Environmental Impact Assessment: Annexures

Project No. 48289-002
April 2017

PAK: Peshawar Sustainable Bus Rapid Transit Corridor Project

Annexures J - R

Sample Ambient Monitoring Results
Photographs of Air Quality & Noise Monitoring
NOC from Department of Archaeology
Occupational Health and Safety Plan
Emergency Response Plan
Archaeological ‘Chance Find’ Procedure
Scope of Work for Structural Assessment of Bala Hisar Fort
Methodology for Air Quality and Noise Monitoring
ToRs of Third Party Monitor

Prepared by Peshawar Development Authority (PDA), provincial Government of Khyber Pakhtunkhwa (GoKP) for the Asian Development Bank (ADB).
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ANNEXURE J

SAMPLE AMBIENT AIR QUALITY AND NOISE MONITORING RESULTS
## Ambient Air Quality

**Client**: ADB Consultant  
**Sampling Point**: Soekarno Square  
**Date of Intervention**: October 18-19, 2016

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<th>NO₂ (μg/m³)</th>
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| Average Concentration | 4.11 | 10.27 | 16.39 | 10.06 |

SGS PAKISTAN (PVT.) LTD

E(QA)               SH
### Average Obtained Concentrations of Priority Pollutants

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<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Monitoring Duration</th>
<th>LDL</th>
<th>Average Obtained Concentration</th>
<th>Limits As Per NEQS</th>
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| µg/m³: micrograms per cubic meter |
| mg/m³: milligram per cubic meter |
| LDL: Lowest Detection Limit       |
| NEQNS: National Environmental Quality Standards |

SGS PAKISTAN (PVT.) LTD

E(QA) SH
## Ambient Air Quality

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## Average Obtained Concentrations of Priority Pollutants

**Client:** ADB Consultant.

**Sampling Point:** Saddar Bazar

**Date of Intervention:** October 19-20, 2016

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<th>Average Obtained Concentration</th>
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<tr>
<td>Nitrogen Dioxide (NO)</td>
<td>µg/m³</td>
<td>24 Hours</td>
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<td>Particulate Matter (PM₁₀)</td>
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µg/m³: micrograms per cubic meter
mg/m³: milligrams per cubic meter
LDL: Lowest Detection Limit
NEQS: National Environmental Quality Standards

SGS PAKISTAN (PVT.) LTD

E(QA)                      SH
# Meteorological Data

**Client:** ADB Consultant  
**Sampling Point:** Soekarno Square  
**Date of Intervention:** October 18-19, 2016

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SGS PAKISTAN (PVT.) LTD

E(QA) SH
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**Client**: ADB (Consultant)  
**Sampling Point**: Soekarno Square  
**Date of Intervention**: October 18–19, 2016

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</table>

As per OSHA; Standard Max Permissible Limit is 90 dB  
As per NEQS; Standard Max Permissible Limit is 75 dB

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**SGS PAKISTAN (PVT.) LTD**

**E(QA)**

**SH**
### Noise Level Monitoring

**Client:** ADB (Consultant)  
**Sampling Point:** KTH (Peshawar)  
**Date of Intervention:** October 20–21, 2016  

<table>
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<th>Sr. #</th>
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<th>Noise Level (Reading-2)</th>
<th>Noise Level (Reading-3)</th>
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</tbody>
</table>

As per OSHA; Standard Max Permissible Limit is 90 dB  
As per NEQs; Standard Max Permissible Limit is 75 dB

SGS PAKISTAN (PVT.) LTD  

E(QA)  

SH
ANNEXURE K

PHOTOGRAPHS OF AMBIENT AIR QUALITY AND NOISE MONITORING
Photograph 11-1: SGS technician conducting ambient noise monitoring

Photograph 11-2: Ambient air quality parameters being shown on handheld meter

Photograph 11-3: SGS mobile van containing all equipment for ambient monitoring

Photograph 11-4: SGS mobile van conducting ambient monitoring in Peshawar

Photograph 11-5: SGS mobile van conducting ambient monitoring in Peshawar

Photograph 11-6: SGS mobile van conducting ambient monitoring in Peshawar
Photograph 11-7: SGS mobile van conducting ambient monitoring in Peshawar

Photograph 11-8: SGS technician conducting ambient air quality monitoring

Photograph 11-9: SGS mobile van conducting ambient monitoring in Peshawar
ANNEXURE L

No Objection Certificate (NOC) issued from Directorate of Archaeology
DIRECTORATE OF ARCHAEOLOGY AND MUSEUMS
GOVT. OF KHYBER PAKHTUNKHWAS, PESHAWAR

No. A-68132
Archymus:

Dated: 27-9-16

C/O Peshawar Museum Peshawar
Ph. # 091-9211194, 9211488
Fax # 091-9210690

To

The Incharge
Rapid Bus Transit (RBT) Project
Peshawar.

Subject: RAPID BUS TRANSIT (RBT) PROJECT PESHAWAR.

I am directed to state that this Directorate has no objection on the road/route falling in the subject project. However, during excavations of tunnels, a team of experts/archaeologist will supervise the work accordingly.

Assistant Director

[Signature]

27/09
ANNEXURE M

Occupational Health and Safety Plan
Occupational Health and Safety covers all personnel working under the project and will be in line with the World Bank EHS guidelines on health and safety.

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace or workplaces; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

**a. Screening and regular unannounced checking of workers.**

As per the procedure for hiring workers, all contractors and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The contractor is also responsible for ensuring that no worker who has a criminal record is employed at the project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Project Management will also undertake sudden, unannounced checks on workers to look for diseases such as HIV, STDs, and hepatitis. If such cases are detected, the contractor will be required to immediately release the worker from the site (as this indicates that proper screening was not conducted).

**b. Minimizing hazards and risks at the workplace.**

To ensure safety at all work sites, the following will be carried out:

i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.

ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.

iii. Providing a safe storage site/area for large equipment such as power tools and chains, to
iv. Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than 7 feet in height and for concrete blocks they will not be more than 6 feet high.

v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.

vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;

vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined more than a slope of 1 vertical and 3 horizontal.

viii. Stacking away all excavated earth at least 2 feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites.

ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.

x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.

xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

c. Provision of Personal Protective Equipment

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for each Contractor. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment:

i. Helmet shall be provided to all workers, or visitors visiting the site, for protection of the
head against impact or penetration of falling or flying objects.

ii. Safety belt shall be provided to workers working at heights (more than 20 ft) such as roofing, painting, and plastering.

iii. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.

iv. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.

v. Eye and face protection equipment shall be provided to all welders to protect against sparks.

vi. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.

vii. Safety nets shall be provided when workplaces are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

Table M.1 PPE Requirement List

<table>
<thead>
<tr>
<th>Type of Work</th>
<th>PPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated work</td>
<td>Safety helmet, safety belt (height greater than 20 ft), footwear for elevated work.</td>
</tr>
<tr>
<td>Handling work safety</td>
<td>Helmet, leather safety shoes, work gloves.</td>
</tr>
<tr>
<td>Welding and cutting work</td>
<td>Eye protectors, shield and helmet, protective gloves.</td>
</tr>
<tr>
<td>Grinding work</td>
<td>Dust respirator, earplugs, eye protectors.</td>
</tr>
<tr>
<td>Work involving handling of chemical substances</td>
<td>Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.</td>
</tr>
<tr>
<td>Wood working</td>
<td>Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.</td>
</tr>
<tr>
<td>Blasting</td>
<td>Hard hat, eye and hearing protection.</td>
</tr>
<tr>
<td>Concrete and masonry work</td>
<td>Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.</td>
</tr>
<tr>
<td>Excavation, heavy equipment, motor graders,</td>
<td>Hard hat, safety boots, gloves, hearing protection.</td>
</tr>
</tbody>
</table>
and bulldozer operation

| Quarries     | Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator. |

d. Procedures to Deal with Emergencies such as Accidents, Sudden Illness and Death of Workers

First aid kits will be made available at all times throughout the entire construction period by the respective contractors. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

i. Provision of dispensaries by the individual EPC contractor.

ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.

iii. A designated Health Officer/worker for the Project will be identified as a focal person to attend to all health and safety related issues. This employee’s contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital.

iv. Communication arrangements, such as provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

e. Record Maintenance and Remedial action

The Project Management will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the contractor to the site supervisor and regularly reviewed every quarter by project management. Reports prepared by the contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigative actions to change any unsafe or harmful conditions.

f. Compensation for Injuries and Death

Any casualty or injury resulting from occupational activities should be compensated as per the local labor laws of Pakistan. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the
accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. Each individual contractor will be responsible for ensuring compensation for the respective workers.

g. Awareness Programs
The Project management will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

i. Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS), work site health and safety, waste management (waste separation, recycling, and composting), and the illegality of poaching.

ii. Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

h. Nomination of a Health and Safety Focal Person
Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

i. Function as the focal person/representative for all health and safety matters at the workplace;

ii. Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;

iii. Be the link between the contractor and all workers and submit grievances of the workers to the contractor and instructions/directives on proper health care and safety from the contractors back to the workers;

iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;

v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.
ANNEXURE N

Emergency Response Plan
**N.1 PURPOSE**

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the Bus Rapid Transit Project. The aim of the Emergency Response Procedure is to:

(i) Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events.

(ii) Ensure all personnel are aware of the importance of this procedure to protection of life and property.

**N.2 EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE**

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that may require coordinated response.

(i) Construction Accident

(ii) Road & Traffic Accident

(iii) Hazardous material spills

(iv) Structure collapse or failure

(v) Trauma or serious illness

(vi) Sabotage

(vii) Fire

(viii) Environmental Pollution

(ix) Loss of person

(x) Community Accident

**N.3 RESPONSIBILITIES**

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in Table M.1 below.
<table>
<thead>
<tr>
<th>Action Group</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| **Emergency Coordinator**          | ▪ Overall control of personnel and resources.  
▪ The Emergency Coordinator will support and advise the Site Safety Supervision as necessary.  
▪ Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also assure proper coordination of news release with appropriate corporate staff or other designated people.                                                                                                                                                                                                 |
| **Site Safety Supervision**        | ▪ Overall responsibility for activating emergency plan and for terminating emergency actions.  
▪ Be alternative of emergency response chairpersons.  
▪ Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth.  
▪ Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger.  
▪ Notify outside authorities if assistance is required.  
▪ Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation.  
▪ Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency.  
▪ Establish and appoint all emergency organization structure and team.  
▪ Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency.  
▪ Ensure resources available to purchase needed emergency response equipment and supplies.  
▪ Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan.  
▪ Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency.  
▪ The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event. |
| **Security Team**                  | ▪ Ensure that the exit route is regularly tested and maintained in good working order.  
▪ Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment may enter, prevent access to the site of unauthorized personnel.  
▪ Assist with strong/activation of services during an emergency.  
▪ Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency. |

Table N.1 Emergency Response Team
### Rescue & Medical Team
- Protect the injured from further danger and weather.
- Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital.
- Remain familiar with the rescue activities and rescue apparatus.
- Assist outside medical services personnel when they arrive.

### General Administration Team
Response to support any requested general facilities for assisting Emergency Response Team in their work.

### Government Relation Team
- Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team.
- Coordinate emergency plan with the government authorities, local community.

### Environment Team
In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will support the technical advice to control and mitigate the pollution until return to the normal situation.

### Department Heads
- Call up of personnel into the safe location for protective life and property.
- Take immediate and appropriate action while Emergency Response Team is being mobilized.
- Keep in touch with the Emergency Commander.
- Control and supervise operators and contractors on the implementation of this procedure, with consultation with Safety Team as necessary.
- Provide and maintain emergency equipment of their responsible areas.

### Other Staff and Employees
- All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team.
- Each supervisor will ensure that all members of his work group are accounted for and keep in touch with each of their Department Head.

