

SECTION 6

SCHEDULE REQUIREMENTS

**CW 301/B - Design and Build of the TESDA
Innovation Center with Rehabilitation Works,
RTIC, Tuguegarao, Cagayan Valley**

Section 6 - Employer's Requirements

This Section contains the Specifications, Drawings, Supplementary Information that describe the Works to be procured, Personnel Requirements, and Equipment Requirements.

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I. BACKGROUND AND OBJECTIVE

The Asian Development Bank has approved a \$100 million loan to the Government of the Philippines (GOP) to finance the Supporting Innovation in the Philippine Technical and Vocational Education and Training System (SIPTVETS) Project. The project will support the modernization of the Philippines' technical and vocational education and training (TVET) system, so that it can respond effectively to an increasingly globalized, technology- and knowledge-driven market. It will improve the quality of skilling programs, upgrade training facilities and equipment, and build the capacity of trainers to impart the higher-level skills and competencies demanded by the job market. The project will help the Technical Education and Skills Development Authority (TESDA), the Philippine TVET agency, to undertake institutional reforms and forge stronger engagement between public TVET institutions and industry, thereby enhancing the employability of Filipino youth and workers.

Impact, outcome, and outputs. The project is aligned with the following impacts: global competitiveness and readiness of the Filipino mid-level workforce strengthened, and TVET used more effectively as an instrument for social equity for workforce inclusion and poverty reduction.³ The project will have the following outcome: access to quality TVET programs and employability of TVET graduates improved. The project will achieve this outcome by supporting the following outputs: (i) The Philippines' skills development ecosystem modernized; (ii) TVET training made more demand-driven and industry-led; (iii) selected TESDA Technology Institutes (TTIs) upgraded and modernized into industry-responsive innovation centers; and (iv) TESDA's institutional capacity strengthened.

SIPTVETS' Regional TVET Innovation Center (RTIC). The project will upgrade and modernize 17 TTIs, selected based on demand- and supply-side considerations; and establish new RTICs within the premises of these 17 TTIs. The RTIC is a significant element of project (Output 3). It aims to address the challenges faced by the TVET sector in the Philippines by enhancing the quality, relevance, and accessibility of TVET programs. As focal areas for the RTIC to be able to achieve these goals, the following are important aspects of development for incorporation into the RTICs:

- (i) **Curriculum Development.** The RTIC collaborates with TVET institutions, industry partners, and experts to develop competency-based, industry-responsive curricula that meet the changing demands of the labor market. The curriculum would be of an "innovation" nature where participants work on helping industry innovate. TESDA has indicated such a program to start with their diploma programs and subsequently percolate to their other NC offerings. These innovation programs help RTIC participants engage with industry and help aligned them with the latest industry needs, trends, and technological advancements.
- (ii) **Trainer Training.** The RTIC supports the professional development of TVET trainers by offering training programs to enhance their pedagogical and technical skills. This enables trainers to deliver high-quality, up-to-date instruction to their students.
- (iii) **Industry Partnership Building.** Strong industry partnerships are crucial for the success of TVET programs. The RTIC works to establish and maintain collaborations between TVET institutions and industry stakeholders, facilitating a more seamless transition for graduates into the workforce.
- (iv) **Innovation Services.** The RTIC promotes innovation by providing a platform for TVET institutions, trainers, students, and industry partners to collaborate on research and development projects. This fosters a culture of innovation, ensuring that TVET programs keep pace with the rapid advancements in technology and industry practices. Such engagements may be initiated and supported by the planned innovation programs.
- (v) **Resource Center.** The RTIC functions as a resource center, providing access to a wide range of educational materials, tools, and equipment. The resources are for supporting innovation activities especially with industry.
- (vi) **Networking and Collaboration.** The RTIC encourages collaboration among TVET institutions, trainers, students, and industry partners through conferences, workshops, and other networking events. This

facilitates the sharing of best practices, experiences, and expertise, ultimately improving the overall quality of TVET in the Philippines.

