BAN: COVID-19 Response Emergency Assistance Project

ADB Project 54173-001| Loan3918-BAN

ENVIRONMENTAL MANAGEMENT PLAN

Package

Package No. DMCH/ICU/ADB/WD-1: Construction of 10 Bed ICU/CCU at Dhaka Medical College Hospital (Lot 2: Installation of Medical Gas System at Dhaka Medical College Hospital, Dhaka)

Implementing Agency

Health Services Division (HSD)
Ministry of Health and Family Welfare

September 2021

Prepared by Health Services Division (HSD) of the Ministry of Health and Family Welfare for the Asian Development Bank.

The Environmental Management Plan is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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I. PROJECT BACKGROUND

1. COVID-19 is a new disease with similar symptoms as influenza but different in terms of severity and community transmission[1]. The World Health Organization (WHO) declared the COVID-19 as a Public Health Emergency of International Concern on 30 January 2020 under the International Health Regulations (IHR) 2005 and recognized it as a pandemic on 11 March 20202[2]. On 23 March 2020, the Government of Bangladesh requested ADB for a support in its preparedness and response to the COVID-19 outbreak. Accordingly, ADB approved a loan of $100 million from its ordinary capital concessional resource for Loan 3918 -BAN(COL): COVID-19 Response Emergency Assistance Project (the project) on 30 April 2020. The loan agreement was signed on 13 May 2020 and became effective on 16 May 2020. The loan completion date is 31 October 2023. The Health Services Division (HSD) of the Ministry of Health and Family Welfare is the executing agency (EA) and the Directorate of Health Services (DGHS) is the implementing agency (IA) of the project.

2. The project will support the procurement of equipment and supplies, the upgrading of health and testing facilities, and build system and community capacities for surveillance, prevention and response to COVID-19. The project's outcome will be the improved Health and wellbeing of COVID-19 affected persons. The project will have three outputs: (i) Output 1: Immediate and urgent needs are met in prevention and control of COVID-19; (ii) Output 2: Infrastructure and related equipment are delivered to support and sustain prevention and management of COVID-19; and (iii) Output 3: Health system and community capacities in combating COVID-19 are strengthened. The project will involve works supporting the renovation of existing facilities for the establishment of (i) screening and quarantine areas at points of entry; (ii) critical care and isolation units in existing healthcare facilities; (iii) microbiological diagnostics facilities in existing medical colleges and hospitals across the country.

[1]WHO Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. https://www.who.int/health-topics/coronavirus#tab=tab_1.
[2]WHO. International Health Regulations (2005). 3rd Ed. https://www.who.int/ihr/publications/9789241580496/en.
[3]https://en.wikipedia.org/wiki/Dhaka_Medical_College_and_Hospital

II. SUBPROJECT DESCRIPTION

3. Dhaka Medical College is a medical college and hospital located in Dhaka, the capital city of Bangladesh. It is situated in the Bakshibazar area of the city, close to the University of Dhaka and the Bangladesh University of Engineering and Technology. After beginning the journey in 10th July 1946, Dhaka Medical College established a new era in the history of medical education in Bangladesh. Dhaka Medical College Hospital (DMCH) is one of the major teaching hospitals in the country. Bedside teaching and clinical examinations of the undergraduate as well as postgraduate students take place at the hospital wing. It is a recognized clinical examination center for fellowship examination of Bangladesh College of Physicians and Surgeons. Dhaka Medical College has a 2600-bed teaching hospital as Dhaka Medical College Hospital (DMCH) within the college compound. It is a tertiary referral hospital. It has a 300-bed facility dedicated for burn & plastic surgery.

4. Starting with only one building, DMCH now consists of a college building with a new extension, an auditorium, a Nuclear Medicine Centre, male and female dormitories, burn units etc. scattered on about 25 acres of land. There are 8 laboratories for each of the department of physiology, biochemistry, pharmacology, pharmacy, histology, histo-pathology, clinical pathology, and microbiology. In 34 different departments and 42 wards - 234 doctors, 140 interns, 560 nurses and 1100 other staffs are dedicated to ensure 24-hour health services both in indoor and outdoor. Its occupancy rate is about 130%. The hospital now consists of about 2300 beds with a new academic and hospital building with a bone marrow transplantation facility rendering services to almost 3500 inpatients every day.

