ATLSS Multi-Directional Structural Testing Laboratory Safety Plan

Revision 1
October 15, 2015

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ATLSS Laboratory Safety Plan

I. Lehigh University's Safety Policy

It is the intent of Lehigh University to provide a safe and healthy environment for all faculty, staff, students, contractors, and others who may work at or visit the University's facilities and grounds. These individuals are entitled to work and study in a relatively hazard-free environment. Therefore, the University will strive to achieve an optimal degree of safety while still providing an intellectual and cultural atmosphere. Federal, State, and Local regulations mandate a minimum level of safety. However, since the management of Lehigh University holds safety in such high regard, we will endeavor to surpass these minimal standards to attain a higher degree of compliance.

I believe that health and safety should be of concern to everyone, as it is only through our mutual efforts and vigilance that we will eliminate accidents resulting in personal injury and loss of property. Each person using University facilities and equipment is required to act in a safe and responsible manner and is requested to report unsafe conditions to the appropriate University official.

Lehigh University has long been recognized for its excellence in academics and research. Through the dedicated efforts of everyone involved, we can maintain a safe and healthy environment in which to continue our educational and research pursuits.

II. ATLSS Engineering Research Center Safety Policy

All activities at the ATLSS Engineering Research Center must be in full compliance with Lehigh University's safety policy. Our intent is to provide a safe and healthy environment for all faculty, staff, students, contractors, and others that work at or visit the Center. Health and safety are a primary concern for everyone. Only through the efforts of ATLSS Center faculty, staff, students, and visitors will we eliminate accidents resulting in personal injury or damage to valuable resources, such as research equipment and specimens. We need to maintain a culture of safety at the ATLSS Center. Everyone at the Center has a responsibility to participate in and enhance this culture each day in the laboratories and other spaces that support the Center's operations. This responsibility requires everyone to address safety issues that they observe or encounter. As we look forward to continued advancements in research, service, and education, we must focus also on maintaining a safe and healthy working environment.

Dr. Richard Sause
Director
ATLSS Engineering Research Center
Lehigh University

III. Emergency Phone List

Effective 10/01/15

Lehigh University			
Contact	**Type of Emergency**	**On Campus**	**Public Phone**
University Police	Bomb threats; Explosions; Fires	8-4200	610-758-4200
Environmental Health and Safety	Chemical and radiation incidents	8-4251	610-758-4251
City of Bethlehem			
Contact	**Type of Emergency**	**On Campus**	**Public Phone**
Ambulance	------	8-4200	610-865-7171
Fire Department	------	8-4200	610-865-7171
Police Department	------	8-4200	610-865-7171
St. Luke's Hospital Emergency Room	------	N/A	610-954-4500

IV. ATLSS Personnel Emergency Contact Information

The following individuals (in contact order) should be contacted in case of after hour, weekend, or holiday incident involving the ATLSS Laboratory.

Last Name	First Name	Title	Building Monitor	Campus Phone	Cell Phone	E-mail (@lehigh.edu)
Fritchman	Darrick	Manager of Laboratory Operations	-----	610-758-4365	484-809-3541	djf310
Kusko	Chad	Administrative Director	Primary	610-758-5299	610-349-3489	chk205
Sause	Richard	Director	-----	610-758-3565	610-297-1527	rs0c
Ricles	James	Deputy Director; RTMD Site Director	-----	610-758-6252	610-393-8582	jmr5

V. Hours of Operation

The ATLSS Engineering Research Center is located within the Imbt Laboratories. The hours for the Engineering Research Center are 8:15 am – 4:45 pm, Monday through Friday (excluding University holidays). The ATLSS multi-directional, large scale structural testing laboratory's hours are 7:00 am – 3:00 pm, Monday through Friday (excluding University holidays). Modifications to these hours may be made by the ATLSS Laboratory Operations Manager. Any activity that occurs outside of normal working hours needs to be approved in advance by the ATLSS Laboratory Operations Manager and is subjected to the policies outlined in "After Hours Work" in Section VIII below. The balance of the laboratories in the Center also operate under the 7:00 am – 3:00 pm schedule and area also subject to the policies outlined in "After Hours Work".

VI. Expectations in the Laboratory

ATLSS safety rules apply to all individuals working in the ATLSS structural testing laboratories, including students, faculty, staff, visitors, and contractors. Specific procedures for additional Center laboratories may be available as an addendum to these policies.

The ATLSS multi-directional, large-scale structural testing laboratory, allows for multi-directional testing in order to investigate the performance of components and systems associated with the civil and marine infrastructure. This may be achieved through the combined use of dynamic actuators, reaction wall, and strong floor. This facility also is home to the NEES real-time, multi-directional equipment site, which investigates the seismic performance of large scale structures.

The hydraulic actuators have varying load capacities, with some in the area of hundreds of thousands pounds and operate at hydraulic supply pressures exceeding 3000 psi. The danger potential within the laboratory is very high. Sudden and catastrophic specimen or fixture failure is possible. It is the responsibility of each project principal investigator and assigned staff member and student to evaluate the test, from erection through testing and removal to identify hazards and determine the possibility and consequences (projectiles, collapse, etc.) of failures. Preventative measures should be implemented to minimize the danger to personnel and equipment. If the danger cannot be eliminated, additional safety measures and limited access to the test areas or entire lab should be enforced and appropriate warning signs displayed.