II. PROJECT DESCRIPTION: CIVIL WORKS COMPONENT UNDER SIPTVETS

Under SIPTVETS, the Technical Education and Skills Development Authority (TESDA) proposes to **construct a new multi-storey building in Regional Training Center (RTC) – Tuguegarao, Cagayan**, with approximate total floor area ranging from **2,200.00-2,500.00square meters**, which shall be designed to meet the proposed requirements of the project and the operation of an RTIC. The building is expected to be structurally sound to have a long possible lifespan, able to withstand adverse weather conditions, have green and sustainable design and features, and architecturally attractive.

The civil works will also include **rehabilitation and renovation** of existing structures or buildings within the TTI or RTIC complex. The rehabilitation and renovation shall prioritize but not limited to the following: upgrading of electrical and auxiliary, fire safety/protection, utilities, structural integrity, improvement of air circulation or ventilation, roofing and ceiling works and refurbishing of exterior and interior finishes.

The project implementation shall adopt the **Design and Build Scheme** guidelines under the **Republic Act 9184 and its Implementing Rules and Regulations** and **ADB Policy on Civil Works**.

The title of the project is:

Design and Build of SIPTVETS-RTIC with Rehabilitation Works in RTC- Tuguegarao, Cagayan

The civil works will have two sub-components:

1. Detailed design and construction of a **new building** for the SIPTVETS-Regional TVET Innovation Center; and
2. Inspection, As-Built, Design for the **rehabilitation / renovation** of existing building/structures within the TTI/ RTIC complex

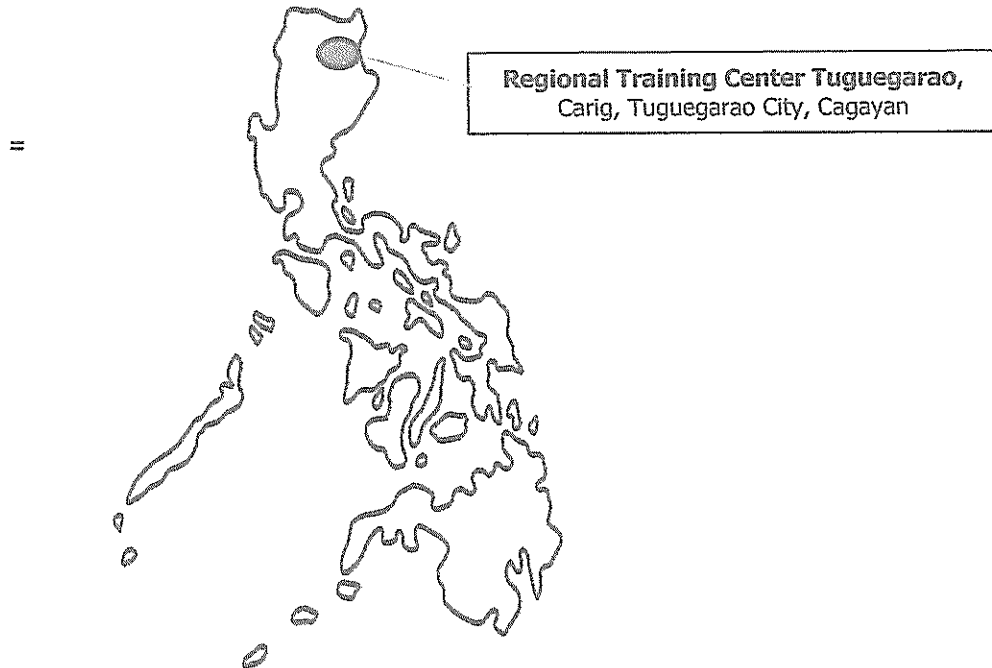
The work contemplated under this contract shall consist of code-compliant design. It shall be furnished with all approved materials, labor, tools, and equipment.

The **design and build contractor** shall ensure satisfactory performance of all work necessary to complete the new construction and rehabilitation/ renovation, **ready for use**, strictly conforms with the plans, the specifications, codes and LGU ordinances and other related contract documents.

III. PROJECT SITE

1. Location

The proposed new building and rehabilitation works will be at
Regional Training Center Tuguegarao, Tuguegarao City, Cagayan.



2. Preliminary Investigations

The contractor shall conduct the necessary investigations that will use as basis in the detailed design and rehabilitation/renovation works, to wit;

- a. Existing Boundaries
- b. Terrain, Line and Grade Survey
- c. Location and Orientation of Facilities, Utilities
- d. Soil and Geotechnical Report
- e. Hydrological
- f. Hydraulic
- g. Seismic
- h. Existing Environmental Conditions
- i. Other Hazards in close proximity to or within the local vicinity of the site.

