



STANDARD OPERATING PROCEDURE (SOP) LABORATORY SURVEY AND MAPPING

PREPARED BY,

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Laboratory

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1. PROFILE

The Survey and Mapping Laboratory is an academic support facility that provides services for the storage, borrowing, return, and maintenance of survey and mapping equipment. The laboratory also serves as a venue for practical courses, research activities, community service programs, and other academic activities conducted by lecturers, students, researchers, and authorized external users.

2. PORTOFOLIO

Laboratory Profile

Laboratory Name : **Survey and Mapping Laboratory**
Department Geography
Faculty of Social Sciences
Universitas Negeri Padang

Study Programs : 1. Bachelor Degree of Education Geography (S1)
2. Bachelor Degree of Geography (S1)

Head of Laboratory : Risky Ramadhan, S.Pd., M.Si.
Laboratory
Manager/Technician : Feri Ferdinal
Position : Laboratory Technician

Laboratory Facilities

No	Room Name	Dimensions	Area (M ²)	Description
1	Survey and Mapping Laboratory	6 m x 6 m	36 M ²	Available at: https://bit.ly/DenahdanFotoRuanganLabSurveydanPemetaan
	Total Area	6 m x 6 m	36 M²	

3. STANDARD OPERATING PROCEDURE (SOP)

A. PURPOSE

This Standard Operating Procedure (SOP) aims to:

1. Establish standardized procedures for borrowing and returning laboratory equipment.
2. Ensure an efficient and transparent laboratory administration system.
3. Facilitate the management and control of survey and mapping equipment.
4. Maintain the availability, security, and completeness of laboratory assets.
5. Support teaching, research, and community service activities through effective laboratory management.

B. SCOPE

This SOP applies to all users of the Survey and Mapping Laboratory, including students, lecturers, researchers, laboratory staff, and authorized external parties who have obtained approval to use or borrow laboratory equipment.

Users are required to comply with the following provisions:

- An official borrowing request letter must be submitted and approved by the Head of Laboratory or an authorized representative.
- Borrowers must provide a valid identification card (Student ID Card, National Identity Card, or Driver's License) as collateral during the borrowing period.
- The identification card will be returned only after all borrowed equipment has been inspected and accepted in good condition.
- Equipment borrowing for academic or institutional activities must be supported by an official letter signed by the responsible lecturer or the person in charge of the activity.

C. GENERAL PROVISIONS

The following provisions shall apply to all equipment borrowing activities:

1. The borrowed equipment must correspond to the items listed in the approved borrowing request.
2. The borrowing period shall follow the duration specified in the approved request letter.
3. Equipment borrowing and return services are available only during working days from **09:00 AM to 03:00 PM (WIB)**.
4. Borrowers are fully responsible for maintaining the condition and security of the borrowed equipment throughout the borrowing period.
5. Borrowed equipment shall not be transferred or lent to any third party without prior authorization from the laboratory.
6. Failure to return the equipment within the approved borrowing period without prior notification to the laboratory will result in an administrative penalty of:

IDR 100,000 (One Hundred Thousand Rupiah) per equipment item per day of delay.

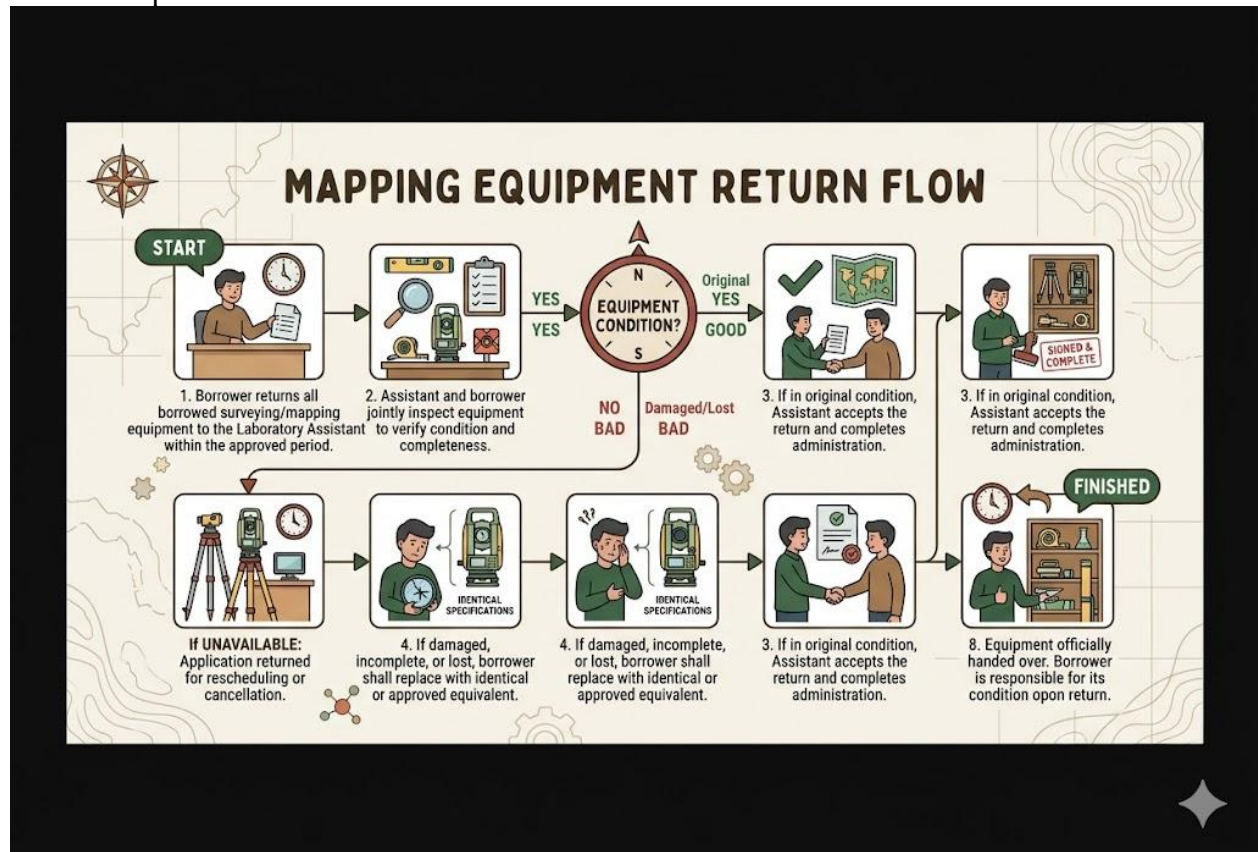
D. EQUIPMENT BORROWING PROCEDURE

The borrowing procedure shall be carried out as follows:



E. EQUIPMENT RETURN PROCEDURE

The return procedure shall be carried out as follows:



F. OCCUPATIONAL HEALTH, SAFETY, AND SECURITY (OHSS)

1. Purpose

This Occupational Health, Safety, and Security (OHSS) procedure is established to ensure that all laboratory activities are conducted in a safe, healthy, and secure environment while minimizing the risk of accidents, equipment damage, and personal injury.

The implementation of these procedures is mandatory for all laboratory users, including students, lecturers, researchers, laboratory staff, and authorized external users.

2. Occupational Safety

Occupational safety refers to all preventive measures implemented to protect laboratory users from hazards associated with laboratory equipment, instruments, materials, operational procedures, and the working environment.

2.1 Personal Protective Equipment (PPE)

All laboratory users shall wear appropriate Personal Protective Equipment (PPE) during laboratory activities, including:

- Laboratory coat
- Safety gloves
- Closed-toe shoes
- Safety goggles (when required)
- Face mask (when required)

Failure to wear the required PPE may result in denial of access to laboratory facilities.

2.2 Safety Supporting Facilities

The laboratory shall provide the following safety facilities:

- Equipment operation manuals
- Safety signs and warning labels
- Emergency exit signs
- Fire extinguishers
- First Aid Kit (P3K)
- Emergency contact information

All users are required to familiarize themselves with these facilities before commencing laboratory activities.

2.3 Responsibilities

Head of Laboratory

- Develop and implement laboratory safety policies.
- Ensure compliance with laboratory safety regulations.
- Supervise the implementation of occupational health and safety procedures.

Laboratory Assistant

- Verify the readiness and condition of laboratory equipment.
- Provide safety instructions to laboratory users.
- Monitor laboratory activities and respond to emergency situations.

Laboratory Users

- Comply with all laboratory regulations.
- Wear appropriate PPE.
- Operate equipment according to the manufacturer's instructions and laboratory SOPs.
- Report any unsafe conditions, equipment malfunctions, or accidents immediately.

3. Occupational Health

Occupational health aims to maintain the physical, mental, and social well-being of laboratory users throughout laboratory activities.

Every laboratory user is expected to:

- Be physically fit before entering the laboratory.
- Refrain from laboratory activities while suffering from contagious diseases or conditions that may endanger themselves or others.
- Maintain personal hygiene and laboratory cleanliness.
- Follow ergonomic practices when handling equipment and conducting measurements.

Laboratory users who experience illness or injury during laboratory activities shall immediately notify the Laboratory Assistant for appropriate assistance.

