Potential Hazards encountered on the roof
- Explains the responsibilities of roof users
- Tells how to get access to the roof (file a Research Plan and an SOP/training record for approval by the CSRB Safety Committee)

The Roof Resource

- Roofs are generally off-limits
  - Domain of Plant Dept.
  - (like boiler rooms, steam tunnels, etc)
- With great effort, CLaSP convinced the U that our roof is also a laboratory
  - All labs are domain of the Dept. of Environmental Health & Safety
  - EHS performs periodic inspections and monitoring.
  - Like any other lab, EHS has the power to shut down all operations if it finds unsafe conditions.
- The CSRB roof situation is unique. As a roof user you can help maintain our continued access or you can screw everything up!

A Shared Laboratory

- Space Research Building rooftop is used by
  - Research groups
  - Classes
- For
  - In situ measurements (eg. weather station)
  - Remote measurements (eg. GPS signal delays)
- Coordination is essential to insure that these activities
  - Do not pose a risk to others on the roof, or around the building.
  - Do not interfere with the activities of another group.
  - Are recorded so that First Responders know what to do in an emergency.
  - Are conducted by properly trained personnel (the point of this presentation).

Hazards on the Roof

#1. **Inclement Weather**
(wind, snow, ice, rain, lightning or darkness)




Never attempt to work on the roof during any conditions that might pose a risk to your traction and/or overall safety!
No roof work between sunset and sunrise.

Hazards on the Roof

#2. **The Roof Edge**

- No guard rail on most of the roof
- Remain at least **15 feet** from the roof edge

The 15 foot markings may fade with weather

Hazards on the Roof

15 foot roof edge exceptions

Exception #1:
to transit to a wing
from the main building

Stay in the middle
(impossible to be 15 feet
away from the edges)

Exception #2: Roof edges w/ railings

No climbing on, sitting on,
or leaning over railings

Hazards on the Roof

#3. **Fume hood exhausts**

Hazardous exhausts marked with RED tape

- Stay at least **20 feet** away from exhausts w/ solid red tape.
- If work must be performed within 20 feet of red taped exhaust, the fume hood must be shut down
  (See Bldg Mgr).

Hazards on the Roof

Other Exhaust Markings

All fume hood exhaust vents on the roof should be **marked with tape** signifying the nature of exhaust from that particular vent.

√ • **Green/White Stripes**: No hazardous constituents exhausted. **Safe to approach**, to work near, and work on system at any time.

X • **Red/White Stripes**: Potentially hazardous exhaust, but system meets minimum safety and engineering requirements. These systems are **safe to approach** and work near.

√ • **Solid Red**: Hazardous exhaust.

Stay 20 feet away.

X • **Yellow/White Stripes**: Exhaust for potential asphyxiant.

√ = CSRB roof has these
X = CSRB roof does not have these

Hazards on the Roof

#4. **Radio Frequency Energy**

- Lots of antennas on the roof
- Most receive, don't transmit
- This one does transmit, sometimes

Antenna in motion: mezzanine unsafe

- Antenna moves slowly to track a satellite. Duration: about 5 minutes
  - Check the mini LCD display by the door for pass times. It will be powered off when operations aren't happening.
- Transmit power high enough to warrant caution: long term exposure hazardous
- If you see the antenna moving:
  - Stay on main roof; don't climb stairs up to the mezzanine.
- If already on the mezzanine:
  - Secure what you are working on, then
  - Descend the stairs and wait for it to park. Don't rush.

Antenna parked: Safe

Antenna horizontal: Transmitter is off.

Hazards on the Roof

#5. **Tripping Hazards**

- Cables
- Hatches
- Hoses
- Edges
- Pipes
- And more!

Quick Quiz: Hazards on the Roof

How far should you be from the edge of the roof?

Hazards on the Roof

How far should you be from the edge of the roof?

FIFTEEN FEET! (4.6 m)

Hazards on the Roof

Is this experiment far enough away from the edge of the roof?

Hazards on the Roof

Is this the correct path to take?

Use of Ladders on the Roof

- Some activities may require the use of a ladder to install /maintain /remove equipment.
- **Faculty**: Please let Josh Synowiec know that you will be using a ladder in your Roof Activity Plan.
- **Students**: Obtain ladders from your principal investigator who will be responsible for oversight of use.