Although some activities are restricted to the laboratory technician staff, many activities in the structural labs may be performed by students, faculty, and staff researchers. All users must be trained and demonstrate safe and competent operation before being permitted to operate tools, testing equipment, and data acquisition systems on their own. The primary source for training is the ATLSS Laboratory Operations Manager, who may delegate training for specific pieces of equipment, tools, or processes to other laboratory staff due to their specific expertise in a given area.

Any person entering the laboratory should be aware of the environment and surroundings. Crane operation, fabrication, erection of test setups, congested areas, storage areas, and oil on the floor all contribute to potentially dangerous areas. All warning signs, signals, and roped off areas that may be in effect for a given test program should be observed and respected.

VII. ATLSS Multi-Directional Structural Testing Laboratory Safety Rules

This section covers the general safety rules for working in the ATLSS large-scale multi-directional structural testing laboratory. The purpose of these rules is to ensure safe working laboratory conditions for all members of the Lehigh community and their visitors. The contents of this manual are not necessarily comprehensive. Therefore, supplemental safety procedures may be required as each situation warrants.

Safe laboratory practice is an attitude, knowledge and an awareness of potential hazards. Safety is a mutual responsibility and requires the full cooperation of everyone in the laboratory. Many accidents can result from an indifferent attitude, failure to use common sense and failure to follow instructions. Be aware of what other workers are doing, since you may be a victim of their mistakes. Do not hesitate to comment to a fellow worker engaging in an unsafe practice or operation.

Additional specific policies outlined by Lehigh University may be introduced and referenced throughout this and subsequent sections. Each user of the laboratory must review and understand these safety rules prior to being allowed to utilize the laboratory. All ATLSS faculty and staff members are responsible for supervision and oversight of laboratory safety. Failure to comply with the following policies could result in removal of individual from the laboratory and suspension of individual's project activity within the laboratory.

1. All safety rules detailed in the ATLSS Safety Manual must be strictly followed by all Lehigh University faculty, staff, and students along with all visitors to the laboratory. Disregarding these rules may lead to removal of the individual from the laboratory.
2. On-site safety training will be required for all laboratory users in order to be authorized to utilize the ATLSS Laboratory. The training will be conducted by the ATLSS Laboratory Operations Manager and will include a minimum of a review and acknowledgement of these safety rules.
3. The laboratory area must be kept clean. All users of the laboratory are responsible for keeping the laboratory clean.
4. No horseplay is permitted in the laboratory. Individuals observed behaving in such a manner will be asked to immediately leave the laboratory.
5. No headphones/earbuds are allowed while operating power tools/equipment or while conducting tests. Hearing protection is permitted and encouraged.
6. All requests to utilize the laboratory for a project, activity, or function should be channeled through the ATLSS Laboratory Operations Manager for review and consideration of next steps. Activities being conducted in the laboratory that have not been communicated to the ATLSS Laboratory Operations Manager may be removed from the laboratory.
7. All laboratory personnel, including students and visitors, must be dressed appropriately:
    a. Hard hats and safety glasses must be worn at all times while in the ATLSS multi-directional structural testing laboratory, including the yellow walkway area within the laboratory (previously safety glasses were not required in this area) and in the north bay of the laboratory beyond the reaction wall. Regular eyeglasses may be worn in lieu of safety glasses by individuals visiting, but not working, in the laboratory. The only location within the laboratory area where hardhat and safety glasses are not required is in the walkway area in front of the Laboratory Operations Manager's office.
    b. Long pants and closed-toe shoes are required in the laboratory. Individuals working within the laboratory should not wear loose clothing, with special precaution given when operating sanding belt or other rotating equipment.
    c. Neckties, bracelets (non-medical ID bracelets), and other loose clothing/jewelry must be removed prior to working in the laboratory.
    d. Additional personal protective equipment, including hearing protection, goggles, and dust masks, are available from the ATLSS Laboratory Operations Manager.
    e. Additional process-specific protection, including long-sleeves, masks, gloves, and protective clothing, should be worn when conducting specific laboratory operations, such as welding. Contact the ATLSS Laboratory Operations Manager or designated ATLSS Laboratory Technician regarding such protection.
8. Safety harnesses are required when free climbing on test specimens or laboratory equipment, including when in the manlift bucket.
9. Individuals working on test structures must be within sight of other members of the staff or employ two way radio communications when this is not possible. Refer to the Two-Person Rule (section FF) for more details.

10. A minimum of two personnel are required to be in the laboratory when any power equipment is in use.
11. Crane, forklift, and manlift are to be operated exclusively by ATLSS laboratory staff. See ATLSS Laboratory Operations Manager if you require the use of this equipment.
12. Other laboratory machinery, equipment, and power tools are to be used only by those individuals that have received proper training by appropriate laboratory staff. See the ATLSS Laboratory Operations Manager if you require training on a specific piece of machinery or power tools or if you are unsure as to whom to contact regarding training on a specific piece of equipment. All students should inform an ATLSS laboratory staff member if he/she plans on utilizing a piece of laboratory machinery, equipment, and power tools during normal laboratory working hours (7:00 am – 3:00 pm).
13. After normal laboratory operating hours:

    (A). The following outlines the requirements for undergraduate students, graduate students, and professionals working after normal laboratory operating hours (3:00 pm through 7:00 am), on weekends (3:00 pm Friday through 7:00 am Monday morning), or on holidays, with the exception of routine inspections of long-term, 24-7 testing, for which the requirements are outlined in Section 13(B). Failure to comply with these guidelines could result in removal of the individual from the laboratory after normal operating hours and/or suspension of project activity within the laboratory.

    a. Undergraduate Students
        - For all laboratory activities after normal operating hours:

            (1). At least two students must be in the laboratory during these times (two-person rule in effect).