4. Laboratory Security

Laboratory security is intended to protect laboratory assets, equipment, and users while ensuring uninterrupted academic activities.

The following security measures shall be observed:

1. Only authorized personnel may access laboratory facilities.
2. Borrowed equipment shall not be transferred to unauthorized individuals.
3. Laboratory users are responsible for maintaining the security of all borrowed equipment throughout the borrowing period.
4. Any loss, theft, or damage shall be reported immediately to the Laboratory Assistant.
5. Laboratory doors, storage cabinets, and equipment rooms shall remain secured when not in use.

5. General Safety Rules

All laboratory users shall comply with the following rules:

1. Read and understand the operating procedure before using any equipment.
2. Inspect equipment condition before operation.
3. Ensure that measuring instruments are properly calibrated and functioning normally.
4. Do not operate equipment without proper authorization or supervision.
5. Keep the working area clean, organized, and free from unnecessary objects.
6. Do not modify laboratory equipment without approval from the Head of Laboratory.
7. Follow the manufacturer's operating instructions at all times.

6. Emergency Procedures

In the event of an emergency:

Equipment Failure

- Stop the operation immediately.
- Turn off the equipment.
- Report the incident to the Laboratory Assistant.
- Do not attempt unauthorized repairs.

Personal Injury

- Stop all ongoing activities.
- Provide first aid if qualified to do so.
- Contact the Laboratory Assistant immediately.
- Seek medical attention if necessary.

Fire or Other Emergencies

- Remain calm.
- Turn off electrical equipment if it is safe to do so.
- Evacuate the laboratory through the designated emergency exit.
- Assemble at the designated evacuation point.
- Follow instructions from laboratory staff or emergency responders.

7. Safety Objectives

The implementation of this Occupational Health, Safety, and Security (OHSS) procedure aims to:

- Protect laboratory users from accidents and occupational hazards.
- Ensure laboratory activities are conducted safely and efficiently.
- Minimize the risk of equipment damage and asset loss.
- Promote a culture of safety and responsibility among laboratory users.
- Support sustainable laboratory management in accordance with university quality standards.

G. LABORATORY ADMINISTRATION AND GENERAL REGULATIONS

1. Purpose

This procedure establishes standardized administrative requirements and general laboratory regulations to ensure that all academic, research, and community service activities are conducted in an orderly, efficient, accountable, and professional manner.

The procedure applies to all laboratory users, including students, lecturers, researchers, laboratory staff, and authorized external users.

2. Laboratory Access

2.1 Authorized Users

The Survey and Mapping Laboratory may be accessed only by:

- Registered students conducting laboratory classes, research, or final projects;
- Academic staff conducting teaching and research activities;
- Laboratory personnel performing operational duties;
- External users who have obtained written approval from the Head of Laboratory.

Unauthorized individuals are prohibited from entering laboratory facilities.

2.2 Operating Hours

The laboratory operates during official university working hours.

Administrative Services

ACTIVITY	OPERATING HOURS
EQUIPMENT BORROWING	09:00–15:00 WIB
EQUIPMENT RETURN	09:00–15:00 WIB
ADMINISTRATIVE SERVICES	08:30–15:30 WIB

Activities conducted outside these hours require prior approval from the Head of Laboratory.

3. Registration Procedure

Conducting laboratory activities:

1. Register with the Laboratory Assistant.
2. Complete the laboratory attendance log.
3. Submit all required documents, including:
 - Student Identification Card (Student ID);
 - Equipment Borrowing Form (if applicable);
 - Research Approval Letter (if applicable);
 - Practicum Assignment Letter (if applicable).
4. Receive authorization before entering the laboratory.

No laboratory activity may commence without completing the registration process.

4. User Responsibilities

Every laboratory user is responsible for:

- Maintaining laboratory cleanliness and order.
- Using equipment according to established procedures.
- Following all instructions provided by laboratory personnel.
- Reporting damaged or malfunctioning equipment immediately.
- Returning all borrowed equipment on schedule.
- Preserving laboratory facilities and infrastructure.

Users shall be fully responsible for any negligence resulting in equipment damage or loss.

5. Laboratory Conduct

To maintain a safe and professional working environment, laboratory users shall comply with the following regulations:

Users SHALL:

- Wear appropriate laboratory attire.
- Maintain professional behavior.
- Keep personal belongings in designated areas.
- Follow laboratory schedules and instructions.
- Clean their work area after completing activities.
- Return equipment to its designated storage location.

Users SHALL NOT:

- Eat, drink, or smoke inside the laboratory.
- Bring unauthorized persons into laboratory facilities.
- Operate equipment without authorization.
- Remove laboratory property without approval.
- Modify equipment settings without permission.
- Engage in activities unrelated to laboratory functions.

6. Equipment Documentation

Every equipment transaction shall be documented by the Laboratory Assistant.

The documentation shall include:

- Equipment name
- Equipment identification number
- Borrower's name
- Student/Employee identification number
- Date and time of borrowing
- Expected return date
- Actual return date
- Equipment condition before borrowing
- Equipment condition upon return
- Remarks

All records shall be maintained as official laboratory documents.

7. Laboratory Inventory Management

The Laboratory Assistant shall maintain an updated inventory system that includes:

- Equipment specifications
- Asset identification numbers
- Calibration records
- Maintenance history
- Repair records
- Equipment availability status

Periodic inventory inspections shall be conducted to ensure data accuracy and equipment readiness.

8. Documentation and Record Keeping

The following documents shall be maintained by the laboratory:

- Equipment Borrowing Forms
- Equipment Return Forms
- Laboratory Attendance Records
- Maintenance Records
- Calibration Certificates
- Incident Reports
- Damage Reports
- Laboratory Clearance Forms

All records shall be archived in accordance with university document retention policies.

9. Non-Compliance and Administrative Sanctions

Laboratory users who violate laboratory regulations may be subject to one or more of the following administrative actions:

Level 1 – Written Warning

Issued for minor violations, including:

- Failure to complete administrative procedures;
- Minor violations of laboratory regulations;
- Late return of equipment without prior notification.

Level 2 – Temporary Suspension

Temporary suspension of laboratory access may be imposed for:

- Repeated violations of laboratory regulations;
- Unauthorized use of laboratory equipment;

- Failure to comply with Laboratory Assistant instructions.

Level 3 – Financial Responsibility

Users shall be financially responsible for:

- Lost equipment;
- Damaged equipment caused by negligence;
- Missing accessories or components.

Replacement equipment shall meet the same specifications or an equivalent standard approved by the Head of Laboratory.

Level 4 – Revocation of Laboratory Privileges

Serious misconduct may result in permanent or temporary revocation of laboratory privileges, subject to review by the Head of Laboratory and the Department.

10. Continuous Improvement

The Survey and Mapping Laboratory is committed to continuous improvement through:

- Periodic SOP review;
- Annual equipment audits;
- User satisfaction surveys;
- Safety inspections;
- Internal quality assurance evaluations;
- Corrective and preventive actions (CAPA).

Suggestions and feedback from laboratory users are encouraged to improve laboratory services and operational effectiveness.

H. LABORATORY HAZARD MANAGEMENT AND EMERGENCY RESPONSE

1. Purpose

This procedure establishes standardized practices for identifying laboratory hazards, preventing occupational accidents, and responding effectively to emergency situations within the Survey and Mapping Laboratory.

The objective is to protect laboratory users, safeguard laboratory assets, and ensure the continuity of academic and research activities.

2. Scope

This procedure applies to all laboratory users, including:

- Students
- Lecturers
- Researchers
- Laboratory Assistants
- Laboratory Technicians
- Authorized External Users

Every laboratory user is responsible for understanding and complying with the safety requirements before conducting any laboratory activity.

3. Hazard Identification

Laboratory hazards are classified into four categories:

<i>Hazard Category</i>	<i>Examples</i>
<i>Fire Hazard</i>	Flammable materials, electrical short circuits, overheating equipment
<i>Electrical Hazard</i>	Damaged cables, overloaded sockets, exposed wiring
<i>Chemical Hazard</i>	Corrosive, toxic, or flammable chemicals

Physical Hazard | Slips, trips, falls, heavy equipment handling, sharp objects
All hazards shall be assessed before laboratory activities begin.

4. General Safety Rules

Every laboratory user shall:

- Read and understand all operating procedures before using equipment.
- Follow instructions provided by the Laboratory Assistant.
- Wear appropriate Personal Protective Equipment (PPE).
- Maintain a clean and organized working environment.
- Report unsafe conditions immediately.
- Avoid actions that may endanger themselves or others.

Failure to comply with these regulations may result in suspension of laboratory privileges.

5. Fire Hazard Management

5.1 Potential Sources of Fire

Potential fire hazards within the laboratory include:

- Electrical equipment malfunction
- Overloaded electrical circuits
- Flammable chemicals
- Heat-producing instruments
- Improper storage of combustible materials

A fire can occur when the following three elements are present simultaneously:

- Oxygen
- Fuel (combustible material)
- Heat source

5.2 Potential Consequences

Fire incidents may result in:

- Minor to severe burns
- Property damage
- Equipment destruction
- Smoke inhalation injuries
- Fatalities

5.3 Preventive Measures

The laboratory shall provide:

- Portable Fire Extinguishers (APAR)
- Emergency Exit Routes
- Fire Alarm Systems
- Emergency Assembly Points
- Fire Safety Signage

Laboratory users shall:

- Know the location of fire extinguishers.
- Keep emergency exits unobstructed.
- Store flammable materials properly.
- Disconnect electrical equipment after use.
- Report any potential fire hazards immediately.