### N.4 PROCEDURE
Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident.
Figure N.1 Emergency Procedure for Fire

FIRE

RESCUE
• Rescue any person in immediate danger if safe to do so

ALARM
• Raise the alarm by shouting to raise attention to others
• If confident and safe to do so, commence fighting the fire

EVACUATE
• If not practical to fight the fire, move to safe area ensuring all other personnel are warned along the way

REPORT
• Advice the Emergency coordinator of the reasons for the alarm and location of fire.
Figure N.2 Emergency Procedure for Serious Accident

**ACCIDENT**

In the event of injuries of persons, the first person on the scene should take the following action:

- If a hazard exists consider your own safety then if possible remove the hazard or the injured person.
- Assess the patient by checking for Airway, Breathing, Pulse and obvious
- Report directly to First Aid or Security Centers, when raising the alarm you must clearly give the following in formation;
  - Your name and the detail of accident
  - The location of the injured person(s)
  - The number of persons injured
  - The extent of the injuries, if known
  - What known hazards are in the area
- Make the injured person as comfortable as possible
- Treat the obvious injuries
- Reassure the injured person
N.5 COMMUNICATION WITH AUTHORITIES / PRESS AT SITE

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoiding politely, at all costs, with the terse comment that “the matter is under investigation and relevant information when available will be provided by our Head Office” Do not ever give your opinion or story.

First Aid Persons

Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also,

- Provide treatment to the victim(s) to the best of his/her ability.
- Ensure the safety of victims by ceasing any work activity in the area.
- Protect the injured from further danger and weather.
- Assist medical services personnel when they arrive.

General Administration Team

Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

Security Team

- If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene.
- Prevent access to the site of unauthorized personnel (press, etc.).

Emergency Coordinator

- The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources.
- The Emergency Coordinator shall ensure next-of-kin are properly notified as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation
- The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event.
Note: Name of contact person and call number from Owner/Contractor to be determined.
### N.5 INCIDENT AND ACCIDENT REPORT

#### Section A: Identification Data
- **Report No:**
- **Date of Reported:**
- **Reporter:**
- **Sign:**
- **Job Title:**
- **Company Name:**

#### Section B: Violence Rate
- **Accident Violence:**
  - 01-Death
  - 02-Serious Injury
  - 03-Lost Time Injury
  - 04-First Aid
  - 05-Not Injury
  - 06-Near Miss
- **Property Damage Cost:**
  - 1-2,000 USD
  - 2,001-10,000 USD
  - 10,001-50,000 USD
  - > 50,001

#### Section C: Environmental Impact
- **Affected area:**
  - Construction area
  - Public area
  - Community
- **Receptor:**
  - None
  - Workers
  - Biological
- **Type of pollution:**
  - Physical
  - Chemical
  - High - toxic
- **Toxicity:**
  - Non-toxic
  - Low - toxic
  - ≥ 1 week
- **Return to Normal:**
  - 1 day
  - 1 day to 1 week
- **Cumulative impact:**
  - Non-cumulative
  - Cumulative

#### Section D: Injured/Illness Employee

1. **Name:**
   - **Sex:**
     - Male
     - Female
   - **Date of Birth:**
     - Month
     - Day
     - Year
   - **Age:**
   - **Regular Job Title:**
   - **Experience:**
     - In this job title
     - In this Project
     - Years
     - Weeks
     - Years
     - Weeks
   - **Site:**
   - **Company:**
   - **Reference:**
   - **Phone No:**
   - **Social Security Number:**

   **Part of Body Injured or Affected:**
   - Head
   - Hands
   - Face
   - Nose
   - Laceration
   - Amputation
   - Puncture
   - Fracture

   **Nature of Injury or Illness:**
   - Eye
   - Leg
   - Teeth
   - Neck
   - Strain & Sprain
   - Burns
   - Contusion
   - Dry Heat Friction

   **Remark:**

2. **Name:**
   - **Sex:**
     - Male
     - Female
   - **Date of Birth:**
     - Month
     - Day
     - Year
   - **Age:**
   - **Regular Job Title:**
   - **Experience:**
     - In this job title
     - In this Project
     - Years
     - Weeks
     - Years
     - Weeks
     - **Site:**
     - **Company:**
     - **Reference:**
     - **Phone No:**
     - **Social Security Number:**

   **Part of Body Injured or Affected:**
   - Head
   - Hands
   - Face
   - Nose
   - Laceration
   - Amputation
   - Puncture
   - Fracture

   **Nature of Injury or Illness:**
   - Eyes
   - Leg
   - Teeth
   - Neck
   - Strain & Sprain
   - Burns
   - Contusion
   - Dry Heat Friction

   **Remark:**

#### Section E: Accidents/incident Details
- **Date Accident/Incident Occurred:**
- **Time Accident/Incident Occurred:**
- **Exact Location of the Accident / Incident:**
Details of the actual Job Being done at the time:

Details of Accident/incident/ What actually happened?

### Section F: Accident Cause

<table>
<thead>
<tr>
<th>UNSAFE CONDITIONS</th>
<th>UNSAFE ACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inadequately Guarded</td>
<td>1. Operating Without Authority / Training</td>
</tr>
<tr>
<td>2. Unguarded</td>
<td>2. Operating at Unsafe Speed</td>
</tr>
<tr>
<td>3. Defective Tools, Equipment, or Substance</td>
<td>3. Marking SHE Device Inoperative</td>
</tr>
<tr>
<td>4. Unsafe Design or Construction</td>
<td>4. Using Unsafe Equipment or Equipment Unsafely</td>
</tr>
<tr>
<td>5. Hazardous Arrangement</td>
<td>5. Unsafe Loading, Placing, Mixing</td>
</tr>
<tr>
<td>6. Unsafe Illumination</td>
<td>6. Taking Unsafe Position</td>
</tr>
<tr>
<td>7. Unsafe Ventilation</td>
<td>7. Working on Moving or Dangerous Equipment</td>
</tr>
<tr>
<td>9. Insufficient Instruction</td>
<td>9. Failure to use Personal Protective Devices</td>
</tr>
<tr>
<td>10. Lack of system of work</td>
<td>10. Lack of effective instruction or supervision</td>
</tr>
</tbody>
</table>

Why was the unsafe act committed? Why did the unsafe condition exist?