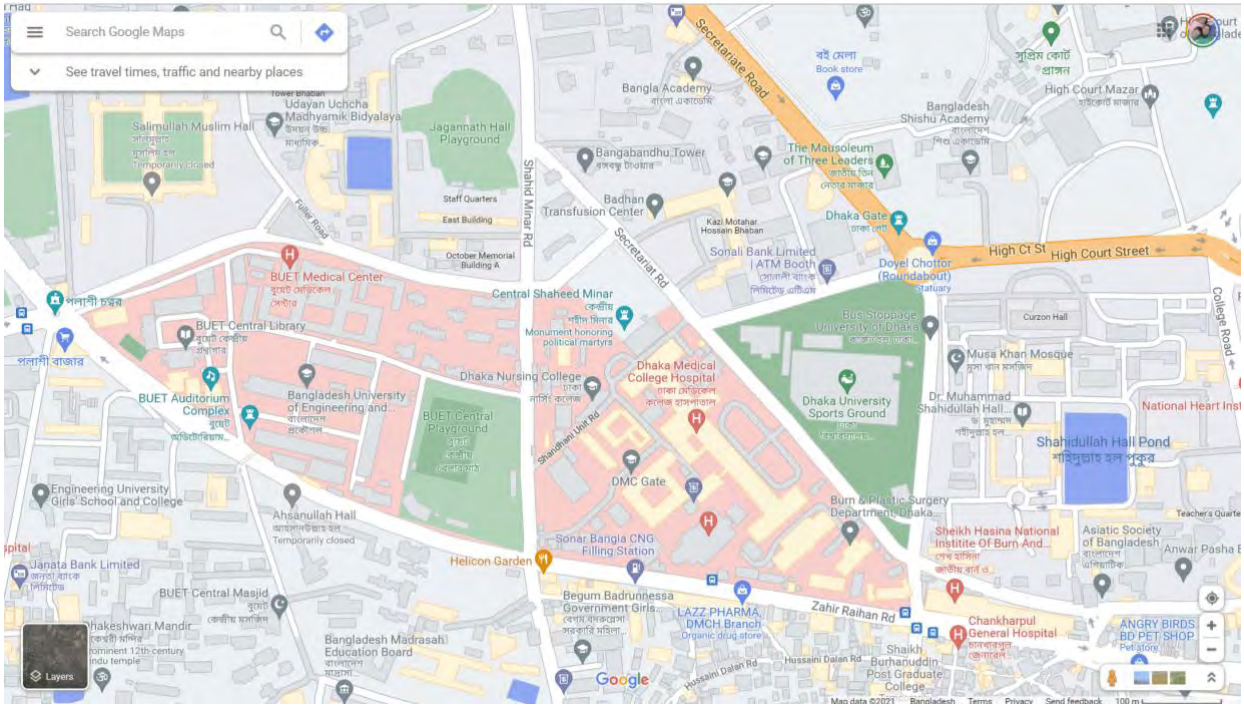


Figure 1: Location of Dhaka Medical College Hospital

5. Dhaka Medical College Hospital (DMCH) is conducting coronavirus test from April 8, 2020. DMCH was added to the approved list on April 8, but on May 10, it stopped receiving samples from outpatients as it became hard for them to manage the huge rush of Covid-19 test applicants with only one Real Time Polymerase Chain Reaction (RT-PCR) machine from the beginning. Dhaka Medical College Hospital (DMCH) opened an isolation unit for coronavirus patients, but it still lacks certain facilities essential for treating patients carrying the virus. Located on the ground floor of DMCH Building-2, the hospital authorities transformed its acute medicine unit into a 12-bed isolation unit. A special laboratory, capable of conducting tests like ultrasonography, endoscopy, and X-rays, has been attached to the unit. However, the unit does not yet have life support and artificial respiration facilities.

6. This subproject includes installation of Medical Gas System within the ICU/CCU block of DMCH. Appendix 1 represents the layout plan of subproject components. The main components of

this work include supplying & installation of medical gas line ball valve, installation of medical copper pipe, installation of bed head trunking system used in ICU, installation of microprocessor-based area alarm, installation of direct probe Oxygen flow meter complete with high precision metering valve, high impact polycarbonate flow tubes, black glass float and reusable steam auto clavable bubble humidifier, face mask, nipple tubing etc. Intended Completion Date is approximately 180 days from the commencement date. The respective medical authority will provide necessary support and supervision and the monitoring process will be done through Public Works Department (PWD). The handling procedures of medical wastes along with other waste are included in Appendix 2.

III. BASELINE INFORMATION

7. **Climate.** Dhaka experiences a hot, wet and humid tropical climate. Under the Köppen climate classification, Dhaka has a tropical wet and dry climate. The city has a distinct monsoonal season, with an annual average temperature of 25 °C (77 °F) and monthly means varying between 18 °C (64 °F) in January and 29 °C (84 °F) in August. Nearly 80% of the annual average rainfall of 1,854 millimeters (73.0 in) occurs during the monsoon season which lasts from May until the end of September. Increasing air and water pollution emanating from traffic congestion and industrial waste are serious problems affecting public health and the quality of life in the city. Water bodies and wetlands around Dhaka are facing destruction as these are being filled up to construct multi-storied buildings and other real estate developments. Coupled with pollution, such erosion of natural habitats threatens to destroy much of the regional biodiversity.

8. **Air Quality and Noise Level.** There is a good reason to worry about the Air Quality in Dhaka, as Bangladesh ranks 169th (out of 178 countries) at the Environmental Performance Index for Air Quality (2014 score). Furthermore, according to the most recent World Health Organization data, the air quality in Dhaka reaches a yearly average of 90 µg/m3 of PM2.5, which corresponds to a 168 - Unhealthy Air Quality Index. Obviously, 168 - Unhealthy is just a yearly average, and the air pollution can reach much higher 300+ hazardous levels. There are many industries are located in Dhaka City.

9. Along with air pollution, noise pollution has become a hazard to the quality of life in Dhaka. The noise level in different locations of the metropolitan area exceeds specified standard limits by as much as 20dB. In the “so-called” silent zones, it does not fall below 55dB even in the morning hours. World Health Organization (WHO) identified many adverse effects of long exposure to moderate level noise or sudden exposure to excessive noise. It is reported that most of the dwellers of Dhaka are not aware of the ill effects of noise pollution. They even do not consider noise a pollutant, and take it as a part of routine life. It is reported that average noise level in roadside and inside positions are about 82 dBA and 73 dBA, respectively. Dwellers of Dhaka city including school going children to retired persons are exposed to this high-level environmental noise for minimum 2 hours per day on an average which implies that they are in the risk of serious health hazards. Extended exposure to excessive sound has been proved to produce physical and psychological damage. Because of its annoyance and disturbance implications, noise adds to mental stress and hence affects the general wellbeing of those exposed to it.

10. **Drinking Water Quality.** The quality of the water sources used in Bangladesh is at high risk, especially in the capital city of Dhaka, due to increased pollution resulting from unlimited migration of rural people. Consequently, the existing groundwater-based water supply system is not adequate to fulfill the water demand of this mega-city. Dhaka, one of the mega cities of the world, has a population of about 11 million in metropolitan area. About 19.4% of the total population of Dhaka city lives in the slum and squatter areas. Due to the faster growth of Dhaka city, people from all over the country come to Dhaka. Dhaka Water Supply and Sewerage Authority (Dhaka WASA) is the responsible body to supply water to this huge population. But the Dhaka WASA can only produce 1900 million liters of water per day against Dhaka city’s daily demand of 2200 million liters. About 87% of total water supply by Dhaka WASA comes from deep tube wells, and rest of the supply comes from surface water treatment. But as the water table of Dhaka city is being lowered day by day, it is high time to consider surface water treatment as the primary source.

11. **Current Situation of Medical Waste Management.** Waste management systems in Dhaka Medical College Hospital:

- Collection: In DMCH there is a bowl with capacity 2-3 kg kept below the bed of various wards for collecting general waste. This general waste includes plastic, packaging, paper, food, vomit, pharmaceutical waste both liquids and tablets etc.
- Separation and segregation: Syringes, needles and saline bags are claimed to be separated for the interchange with the new products from the suppliers by the ward masters and cleaner.
- Disinfection and treatment: Chemical disinfection such as chlorination is also performed in this hospital to disinfect surgical instruments. There was an onside incinerator for treatment of

pathological and infectious waste which has been out of order for the last several years. Basically, infectious wastes are now disposed off to the DCC bin without any prior treatment.

- Internal temporal storage bin: Waste collected from different wards, cabins, departments and operation theatres are then stored in a temporal storage bin until they are finally disposed off to the nearest DCC bin outside the hospital boundary.
- Recycling and reuse: Some cleaners are involved in separating plastic and glass bottles, drinking and pharmaceuticals containers for selling to the recyclers after throwing off into the internal bin.
- Disposal to the DCC bin: Wastes are then transported by the hospital authorities to the nearest DCC bin outside the boundary. As no segregation and separation of hazardous infectious waste is performed, the waste thus disposed off to the open DCC bin causes serious health hazard to the scavengers, tokais, waste handling personnel and the public as well as to the environment also.