6. Electrical Hazard Management

6.1 General Requirements

Before operating electrical equipment, users shall:

- Inspect power cables and plugs.
- Verify that equipment is in good working condition.
- Ensure that hands are completely dry.
- Confirm that power sources are properly grounded.

Damaged equipment shall not be used under any circumstances.

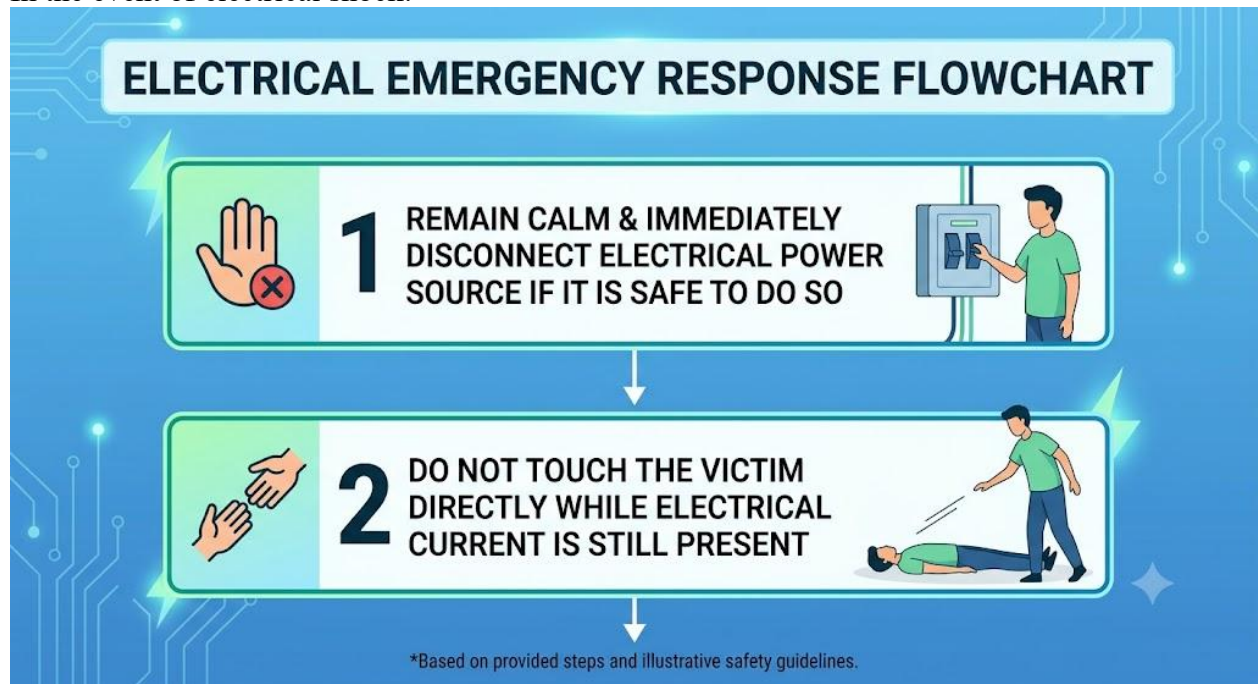
6.2 Preventive Measures

Laboratory users shall:

- Avoid touching exposed electrical components.
- Never overload electrical outlets.
- Keep liquids away from electrical equipment.
- Report damaged wiring immediately.
- Turn off equipment after completing laboratory activities.

6.3 Emergency Response for Electrical Accidents

In the event of electrical shock:



7. Chemical Hazard Management

7.1 Chemical Risks

Laboratory chemicals may present one or more of the following hazards:

- Toxicity
- Corrosiveness
- Flammability
- Irritation
- Environmental hazards

Exposure may occur through:

- Inhalation
- Skin contact
- Eye contact

- Ingestion

7.2 Preventive Measures

Every laboratory user shall:

- Read the Material Safety Data Sheet (MSDS) before handling chemicals.
- Wear appropriate PPE, including gloves, safety goggles, laboratory coats, and masks when required.
- Handle chemicals according to laboratory procedures.
- Store chemicals in designated storage areas.
- Clearly label all chemical containers.

7.3 Chemical Spill Response

In the event of a chemical spill:

1. Stop laboratory activities immediately.
2. Isolate the affected area.
3. Notify the Laboratory Assistant.
4. Use appropriate spill response materials according to the chemical classification.
5. Dispose of contaminated materials following laboratory waste management procedures.

Unauthorized personnel shall not attempt to clean hazardous chemical spills.

8. Chemical Exposure Response

If chemical exposure occurs:

Skin Contact

- Remove contaminated clothing.
- Rinse the affected area thoroughly with running water for at least 15 minutes.
- Report the incident immediately.

Eye Contact

- Flush eyes continuously with clean water for at least 15 minutes.
- Do not rub the eyes.
- Seek medical attention immediately.

Inhalation

- Move the affected person to fresh air.
- Keep the individual comfortable and under observation.
- Seek medical assistance if symptoms persist.

Ingestion

- Do not induce vomiting unless instructed by medical personnel.
- Contact emergency medical services immediately.

9. Laboratory Waste Management

Laboratory users shall:

- Separate waste according to its classification.
- Dispose of liquid waste only in designated waste containers.
- Never discharge hazardous chemicals into sinks or public drainage systems.
- Follow laboratory waste disposal procedures established by the laboratory.

Laboratory waste shall be collected and managed periodically by authorized laboratory personnel.

10. Incident Reporting

Every laboratory accident, near miss, equipment failure, or unsafe condition shall be reported immediately to the Laboratory Assistant.

The incident report shall include:

- Date and time
- Location
- Description of the incident
- Persons involved
- Equipment involved
- Immediate corrective actions
- Recommendations for prevention

All reports shall become part of the laboratory safety records.

11. Emergency Evacuation Procedure

When an emergency alarm is activated:

1. Stop all laboratory activities immediately.
2. Turn off electrical equipment if it is safe to do so.
3. Leave all laboratory equipment in place.
4. Evacuate using the nearest emergency exit.
5. Proceed to the designated assembly point.
6. Follow instructions from laboratory personnel or emergency responders.
7. Do not re-enter the laboratory until official clearance has been given.

12. Continuous Safety Improvement

The Survey and Mapping Laboratory is committed to maintaining a proactive safety culture through:

- Periodic safety inspections
- Emergency drills
- Equipment maintenance programs
- Risk assessments
- Laboratory safety training
- Incident investigations
- Continuous improvement initiatives

Every laboratory user shares responsibility for creating a safe, secure, and productive working environment.

I. LABORATORY WASTE MANAGEMENT

1. Purpose

This Standard Operating Procedure (SOP) establishes guidelines for the proper segregation, collection, storage, transportation, and disposal of laboratory waste generated from academic, research, and community service activities within the Survey and Mapping Laboratory.

The procedure aims to protect human health, preserve the laboratory environment, and ensure compliance with university policies and environmental regulations.

2. Scope

This procedure applies to all laboratory users, including:

- Students
- Lecturers

- Researchers
- Laboratory Assistants
- Laboratory Technicians
- Authorized External Users

Every laboratory user is responsible for managing laboratory waste in accordance with this SOP.

3. Waste Classification

Laboratory waste shall be classified into the following categories:

<i>Waste Category</i>	<i>Examples</i>
<i>General Waste</i>	Paper, cardboard, plastic packaging
<i>Recyclable Waste</i>	Plastic bottles, clean containers, metal cans
<i>Chemical Waste</i>	Solvents, acids, bases, laboratory reagents
<i>Electronic Waste (E-Waste)</i>	Batteries, cables, damaged electronic components
<i>Hazardous Waste</i>	Corrosive, flammable, toxic, or contaminated materials

Each waste category shall be disposed of only in designated containers.

4. Responsibilities

4.1 Laboratory Users

Laboratory users shall:

- Segregate waste according to its classification.
- Dispose of waste only in designated containers.
- Prevent contamination between different waste categories.
- Report any hazardous waste incidents immediately.
- Maintain cleanliness of the laboratory working area.

4.2 Laboratory Assistant

The Laboratory Assistant shall:

- Provide appropriate waste collection containers.
- Monitor waste segregation practices.
- Ensure temporary waste storage areas remain organized and secure.
- Coordinate waste collection and disposal activities.
- Maintain waste management records.