### Section G: Guide to Corrective Action

<table>
<thead>
<tr>
<th>UNSAFE ACT</th>
<th>UNSAFE CONDITION</th>
<th>If Supervisor can’t handle, then recommend to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop the Behaviour</td>
<td>Remove</td>
<td>Site Engineer, or</td>
</tr>
<tr>
<td>Study the job</td>
<td>Guard</td>
<td>Site Manager, or</td>
</tr>
<tr>
<td>Instruct (tell-show-try-check)</td>
<td>Warn</td>
<td>Project Manager, or</td>
</tr>
<tr>
<td>Follow Up</td>
<td>Supervisory Training</td>
<td>Safety Committee</td>
</tr>
<tr>
<td>Enforce</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Detail below any immediate remedial actions that have been taken:

Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:

| Responsible | Completion Date |
|-------------|-----------------|-----------------|
|             |                 |                 |
### Section H: Witness Statement

<table>
<thead>
<tr>
<th>Witness Name</th>
<th>Interviewer Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section I: Reviewed & Recommend by

**Recommendation:**

Reviewed By:          Position:          Signature:          Date:          

Remarks: If Accident or Incident happened with lost time injury and affected to the publicity must further report to Safety Department; First Aid Cases will not applicable to this form; The accident report shall submit to Safety Department within 3 days; Attached the photograph or sketch the location of accident/incident;
ANNEXURE O

Archaeological ‘Chance Find’ procedure
Background
The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

The KPK Antiquities Act, 2016, protects archaeological sites, whether on Provincial Government owned or private land. They are non-renewable, very susceptible to disturbance and are finite in number. Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this 'Archaeological Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling. It is recommended that due to the moderate to high archaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

Potential Impacts to Archaeological Sites
Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

Relevant Legislation
It ensures the protection, preservation, development and maintenance of antiquities in the province of KPK. The Act defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GoKPK to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, GoKPK, any archaeological discovery made during the course of the project.

Remedies and Penalties
The KPK Antiquities Act, 2016 provides for heritage inspection or investigation orders, temporary protection orders, civil remedies and penalties to limit contraventions. These powers provide:
“A contravention of any provision of this Act or the rules shall, where no punishment has been specifically provided be punishable with rigorous imprisonment for a term which may extend to two years, or with fine up to rupees ten hundred thousand, or with both. “

**Archaeological ‘Chance Find’ Procedure**

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

The following ‘chance-find’ principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

(i) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.

(ii) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.

(iii) If the site supervisor determines that the item is of potential significance, an officer from the department of Archaeology (DoA), GoKPK will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.

(iv) Work will not re-commence in this location until agreement has been reached between DoA and PDA as to any required mitigation measures, which may include excavation and recovery of the item.

(v) A precautionary approach will be adopted in the application of these procedures.

**Detailed Procedural Steps**

- If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.

- Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.

- If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

- Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.
- If any person, who discovers or finds any movable antiquity contravenes the provisions of the Act, he shall be punishable with imprisonment for a term which may extend to five (05) years, or with fine not less than fifteen hundred thousand rupees or with both and the Court convicting such person shall direct that the antiquity in respect of which such contravention has taken place shall stand forfeited to Government.

- The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.

- The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.

- No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.

- Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.

- If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part under the Land Acquisition Act, 1894 (I of 1894), as for a public purpose.
ANNEXURE P

Scope of Work for Structural Assessment of Bala Hisar Fort
Introduction

Background
These terms of reference address the purpose, scope and duration of the Structural Vulnerability Assessment of Bala Hisar Fort for the Peshawar Bus Rapid Transit Project. The assessment of the Bala Hisar Fort will be conducted prior to the construction activity to ensure no damage takes place during the project construction phase.

The Project consists of the development of a bus rapid transit (BRT) corridor with a total length of 30.8 km to be constructed on a phase wise basis in Peshawar city. The first phase will involve construction of 25.8 km of the BRT corridor while 5 km will be constructed in the second phase. The BRT corridor will consist of a total of 31 stations and will run from Chamkani to Hayatabad.

It is proposed for the route to travel along Hospital Road to the existing overpass carrying traffic over Grand Trunk Road, after which the route may utilise the bridge (following widening) or may be routed underground on Hospital Road. As such the route will run adjacent to Bala Hisar Fort and there is a potential for damage to the structural aspects of the fort in the process of construction. A structural vulnerability assessment will be conducted that determines the potential vulnerability to cracking, mortar dislocation, or other forms of incipient failure due to vibrations set up by construction equipment during the work on the PBRT.

Objective
The objective is to determine if damage to the fort is possible due to vibrations induced during construction of the PBRT, to assess the types of damage that might occur, and to make a determination of measures necessary to mitigate damage, including specification of a limit or standard for vibration intensity from construction equipment expressed as peak particle velocity (PPV) measured at a standard distance from the vibration source.

Scope
A two-phased assessment will be conducted consisting of a) a level 1 qualitative assessment to determine if the potential for damage to the structure is considered possible and b) a level 2 quantitative assessment to confirm the initial assessment of damage, provide a description of the types of damage that could occur, and recommend mitigation actions.

Detailed Terms of Reference

Level 1 Qualitative Assessment
Buildings constituting the fort including ramparts, parapets and walls, will be assessed on the basis of the characteristics of their structural layout and material compositions and strengths that can affect vulnerability. The qualitative assessment will be performed in order to screen the structure for detailed evaluation as necessary.

The qualitative assessment will be based on the experience of the expert and on elaboration of a restricted set of qualitative data, including data gathered in-situ by means of an onsite inspection,
and data obtained through an archival search regarding the building history and its architectural and technical features.

An inspection will be undertaken to understand the structural and material features of the building, its relationship with the surroundings, state of damage and decay, and alterations made in the structure, including repair and restoration works.

Basic survey data will be recorded in order to carry out the qualitative seismic vulnerability assessment: geometric characteristics of the structure, plan configuration, storeys, lifts and junctures between segments, dimensions and presence of mezzanines.

A dimensional survey of sufficient accuracy will be conducted to understand the spatial relationship between the proposed construction activity and buildings with a potential to suffer damage.

The assessor will evaluate the potential for vibrations from construction machinery operating near to the vulnerable buildings. The types of machinery and construction activities will be characterized and evaluated for their potential to generate destructive vibrations.