12. Until 2004 there were no organized form of medical waste collection and disposal in the country including in Dhaka. Since 2005, a local NGO Prism Bangladesh Foundation has been engaged by Dhaka City Corporation for collecting and disposal of medical solid wastes in Dhaka city. Approximately 13.5 tons of medical wastes are collected daily from hospitals and clinics and healthcare facilities in Dhaka city (Dhaka South City Corporation and Dhaka North City Corporation). A study of Dhaka South City Corporation suggests that approximately 50 tons of total solid wastes are collected daily by both Dhaka North and Dhaka South City Corporations. Prism Bangladesh Foundation and Dhaka South City Corporation officials responsible for medical waste collection. Dhaka South City Corporation has allocated a special site at Matuail sanitary landfill area for safe management and disposal of medical waste there. Prism Bangladesh Foundation collects and carries different types of medical wastes from different locations of Dhaka City to Matuail landfill site, segregate them and manage them further. The wet part of medical wastes is put into an autoclave chamber to disinfect them for further disposal at the landfill. On the contrary, sharp (needle, glass etc.) items, body parts are buried at designated sites of the Matuail landfill. Recyclable plastic items are separated and chemically treated, shredded and sold as raw materials for plastic factories. All other dry items from medical wastes are incinerated and the ash is buried at the landfill. Matuail sanitary landfill site designated for medical waste management has its autoclave, incinerator and effluent treatment plant (ETP for treating waste water) for safely managing medical wastes generated and collected by Prism Bangladesh Foundation in Dhaka city.

IV. ENVIRONMENTAL MANAGEMENT PLAN

13. Environmental Management Plan (EMP) is an instrument for implementing the mitigation plan for the proposed subproject. The plan provides guidance regarding environmental and social issues/parameters, location, frequency, and means of management and mitigation. The EMP specifies the means through which adverse environmental and social impact of the project associated with construction, renovation, and operational activities of the subproject are either avoided or mitigated.

14. The basic objective of the EMP is to manage the adverse impacts of proposed project interventions in a way that minimizes the adverse impact on the environment and people at the subproject sites. The specific objectives of the EMP are to –

- Identification of the environmental impacts and recommended mitigation and enhancement measures;
- Define the responsibilities of the subproject proponents in accordance with the project phases (construction, renovation and operation);
- Facilitate the implementation of the mitigation measures by providing the technical details of each project impact;
- Define a monitoring mechanism and identify monitoring parameters to ensure that all proposed mitigation measures are completely and effectively implemented;
- Providing a cost estimate for EMP implementation.

15. **Implementation Arrangements:** MOHFW will be the executing agency (EA) while DGHS will be the implementation agency (IA). The project is expected to be completed by April 2023. A project implementation unit (PIU) will be set up in DGHS to provide the technical, administrative, and logistical support necessary for implementation. An inter-ministerial Project Steering Committee is to be constituted under the project of DGHS under the chairmanship of the Secretary, MOHFW, will provide guidance on policy directions and oversee the overall project implementation. The PIU will work directly with the government entity involved in each activity, such as but not limited to: (i) the COVID-19 Emergency Operation Center (EOC) in preparedness and response; (ii) the various coordination committees at Divisional, District, City Corporation and Upazila levels for civil works activities; and (iii) the Institute of Epidemiology, Disease Control and Research (IEDCR) and other relevant institutes under DGHS in contact tracing support and surveillance strengthening activities. The PIU will conduct regular monitoring and evaluation activities and hold quarterly reviews of progress against the indicators. For technical oversight and hands-on support to the PIU for ensuring environmental safeguards, an intermittent environmental specialist will be appointed throughout project implementation up to completion.

16. The contractor will designate their environmental staff who will be responsible in overseeing the implementation and compliance to the EMP during construction phase and maintain a record of complaint/grievance submitted at the project level through the contractor including any actions taken to address the issue. Contractors will also follow the guidelines for COVID-19 preparedness provided in Appendix3.

17. **Grievance Redress Mechanism (GRM):** MOHFW will ensure that affected persons will have the chance to express their legitimate grievances or to file a complaint about the project by setting up a Grievance Redress Mechanism (GRM) as soon as the loan becomes effective. The GRM shall resolve complaints in a time-bound and transparent manner. The GRM process will be aligned with the process adopted by MOHFW, while ensuring compliance with the policy principles of ADB SPS 2009. Any cost related to the implementation of the GRM will be part of the administration cost borne by MOHFW. Grievances filed and resolved will be thoroughly documented and included in the monitoring reports submitted to ADB.

18. Complainants or affected persons can seek redress to their complaints in three levels: Level 1: The complaint will be resolved at the activity level through the Site Engineer or Representative by the Contractor within one to two working days and advise the Complainant accordingly. Level 2: The GRM Focal Person will assist the complainant in elevating the complaint to the PIU. The PIU will address the

grievance within 7 days through continuous interactions with the complainant to answer queries and resolve the complaint. Level 3: In the event the complainant is not satisfied with the decision after the GRM, the Complainant can access the ADB's Accountability Mechanism (ADB's Office of Special Project Facility or Office of Compliance Review).

Table 1: Environmental Management Plan for Installation of Medical Gas System at DMCH

IEC	Potential Impact	Mitigation Measures	Monitoring Method		Responsibility	
			Method of Collecting and Reporting Data	Location and Frequency	Implementation	Supervision
CONSTRUCTION PHASE						
Waste Management for Construction and COVID Waste	• Soil, water and air pollution from the improper management of wastes and excess materials from the construction sites. • The discarded PPE has posed serious health hazards and can spread the contagion among cleaners and walkers.	• Develop a waste management plan including COVID waste by the help of the environmental consultant and later to update the plan, if required. • Use of colored bins (like yellow) and to put medical wastes in 2-3 layered plastic bag. These wastes need to disinfectant first using chlorine or any other germicides and then safely transport them through marked vehicles in a marked place. • Waste segregation, packaging, collection, storage disposal, and transport will be conducted in compliance with GOB, ADB and WHO COVID-19 Guidelines. • Train on correct use and disposal of PPEs and check that they understand. • Construction wastes (such as piece of rod, wood, bamboo, tin sheet, brick etc.) shall be kept in designated area and sprayed water mist to reduce the dust. • Use PPE for staff handling any hazardous materials seepage of hazardous chemicals in case of any accidental spills. • Do not burn/throw in any wastes to the water bodies/drains. • The PIU will audit any off-site waste disposal required on a monthly basis and institute any remedial measures required to ensure compliance.	• Record of waste type and quantity and the disposal method	Construction camp and work sites during construction period	Contractor	PIU and Environmental Consultant (ES)
Management of Workers Facility	• Lack of proper facilities such as water supply and sanitation facilities may pose health hazards to workers.	• Ensure sufficient stock of soap, sanitizer, washing facility and safe water at work site. Also, provision of an appropriate number of toilets and hand-washing points. • At the entrance of the worksite every personnel must wash their hands for 20 second with maintaining a distance of at least 6ft from each other. • Check the availability of medical kits at the site on weekly basis. • Preparation of daily routine checkup including temperature screenings of the workers and staff.	• Visual inspection & consultation with worker; • Health checkup record.	Construction camp site during construction period	Contractor	PIU and ES
Drinking Water Quality	• Groundwater at shallow depths may be contaminated with arsenic and other parameters and hence not suitable for drinking purposes.	• Provide the drinking water that meets national standards. • Select aquifers for drinking water free from arsenic and other contaminants. • Tube wells will be installed with due regard for surface environment, protection of groundwater from surface contaminants, and protection of aquifer cross contamination. Sanitary waste should be adequately disposed-off to avoid groundwater contamination.	• Record of water-borne diseases	Regular monitoring the drinking water source during construction period	Contractor	PIU and ES
Drainage Congestion	• Water logging due to improper management of drainage for rainwater/liquid waste or wastewater.	• Regularly inspect and maintain all drains to assess and alleviate any drainage congestion problem. • Stockpile materials away from drainage lines. • Reconstruct internal road-side drains immediately if damaged by any activities.	• Visual inspection & consultation with hospital staff and visitors.	In the project area during construction period	Contractor	PIU and ES
Dust/Air Quality Management	• Dust generation from construction sites, material stockpiles specially earth material stockpiles and access roads are a nuisance in	• During pneumatic drilling/wall destruction dust shall be suppressed by ongoing water spraying and/or installing dust screen enclosures at site. • Water spraying the material stockpiles and access roads when and as required basis to minimize the potential for environmental nuisance due to dust. Increase	• Visual inspection &consultation with hospital staff, doctors, patients	On the worksite Weekly monitoring during	Contractor	PIU and ES