            (2). The students are required to email, call, or text message the ATLSS Laboratory Operations Manager when they enter the laboratory and again when they conclude activities within the laboratory.

            (3). The students are permitted to only use equipment for which they have received explicit training from ATLSS Laboratory Operations Manager or designated staff, and for which they have received documented approval for after-hours utilization from the ATLSS Laboratory Operations Manager in advance.

            (4). This guideline applies to both Lehigh University students and students visiting from other universities.

            (5). Proper clothing and personal safety equipment (such as hardhats, safety glasses, etc.) should be worn at all times during after hours work.

    b. Graduate Students
        - When utilizing Power Tools or working on a test specimen, the following requirements must be met:

            (1). All requirements outlined above for undergraduate students
        - When performing all other activities, except for routine inspection of long-term 24-7 testing (outlined in Section 13(B), the following requirements must be met:

            (1). A second student must be, at a minimum, within the ATLSS Research Center building and aware of the student's activity in the laboratory (through direct communication, email, call, or text message). It is the responsibility of the student in the laboratory to make sure a second student is aware of his/her activity in the laboratory and when he/she enters and concludes activities in the laboratory.

(2). The graduate student utilizing the laboratory is required to call, email or text message (a copy on an original email or text sent to the second student is sufficient) to the ATLSS Laboratory Operations Manager when he/she enters the laboratory and again when he/she concludes activities within the laboratory.

(3). This guideline applies to both Lehigh University students and students visiting from other universities.

(4). Proper clothing and personal safety equipment should be worn at all times during after hours work.

c. Professionals

- Professionals include staff, faculty, visiting project sponsors, and project subcontractors. The following requirements must be met:

(1). Any professional planning to work after hours in the laboratory is required to make the ATLSS Laboratory Operations Manager aware of his/her plan and must receive approval from Laboratory Operations Manager to conduct the specific work after hours.

(2). The professional is permitted to only utilize equipment for which he/she has been explicitly trained.

(3). The professional should notify the ATLSS Laboratory Operations Manager via email, call, or text message when he/she enters the laboratory and again when he/she concludes activities within the laboratory.

(4). Note that the two-person rule is required if any power equipment or hydraulics are being used.

- When the professional is a member of the Lehigh University faculty or ATLSS staff, the second person can be a Lehigh graduate student or undergraduate student with proper training in laboratory safety.
- When the professional is a visiting professional, the second person must be a Lehigh University faculty or ATLSS staff member

(5). Proper clothing and personal safety protection should be worn at all times during after hours work.

(B). The following outlines the requirements for after normal laboratory operating hours routine inspections of long-term, 24-7 testing. These requirements apply to all undergraduate students, graduate students, and professionals, as outlined below. All other requirements of the safety plan must be complied with at all times.

a. Undergraduate Students

- Same requirements as listed in Section 13(A).

b. Graduate Students and Professionals

- Inspections may be conducted only between the hours of 7:00 am and 11:00 pm any day of the week, and may not be longer than 20 minutes in duration.
- The ATLSS Laboratory Operations Manager must be notified of the inspection schedule at the beginning of the tests and must be updated with any significant change such as interruption or completion of tests.
- The inspector must maintain a safe distance from live hydraulics.
- The inspector must ensure that the test is operating safely. If any discrepancy is noted with the equipment or the specimen, the test must be suspended immediately and the ATLSS Laboratory Operations

Manager must be notified. Under no circumstances should the inspector attempt to modify the hydraulic equipment without approval and direction from the Laboratory Operations Manager or delegated ATLSS staff.

- Each scheduled inspection must be assigned to a primary inspector and an alternate inspector. While the primary inspector is responsible for performing the physical inspection, the alternate inspector should ensure that the scheduled inspection has been completed safely. The alternate inspector need not be physically present in the laboratory premises, but must be able to reach the laboratory within 15 minutes during designated inspection times.
- Upon successful completion of each inspection, the primary inspector must send an official inspection email to the PI, the alternate inspector, the Laboratory Operations Manager, and any other members of the research team verifying that the inspection is safely and successfully completed, all equipment are functioning properly, and the inspector has exited the laboratory premises.
- The alternate inspector must monitor the primary inspector. If the alternate does not receive the official inspection email from the primary inspector within 30 minutes of the scheduled inspection, the alternate must contact the primary inspector by phone. In case the primary inspector cannot be reached, the alternate must notify the PI by phone and physically arrive at the laboratory to follow up.
- Proper clothing and personal safety equipment, as outlined in other sections of the safety plan, must be used at all times during inspection.

14. Proximity to specimen during test operations: The ATLSS Laboratory Operations Manager has final authority with respect to the proximity to a test specimen to which test observers may stand during the execution of testing. If an area is chained off during testing, no one is allowed inside the chained off area during test operation.
15. No chemicals are to be brought or shipped to the ATLSS multi-directional structural testing laboratory without prior approval of the ATLSS Laboratory Operations Manager or designate, if absent. Such chemicals include, but are not limited to, concrete additives and curing agents, degreasers, strain gage application chemicals, and household cleaning products.
16. First aid kit is available in the ATLSS Laboratory Operations Manager's office. An eye wash station is available at the sink immediately to the left of the south-most laboratory entrance from the Center's main hallway (just outside the ATLSS Laboratory Operations Manager's office). Fire extinguishers are located at various locations throughout the laboratory. All laboratory personnel should familiarize themselves with the locations of this safety equipment.
17. Accident and Injury Reporting: All accidents or injuries are to be reported to a member of the laboratory staff for immediate response and treatment. The emergency response phone numbers are available on the bulletin board outside the ATLSS Laboratory Operations Manager's office. The accident should be documented and communicated to Lehigh University's Environmental Health and Safety Department. The University's policy on Accident Information is available at the following website: http://www.lehigh.edu/~inehs/accidents.html. This link includes the procedures for investigation, reporting, and corrective actions.