**Level 2 Quantitative Assessment**

The quantitative assessment will be conducted based on a reasonable possibility of damage, as determined by the level 1 assessment. The quantitative assessment will utilize accepted analytical methods to categorize the potential for damage, by identifying load bearing walls and overhead structural elements, and horizontal structural systems. To the extent necessary, the assessment will evaluate masonry properties for their potential response to vibrations and resonance effects. Only non-destructive testing is allowed.

The quantitative assessment should consider:

- Load bearing masonry walls with a variety of horizontal structures, which are not vaulted.
- Load bearing masonry with vaulted structures, where the vaulted structures shall be assessed in a way that allows calculating the resultant maximum settlement loads and their effects on hinges or levels of sliding within the load bearing wall system subjected to gravity and vertical loadings.
- Gigantic load bearing masonry walls and defensive constructions that lack a masonry box layout, and which should be analyzed using global indicators such as total shear base capacity and walls or column slenderness factors
- Timber clad frames supported on masonry walls in which the lower part of the structure is made of masonry and the effectiveness of the frame action of the timber portion with respect to the masonry is critical.

The assessment will describe the potential for damage, and the types of damage that are possible, based on a variety or scenarios.

**Mitigation and Standards**

The assessment will lead to recommendations for limiting the potential for damage, to a vibration standard applicable to the Project, particularly in the vicinity of the Fort, and to means for monitoring vibrations (equipment, protocols and frequency) during the course of construction. Recommendations will be based on assessed needs, and will be practical and implementable, so as
not to hinder the progress of construction. No mitigation measures need be recommended if the conclusion is such that vibration damage is unlikely to occur, given an adequate factor of safety in respect to same.

**Scheduling and Duration of Involvement**

The level 1 assessment should be completed in one weeks’ time, after which the level 2 assessment, if considered necessary, will be scheduled.

**Reporting**

A report of the level 1 assessment will be provided at the end of the first week. A further report will be required in the event a level 2 assessment is conducted.

The level 2 report will follow a common format emphasizing issues particularly relevant to the assessment. It should contain clear recommendations and an overall conclusion based on a logical conclusion of the analysis. Brief annexure to the report of evidences (notes, observations, calculations and other materials) is useful to the extent the practice does not lead to a bulky and unfocused result. An executive summary will be provided.
ANNEXURE Q

Methodology for Air Quality and Noise Monitoring
1. Introduction

ADB consultants services are available to businesses new or existing, large or small, which require the support of time and resource to improve, develop or grow their business and bottom line hired the services of SGS Pakistan (Pvt.) Ltd. to conduct an environmental monitoring of the said site.

1.1 Study Objective

The objective of the study is to:
- To assess the baseline conditions of the site before start of the project.
- Monitor air, and noise level at periodic intervals in project area.

1.2 Scope of Services

Scope of services covered following main components:
- Ambient Air Quality Monitoring
- Weather Conditions
- Noise Level Monitoring

1.2.1 Ambient Air Quality Monitoring

In accordance to NEQS (National Environmental Quality Standards) the following priority pollutants were monitored in the ambient air.
- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO, NO₂)
- Sulphur Dioxide (SO₂)
- Particulate Matter (PM₁₀)
- Particulate Matter (PM₂.₅)
- Suspended Particulate Matter (SPM)

In addition to above mentioned parameters, the metrological conditions were also monitored in order to interpret ambient air quality. For the purpose following parameters would be monitored:
- Ambient Temperature
- Relative Humidity
- Barometric Pressure
- Wind Direction
- Wind Velocity
2. Methodology

Following is the brief description of methodology adopted for this environmental assessment:

2.1 Ambient Air Quality Monitoring
Ambient air quality of the selected locations was monitored for the estimation of carbon monoxide, nitrogen dioxide, sulphur dioxide and particulate matter concentrations.

2.1.1 Carbon Monoxide
Carbon monoxide monitoring was carried out using gas filter Correlation CO. Measurement range of the analyzer is 0-100 ppm. Continuous data was recorded for duration of 24 hrs and hourly average is reported. US EPA Designated Method RFCA-0981-054 was used to measure CO concentration.

2.1.2 Nitrogen Dioxide
Nitrogen Dioxide at the project site was measured using chemiluminescent analyzer. Measurement range of the analyzer is 0-50 ppb and 0-1000 ppm. Reference method used for detection of NO₂ is USEPA Method RFNA-1289-074.

2.1.3 Sulphur Dioxide
Concentration of Sulphur dioxide in ambient air of the project site is measured by using Pulsed Fluorescent Analyzer. Measurement range of the analyzer is 0-50 ppb and 0-1000 ppm. USEPA Designated Method EQSA-0486-060 was used to measure SO₂ concentrations.

2.1.4 Particulate Matter (SPM)
Particulate matter concentration in terms of SPM was monitored in the ambient air with the help of high Volume Sampler. Reference method used for determination in ambient air is 40 CFR Part 50, Appendix J (USEPA).

Air sample for detection of SPM concentration was drawn on fiber glass filter paper and then the collected sample was preserved in protective holder which was transported to SGS lab for further analysis. Calculation under standard environmental conditions. The methodology for all the ambient air parameters are provided in the following Table.
2.1.5 Particulate Matter (PM$_{10}$)

Particulate matter concentration in terms of PM$_{10}$ was monitored in the ambient air with the help of AEROCET 531. PM$_{10}$ sampling was conducted for 24 hours at mutually agreed sampling locations. This method is applicable to measure ambient Particulate Matter PM$_{10}$ concentration from 0 to 1000 µg/m$^3$.

2.1.6 Particulate Matter (PM$_{2.5}$)

Particulate matter concentration in terms of PM$_{2.5}$ was monitored in the ambient air with the help of AEROCET 531. PM$_{2.5}$ sampling was conducted for 24 hours at mutually agreed sampling locations. This method is applicable to measure ambient Particulate Matter PM$_{2.5}$ concentration from 0 to 1000 µg/m$^3$.