Use of Ladders on the Roof

- All portable ladders shall be inspected before use.
  - Inspect rungs, side rails, locking devices, etc.
- Maintain a “three points of contact” when climbing or working unless fall protection system is in place.
  - This means that at least three points of your body - always two of these being your feet - are to be touching the ladder at all times - for safety purposes.
- Stepladders shall not be leaned against a wall and used as a straight ladder.
- Do not use the top two steps of a ladder; it may tip!
- Ladders may not be used near railings where a slip, tip or fall would be unprotected.

Fixed stairs up to the mezzanine

Looking up – not so bad

Looking down- very steep

Be careful if carrying anything. <u>Stay off in icy conditions.</u>

Fixed stairs up to the mezzanine

- Stairs are sheltered from prevailing wind
- But not at the top
- Be especially wary of strong gusts at the top of the stairs

Be careful if carrying anything. Stay off in icy conditions.

An example of "What could have happened…."

A group of students wanted to move a 160-pound six foot satellite dish from the top of the mezzanine to the main roof below. They did not attempt to belay the dish. Students had begun backing down the stairs under the dish when they were stopped by EHS.

An example of "What could have happened…"

Another investigator's equipment could be damaged!

Inadequate clearance to carry the dish down the steps. Students could be injured.

The importance of filling out the Research Activity Form …

- The students with the 160 pound satellite dish had filled out a Research Activity Form.

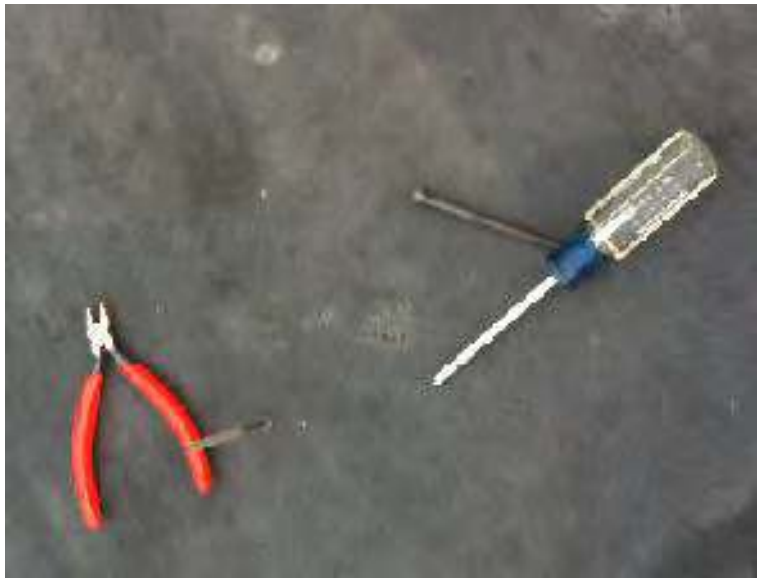
- Their Form stated that the satellite dish would have a circumference of 3 feet, but in reality it was much bigger.

- They did not amend the Form or notify the appropriate people of the changes so no one knew they would have the hazard of transporting a large dish on or off the mezzanine.

… AND revising it when research plans change

Responsibilities

The roof is covered by a rubber membrane which if punctured will allow water infiltration. Culprits are likely falling objects (heavy tools or equipment) or loose sharp objects (screws or tools) that are stepped on.



There are roof drains, but the roof is flat and uneven and water does pool in many spots after rains. A puncture in one of these areas could cause a lot of water damage, and moisture problems like mold, inside the building.

- There is a large raised metal platform that should be used for roof activities unless the equipment or experiment requires otherwise

- Likely roof travel paths have traction mats bonded in place that protect the membrane.

- Stay on these paths as much as possible unless a hazard exists.

Hazards trump footpaths

Footpath (small mats) on the roof

- Not all footpaths are safe to use.
- “Do Not Use” and “X” markings have been painted on the mats.
- Paint may fade with weather.

DO NOT USE !

- Repositionable mats are available from the Building Manager to protect the membrane around work areas

- Domes, hatch covers, plywood sheets, etc. have blown off the roof in the past during strong winds. All items taken onto the roof that will be left unattended are to be secured with weights or tethers

Roof Key

- The key is in a lock box next to the roof door. The lock box code is given to users who have completed training, documentation submittal, and have been approved by the CSRB Safety Committee.