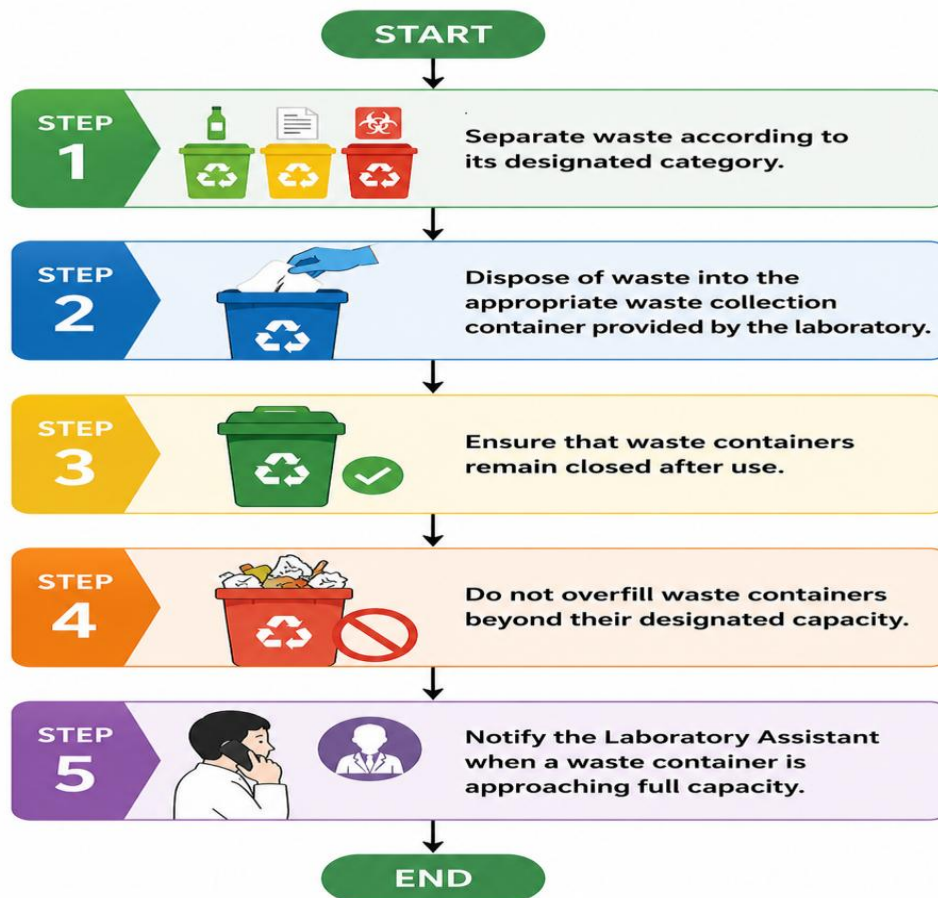
4.3 Head of Laboratory

The Head of Laboratory shall:

- Supervise laboratory waste management practices.
- Ensure compliance with university environmental policies.
- Evaluate waste management performance periodically.
- Approve corrective actions when deficiencies are identified.

5. General Waste Disposal Procedure

Laboratory users shall follow these procedures:



6. Chemical Waste Management

Chemical waste requires special handling procedures.

Laboratory users shall:

- Collect liquid chemical waste in designated chemical waste containers.
- Clearly identify waste contents whenever required.
- Never mix incompatible chemicals in the same container.
- Never dispose of chemical waste through sinks, drains, or public sewage systems.
- Follow Material Safety Data Sheet (MSDS) recommendations for chemical disposal.

Chemical waste shall only be handled by authorized laboratory personnel.

7. Temporary Waste Storage

Waste generated from laboratory activities shall be stored temporarily under the following conditions:

- Storage areas shall be clearly labeled.
- Hazardous waste shall be separated from general waste.
- Waste containers shall remain closed when not in use.
- Storage areas shall be protected from unauthorized access.
- Waste shall be removed periodically to prevent accumulation.

8. Waste Collection Procedure

The waste collection process shall be conducted as follows:



9. Prohibited Practices

The following actions are strictly prohibited:

- Mixing hazardous and non-hazardous waste.
- Disposing chemical waste into sinks or drainage systems.
- Burning laboratory waste within laboratory premises.
- Removing laboratory waste without authorization.
- Using unlabelled waste containers.
- Leaving waste unattended in laboratory work areas.

Violation of these provisions may result in disciplinary action.

10. Spill and Waste Emergency Response

In the event of accidental waste release or chemical leakage:

1. Stop laboratory activities immediately.
2. Restrict access to the affected area.
3. Notify the Laboratory Assistant.
4. Wear appropriate Personal Protective Equipment (PPE).
5. Follow laboratory spill response procedures.
6. Dispose of contaminated cleanup materials as hazardous waste.
7. Document the incident for laboratory records.

11. Environmental Commitment

The Survey and Mapping Laboratory is committed to sustainable laboratory operations by:

- Reducing waste generation whenever possible.
- Promoting reuse and recycling of appropriate materials.
- Minimizing environmental impacts from laboratory activities.
- Encouraging environmentally responsible behavior among laboratory users.
- Continuously improving laboratory waste management practices.

12. Documentation

The following records shall be maintained:

- Laboratory Waste Collection Log
- Hazardous Waste Inventory
- Chemical Waste Disposal Record
- Waste Transfer Documentation

- Incident and Spill Reports
- Periodic Waste Inspection Reports

All documentation shall be archived as part of the laboratory quality management system.

J. LABORATORY EQUIPMENT LOAN APPLICATION PROCEDURE

1. Purpose

This Standard Operating Procedure (SOP) establishes a standardized process for requesting, reviewing, approving, and documenting the borrowing of laboratory equipment to support teaching, research, community service, and other academic activities.

The procedure aims to ensure the efficient utilization, accountability, and proper management of laboratory assets while maintaining their availability and operational condition.

2. Scope

This procedure applies to all laboratory equipment loan requests submitted by:

- Undergraduate Students
- Graduate Students
- Lecturers
- Researchers
- Laboratory Staff
- Authorized External Institutions

The procedure covers both on-campus and off-campus use of laboratory equipment.

3. References

This procedure shall be implemented in conjunction with:

- Equipment Borrowing and Return Procedure
- Laboratory Administration Procedure
- Occupational Health, Safety, and Security (OHSS) Procedure
- Laboratory Asset Management Policy

4. Responsibilities

4.1 Applicant

The applicant shall:

- Submit a complete equipment loan application.
- Provide accurate information regarding the intended use of the equipment.
- Accept full responsibility for the borrowed equipment.
- Return the equipment within the approved borrowing period.

4.2 Laboratory Assistant

The Laboratory Assistant shall:

- Verify the completeness of the application.
- Check equipment availability.
- Prepare and inspect the equipment before release.
- Record all equipment transactions.

4.3 Head of Laboratory

The Head of Laboratory shall:

- Review and approve equipment loan requests.
- Authorize the release of laboratory assets.

- Resolve conflicts in scheduling or equipment allocation.

5. Eligibility Requirements

Applicants shall satisfy the following requirements before borrowing laboratory equipment:

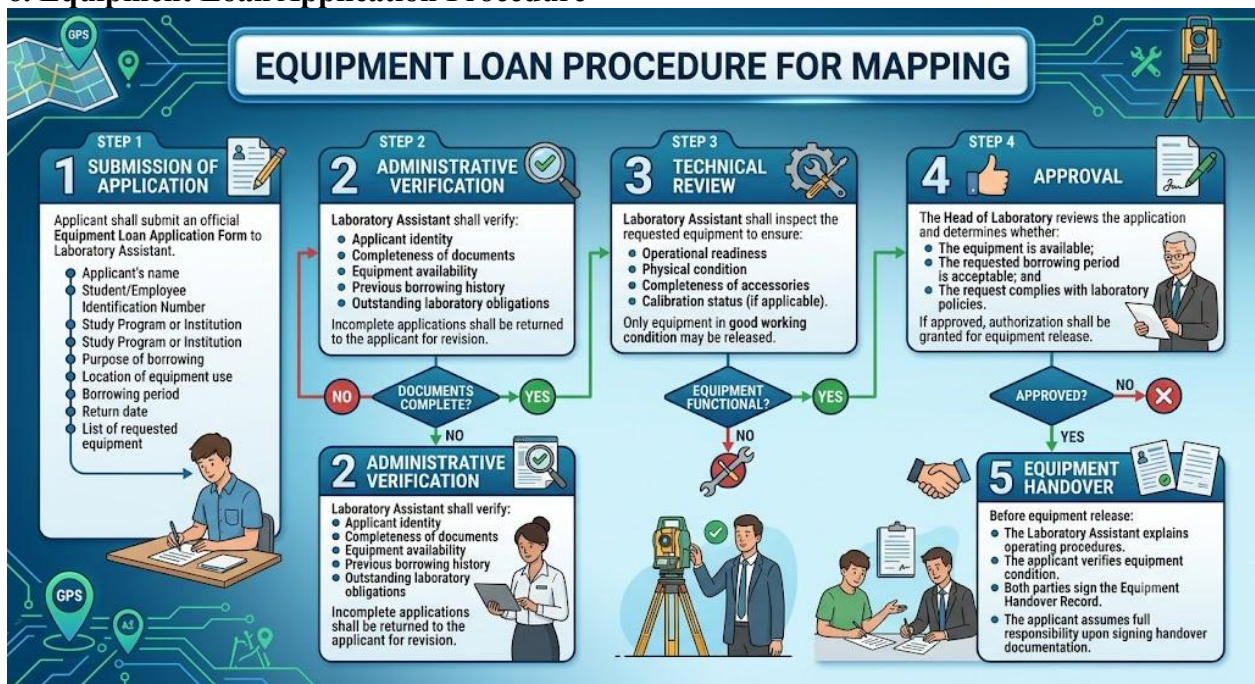
Internal Users

- Valid Student Identification Card or Employee Identification Card
- Official activity assignment or research approval
- Completed Equipment Loan Application Form

External Users

- Official request letter from the institution
- Identity document of the responsible person
- Memorandum of Agreement (if applicable)
- Approval from the Head of Laboratory

6. Equipment Loan Application Procedure



7. Conditions of Equipment Use

Borrowers shall:

- Use equipment only for the approved purpose.
- Operate equipment according to the manufacturer's instructions.
- Prevent unauthorized use by third parties.
- Protect equipment from loss, theft, or damage.
- Notify the laboratory immediately in case of malfunction or accident.