Table 1: Methodology of Ambient Air Quality Monitoring

<table>
<thead>
<tr>
<th>Air Pollutant</th>
<th>Monitoring Technique</th>
<th>Method</th>
<th>Measurement Range</th>
<th>Lowest Detection Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide (CO)</td>
<td>Automatic Portable Analyzer</td>
<td>40 CFR 50, App. C (US-EPA)</td>
<td>1 – 100 ppm</td>
<td>1 ppm</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO$_2$)</td>
<td>Calorimetric Improved West &amp; Gaeke (Sod. Tetrachloro Mercurate ) Method</td>
<td>40 CFR 50, App. A (US-EPA)</td>
<td>0.01– 0.4 ppm, 25 µg/m$^3$ to 1000 µg/m$^3$</td>
<td>0.01 ppm</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO$_2$)</td>
<td>Chemiluminescent Analyzer</td>
<td>US EPA Designated Method RFNA-1289-074</td>
<td>0 – 1000 ppb, 0 – 100 ppm</td>
<td>0.001 ppm</td>
</tr>
<tr>
<td>Particulate Matter (PM$_{10}$)</td>
<td>Laser Light</td>
<td>(USEPA)/ISO 21501-4:2007</td>
<td>1-1000µg/m$^3$</td>
<td>1 µg/m$^3$</td>
</tr>
<tr>
<td>Particulate Matter (PM$_{2.5}$)</td>
<td>Laser Light</td>
<td>(USEPA)/ISO 21501-4:2007</td>
<td>1-1000µg/m$^3$</td>
<td>1 µg/m$^3$</td>
</tr>
<tr>
<td>Suspended Particulate Matter (SPM)</td>
<td>High volume Sampler</td>
<td>(USEPA) 40 CFR 50 APPB</td>
<td>2-750 µg/m$^3$</td>
<td>2 µg/m$^3$</td>
</tr>
</tbody>
</table>

2.2 Meteorological Conditions

In addition to the mutually agreed parameters for ambient air quality, weather conditions were also monitored continuously for 24 hours with the help of mobile
weather station. Selection of sampling points was made considering the wind direction at the mutually agreed sampling site.

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Method of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO₂</td>
<td>Ultraviolet Fluorescence Method</td>
</tr>
<tr>
<td>NO</td>
<td>Gas Phase Chemiluminescence</td>
</tr>
<tr>
<td>NO₂</td>
<td>Gas Phase Chemiluminescence</td>
</tr>
<tr>
<td>O₃</td>
<td>Non Dispersive UV Absorption Method</td>
</tr>
<tr>
<td>Suspended Particulate Matter (SPM)</td>
<td>High Volume Sampling (average flow rate not less than 1.1 m³/minute)</td>
</tr>
<tr>
<td>Respirable Particulate Matter (PM₁₀)</td>
<td>β Ray Absorption Method</td>
</tr>
<tr>
<td>Respirable Particulate Matter (PM₂.₅)</td>
<td>β Ray Absorption Method</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>Infra Red (NDIR) Method</td>
</tr>
</tbody>
</table>

2.3 Noise level monitoring

The Rion NL series sound level meter for noise measurement was utilized with a range from 35 dB to 135 dB with minimum detection limit of 0.1 dB. The details of the noise monitoring device used is provided below.
Clean and simple design, intuitive operation, wide range of applications

The NL Series Lineup

Sound Level Meter <Class 1>
NL-32/31

Sound Level Meter <Class 2>
NL-22/21/20
Sound level meter characteristics and sound level measurement

**Output connector**

- AC Output: Supplies an AC signal after frequency weighting. When a filter card (N1-216A, N1-217A) is inserted, the AC signal is output after filter processing. The relationship between display reading and output voltage is as shown below.

  - Output voltage: 1 Vrms ± 0.2 mVrms (scale upper limit)
  - Output impedance: approx. 500 Ω
  - Load impedance: 50 O
  - Suitable cable: BNC, RCA cable CC-04 (option)

  ![](Diagram.png)

Output signal in calibration mode (scale upper limit ~ 6 dB, 10 dB in zero wave) is 0.0 Vrms.

**DC Output**

- Supplies a level-converted DC signal after frequency weighting, rms detection, and logarithmic compression. The selected frequency weighting and time weighting characteristics are identical to the AC version. The relationship between display reading and output voltage is as shown below.

  - Output voltage: 2.5 V ± 0.5 mV rms (scale upper limit), 0.25 V rms (dil)
  - Output impedance: approx. 500 Ω
  - Load impedance: 50 O
  - Suitable cable: BNC, RCA cable CC-04 (option)

  ![](Diagram.png)

Output signal in calibration mode (scale upper limit ~ 6 dB, 10 dB in zero wave) is 2.5 V.

**Frequency weighting characteristics**

The major types of frequency weighting used by sound level meters are A, C, and Flat. The respective weighting curves are shown below. The subjective impression of how loud a sound is depends not only on this sound level. Low-frequency sounds and high-frequency sounds are perceived differently, even if they have the same level. Using the A weighting curve when measuring sound produces results that are fairly similar to the subjective impression given by this human hearing. Therefore, A-weighting is normally used, both in Japan and internationally, for noise evaluation and similar tasks. Flat characteristics are suitable for example when the actual sound level is to be measured or when the output of the sound level meter will be used for frequency analysis. C-weighting produces results that are close to flat response characteristics, but the influence of sounds below 51.5 Hz and above 8 kHz is reduced. This setting is useful for sound pressure measurements where unwanted low-frequency components are to be excluded or where a high degree of high-frequency components exist.

![](Diagram.png)

**Influence of microphone extension cable**

When the output of the microphone/preamplifier is routed through an extension cable, certain limitations regarding measurable sound level and frequency range will apply. This is due to the influence of the cable capacitance. The longer the cable, the lower the measurable sound level and the lower the frequency limit. The diagram below shows the relationship between cable length, measurable sound level, and frequency. If, for example, a sound level of 125 dB is to be measured up to 8 kHz, an extension cable length of up to about 100 meters is possible.

![](Diagram.png)

**Effect of windscreen**

When making outdoor measurements in windy weather or when measuring air conditioning equipment or similar, wind noise at the microphone can cause measurement errors. To prevent this, the supplied windscreen WS-10 can be attached to the microphone. The windscreen characteristics are shown below. The windscreen will reduce wind noise by about 25 dB during noise level measurement (with A-weighting), and by about 15 dB during sound level measurement.