VIII. Detailed Safety Procedures

The following section outlines detailed safety procedures, listed alphabetically by topic, for more thorough outline of ATLSS laboratory safety requirements.

A. Accident Analysis
B. Accident Investigation
C. After Hours Work
D. Alcohol and Drug Use
E. Bloodborne Pathogen Exposure Control
F. Clothing Requirements
G. Confined Space
H. Contractor Protection
I. Emergency Contacts
J. Emergency Evacuation Procedures
K. Emergency Response Plan (ATLSS)
L. Environmental Preparedness, Prevention and Contingency Plan (EPPC Plan)
M. Fabrication and Machine Shop Areas
N. Fall Protection
O. Fire Safety
P. Forklift Operation
Q. Hazardous Materials
R. Hearing Conservation
S. Heavy Equipment
T. Housekeeping
U. Job Safety/Hazard Analysis
V. Language Barrier or Uncertainty
W. Lifting
X. Lockout/Tagout, the Control of Hazardous Energy Sources
Y. Machine Guarding
Z. Medical Emergency
AA. Off Campus Projects
BB. OSHA Action Plan
CC. Protective Equipment
DD. Respirators
EE. Safety Audit
FF. Safety Rule Enforcement
GG. Scaffolding
HH. Security Threats
II. Temperature Stress
JJ. Tools
KK. Two-Person Rule
LL. Welding, Cutting, and Brazing Policy

A. Accident Analysis

The Lehigh University Accident Analysis Process and Procedures can be found at the following link on the University Environmental Health and Safety Organization webpage:

http://www.lehigh.edu/~inehs/accidents.html

At ATLSS, it is the responsibility of the ATLSS Laboratory Operations Manager to investigate all accidents, determining the cause of the accident, implementing corrective measures, and following up to ensure corrective measures are adequate.

B. Accident Investigation

The Lehigh University Accident Investigation Process and Procedures can be found at the following link on the University Environmental Health and Safety Organization webpage:

http://www.lehigh.edu/~inehs/accidents.html

C. After Hours Work

After normal laboratory operating hours:

(A). The following outlines the requirements for undergraduate students, graduate students, and professionals working after normal laboratory operating hours (3:00 pm through 7:00 am), on weekends (3:00 pm Friday through 7:00 am Monday morning), or on holidays, with the exception of routine inspections of long-term, 24-7 testing, for which the requirements are outlined in Section VIII, C(B). Failure to comply with these guidelines could result in removal of the individual from the laboratory after normal operating hours and/or suspension of project activity within the laboratory.

a. Undergraduate Students

- For all laboratory activities after normal operating hours:

(1). At least two students must be in the laboratory during these times (two-person rule in effect).

(2). The students are required to email, call, or text message the ATLSS Laboratory Operations Manager when they enter the laboratory and again when they conclude activities within the laboratory.

(3). The students are permitted to only use equipment for which they have received explicit training from ATLSS Laboratory Operations Manager or designated staff, and for which they have received documented approval for after-hours utilization from the ATLSS Laboratory Operations Manager in advance.

(4). This guideline applies to both Lehigh University students and students visiting from other universities.

(5). Proper clothing and personal safety equipment (such as hardhats, safety glasses, etc.) should be worn at all times during after hours work.

b. Graduate Students

- When utilizing Power Tools or working on a test specimen, the following requirements must be met:

(1). All requirements outlined above for undergraduate students

- When performing all other activities, except for routine inspection of long-term 24-7 testing (outlined in Section VIII, C(B), the following requirements must be met:

(1). A second student must be, at a minimum, within the ATLSS Research Center building and aware of the student's activity in the laboratory (through direct communication, email, call, or text message). It is the responsibility of the student in the laboratory to make sure a second student is aware of his/her activity in the laboratory and when he/she enters and concludes activities in the laboratory.

(2). The graduate student utilizing the laboratory is required to call, email or text message (a copy on an original email or text sent to

the second student is sufficient) to the ATLSS Laboratory Operations Manager when he/she enters the laboratory and again when he/she concludes activities within the laboratory.

(3). This guideline applies to both Lehigh University students and students visiting from other universities.

(4). Proper clothing and personal safety equipment should be worn at all times during after hours work.

c. Professionals

- Professionals include staff, faculty, visiting project sponsors, and project subcontractors. The following requirements must be met:

(1). Any professional planning to work after hours in the laboratory is required to make the ATLSS Laboratory Operations Manager aware of his/her plan and must receive approval from Laboratory Operations Manager to conduct the specific work after hours.

(2). The professional is permitted to only utilize equipment for which he/she has been explicitly trained.

(3). The professional should notify the ATLSS Laboratory Operations Manager via email, call, or text message when he/she enters the laboratory and again when he/she concludes activities within the laboratory.

(4). Note that the two-person rule is required if any power equipment or hydraulics are being used.