Equipment shall not be modified, dismantled, or repaired without written authorization from the Head of Laboratory.

8. Extension of Borrowing Period

Borrowers requiring additional time shall:

1. Submit an extension request before the approved return date.
2. Obtain approval from the Head of Laboratory.
3. Ensure that no conflicting reservations exist.

Extensions are not granted automatically.

9. Cancellation of Equipment Loan

The laboratory reserves the right to cancel an approved loan if:

- False information is provided in the application;
- Equipment is required for urgent institutional activities;
- Laboratory regulations have been violated;
- Safety concerns are identified.

10. Applicant Responsibilities

The borrower shall be responsible for:

- Equipment integrity
- Equipment security
- Transportation
- Proper operation
- Timely return

Loss or damage resulting from negligence shall become the financial responsibility of the borrower.

11. Required Records

The following documents shall be maintained:

- Equipment Loan Application Form
- Equipment Availability Record
- Equipment Handover Record
- Equipment Return Checklist
- Damage Report (if applicable)
- Extension Request Form (if applicable)

All records shall be archived as part of the Laboratory Quality Management System.

K. LABORATORY EQUIPMENT HANDOVER AND RETURN PROCEDURE

1. Purpose

This Standard Operating Procedure (SOP) establishes a standardized process for the inspection, handover, acceptance, and return of laboratory equipment to ensure accountability, traceability, and proper asset management.

The procedure is intended to minimize equipment damage, prevent loss of laboratory assets, and maintain accurate documentation of all equipment transactions.

2. Scope

This procedure applies to all equipment borrowed from the Survey and Mapping Laboratory by:

- Students
- Lecturers
- Researchers
- Laboratory Staff

- Authorized External Users

The procedure covers both equipment handover before use and equipment acceptance upon return.

3. Definitions

Equipment Handover

The formal transfer of responsibility for laboratory equipment from the Laboratory Assistant to the borrower.

Equipment Return

The formal process of returning laboratory equipment to the laboratory following completion of approved activities.

Equipment Inspection

The joint verification of the physical condition, operational status, and completeness of equipment before handover and after return.

4. Responsibilities

4.1 Laboratory Assistant

The Laboratory Assistant shall:

- Prepare the requested equipment.
- Inspect equipment prior to release.
- Explain operational procedures and safety precautions.
- Verify returned equipment.
- Record all observations in the Equipment Handover and Return Report.

4.2 Borrower

The borrower shall:

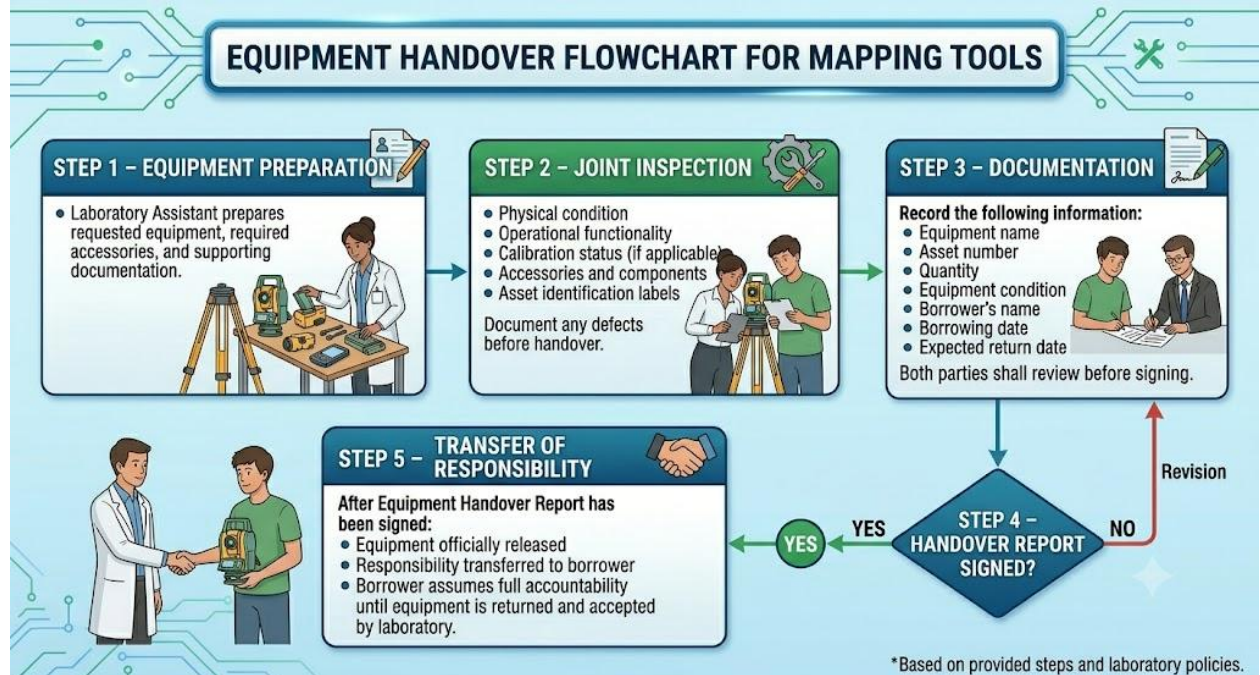
- Participate in the inspection process.
- Verify equipment completeness and condition.
- Use equipment responsibly.
- Return equipment within the approved borrowing period.
- Report any damage or malfunction immediately.

4.3 Head of Laboratory

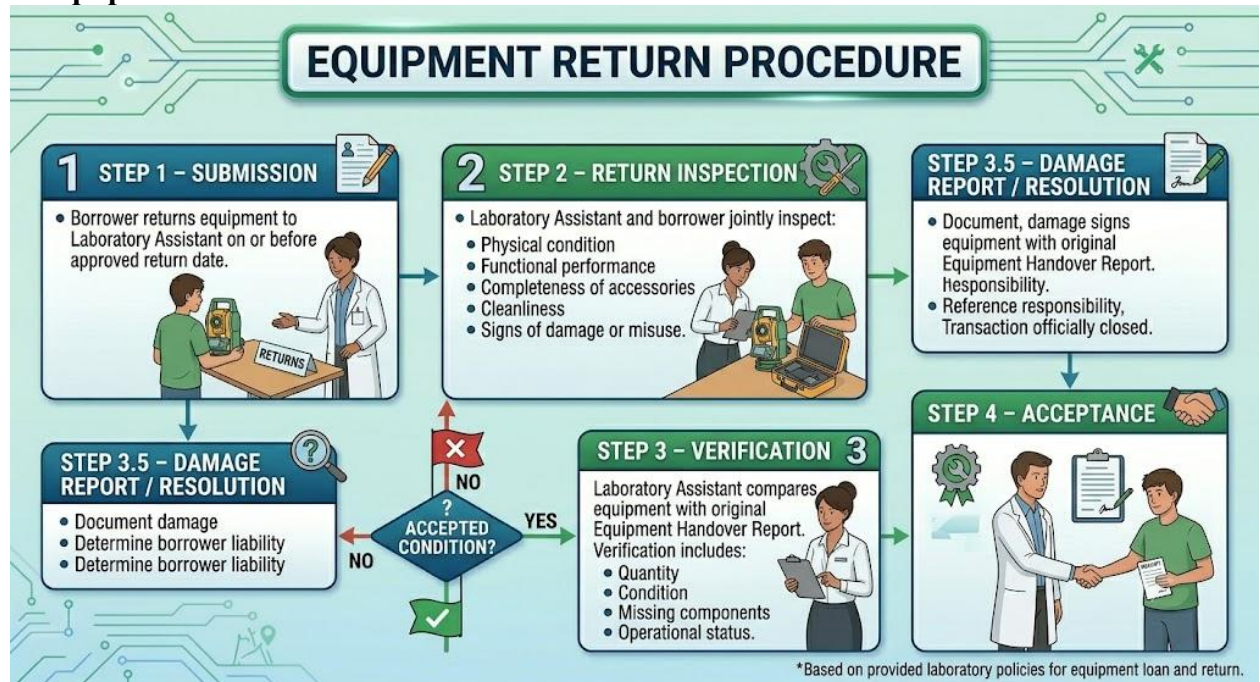
The Head of Laboratory shall:

- Supervise implementation of this procedure.
- Resolve disputes related to equipment condition.
- Approve replacement or repair recommendations when necessary.