![](Diagram.png)

**All-weather windscreen WS-03**

This sturdy, durable product is designed for prolonged outdoor use. It not only reduces wind noise but also provides protection against rain and dew. The product consists of a 20-cm diameter open cell type polyurethane foam structure for reducing wind noise and a ball-shaped nylon non-woven cloth for water proofing.

- Specifications:
  - Wind noise reduction: approx. 28 dB (A-weighting), approx. 18 dB (C-weighting)
  - Effect on frequency response: 20 Hz to 8 kHz, -0.5 dB (with water droplets)
  - Compatible microphones: 1/2 inch, 1 inch diameter
  - Shape and weight: 200 mm dia. ball shape, approx. 2.5 kg

- Material:
  - Open cell type polyurethane foam and mylar non-woven cloth
Wide 100 dB dynamic range eliminates need for level range switching

NL series is compliant with the current Measurement Law, JIS and IEC regulations. An attractive lineup of optional program cards is provided. These CompactFlash (CF) cards contain programs for adding useful functions such as sound monitoring, 1/1 and 1/3 octave real-time analysis, and FFT analysis. (Depending on the sound level meter model, some restrictions may exist as to which program cards can be used.) Automated measurements for environmental evaluation and noise control purposes are made easy by various convenient features of these sound level meters, such as power-saving design, and optional real sound monitoring capability. Results of automatic measurement can be stored directly on CF card, making it easy to transfer such data to a computer for further processing.


- Real sound monitor function
  The real sound monitor card NX-22U integrates a sound monitor function in the sound level meter. This allows event recording (above a certain threshold) or interval recording (at preset intervals) during sound level measurement. By using the NL-22PB management software, you can perform various data processing functions while listening to the actual recorded sound.

- Comparator function
  An open collector output limited to the comparator function can be used for various purposes. This comparator level can be set from 30 to 130 dB in 1-dB steps. (Maximum applied voltage: 34 V DC, maximum current: 60 mA DC)

- Power backup capability
  When the unit is powered from an external source (AC adapter), the inserted batteries will automatically take over if the external power is interrupted for any reason.

- Timer function
  The unit can be set to start and stop measurement at specified times. In the standby condition, the unit consumes only a small amount of power. In combination with the interval function, this enables problem-free long-term measurement.

- Graphic indication of sound level fluctuations, back-annex function for excluding incident data

- Easy-to-read backlit LCD display

- Filter cards provide expanded settings for various filter functions

- USB interface (with optional connection cable)
LCD screen examples

- Level/time measurement screen
- Simultaneous processing result display screen
- Sound level display screen (with backlight)

Main unit functions (data recording/output)

Card slot
A CompactFlash card slot is integrated in the unit, allowing a card that enables auto store operation. Optional program cards can also be inserted, to load various operation functions.

I/O connectors (RS-232C/USB)
The I/O connector allows sound level measurement control from a computer, data output to a printer, data output to an external computer, and environment output (dedicated cable required). In addition, an AGC output connector and AC adapter connection jack are also provided.

System diagram (Equipment other than sound level meter is optional)

The diagram illustrates the components and connections of the system, including the sound level meter, management software, CF card, printer, and various cables and adapters.
Management software

NL-22PB1

[with real sound playback function]

Daily report display screen
By reading in auto store data from memory card, processing functions such as measurement data display, editing, creation of daily and weekly reports, load file export, and printing become possible.

Edit display screen
When using the real sound monitor card NX-22U, recorded live sound can be played back. Data erase and recall function are also possible.

Program cards

NL-22/22/31/21

Real sound monitor card
NX-22U

Add real sound monitor function to sound level meter.
This allows event recording (above a certain threshold) or interval recording (at preset intervals) during sound level measurement. By using the NL-22PB1 management software, you can perform various data processing functions while listening to the recorded sound.

FET Analyzer card
NX-22FT

Add FFT analyzer function to sound level meter.

Frequency analyzer bands:
FET analyzer: 0.1 Hz to 16 kHz
L1 fast filter: 125 Hz to 16 kHz
Memory: 100 data points
AC/DC output: Voltage output corresponds to 1.0 dB rms, regardless of selected measurement type (full scale: 10 dB)

Universal filter card
NX-21VA

Add high-pass filter and low-pass filter function to sound level meter.
Set center high-pass filter: 10 Hz to 125 Hz (NL-21V to 11 dB)
Set center low-pass filter: 10 kHz to 125 kHz (NL-21V to 11 dB)
AC/DC output: For selected frequency band

Program card compatibility chart

NL-22/22
NL-23/23
NL-24

Real sound monitor card
NX-22U
Yes
No
No

FET Analyzer card
NX-22FT
Yes
No
No

Universal filter card
NX-21VA
Yes
Yes
No

Sound calibrator
NC-74

ideal for calibration of high-precision sound level meters
This device conforms to IEC 65164: 1997 Class 1 and IEC 65164: 1997. Its performance and functions are especially suitable for high-precision sound level meters. Sound level: 58 dB, Frequency: 10 Hz.
## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>MI-22</th>
<th>MI-21</th>
<th>MI-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable standards</td>
<td>High-Frequency level meter according to the following standards</td>
<td>General Purpose Level Meter according to the following standards</td>
<td>JIS C 1559-1 Class 2</td>
</tr>
</tbody>
</table>

### Measurement functions

#### Main processing

Simultaneous measurement of all items, with selected time weighting and frequency weighting:
- Sound level \( L_A \) equivalent continuous sound level \( L_{eq} \), sound exposure level \( L_{ex} \), maximum sound \( L_{max} \), minimum sound \( L_{min} \), percentile sound level \( L_{p} \) (selectable values)
- In addition to main processing items, one of the following can be selected for simultaneous processing:
  - Peak sound level \( L_{peak} \), C-weighted peak sound level \( L_{peak,c} \)
  - C-weighted equivalent continuous sound level \( L_{eq,c} \)
  - Power average of maximum sound level in a given time frame \( L_{eq,d} \), impulse sound \( L_{imp} \)
  - Impulse equivalent continuous sound level \( L_{eq,i} \)
- \( L_{eq,da} \), \( L_{eq,da,50} \), \( L_{eq,da,100} \), \( L_{eq,da,1000} \), \( L_{eq,da,10000} \)
- \( T \) : smoothing time (selectable range)