- When the professional is a member of the Lehigh University faculty or ATLSS staff, the second person can be a Lehigh graduate student or undergraduate student with proper training in laboratory safety.
- When the professional is a visiting professional, the second person must be a Lehigh University faculty or ATLSS staff member

(5). Proper clothing and personal safety protection should be worn at all times during after hours work.

(B). The following outlines the requirements for after normal laboratory operating hours routine inspections of long-term, 24-7 testing. These requirements apply to all undergraduate students, graduate students, and professionals, as outlined below. All other requirements of the safety plan must be complied with at all times.

b. Undergraduate Students

- Same requirements as listed in Section VIII, C(A).

b. Graduate Students and Professionals

- Inspections may be conducted only between the hours of 7:00 am and 11:00 pm any day of the week, and may not be longer than 20 minutes in duration.
- The ATLSS Laboratory Operations Manager must be notified of the inspection schedule at the beginning of the tests and must be updated with any significant change such as interruption or completion of tests.
- The inspector must maintain a safe distance from live hydraulics.
- The inspector must ensure that the test is operating safely. If any discrepancy is noted with the equipment or the specimen, the test must be suspended immediately and the ATLSS Laboratory Operations Manager must be notified. Under no circumstances should the inspector

attempt to modify the hydraulic equipment without approval and direction from the Laboratory Operations Manager or delegated ATLSS staff.

- Each scheduled inspection must be assigned to a primary inspector and an alternate inspector. While the primary inspector is responsible for performing the physical inspection, the alternate inspector should ensure that the scheduled inspection has been completed safely. The alternate inspector need not be physically present in the laboratory premises, but must be able to reach the laboratory within 15 minutes during designated inspection times.
- Upon successful completion of each inspection, the primary inspector must send an official inspection email to the PI, the alternate inspector, the Laboratory Operations Manager, and any other members of the research team verifying that the inspection is safely and successfully completed, all equipment are functioning properly, and the inspector has exited the laboratory premises.
- The alternate inspector must monitor the primary inspector. If the alternate does not receive the official inspection email from the primary inspector within 30 minutes of the scheduled inspection, the alternate must contact the primary inspector by phone. In case the primary inspector cannot be reached, the alternate must notify the PI by phone and physically arrive at the laboratory to follow up.
- Proper clothing and personal safety equipment, as outlined in other sections of the safety plan, must be used at all times during inspection.

D. Alcohol and Drug Use

Alcohol and drug use is not permitted in ATLSS laboratories. Report any suspicions of a faculty, staff, student, or visitor within the laboratory acting under the influence of alcohol or drugs immediately to the ATLSS Laboratory Operations Manager, ATLSS Administrative Director, or ATLSS Director.

E. Bloodborne Pathogen Exposure Control

University policy for bloodborne pathogen exposure control can be found at the following link: http://www.lehigh.edu/~inehs/policies/bbppolicy.html.

F. Clothing Requirements

Long pants and fully enclosed shoes must be worn by students, faculty, staff, and visitors in all laboratories within the Center. Areas included are the test floors, staging areas, fabrication areas, and aisle ways. Shorts, skirts, dresses, and sandals are not permitted. The dress code is applicable at all times (24-7) and all circumstances (fabrication, setup, gaging, wiring, testing, observing the test, checking control/data acquisition systems, data analysis, cleanup, examining specimens, discussing technical activities, etc.). Exceptions to the dress code may be granted under special circumstances by the ATLSS Director or ATLSS Administrative Director. Anyone violating the dress code will be asked and expected to leave the laboratory immediately.

Long sleeve shirts should be worn if operating grinding or burning equipment. Loose fitting clothing, such as lab jackets, ties, etc., should not be worn when operating the sanding belt or other rotating equipment.

G. Confined Space

If a proposed project involves the need to enter a confined space, contact the ALTSS Laboratory Operations Manager to schedule an evaluation by the University's Department of Environmental Health and Safety.

University policies, processes and procedures on this topic can be found at the following links:

http://www.lehigh.edu/~inehs/policies/confinedpol.html

http://www.lehigh.edu/~inehs/confined.html

H. Contractor Protection

To provide University personnel and contractors with a clear and concise understanding of the safety requirements and responsibilities needed while working on Lehigh University property, the University has implemented at contractor protection policy which can be found at the following link on the University's Environmental Health and Safety website:

http://www.lehigh.edu/~inehs/policies/contractorpol.html

I. Emergency Contacts

Emergency Contacts can be found at the following link on the University Environmental Health and Safety Organization webpage: http://www.lehigh.edu/~inehs/em ergencynum.html and are also available in Section IV. ATLSS Personnel Emergency Contact Information is provided above.

J. Emergency Evacuation Procedures

Emergency Evacuation Procedures can be found at the following link on the University Environmental Health and Safety Organization webpage:

http://www.lehigh.edu/~inehs/emergency_procedures.html

K. Emergency Response Plan (ATLSS)

The ATLSS Emergency Response Plan is updated periodically and disseminated to ATLSS faculty, staff, and students through the following mechanisms: (1). Email distribution and (2). posting at various locations within the ATLSS Engineering Research Center. The Plan is also on file with the University's Department of Environmental Health and Safety. The emergency response plan of the Center is intended to cover specific aspects of potential emergencies that would relate to the Center. All faculty, staff, and students are strongly encouraged to review this plan to familiarize oneself with the information contained.