IEC	Potential Impact	Mitigation Measures	Monitoring Method		Responsibility	
			Method of Collecting and Reporting Data	Location and Frequency	Implementation	Supervision
	the environment and can be a health hazard.	the watering frequency during periods of high risk (especially during the dry period and high winds). • Cover hauls vehicles carrying dusty materials moving outside the construction site. • Fit machinery/vehicles with appropriate exhaust systems and emission control devices.	and their relatives	construction period		
Noise and Vibration Management	• Noise may have an impact on workers, patients, hospital staffs, local residents etc.	• Appropriately site all noise generating activities to avoid noise pollution to workers, patients, hospital staffs, local residents etc. • Install temporary noise barriers by screen, tin, wood around generators to reduce noise levels. • Employ best available work practices on-site to minimize occupational noise levels. Use ear plugs in noisy areas of the construction activities. • Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures.	• Visual inspection & consultation with hospital staff, doctors, patients and their relatives	On the worksite Weekly monitoring during construction period	Contractor	PIU and ES
Occupational Health and Safety (OHS)	• Construction works may pose health and safety risks to construction workers that may cause severe injuries and deaths. • Lack of first aid and health care facilities in the immediate vicinity. • Health risk of construction workers due to COVID-19.	• Develop and implement an Occupational Health and Safety Plan to ensure competent and consistent attention to worker health and safety throughout the construction phase. • Prepare the health and safety guidance for COVID-19 at work sites and get approval from PMU, and strictly follow the guidance at worksite; • Any worker showing symptoms of respiratory illness (fever, cold or cough) and has potentially been exposed to COVID-19 should be immediately removed from the site and tested for the virus at DMCH; • Workers involved for any short renovation activities at isolation area for COVID-19 will have WHO certified PPE and subsequently dispose the PPE in designated areas. • Provide PPE to workers such as safety shoes, safety helmets, face masks, hand gloves, protective clothing, goggles, full face eye shields, and ear plugs and monitor to maintain them. • Ensure hand washing and other sanitary stations are always supplied with clean water, soap, and disinfectant; • Provide safety measures as appropriate during works such first aid kits, restricted access zones, warning signs, overhead protection against falling debris, lighting system to protect community, hospital staff and patients against construction risks. • Simple poster/signage in Bangla explaining entry procedures. Signage available in hospitals to remind health personnel to wear masks if necessary and wash hands before entering/leaving. • Emergency preparedness and response procedures and equipment (warning signs, fire extinguishers, fire exit etc.). • Train all construction workers in OHS matters and on the specific hazards of their work and maintain a register of the person present during the training.	• Visual inspection & consultation with hospital staff, doctors, patients and their relatives • Record of accidents • Obtain record of training • Provision of regular temperature check, using disinfectants and also provision of time-to-time hand wash are required to limit the COVID-19 pandemic.	Contractor' site office and work site during construction	Contractor	PIU and ES