5. Equipment Handover Procedure



6. Equipment Return Procedure



8. Equipment Damage Procedure

If damage is identified during inspection:

The Laboratory Assistant shall:

- Document the damage.
- Photograph the affected equipment (if necessary).
- Prepare an Equipment Damage Report.
- Notify the Head of Laboratory.

The borrower shall provide an explanation regarding the incident.

The Head of Laboratory shall determine whether:

- Maintenance is required;
- Replacement is necessary; or
- Administrative sanctions shall be imposed.

8. Lost Equipment Procedure

If equipment is lost during the borrowing period:

The borrower shall immediately:

- Notify the Laboratory Assistant;
- Submit a written incident report;
- Cooperate during the investigation process.

The borrower shall replace the lost equipment with:

- The same model and specifications; or
- An equivalent model approved by the Head of Laboratory.

9. Documentation Requirements

Every handover and return transaction shall be documented and archived.

Required documents include:

- Equipment Handover Report
- Equipment Return Report
- Equipment Inspection Checklist
- Damage Report (if applicable)
- Incident Report (if applicable)
- Equipment Replacement Record (if applicable)

L. SURVEY AND MAPPING EQUIPMENT OPERATION PROCEDURE

1. Purpose

This Standard Operating Procedure (SOP) establishes standardized operational procedures for the use of Survey and Mapping Laboratory equipment to ensure safe operation, accurate data collection, proper equipment handling, and long-term asset preservation.

This procedure applies to all field and laboratory activities involving geospatial surveying instruments.

2. Scope

This SOP applies to the operation of laboratory equipment, including but not limited to:

- Total Station
- Digital Theodolite
- Automatic Level
- GNSS/GPS Receiver
- UAV/Drone for Mapping
- Digital Compass
- Laser Distance Meter
- Survey Accessories



This procedure is mandatory for students, lecturers, researchers, laboratory staff, and authorized external user

3. General Requirements

Before operating any laboratory equipment, users shall:

- Complete the laboratory registration process.
- Receive authorization from the Laboratory Assistant.
- Read and understand the equipment operating manual.
- Attend operational briefing or training when required.
- Wear appropriate Personal Protective Equipment (PPE).

Equipment shall only be operated for approved academic or research purposes.

4. Pre-Operation Inspection

Prior to equipment use, the operator shall verify the following:

<i>Inspection Item</i>	<i>Verification</i>
<i>Physical condition</i>	✓
<i>Battery condition</i>	✓
<i>Calibration status</i>	✓
<i>Memory/storage capacity</i>	✓
<i>Accessories completeness</i>	✓
<i>Tripod condition</i>	✓
<i>Carrying case</i>	✓
<i>Charging cables</i>	✓

Any defects shall be reported immediately before operation.

Equipment with known defects shall not be used.

5. Equipment Transportation

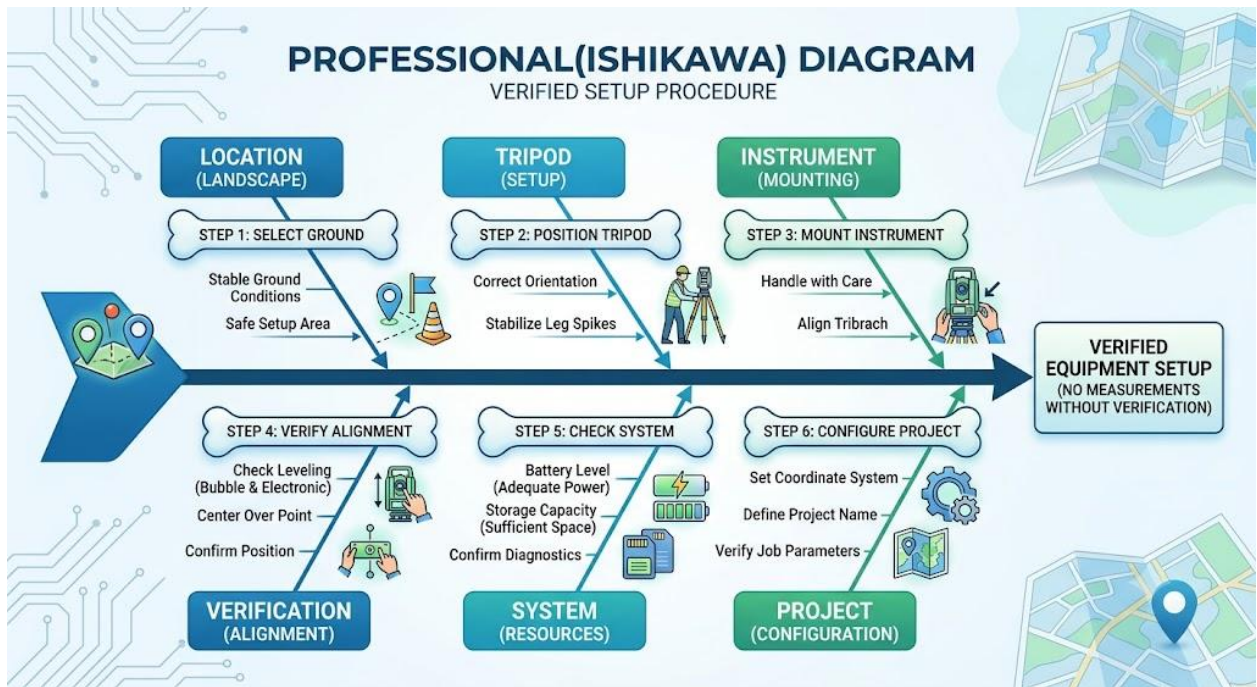
Equipment shall be transported according to the following requirements:

During Transportation

- Store equipment inside its original carrying case.
- Secure equipment against movement.
- Protect equipment from excessive vibration.
- Avoid exposure to rain, direct sunlight, or extreme temperatures.
- Transport sensitive instruments in an upright position whenever possible.

Heavy objects shall never be placed on top of laboratory equipment.

6. Equipment Setup



7. Equipment Operation

Operators shall:

- Follow the manufacturer's operating instructions.
- Operate equipment within specified environmental conditions.
- Avoid excessive force during instrument adjustment.
- Protect equipment from dust, moisture, and impact.
- Periodically verify measurement accuracy.

Unauthorized modification of instrument settings is prohibited.

8. Field Operation Safety

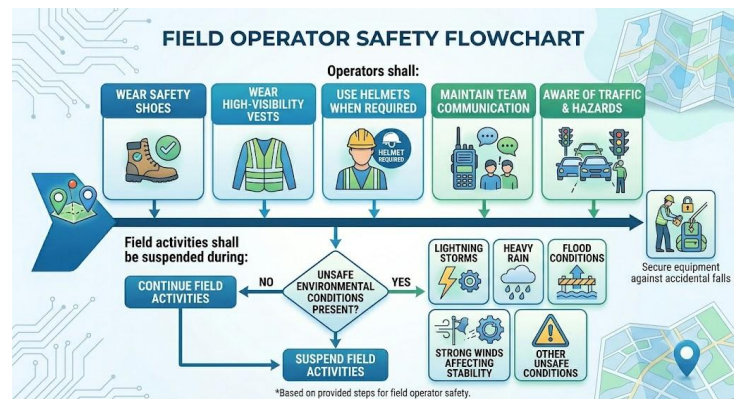
During field surveys:

Operators shall:

- ✓ Wear safety shoes.
- ✓ Wear high-visibility safety vests.
- ✓ Use helmets when required.
- ✓ Maintain communication with team members.
- ✓ Be aware of surrounding traffic and environmental hazards.
- ✓ Secure equipment against accidental falls.

Field activities shall be suspended during:

- Lightning storms
- Heavy rain
- Flood conditions
- Strong winds affecting equipment stability
- Other unsafe environmental conditions



9. Data Management

Immediately after data acquisition:

Operators shall:

- Verify data completeness.
- Create backup copies.
- Store raw data in laboratory-approved storage media.
- Label project folders appropriately.
- Report corrupted or missing data immediately.

Laboratory survey data shall be treated as official academic records.

10. Post-Operation Procedure

After completing field activities:

Equipment Cleaning

Operators shall:

- Remove dust and dirt using appropriate cleaning materials.
- Dry equipment exposed to humidity.
- Clean optical components using lens cleaning tissue.
- Return accessories to their designated compartments.

Functional Check

Before returning equipment:

- Verify operational status.
- Check battery condition.
- Confirm accessory completeness.
- Inspect for physical damage.

Any abnormalities shall be documented.

11. Storage Procedure

Equipment shall be stored under the following conditions:

- Clean and dry environment
- Controlled room temperature
- Low humidity
- Locked storage cabinets
- Organized by equipment category
- Protected from unauthorized access

Sensitive instruments shall remain inside protective carrying cases.