L. Environmental Preparedness, Prevention and Contingency Plan (EPPC Plan)

Environmental Health and Safety has written an EPPC Plan to minimize hazards to human health and the environment from fires, explosions, or any unplanned, sudden, or non-sudden release of hazardous waste, hazardous materials, or radioactive materials to the air, soil, or water. Environmental Preparedness, Prevention and Contingency Plan (EPPC Plan) can be found at the following link on the University Environmental Health and Safety Organization webpage: http://www.lehigh.edu/~inehs/eppc.html

M. Fabrication and Machine Shop Areas

Welding, sawing, drilling, machining, grinding, and sanding equipment are regularly utilized in the laboratory. Equipment operation restricted to the laboratory technician staff includes the overhead cranes, forklift, and manlift. Other equipment and processes may be used by students and researchers who have received and successfully completed operational and safety training in the use of each tool and/or process. Contact the ATLSS Laboratory Operations Manager for training. Safety glasses, goggles, or face shields should be worn when using this equipment. Street glasses satisfying the general eye protection guidelines are not adequate for these applications. Welders are required to wear special goggles and/or face shield.

Glare shields and other barriers are to be placed to protect passers-by from weld glare and airborne debris. Do not look directly at welding operations.

N. Fall Protection

Lehigh University's fall protection requirements are outlined on the University's Environmental Health and Safety webpage at the following link:

http://www.lehigh.edu/~inehs/policies/fallpol.html

Obtain fall protection equipment and training on proper use from the ATLSS Laboratory Operations Manager.

O. Fire Safety

In case of fire/explosion emergency in the laboratory, activate the nearest fire alarm pull station. Do not attempt to fight the fire. If unable to activate the fire alarm, call Lehigh University Police at 610-758-4200 once safe to do so.

If the building fire alarm sounds:

- Evacuate immediately, checking your immediate area to ensure everyone leaves the building. Close doors when leaving.
- Use the stairways, not the elevators.
- Touch closed doors with your hand before opening to check for heat that may indicate a fire on the other side. Look through the window for signs of smoke.
- If you need to travel through smoke, stay low and breathe through a wet cloth, if possible.
- Do not enter the building until safety personnel give an all-clear signal.
- Locate all the fire safety equipment near your laboratory and office. Memorize your escape routes, including how many flights of stairs are associated with each one.

P. Forklift Operation

University policy can be found at the following link: http://www.lehigh.edu/~inehs/forklift.html.

Operation of forklifts and other powered industrial trucks is restricted to trained staff personnel who have completed the required training. See the ATLSS Laboratory Operations Manager if training is required.

Q. Hazardous Materials and Related Emergencies

Lehigh University's policy on disposal of hazardous waste can be found at the following University Environmental Health and Safety link:

http://www.lehigh.edu/~inehs/hazard.html

In case of hazardous material related emergency, contact Lehigh University police at 610-758-4200, who will notify Bethlehem Hazmat and Lehigh University's Environmental Health and Safety.

R. Hearing Conservation

The purpose of this policy and Lehigh University's Hearing Conservation Program is to prevent occupational noise exposures which could lead to noise-induced hearing loss and to comply with existing federal occupational noise exposure regulations. The policy can be found at the following University Environmental Health and Safety link:

http://www.lehigh.edu/~inehs/policies/hearingpol.html

Questions regarding this policy should be addressed to the University's Environmental Health and Safety Department. Hearing protection accessories can be obtained from the ATLSS Laboratory Operations Manager.

S. Heavy Equipment

Only trained ATLSS personnel are authorized to utilize the equipment. See the ATLSS Laboratory Operations Manager if requiring utilization of such equipment.

T. Housekeeping

Clutter in a fabrication, preparation, or test area can lead to slips, trips, and falls. Keep all work areas and aisles clean and free of debris. Identify and place warning cones or signs at potential trip or slip hazards. Inform the Laboratory Operations Manager, or if not available, any laboratory technician, of any hazardous conditions.

U. Job Safety/ Hazard Analysis

Job Safety/Hazard Analysis are included in University job descriptions (through Physical Demands/Work Environment summaries) and are available upon request.

V. Language Barrier or Uncertainty

The English language should be used within the Center's laboratories for consistency. In the event of any communications problems due to language or uncertainty that may occur regarding any safety related activities, procedures, or plans, contact the ATLSS Laboratory Operations Manager for clarity. It is imperative that there be no miscommunication where safety is involved. Do not proceed in any activity if there is any doubt concerning the understanding of any safety plan or procedure.

W. Lifting

Manual material handling involves lifting, lowering, and carrying objects. For objects that are too heavy or bulky for safe manual handling by employees, mechanical lifting devices should always be used for lifting and moving.

The University policies and processes on mechanical lifting can be found at the following links:

http://www.lehigh.edu/~inehs/policies/cranepol.html.

http://www.lehigh.edu/~inehs/crane.html.

Only trained ATLSS personnel are permitted to operate the facility overhead cranes.

X. Lockout/Tagout, the Control of Hazardous Energy Sources

University policies and procedures can be found at the following link Environmental Health and Safety link:

http://www.lehigh.edu/~inehs/policies/lockoutpol.html

The purpose of this policy is to prevent injuries to employees from the unexpected energizing, start-up, or release of stored energy from machines, equipment, or processes when such employees are engaged in activities where they are at risk from these hazardous sources. This policy requires departments, centers/institutes to establish and implement procedures for affixing the appropriate lockout/tagout devices to energy isolating devices, and to otherwise disable machines, equipment, or processes to prevent unexpected energizing, start-up, or the release of stored energy.