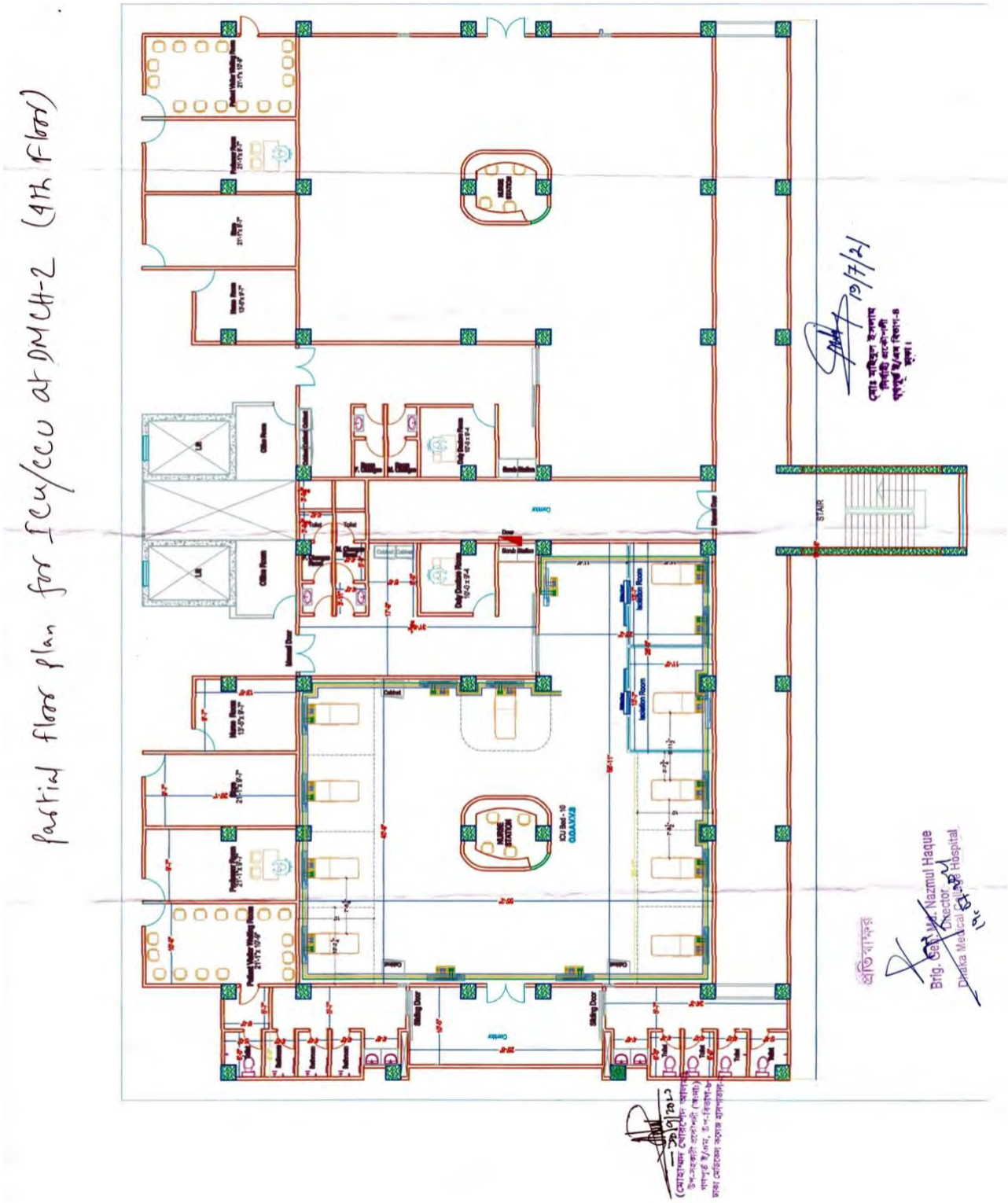
IEC	Potential Impact	Mitigation Measures	Monitoring Method		Responsibility	
			Method of Collecting and Reporting Data	Location and Frequency	Implementation	Supervision
		• Grievance Redress mechanism (GRM) developed to readdress complaints raised by community, health staff, patients and their relatives.				
Site Reinstatement	• Damage due to debris, spoils, excess construction materials.	• Remove all spoils wreckage, rubbish, or temporary structures from the construction and camp sites; • All affected structures rehabilitated.	• Visual inspection & consultation with local people	At the end of construction period	Contractor	PIU and ES
OPERATION PHASE						
COVID Waste Management	• COVID waste has posed serious health hazards and can spread the contagion among hospital staff, waste handlers and the community.	• Prepare medical waste management plan that will cover the waste generated from the response to the COVID-19 infection. The plan will follow **ADB's guidance note on managing medical waste du**ring COVID-19 pandemic as well as any other government regulations. • All medical waste produced during the care of COVID-19 patients must be considered as infectious waste and should be segregated and collected safely in designated colored coded containers. • Use of colored bins (like yellow) and to put Covid-19 wastes in 2-3 layered plastic bag. These wastes need to disinfectant first using chlorine or any other germicides and then safely transport them through marked vehicles in a marked place. • Waste segregation, packaging, collection, storage disposal, and transport will be conducted in compliance with WHO COVID-19 Guidelines. • Train the staffs on color coding and handling of infectious Covid-19 wastes.	• Visual inspection and consultation with hospital staff and cleaners. • Record of waste type and quantity and the disposal method.	Hospital area especially in COVID ward during operation period	DMCH	DGHS
Medical Waste Management	• Poor management of medical waste exposes healthcare workers, waste handlers and the community to infections, toxic effects and injuries. • Soil, water and air pollution from the improper management of wastes generated from the facility.	• Provision of color coded, covered receptacles in strategic positions of the facility for separate categories of waste and regular cleaning of waste bins. Labels showing the type of waste that should be disposed of in each container should be placed near to the bins to guide staff and reinforce good habits. • Medical wastes generated in the hospital will be treated by in-house facility and then these treated wastes will be disposed of as per a pre-determined SOP in accordance with international good practices. Transport the medical waste with covered vehicle. The records of waste disposal will be maintained as proof for proper management as designed. • Ensure necessary PPE (gown, gloves, face mask, goggles or face shield, gumboots) is provided to all staffs, as required and ensure them to wear PPE when handling and disposing waste according to national and WHO guideline. • Do not burn the wastes openly or throw in to water bodies or do not dispose on soil. • Audit for any off-site waste disposal will be required on a monthly basis and institute any remedial measures required to ensure compliance.	• Visual inspection and consultation with hospital staff and cleaners. • Record of waste type and quantity and the disposal method.	Hospital area during operation period	DMCH	DGHS
Occupational Health and Safety including	• Needle-sticks, surgical cuts, and other injuries posing transmission risk of blood-borne diseases such	• Prepare a health and safety guidance for COVID-19 and strictly follow the guidance at the facility. • Refer to IFC EHS Guidelines for Healthcare Facilities (2007) and relevant	• Regular inspection and testing of all safety features and	Hospital area during operation period	DMCH	DGHS

IEC	Potential Impact	Mitigation Measures	Monitoring Method		Responsibility	
			Method of Collecting and Reporting Data	Location and Frequency	Implementation	Supervision
COVID H&S	as COVID-19, Hepatitis C, HIV-AIDS, etc. • Dermatitis and allergic reactions due to workplace exposures.	national guidelines and protocols. • Implement suitable safety standards for all workers and facility visitors. • Mandatory use of personal protective equipment and safety gears, where required. • Arrangements for safe drinking water and sanitation facilities. • Provide regular OHS training to healthcare workers. • Provide incentives to staff and create a work-life balance in work schedule.	hazard control measures and personal protective features			
Accidental Releases of Gas and Fluids	• Leakage of infectious or hazardous substances may pose serious health hazards and can spread the contagion among hospital staff and patients, cleaners etc.	• Develop an Emergency Response Plan and follow strictly during emergency incident. • Emergency preparedness and response procedures and equipment (warning signs, fire extinguishers, fire exit etc.). • Wear disposable gloves and, if aerosols are formed, glasses and a respirator for particles. • Cover the contaminated area with a disinfectant in a concentric way, starting at the edge and progressing towards the center of the contamination. • Avoid spraying or pouring the disinfectant from above, which can cause aerosols. • Mop up, and dispose of all waste and contaminated material in the appropriate container (infectious waste). • Conduct monthly safety audit of facility to identify fire risks, electrocution hazards and other unsafe conditions, and assess adequacy of fire extinguishers and first aid provisions.	• Record of regular inspection.	Hospital area during operation period	DMCH	DGHS