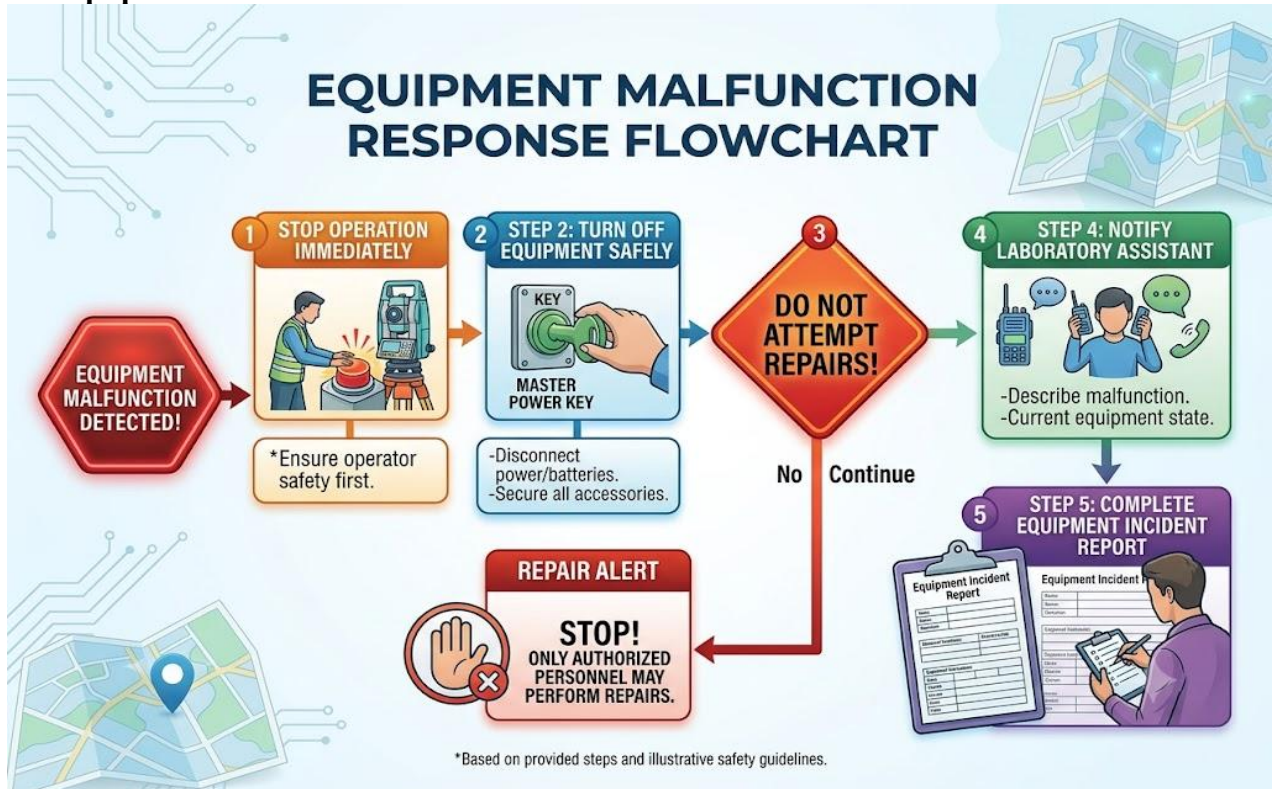
12. Preventive Maintenance

Routine maintenance shall include:

<i>Activity</i>	<i>Frequency</i>
<i>Visual inspection</i>	Before each use
<i>Cleaning</i>	After each use
<i>Battery inspection</i>	Weekly
<i>Functional testing</i>	Monthly
<i>Calibration verification</i>	Every 6–12 months
<i>Comprehensive maintenance</i>	Annually

Maintenance records shall be documented by the Laboratory Assistant.

13. Equipment Malfunction Procedure



14. User Responsibilities

Every operator is responsible for:

- Proper equipment handling
- Safe transportation
- Accurate operation
- Data security
- Equipment cleanliness
- Timely return
- Immediate reporting of incidents

Failure to comply with this SOP may result in administrative sanctions and liability for equipment damage.

M. DOCUMENTATION, RECORD MANAGEMENT, AND QUALITY ASSURANCE

1. Purpose

This Standard Operating Procedure (SOP) establishes a standardized framework for documenting, controlling, maintaining, and preserving all records generated by the Survey and Mapping Laboratory.

The procedure ensures that laboratory records are accurate, complete, traceable, secure, and readily available to support academic activities, research, quality assurance, internal audits, and accreditation processes.

2. Scope

This procedure applies to all laboratory documents and records, including but not limited to:

- Standard Operating Procedures (SOPs)

- Equipment Borrowing Forms
- Equipment Return Reports
- Laboratory Clearance Certificates
- Attendance Logs
- Calibration Certificates
- Maintenance Records
- Equipment Inspection Reports
- Incident Reports
- Laboratory Inventories
- Research and Practicum Documentation

3. Document Classification

Laboratory documents shall be classified into the following categories:

<i>Category</i>	<i>Description</i>
<i>Controlled Documents</i>	Official SOPs, Manuals, Policies
<i>Operational Records</i>	Daily laboratory activities
<i>Technical Records</i>	Calibration, maintenance, inspections
<i>Administrative Records</i>	Borrowing forms, attendance, correspondence
<i>Quality Records</i>	Audit reports, corrective actions, evaluations

4. Document Identification

Every controlled document shall contain the following information:

<i>Item</i>	<i>Description</i>
<i>Document Title</i>	Official document name
<i>Document Number</i>	Unique document identification
<i>Revision Number</i>	Current revision status
<i>Effective Date</i>	Date of implementation
<i>Prepared By</i>	Document author
<i>Reviewed By</i>	Quality reviewer
<i>Approved By</i>	Head of Laboratory

No document shall be implemented without official approval.

5. Document Control

5.1 Creation

All laboratory documents shall be prepared using the official laboratory template.

Documents shall:

- Use clear and concise language.
- Follow standardized formatting.
- Include revision history.
- Maintain consistent terminology throughout.

5.2 Review

Documents shall be reviewed:

- Before initial implementation;
- Following significant operational changes;
- After internal audits;
- When new regulations are introduced.

5.3 Approval

Only the Head of Laboratory or an authorized representative may approve controlled laboratory documents.

Unapproved documents shall not be distributed or used.

6. Record Management

Laboratory records shall be:

- Accurate
- Legible
- Complete
- Traceable
- Protected against unauthorized modification

Records may be maintained in:

- Printed format
- Electronic format
- Digital archive systems

7. Record Retention

The minimum retention period for laboratory records shall be as follows:

<i>Record Type</i>	<i>Minimum Retention Period</i>
<i>Equipment Borrowing Records</i>	5 Years
<i>Equipment Return Reports</i>	5 Years
<i>Maintenance Records</i>	Equipment Lifetime + 2 Years
<i>Calibration Certificates</i>	Equipment Lifetime
<i>Incident Reports</i>	5 Years
<i>Internal Audit Reports</i>	5 Years
<i>Laboratory Clearance Records</i>	5 Years
<i>Inventory Records</i>	Permanent Archive

Retention periods may be adjusted according to university regulations.

8. Electronic Document Management

Electronic records shall comply with the following requirements:

- Password-protected access
- Regular data backup
- Version control
- Access authorization
- Secure cloud or institutional server storage

Electronic files shall use standardized naming conventions.

Example:

LAB-SM-SOP-001_EquipmentBorrowing_Rev02.pdf

LAB-SM-FRM-005_ReturnChecklist_2026.xlsx

9. Internal Audit

Internal audits shall be conducted periodically to evaluate:

- Compliance with SOPs
- Documentation accuracy
- Record completeness
- Equipment traceability
- Asset management
- Corrective action implementation

Audit findings shall be documented and communicated to laboratory management.

10. Corrective and Preventive Actions (CAPA)

Whenever nonconformities are identified, the laboratory shall implement:

Corrective Actions

Actions intended to eliminate the cause of an identified nonconformity.

Examples:

- Revising documentation
- Retraining personnel
- Repairing damaged equipment

Preventive Actions

Actions intended to eliminate potential causes before incidents occur.

Examples:

- Scheduled maintenance
- Periodic inspections
- Risk assessments
- Staff competency development

11. Continuous Improvement

The Survey and Mapping Laboratory adopts a continuous improvement approach based on the **Plan–Do–Check–Act (PDCA)** cycle.

PLAN

- Establish objectives
- Develop procedures
- Identify risks

DO

- Implement laboratory activities
- Conduct training
- Execute operational procedures

CHECK

- Monitor performance
- Review records
- Conduct internal audits

ACT

- Implement improvements
- Update SOPs
- Improve laboratory services

12. Key Performance Indicators (KPIs)

The laboratory shall periodically evaluate its performance using measurable indicators.

<i>Indicator</i>	<i>Target</i>
<i>Equipment Availability</i>	≥ 95%
<i>On-Time Equipment Return</i>	≥ 95%
<i>Equipment Damage Rate</i>	≤ 2%
<i>Documentation Completeness</i>	100%
<i>Internal Audit Compliance</i>	100%
<i>User Satisfaction</i>	≥ 90%

Results shall be reviewed annually for continuous improvement.