ATLSS Laboratory Lockout Policy includes the following specific items:

- Lockout of hydraulic system if hydraulic work requiring opening of hydraulic lines is being conducted on the laboratory floor;
- Lockout of the overhead crane overnight if the crane is hooked to something in the laboratory overnight;
- Lockout of the NEES Control System and actuators attached to the red frame fixture in the laboratory if ATLSS personnel are working on the frame system

Y. Machine Guarding

It is the responsibility of the ATLSS Laboratory Operations Manager to ensure that machine tool and machine equipment guarding is adequate. Never remove factory-installed guards unless they are designed to be removed for a particular operation, and equivalent means of protection are used (for example, table saw guards are removed for fence cuts; when appropriate, push sticks are used).

Guard all reasonably accessible points of operation, pinch and nip points, rotating parts, and flying chip or spark hazards that may expose an employee to injury. In general, guarding prevents inadvertent contact with these hazards. Guarding may be achieved by one or more methods, such as isolation, barriers, shields, devices, or distance.

Z. Medical Emergency

If a medical emergency arises, contact Lehigh University police at 610-758-4200, who may contact the emergency response team and Bethlehem ambulance.

AA. Off Campus Projects

ATLSS faculty, staff, and students may participate in projects off campus. As such, it is strongly encouraged that project teams assess emergency communication and emergency response capabilities for each project. The Two-Person Rule should be adhered to when working off campus. The second person is not required to be a University faculty, staff, or student in this situation.

While driving to an off campus project, adhere to driving laws applicable to the locations, including but not limited to, speed limits, seatbelt usage, cell phone usage, including texting while driving, etc.

When working at an off campus location, adhere to all signs regarding safety and behave in a manner showing respect of this information. Wear appropriate clothing for the work environment. Do not engage in drug or alcohol use.

BB. OSHA Action Plan

In the event of a site inspection by a federal or state OSHA compliance officer contact the University EHS department. Contact information can be found at the following link:

http://www.lehigh.edu/~inehs/staff.html

CC. Protective Equipment

Hard hats are required in all ATLSS laboratory high and low bay areas, including the shop, staging areas, aisle along the test bed, and the north bay. Walking through the laboratory high or low bays for any reason require wearing hard hats. Hard hats are stored in the main aisle closet at ATLSS and also outside of the ATLSS Laboratory Operations Manager's office. Contact the ATLSS Laboratory Operations Manager if you are in need of a hard hat and cannot locate one. The aisle from building main corridor to ATLSS Laboratory Operations Manager's office does not require a hard hat.

Faculty, students, and staff are encouraged to use the entrances to the main corridor to gain access to the building and to offices opening into the high bays, rather than walking through the high bays. Delivery personnel needing signatures from staff will be required to wear a hard hat to get to the ATLSS Laboratory Operations Manager's office.

Eye protection is required in all ATLSS Laboratory areas, including the high bays, machine shop area, weld shop area, Satec room, welding laboratory, and metallography laboratory. Safety glasses must be worn at all times while in the ATLSS multi-directional structural testing laboratory, including the yellow walkway area within the laboratory (previously safety glasses were not required in this area) and in the north bay of the laboratory beyond the reaction wall. Regular eyeglasses may be worn in lieu of safety glasses by individuals visiting, but not working, in the laboratory. The aisle from building main corridor to ATLSS Laboratory Operations Manager's office does not require a hard hat.

General eye protection is required of everyone entering the designated areas, regardless of affiliation with Lehigh University. Specific tasks and equipment require additional measures of eye protection, including use of power tools, chemical use, etc. Safety glasses are stored in the main aisle closet and outside of the ATLSS Laboratory Operation's Manager's office.

Acceptable general eye protection includes, but is not limited to: (a). commercial safety glasses, (b). commercial safety glasses that fit over prescription lenses, and (c). prescription lenses (personal daily glasses) as long as the lenses cover the area from the eyebrow to the cheek.

Specific tasks and equipment require additional measures of eye protection. Tasks and corresponding eye protection include, but are not limited to: (a). power tools (grinding, drilling, machining, sawing, etc.): Glasses with side protection, safety glasses, safety goggles, or full face shield; (b). Hydraulics (connecting Pipes, hoses, etc.): Glasses with side protection, safety glasses, safety goggles, or full face shield; (c). Chemical Use: Goggles or face shield; (d). Torch Soldering & Cutting: Safety glasses with appropriate shading; (e). Welding, Oxygen or Plasma Arc Cutting: Face shields with appropriate shading. The use of contact lenses is discouraged in eye protection required areas, but may be used if commercial safety glasses are used in conjunction.

Gloves, ear plugs, ear muffs, safety glasses, goggles, face shields, dust masks, harnesses, and other protective equipment are available. This equipment should be used as needed to ensure safe working practice. See the ATLSS Laboratory Operations Manager for this equipment and proper use. Respirator use is restricted to people who have taken the respirator training course and respiratory medical exam.

DD. Respirators
University policy on the use of respirators can be found at the following links:

http://www.lehigh.edu/~inehs/policies/respiratorypol.html

http://www.lehigh.edu/~inehs/respiratory.html

EE. Safety Audits
A walkthrough of the ATLSS Laboratory should be conducted, at a minimum, on an annual basis by the University's Department of Environmental Health and Safety in order to address compliance and opportunities for improvement with respect to safety practices in the laboratory.