#### Sub-processing

- Frequency range: 0.1 Hz to 16 kHz
- Frequency range selection: 0.1 Hz to 100 kHz
- Frequency range selection: 0.1 Hz to 20 kHz
- Measurement time: 10 seconds, 1.5, 10, 15, 20 minutes, 1, 8, 24 hours and manual (maximum 200 hours)
- Measurement level range:
  - A-weighting: 25 dB to 150 dB, C-weighting: 25 dB to 120 dB
  - A-weighting: 20 dB or less (Type F)
  - C-weighting: 20 dB or less, D-weighting: 20 dB or less
- Inherent noise:
  - A-weighting: 20 dB or less (Type F)
  - C-weighting: 20 dB or less, D-weighting: 20 dB or less
  - Inherent noise: 100 dB

### Level range selection

- 20 dB to 100 dB, 20 dB to 100 dB, 20 dB to 100 dB
- 20 dB to 100 dB
- 20 Hz to 20 kHz
- 10 Hz to 20 kHz, 10 Hz to 14 kHz

#### Frequency range

- Frequency range:
  - 0.1 Hz to 16 kHz
  - 0.1 Hz to 100 kHz
  - 0.1 Hz to 20 kHz

#### Measurement functions

- Performance: 0.1 Hz to 16 kHz
- Measurement method: Fast, Slow, Impulse (Impulse selectable only as an auxiliary processing function)
- Acoustic calibration: Using sound level meter calibration NC-74
- Back-up function: Data for 5-second intervals before pressing Pause button can be excluded
- Connectors:
  - RS-232C, USB, LAN
  - RS-232C, USB, LAN

#### Accessories

- Unit: Microcomputer speaker: 1/2 inch electrostatic loudspeaker
- Preset mode: N4-2b

#### Display

- LCD with LED backlight (128 x 64 dots + 122 icons), display contrast numeric and bar graph indication of sound level
- Combined display of all processed values, 1-point real-time level metering with 30-second horizontal axis
- Menu screen display for operation
- Outputs:
  - AC/DC jack (user selectable), AC output: 1 Vrms (full scale), DC output: 5 Vrms (full scale), 0.25 Vrms (0 dB)
- Power requirements:
  - For IEC REP (screw AA) batteries (Li-ion or Ni-MH), AC adapter (Option: NC-34, NC-28)
  - Battery life: Approx. 24 hours
  - External power supply: 100 to 240 VAC (no transformer)

#### Dimensions

- Approx. 260 x 26 x 32 mm
- Approx. 260 x 26 x 32 mm

#### Weight

- Approx. 400 g (excluding batteries)

### Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real sound monitor card</td>
<td>NO-25J</td>
</tr>
<tr>
<td>FFT Analyzer card</td>
<td>NO-25T</td>
</tr>
<tr>
<td>1/2 MS Octave filter card</td>
<td>NO-21A</td>
</tr>
<tr>
<td>Universal filter card</td>
<td>NO-21A</td>
</tr>
<tr>
<td>Management software</td>
<td>JY-22551</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>255 MS CompactFlash memory card</td>
<td>MC-255F1</td>
</tr>
<tr>
<td>Microphone calibration cable</td>
<td>CC-04 (2 m and up)</td>
</tr>
<tr>
<td>EIN: 25A cable</td>
<td>CC-04</td>
</tr>
<tr>
<td>Serial connection cable</td>
<td>CC-25</td>
</tr>
<tr>
<td>Printer cable</td>
<td>CC-25 (for DJU-414)</td>
</tr>
<tr>
<td>Comparator cable</td>
<td>CC-04 (for DJU-414)</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB connection</td>
<td>CD-95</td>
</tr>
<tr>
<td>Sound calibrator</td>
<td>CD-74</td>
</tr>
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<td>Protectors</td>
<td>CD-72</td>
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<tr>
<td>All-weather windshield</td>
<td>WS-035</td>
</tr>
<tr>
<td>Printer</td>
<td>DJU-414</td>
</tr>
<tr>
<td>AC adapter</td>
<td>NC-34 series</td>
</tr>
<tr>
<td>AC adapter (100 to 240 V AC)</td>
<td>NC-28A</td>
</tr>
</tbody>
</table>

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Distributed by:

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This leaflet is printed with environmentally friendly soy ink on recycled paper.
Printed in Japan: 0401-3 2005.P.E.
ANNEXURE R

ToRs of Third Party Monitor
i). Develop specific monitoring indicators for undertaking monitoring and evaluation of EMP and RAP implementation including the Community Participation, consultation and disclosure;

ii). Review results of internal monitoring and verify claims through random checking at the field level to assess whether EMP and resettlement objectives have been met. Involve the affected people and community groups in assessing the impacts of EMP implementation and resettlement measures for monitoring and evaluation purposes.

iii). Review monitoring reports and conduct field inspections and verify the progress in EMP and RAP implementation of the project and prepare reports for the PMU and the ADB.

iv). Evaluate and assess the adequacy of compensation given to the PAPs and the livelihood opportunities and incomes as well as the quality of life of PAPs of project-induced changes.

v). Evaluate and assess the adequacy and effectiveness of the consultative process with PAPs, including the adequacy and effectiveness of grievance procedures and legal redress available to the affected parties, and dissemination of information about these.

vi). Socioeconomic conditions of the PAPs in the post-resettlement / rehabilitation period;

vii). Communications and reactions from PAPs on entitlements, compensation;

viii). Grievance procedures; its recording, reporting and processing time and its redressal;

ix). Institutional arrangements and effectiveness and efficiency of PMU, and Supervision Consultants in EMP and RAP Implementation;

x). Evaluation and assessment of the adequacy of compensation given to the PAPs and the livelihood opportunities and incomes as well as the quality of life of PAPs of project-induced changes.

xi). Level of satisfaction of PAPs in the post resettlement period.

xii). Assessment of the resettlement efficiency, effectiveness, impact and sustainability for drawing lessons for future resettlement policy formulation and planning.