- Obviously, do not give out the code!
- Put the key back immediately and twirl the combination
- Do not block the door open as this may allow untrained persons onto the roof

Space Research Building
Rooftop Research Activity Form

- General Information

Project Name: _____

Project Period: _____

Principal Investigator: _____

Office Address: _____

Office Phone Number: _____

Emergency Phone Number: _____

Fax Number: _____

E-mail Address: _____

Co-Investigators (Include office and emergency phone numbers, if possible):

a. _____

b. _____

c. _____

- Project Description

_____

_____

_____

- Measurement Siting and Sampling Requirements

_____

_____

_____

- Potential Hazards to others working on roof (especially near your equipment)

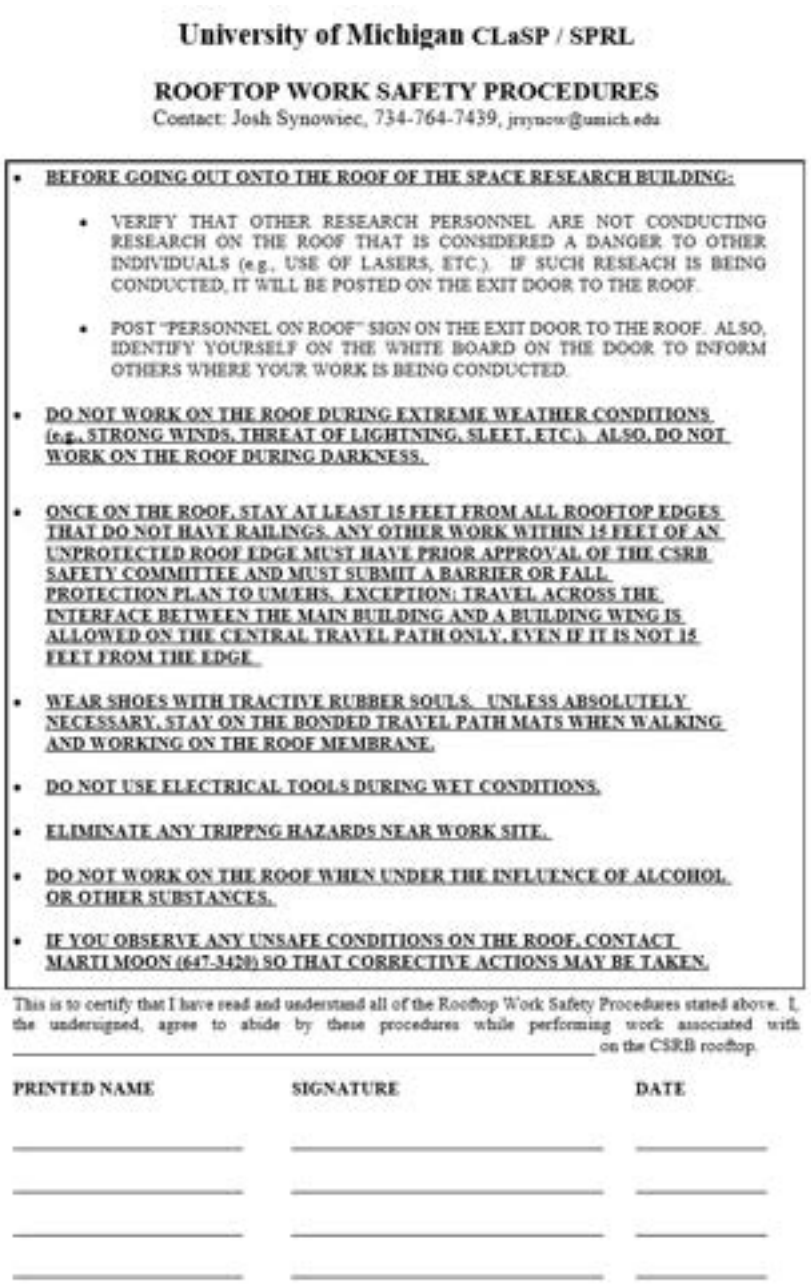
_____

_____

_____

STEPS TO TAKE BEFORE STARTING ANY ROOFTOP PROJECT OR ACTIVITY

1. Complete a Rooftop Research Activity Form found on CLaSP Internal web site: http://clasp.engin.umich.edu/pages/safety
2. Submit the Google form or turn in a paper copy (left) to Safety Committee (Rm 1115 CSRB) for approval to proceed with project.
3. The committee meets once a month. Plan ahead!