Table 2: Cost Estimation for EMP Implementation

Mitigation and Monitoring Items	Unit	Total Unit	Cost/Unit	Total Cost
1. Workers Health and Safety				
Safety Vest	nos	10	270	2,700.00
Helmet	nos	10	350	3,500.00
Safety shoes	nos	10	430	4,300.00
Safety Goggles	nos	10	280	2,800.00
Hand Sanitizer (5 Liter)	nos	2	2600	5,200.00
One time Face Mask	box	2	500	1,000.00
Thermometer for measuring body temperature	no	1	1000	1,000.00
Fire extinguisher	nos	2	1299	2,598.00
First Aid Box	no	1	2500	2,500.00
Sub-total excluding over-head profit & VAT =				25,598.00
Sub-total Including over-head & profit =				29,053.73
Add VAT with adjustment factor (VAT-7.5% & Factor-1.08108)				2,355.68
Total for item 1 including over-head, profit and VAT =				31,409.41
2. Engineers Health and Safety				
Safety Vest	nos	3	270	810.00
Helmet	nos	3	350	1,050.00
Safety shoes	nos	3	1000	3,000.00
Safety Goggles	nos	3	500	1,500.00
Hand Sanitizer (5 Liter)	nos	1	2600	2,600.00
One time Face Mask	box	1	500	500.00
Thermometer for measuring body temperature	nos	1	1000	1,000.00
First Aid Box	nos	1	2500	2,500.00
Sub-total excluding over-head, profit & VAT =				12,960.00
Sub-total including over-head & profit =				14,709.60
Add VAT with adjustment factor (VAT-7.5% & Factor-1.08108)				1,192.65
Total for item 2 including over-head, profit and VAT =				15,902.25
3.Training on Occupational Health and Safety, and COVID-19 Safety Protocol				
Train on correct use and disposal of personal protective equipment (PPE)	nos	1	10000	10,000.00
Sub-total excluding over-head, profit & VAT =				10,000.00
Sub-total Including over-head & profit =				11,350.00
Add VAT with adjustment factor (VAT-7.5% & Factor-1.08108)				920.26
Total for item 3 including over-head, profit and VAT =				12,270.26
4. Water, Sanitation and Waste Disposal/Management				
Supply of color-coded waste bins/pots for different wastes	nos	2	2400	4,800.00
Sub-total excluding over-head, profit & VAT =				4,800.00
Sub-total Including over-head & profit=				5,448.00
Add VAT with adjustment factor (VAT-7.5% & Factor-1.08108)				441.72
Total for item 4 including over-head, profit and VAT =				5,889.72
			Grand Total =	65,471.64
Note: Considering Over-head 3.5%, Profit - 10%, VAT 7.5% (adjustment factor 1.08108)				

APPENDIX-1: LAYOUT PLAN OF SUBPROJECT COMPONENTS



APPENDIX-2: SAMPLE MEDICAL WASTE MANAGEMENT PLAN

OBJECTIVE

Medical Waste which is also referred as clinical waste has to be handled and disposed in a proper manner to eliminate the possibility of injury or infection and safeguarding the environment as a whole. The impacts associated with improper Medical Waste Management (MWM) can damage the environment and affect public heath directly and indirectly.

Medical wastes contain both general wastes (app. 75-80%) and infectious wastes (app. 20-25%). Medical Waste constitutes a public health hazard, if not managed properly. Although majority of the medical waste is no more dangerous than household/municipal waste, the hazardous waste, if exposed to the people or environment in an untreated form, pose various kinds of danger.

The main objective of the Medical Waste Management Plan (MWMP) is to organize disposal of all wastes generated during construction in an environmentally acceptable manner specially consider the following:

- Health hazards of the project personnel as well as community people should not be occurred;
- Manage the wastes in such a way that environment (specially air, water, surrounding environment etc.) will not be polluted;
- Odor means bad smell should not be generated;
- Always friendly environment at the construction sites and construction camps;
- Any waste should not be disposed into the river and any water bodies to avoid water pollution;
- Any waste should not be burnt

STRATEGIES FOR MEDICAL WASTE MANAGEMENT

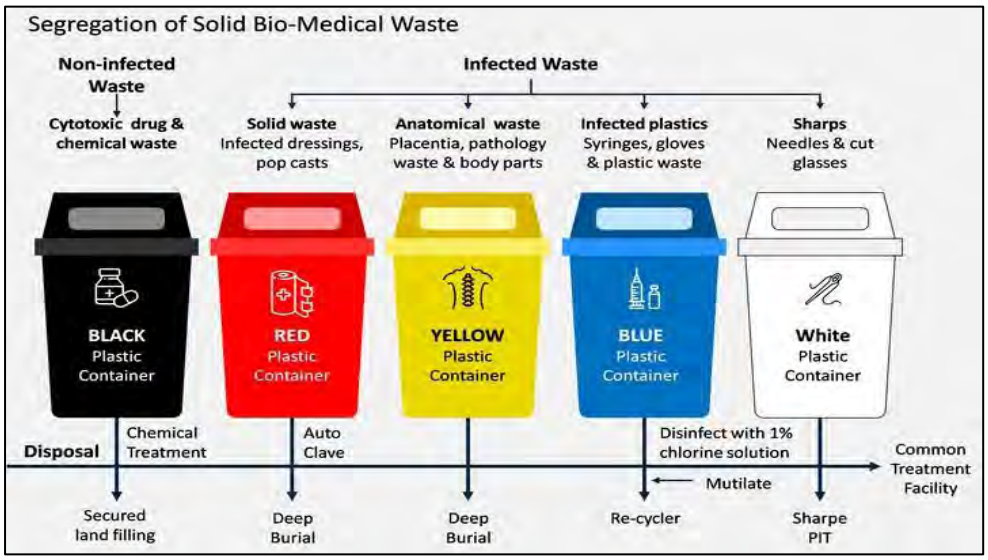
The major components of medical waste management include:

- Proper waste collection and segregation at source – use of standardized color-coded bins for different wastes;
- Waste streams - general, contaminated, cytotoxic/pharmaceuticals, body parts;
- Storage and transport - cold storage for contaminated waste and body parts, transport in safe and leak proof containers;
- Waste treatment – sterilization of contaminated waste (steam autoclave), incineration of cytotoxics, pharmaceuticals and body parts in incinerator meeting relevant standards and statues.

To perform a Medical Waste Management, several stages, need to be followed.

Stage 1: Collecting & Segregating

The biomedical waste has to be collected in containers that are resilient and strong from breakage during the handling process. Do not place sharps, used needles, syringes, or other contaminated tools in common waste disposal or recycle bin because the entire waste will be infectious by doing so. The segregation also needs to be performed between the liquid and solid biomedical waste products. Categorizing the medical waste with correct segregation to isolate and manage each waste in the proper way. For this purpose, the segregations come in colored waste containers, label coding and plastic bags. The simplest way to identify the different types of waste is to collect the various types of waste in separate containers or plastic bags that are color-coded and/or marked with a symbol.