FF. Safety Rule Enforcement
Enforcement of University and ATLSS safety rules in the Center is the responsibility of the ATLSS Laboratory Operations Manager, with oversight by the ATLSS Administrative Director and ATLSS Director. It is the expectation that all faculty, staff, and students comply with the rules as outlined in this manual. Failure to comply with safety rules may result in the following disciplinary procedures:

1) Verbal warnings. 2) Written warnings. 3) Evaluation for retraining. 4) Time off for flagrant or repeated violations. 5) Termination for continued flagrant or repeated violations.

GG. Scaffolding
Prior to using any scaffold system in the ATLSS laboratory, the scaffolding should be evaluated by the ATLSS Laboratory Operations Manager for immediate remedial action if identified. Do not use any scaffold system if there is any doubt as to the safeness of the system.

HH. Security Threats
Any suspicious activity observed within any ATLSS laboratory should be reported immediately to Lehigh University police at 610-758-4200.

II. Temperature Stress
The ATLSS Laboratory is climate controlled and as such any hazards due to heat stress are greatly reduced. Conditions that can lead to temperature stress should be understood and avoided.

JJ. Tools
Hand and power tools are available for student, faculty, staff, and visiting client use. All users must receive and successfully complete operational and safety training in the use of each respective power tool that they use. Contact the ATLSS Laboratory Operations Manager for training.

Machine tools, machine equipment, and power tools should be routinely inspected to verify that they are not damaged, that the controls function as designed, and that all guarding and shields are securely installed and adjustable. For example, prior to using a portable grinder, the grinding

wheel should be inspected visually and a ring test should be performed to insure the integrity of the grinding wheel. To perform a ring test, tap the wheel lightly with a non-metallic instrument. This should result in a ringing sound. If tapping produces a dull thud, the wheel may be faulty and must be replaced prior to use.

The following rules apply to the use and/or maintenance of machine tools and machine equipment, regardless of their location.

- Only qualified personnel who have necessary skills, through experience and/or training, may operate or maintain machine tools or machine equipment.
- Equip all machine tools, power tools, and machine equipment with all required guarding, and prohibit (lock and tag) their operation unless such guarding is in place and fully functional. All guarding should be inspected prior to tool use to ensure that it is properly attached and functioning properly.
- Operate/maintain machine tools, and machine equipment in accordance with the manufacturer's requirements and the requirements of this section.
- Permit only qualified personnel or vendors to repair or otherwise service machine tools or equipment.
- Only operate machine tools when a second person is within sight or earshot of the tool user. The second person need not be qualified to operate the equipment but does need to know how to turn off the equipment and how to call for emergency assistance. This second person must also agree ahead of time to perform such duties should the need arise.
- Wear (at a minimum) safety glasses with side shields while in the vicinity of operating machine tools. This applies both to workers and to visitors. Wear face shields or goggles as required by work authorization for specific operations.
- Wear closed-toe footwear of sturdy construction. Wear approved safety shoes when there is a risk of crushing or piercing. Prohibit personnel, including visitors, from entering the work area with sandals or open-toed shoes.
- Wear appropriate clothing.
- Wear hearing protection and/or respiratory protection as required by work authorization for operations that generate harmful noise or airborne emissions.
- Do not use audio equipment that obstructs the ear canal (e.g., iPods) or cell phone Bluetooth headsets while operating machine or power tools.
- Prohibit personnel under the age of 18 from operating any machine or power tools.
- Tie back or otherwise secure long hair; cuff or roll up long sleeves, and remove or tape down loose jewelry when working with rotating machinery.
- Do not prepare or consume food or beverages in areas where hazardous materials (including oils, solvents, chemicals, cuttings, filings, and sawdust) are handled or generated.
- Where applicable, secure and clamp down work pieces in work-holding devices and machines.
- Use appropriate push sticks or other approved methods as indicated in the work authorization to keep hands and fingers well away from moving or rotating cutters, blades, and other points of operation.
- Turn off the machine before using a brush or wooden dowel (not hands) to remove chips from the machining area.
- Maintain good housekeeping. Clean up the work area with a broom, brush, and dustpan, and clean up all spills with absorbents and/or degreasers. Avoid using compressed air to blow chips off machinery.

KK. Two Person Rule

At times, it is necessary to have a work partner in order to ensure students, faculty, and staff do not place themselves at unnecessary risk. A two person rule to work in the testing laboratory environment provides an increment of safety unavailable to an individual working alone. Any operation of hazardous equipment within the ATLSS Laboratories requires the operator have another individual be aware of the operation and available to protect the operator from a potentially hazardous situation. The proximity of the "buddy" to the work environment will depend on the level of risk to the operator. The second person need not specifically be a faculty or staff member but must be able to contact emergency help if necessary.

LL. Welding, Cutting, and Brazing Policy

To provide the safety requirements for welding, cutting, and brazing in accordance with 29 CFR 1910.251 of the Occupational Safety and Health Administration. The University policy can be found at the following link:

http://www.lehigh.edu/~inehs/policies/weldingpol.html

There are several hazards to consider when performing welding, brazing, or cutting operations. These hazards include fires, explosions, electrocution, burns, welder's flash, oxygen depletion, and toxic fumes. Each welder in the laboratory should assess these hazards and take adequate steps to prevent such an occurrence. Each welder should utilize the appropriate equipment required to safely perform welding, cutting, or brazing operations, which includes respirators (when applicable), flame retardant clothing, high top boots, gloves, and welder shields or goggles.