University of Michigan CLaSP / SPRL

ROOFTOP WORK SAFETY PROCEDURES

Contact: Josh Synowiec, 734-764-7439, jrsynow@umich.edu

- **BEFORE GOING OUT ONTO THE ROOF OF THE SPACE RESEARCH BUILDING:**
  - VERIFY THAT OTHER RESEARCH PERSONNEL ARE NOT CONDUCTING RESEARCH ON THE ROOF THAT IS CONSIDERED A DANGER TO OTHER INDIVIDUALS (e.g., USE OF LASERS, ETC.). IF SUCH RESEACH IS BEING CONDUCTED, IT WILL BE POSTED ON THE EXIT DOOR TO THE ROOF.
  - POST "PERSONNEL ON ROOF" SIGN ON THE EXIT DOOR TO THE ROOF. ALSO, IDENTIFY YOURSELF ON THE WHITE BOARD ON THE DOOR TO INFORM OTHERS WHERE YOUR WORK IS BEING CONDUCTED.
- **DO NOT WORK ON THE ROOF DURING EXTREME WEATHER CONDITIONS (e.g., STRONG WINDS, THREAT OF LIGHTNING, SLEET, ETC.). ALSO, DO NOT WORK ON THE ROOF DURING DARKNESS.**
- **ONCE ON THE ROOF, STAY AT LEAST 15 FEET FROM ALL ROOFTOP EDGES THAT DO NOT HAVE RAILINGS. ANY OTHER WORK WITHIN 15 FEET OF AN UNPROTECTED ROOF EDGE MUST HAVE PRIOR APPROVAL OF THE CSRB SAFETY COMMITTEE AND MUST SUBMIT A BARRIER OR FALL PROTECTION PLAN TO UM/EHS. EXCEPTION: TRAVEL ACROSS THE INTERFACE BETWEEN THE MAIN BUILDING AND A BUILDING WING IS ALLOWED ON THE CENTRAL TRAVEL PATH ONLY, EVEN IF IT IS NOT 15 FEET FROM THE EDGE.**
- **WEAR SHOES WITH TRACTIVE RUBBER SOULS. UNLESS ABSOLUTELY NECESSARY, STAY ON THE BONDED TRAVEL PATH MATS WHEN WALKING AND WORKING ON THE ROOF MEMBRANE.**
- **DO NOT USE ELECTRICAL TOOLS DURING WET CONDITIONS.**
- **ELIMINATE ANY TRIPPNG HAZARDS NEAR WORK SITE.**
- **DO NOT WORK ON THE ROOF WHEN UNDER THE INFLUENCE OF ALCOHOL OR OTHER SUBSTANCES.**
- **IF YOU OBSERVE ANY UNSAFE CONDITIONS ON THE ROOF, CONTACT MARTI MOON (647-3420) SO THAT CORRECTIVE ACTIONS MAY BE TAKEN.**

This is to certify that I have read and understand all of the Rooftop Work Safety Procedures stated above. I, the undersigned, agree to abide by these procedures while performing work associated with _____ on the CSRB rooftop.

PRINTED NAME	SIGNATURE	DATE

STEPS TO TAKE BEFORE STARTING ANY ROOFTOP PROJECT OR ACTIVITY

4. All persons to go on the roof are to view this PowerPoint training presentation!!
5. Download an CSRB Rooftop Work Safety Procedures Form from the CLaSP web site. Customize it for your activity if other safety requirements apply.
   a) Read it! Sign it!
   b) The CSRB Safety Committee must receive a copy (Josh Synowiec)
6. Place documentation that you have received this training in Section 4 of the Chemical Hygiene Plan (Blue) Notebook.

Safe Project Designs

- Even if all of the above safety measures are followed, they will be inadequate if the instruments/experiments themselves are not designed safely.
- Insure that:
  - the experiment is adequately and safely anchored to the roof, so that it will not tip or become airborne in strong winds;
  - the experiment does not have exposed sharp edges that could damage roof in the event of a tip;
  - all electrical connections are weatherproofed; and
  - there are not any hanging wires or features that could become trip hazards.
- If the project must change, update and resubmit the Forms!

If you see a problem...

- If you see a problem, puncture the membrane, or find an unsafe facility condition on the roof, notify the Building Manager, Marti Moon
  - So we can get it fixed
- If you observe unsafe behavior, notify Josh Synowiec or a Safety Committee member
  - So we can make sure it doesn't recur

CSRB Safety Committee

- Will work with you to make your roof experience safe for everyone
  - eg. obtaining safety equipment

- Will likely deny roof access for
  - Observations of violations of
    - Training rules
    - Standard operating procedures
    - Approved safety plans
  - Lack of cooperation with the Safety personnel

Questions?

- Contact Names

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