Stage 2: Storing & Transporting

Specific requirements for storage facilities, such as a secure area that is inaccessible to the general public, as well as separated it from areas for food consumption. The storage facilities also have to be accompanied with refrigerator or freezer unit that can be used with medical waste if necessary. Some facilities even provided special vehicles and protective devices to dispose, handling or transport the biomedical waste products. Remember to observe and keep maintaining the protective devices periodically so it won't be a source of transmitting the infections. Further recommendations should be followed by the ancillary workers in charge of waste collection:

- Wastes should be collected daily or as frequently as required and transported to the designated central treatment site.
- No bags should be removed unless they are labeled with their point of production (hospital and ward or department) and contents.
- The bags or containers should be replaced immediately with new ones of the same type.
- Special packaging requirements for off-site transport in general, the waste should be packaged according to the recommendations provided in sealed bags or containers to prevent spilling during handling and transportation. The bags or containers should be appropriately robust for their content (puncture-proof for sharps, for example, or resistant to aggressive chemicals). Bags and containers must be closed whenever they are two-thirds full. Never pile bags or empty them; grasp them from the top (never hold them against the body) and wear gloves.
- All waste bags or containers should be labeled with basic information on their content and on the waste producer. This information may be written directly on the bag or container or on preprinted labels, securely attached. For health care wastes, the following additional information should be marked on the label: waste category, date of collection and place in hospital where produced (e.g., ward) and waste destination.

Stage 3: Treatment of Medical Waste

Incineration at high temperatures (over 1000°C) is one of the few technologies with which all types of health-care waste can be treated properly and it has the advantage of significantly reducing the volume and weight of the wastes treated. There are simple incinerator models for treating small quantities of medical waste. Some are available on the market, and others have to be built with local materials on the spot according to relatively simple plans. These incinerators consist essentially of one or two combustion chambers (the primary and secondary chambers) and a discharge chimney. The combustion and air-borne emission control system is simple. If infectious medical waste is treated in small single-chamber or dual-chamber incinerators on site, fractions of waste such as drugs, chemicals, halogenated materials or wastes with high heavy metal content (such as batteries, broken thermometers, etc.) must not be treated in this type of facility.

Autoclaving is a thermal process at low temperatures where waste is subjected to pressurized saturated steam for a sufficient length of time to be disinfected (60 minutes at 121°C and 1 bar). Where prions (which cause Creutzfeldt- Jacob's disease) are present, a cycle of 60 minutes at 134°C is recommended, since they are exceptionally resistant. Efficiency tests (biological or thermal) must in any case be carried out regularly. Autoclaving is environmentally safe but, in most cases, it requires electricity, which is why in some regions it is not always suitable for treating wastes small autoclaves are frequently used for sterilizing medical equipment, but the models used for treating healthcare wastes can involve relatively complex and expensive plants (with internal mixing, shredding and drying systems) requiring meticulous design, proper sorting and a high level of operating support and maintenance. Furthermore, the effluents must be disposed of carefully and properly monitored. And lastly, large autoclaves may require a boiler that generates several types of emissions, which have to be monitored. Once wastes have been processed in an autoclave, they are no longer infectious materials: they can be land filled with municipal refuse. Autoclaving is often used for pre-treating highly infectious waste before it is transported outside the hospital. This thermal process needs electricity and high installation cost.

Microwaving is another emerging technology to treat bio-hazardous waste, including material from healthcare facilities. Use of radiation to heat materials and destroy pathogens, can be combined with shredding to make material safe for disposal without modification. In microwave systems, disinfection occurs through the action of moisture and low heat. Microwave units usually operate at a frequency of 2450 MHz and the energy generates hot water and steam. It can be installed indoor with solid floor and require large electricity supply. It has the advantage of significantly reducing the volume and weight of the wastes treated up to 60-80% where autoclave can reduce to 50%.

Stage 4: Disposal of Medical Waste

Disposal in a sanitary landfill or waste burial pit: The disposal of untreated health-care waste in an uncontrolled dump is not recommended and must only be used as a last resort. It can be disposed of in a sanitary landfill, subject to certain precautions: it is important that health-care waste be covered rapidly. One technique is to dig a trench down to the level where old municipal refuse (over three months old) has been buried and to immediately bury health-care waste that is discarded at this level under a 2-metre layer of fresh municipal refuse. The following are the essential factors that must be taken into consideration in the design and use of a sanitary landfill

- access must be restricted and controlled;
- competent staff must be available;
- the discarding areas must be planned;
- the bottom of the landfill must be waterproofed;
- the water table must be more than 2 meters below the bottom of the landfill;
- there must be no drinking water sources or wells in the vicinity of the site;
- chemicals must not be disposed of on these sites;
- the waste must be covered daily and vectors (insects, rodents, etc.) must be controlled;
- the landfill must be equipped with a final cover to prevent rainwater infiltration; lichgates must be collected and treated.

Purpose-built burial pit could also be used, preferably on the hospital site. Ideally, the pit should be lined with low permeability material such as clay to prevent the pollution of shallow groundwater and should be fenced in so as to prevent scavenger access. Health-care wastes must be buried immediately under a layer of soil after each unloading operation. It is suggested that lime be spread on the waste for added health protection (in the event of an epidemic, for example) or to eliminate odor. The pit should be sealed once it has been filled.

Disposal of liquid wastes in the sewage: There are two recommended ways to handle medical waste fluids: i. Collect fluids in a leak proof container, and solidified for autoclave treatment; ii. Thermally (autoclave) fluids then they are disposed into the sanitary sewer system. An extra precaution should be performed before pouring treated fluids in sewer because they may clog and leak.

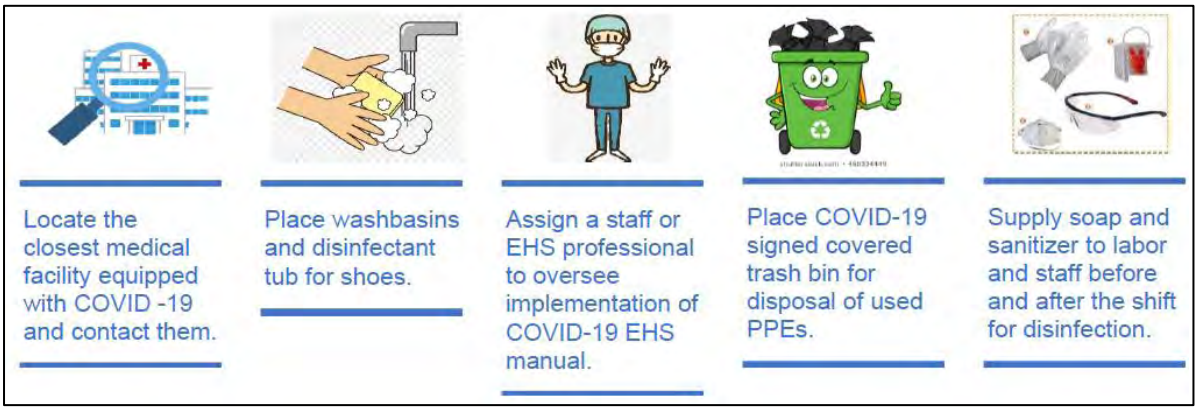
Spill contingency plan: Surfaces contaminated with spilled or leaked biomedical waste must be decontaminated with a solution of industrial strength detergent to remove visible soil before being disinfected by one of the following methods:

- Steam for a minimum of 30 seconds.
- Rinse for at least three (03) minutes with a hypochlorite solution containing 100 parts per million (ppm) available free chlorine (note: one tablespoon per two (02) gallons of water is approximately 100 ppm available free chlorine), or rinse for at least three (3) minutes with an iodine solution containing 25 ppm available iodine.
- Use a chemical germicide that is registered by the Environmental Protection Agency (EPA) as a hospital disinfectant, following recommended dilutions and directions. Liquid waste created by these chemical disinfecting operations shall be disposed of into the sanitary sewage system.
- Employee's cleaning spills of biomedical waste must wear appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection. Spills should be reported to the respective Health and Safety Officer.