N. QUALITY MANAGEMENT, PERFORMANCE EVALUATION, AND CONTINUAL IMPROVEMENT

1. Purpose

This Standard Operating Procedure (SOP) establishes a comprehensive Quality Management System (QMS) for the Survey and Mapping Laboratory to ensure that all laboratory services are delivered consistently, effectively, and in accordance with institutional policies, professional standards, and user expectations.

The implementation of this procedure supports the laboratory's commitment to continuous improvement, operational excellence, and sustainable quality assurance.

2. Scope

This procedure applies to all laboratory operations, including:

- Academic services
- Practical sessions
- Research activities
- Community service projects
- Equipment management
- Laboratory administration
- Occupational Health and Safety (OHSS)
- Documentation and record management

3. Quality Policy

The Survey and Mapping Laboratory is committed to:

- Providing reliable and professional laboratory services;
- Maintaining high standards of accuracy, safety, and accountability;
- Supporting education, research, and innovation;
- Continuously improving laboratory performance through systematic evaluation;
- Ensuring customer satisfaction and stakeholder confidence.

Every laboratory staff member and user shares responsibility for achieving these objectives.

4. Quality Objectives

The laboratory shall strive to achieve the following objectives:

<i>Quality Objective</i>	<i>Performance Target</i>
<i>Equipment Availability</i>	≥ 95%
<i>Equipment Functionality</i>	≥ 98%
<i>On-Time Equipment Return</i>	≥ 95%
<i>User Satisfaction</i>	≥ 90%
<i>Laboratory Safety Compliance</i>	100%
<i>Documentation Completeness</i>	100%
<i>Preventive Maintenance Completion</i>	100%

Performance indicators shall be reviewed annually.

5. Roles and Responsibilities

Head of Laboratory

The Head of Laboratory shall:

- Establish quality objectives;
- Approve quality policies and SOP revisions;
- Allocate resources for laboratory improvement;

- Review laboratory performance;
- Lead management review meetings.

Laboratory Assistant

The Laboratory Assistant shall:

- Implement laboratory procedures;
- Maintain operational records;
- Monitor equipment conditions;
- Support quality improvement initiatives;
- Report operational issues.

Laboratory Users

Laboratory users shall:

- Comply with laboratory regulations;
- Report equipment malfunctions;
- Participate in user satisfaction surveys;
- Support continuous improvement activities.

6. Performance Monitoring

Laboratory performance shall be evaluated using measurable indicators.

Operational Indicators

- Equipment utilization rate
- Equipment availability
- Equipment downtime
- Number of equipment failures

Administrative Indicators

- Processing time for borrowing requests
- Processing time for laboratory clearance
- Documentation completeness
- Record accuracy

Safety Indicators

- Number of laboratory incidents
- Number of safety inspections completed
- PPE compliance rate
- Emergency drill participation

User Service Indicators

- User satisfaction score
- Number of complaints received
- Complaint resolution time
- Number of service improvements implemented

7. User Feedback and Complaint Management

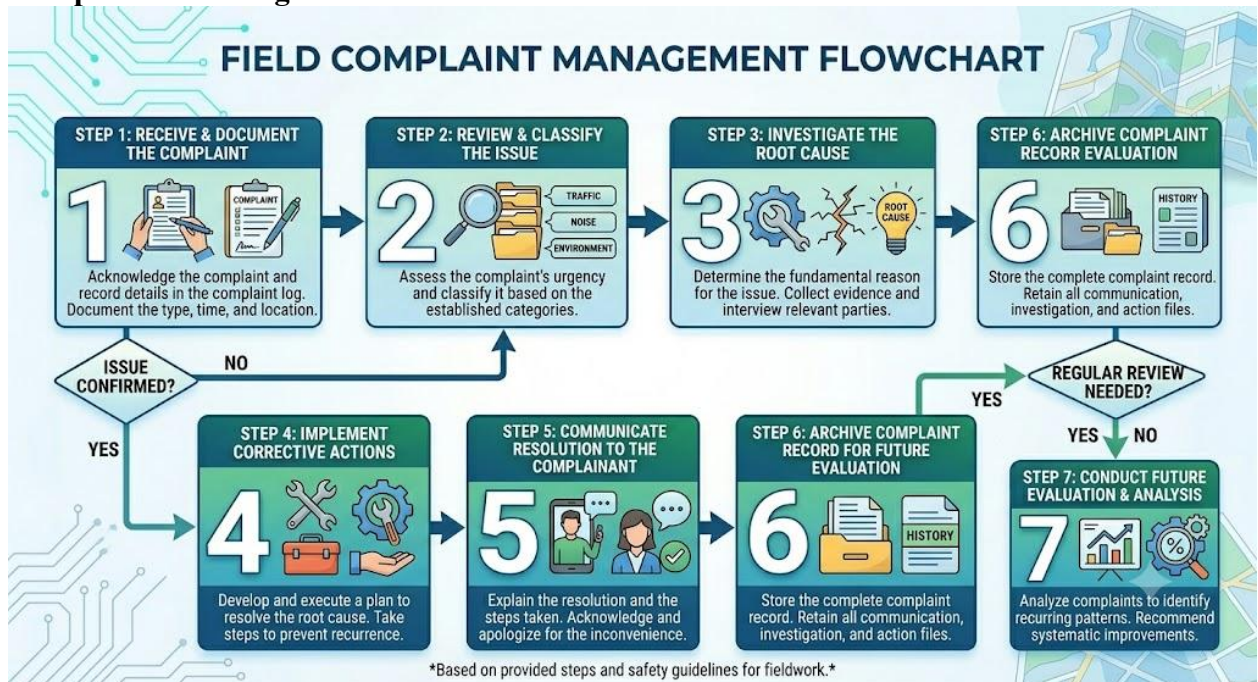
The laboratory encourages users to provide constructive feedback regarding laboratory services.

Feedback may be submitted through:

- Suggestion forms
- Electronic surveys

- Email correspondence
- Direct communication with laboratory personnel

Complaint Handling Procedure



8. Internal Quality Audit

Internal audits shall be conducted periodically to evaluate compliance with:

- Laboratory SOPs;
- University regulations;
- Safety requirements;
- Equipment management procedures;
- Documentation standards.

Audit findings shall be categorized as:

- Conformity
- Minor Nonconformity
- Major Nonconformity
- Opportunity for Improvement

Corrective actions shall be documented and monitored until completion.

9. Risk-Based Thinking

The Survey and Mapping Laboratory adopts a proactive approach to risk management.

Potential risks include:

<i>Risk</i>	<i>Mitigation</i>
<i>Equipment Damage</i>	Preventive maintenance
<i>Equipment Loss</i>	Asset tracking system
<i>Documentation Errors</i>	Periodic document review
<i>Safety Incidents</i>	OHSS implementation
<i>Data Loss</i>	Regular electronic backup
<i>Service Disruption</i>	Contingency planning

Risk assessments shall be reviewed periodically.

10. Management Review

At least once every academic year, laboratory management shall conduct a formal Management Review Meeting.

The meeting shall evaluate:

- Quality objectives
- Audit results
- User satisfaction
- Equipment performance
- Safety performance
- Corrective actions
- Resource requirements
- Improvement opportunities

Meeting results shall be documented as official laboratory records.

11. Continual Improvement

The laboratory adopts the **Plan–Do–Check–Act (PDCA)** methodology to achieve continual improvement.

PLAN

- Identify improvement opportunities.
- Define objectives and performance indicators.

DO

- Implement operational activities.
- Conduct laboratory services.
- Execute quality initiatives.

CHECK

- Monitor performance.
- Review documentation.
- Evaluate user feedback.
- Conduct audits.

ACT

- Implement corrective actions.
- Revise SOPs.
- Improve laboratory services.
- Standardize successful practices.

Continual improvement shall become part of the laboratory culture.

12. Digital Laboratory Management

To improve efficiency and transparency, the laboratory is encouraged to implement a digital management system capable of supporting:

- Online equipment reservations
- Electronic borrowing forms
- Digital asset tracking
- QR Code equipment identification
- Electronic signatures
- Inventory management
- Calibration scheduling
- Maintenance reminders
- User satisfaction surveys
- Document management

Digital transformation shall enhance service quality while maintaining data integrity and security.

13. Document Review and Revision

This SOP shall be reviewed under the following circumstances:

- Every three (3) years;
- Following significant organizational changes;
- Following major laboratory incidents;
- Following changes in university policies or regulations;
- When continuous improvement initiatives require revision.

Only the latest approved version shall be considered valid for implementation.

APPENDIX A

QUALITY PERFORMANCE DASHBOARD

<i>Performance Indicator</i>	<i>Target</i>	<i>Actual</i>	<i>Status</i>
<i>Equipment Availability</i>	≥95%		
<i>Equipment Functionality</i>	≥98%		
<i>User Satisfaction</i>	≥90%		
<i>Safety Compliance</i>	100%		
<i>Documentation Accuracy</i>	100%		
<i>On-Time Equipment Return</i>	≥95%		

4. ACTIVITY DOCUMENTATION

https://bit.ly/ACTIVITY_DOCUMENTATION_LAB