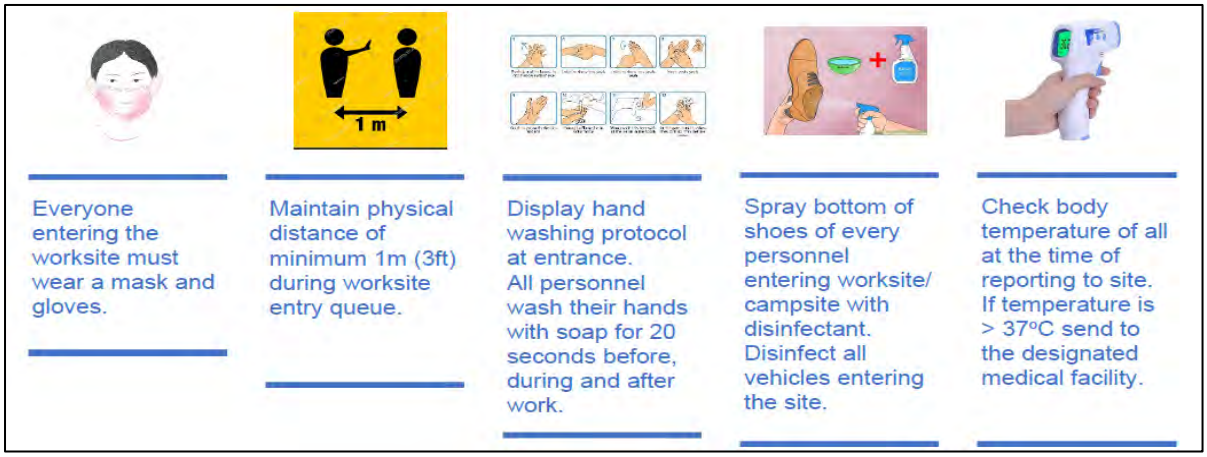
APPENDIX-3: COVID HEALTH AND SAFETY PLAN FOR THE CONSTRUCTION WORK

The contractors shall at all times be responsible to take all reasonable precautions to maintain the health and safety of personnel and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. ADB prepared a COVID-19 Health and Safety Advisory Guidance for Construction Workforce, which may be further updated as the COVID-19 situation evolves. The ADB guidance includes the protocols on the following:

A. Prerequisites for Reopening Worksite: Plan to open/reopen worksite at limited scale (i.e. only essential works at worksite). Map essential/unavoidable works that must be attended at this moment. Identify and engage essential labor force initially. Increase labor force step by step as necessary. Do not engage labor until: i. Conduct risk assessment of worksite and prepare plan as per H&S guideline; ii. Avoid labor intensive works as much as possible; iii. Ensure all to use the Personal Protective Equipment (PPE) as appropriate; iv. Engage health and safety supervisor to implement COVID-19 guideline; v. Engage health worker for daily temperature check and record for workers; vi. Ensure all equipment and vehicles used are routinely disinfected; vii. Provide thermometer, soap, sanitizer, disinfectant, PPE at worksite/camp; viii. Place adequate washbasins, disinfectant tub, dispenser for sanitizer; ix. Engage contractor's EHS staff or assign an existing staff to handle COVID-19 in case if detected; x. Post enough COVID-19 awareness posters throughout the worksites; and xi. Maintain COVID-19 weekly monitoring and reporting mechanism at worksite; including any necessary actions to be taken.



B. Worksite Entrance Protocol: Everyone entering the worksite must wear a mask, gloves and hard shoes. Strictly follow and implement the EHS manual at worksite. The entrance of the worksite/camp site every personnel must wash their hands for 20 second with maintaining a distance of at least 1m (3 ft) from each other.



C. Worksite Management Protocol: A designated EHS and medical person should stay all time during work. The EHS/Medical person should also monitor campsite. He/she will be in charge of ensuring physical distances (minimum 1m) among workers, disinfecting surfaces that are commonly used and investigate worker's/site personnel health and safety.

Ensure physical distance 1m (3ft) all the time at work.
Ensure rotated schedule for break to minimize gathering.

Frequently clean and disinfect highly used tools, machineries, and surfaces (e.g. tables, toilets) by workers.
Use designated trash bin to dispose used PPEs.

Mandatory morning briefing on COVID awareness at site maintaining physical distance.

Display COVID-19 related awareness message in Bangla.

Use alcohol-based wipe to clean tools, equipment, vehicle before and after use.

Discourage gathering at site.
Discourage unnecessary entrance and exit at site.

D. Camp Management Protocol:

1. Provide soap, sanitizer, washing facility and safe water at the workers' dwelling. Encourage frequent hand washing.
2. Ensure separate covered waste bin for disposal of used PPEs.
3. Protect against heat, cold, damp, noise, fire, and disease-carrying animals.
4. Maintain good housekeeping and social distancing in kitchens, meal rooms, canteens.
5. Ensure personal distance at least 1m (3ft) during lunch, dinner and prayer.
6. Ensure ample ventilation at the camp.

E. Work at Site Awareness: Train workers on how to properly put on, use/wear, and take off protective clothing and equipment. The on-site EHS/Medical person should be in-charge of these trainings. These trainings must maintain the WHO's social distancing protocol. Make these trainings mandatory at worksites. Provide 10-15 minutes of a workday for such 'training and encouragement' activities.

Inform the designated ESH/Medical personnel immediately if any person starts showing the symptoms of COVID-19.

Encourage respiratory etiquette, including covering coughs and sneezes. Don't touch nose/eye/ mouth if not washed recently, do not spit.

Encourage the workers at camp to go out for supplies not more than once a week.
Prepare posters for awareness in Bangla.
Place awareness raising posters at worksite & camp.

Shorten toolbox meetings.
Initiate remote meeting protocol to avoid physical contact.

Stay informed.
Get news from WHO and Government news outlets.
Ask your EA.
Ask ADB.

Contractor should develop a preparedness and response plan by following the ADB guideline to prevent COVID-19 infection in the workplace. The preparedness plan will be submitted to PMU for approval. In addition to the ADB guideline, the government's Technical Guidance for Social and Institutional Containment and Prevention of Pandemic COVID-19 Infection issued on 11 May 2020 has also to be complied with.