IV. PROJECT DEFINITION

3. General Requirement

The contractor shall design and build a new **Multi-storey Innovation Center** that is responsive to the needs of the end users, satisfies the requirements for the operations of TESDA, increase the staff and student productivity and shall be aesthetically elegant.

The design and construction of the new building will adhere to the Philippines' national building code/s and integrate climate change resilience and green building features, e.g., type of construction and materials, building orientation, elevation, drainage, roofing system and windows.

It will also take into consideration climate factors such as the amount of rainfall, frequency and intensity of typhoon as well as wind and solar direction. In order to ensure sufficient natural light and ventilation to the building adequate setbacks on all sides will be met; owing to the necessity of providing vehicular access for material delivery the setbacks will be in excess of those required by the building by laws.

The contractor shall also inspect the existing structures/building around the TESDA site, provide the as-built plans, design and rehabilitate in accordance with the latest building codes and provisions to ensure the safety and comfort of the users.

The repair works of TESDA Technology Institutions (TTIs) cover improvement of dilapidated architectural members, major structural retrofitting or general rehabilitation works. Some TTIs include upgrading of existing water supply system, drainage and sewerage system to meet environmental, electrical and safety requirements.

The contractor is expected to provide all the necessary proposal to complete the design, ready for use, occupancy and complying with the latest Philippine Codes and Laws. **The conceptual plans and initial site survey should act as a guide only for further site verification and detailing.**

All Contractors *submitting* proposal for this project shall first examine the site, verify and investigate the existing conditions affecting the Work and submit proposed solutions of anticipated problems to the Employer, TESDA (Owner).

No claim for extra compensation by the Contractor shall be entertained by the Employer, TESDA (Owner) for negligence or inadvertence on the Contractor's part in obtaining all necessary and pertinent data from the site.

4. Minimum Space Requirements

See Section 6- ANNEX B (Space Matrix)

5. Design Concept

1.1 Pre-Design Stage, Updated Schematic Design Phase

- a. Site Inspection of Proposed Site for New Building and Areas to be Rehabilitated
- b. Consultation and securing of clearances from government agencies
- c. Survey, Soil Test, Geotechnical Report – all signed and sealed
- d. Survey of vegetation and tree cutting including all prerequisites for DENR Tree Cutting Permit (i.e. CNC / ECC)
- e. Confirmation of utility tapping points or outlets
- f. Survey of TTI facilities that will be rehabilitated / refurbished
- g. Traffic and access planning

- f. Survey of TTI facilities that will be rehabilitated / refurbished
- g. Traffic and access planning
- h. Capacity building on safeguards implementation and grievance redress

1.2 Site Development

Site development conceptual design shall be responsive to the natural environment, and infrastructure and land developments shall blend to the existing ecological built-in environment.

Site development shall include driveway pavements, perimeter lights, green and landscaping, storm drainage, loading and unloading bay, sidewalk. Vehicle and traffic flow should be considered in the design. Ornamental plants and trees shall be carefully selected for the landscaping and green designs.

1.3 Architectural Design Concept

Green designs and sustainable materials are the top advocacies in architectural practice, which shall be incorporated in this particular project. Proper building and spatial orientation, strategic building envelop designs, lighting and acoustics, and natural lighting and ventilation shall be considered in the designs.

Spatial allocations shall be in accordance to the minimum space requirements set by the procuring unit. Spatial designs shall conform to the operations and organizational set up of the procuring unit. Architectural interior shall include floor covering design, wall finishes, ceiling finishes, lighting, acoustic considerations and built-in furniture. Interior space should be conducive for working and shall enhance worker's productivity.

The building shall have a tempered glass façade design. The rooms' front wall partitions shall be glass with frameless glass door.

See schematic perspective, conceptual floor plans and material finishes for the pre-approved layout. (Section 6- ANNEX A, B, C & D)

The design and build contractor, with the written approval of the employer / TESDA and its representatives can improve and revise the initial conceptual plans to be code-compliant and due to actual or updated site investigation reports (surveys, soil test, etc.) but shall work within the approved and maximum project cost.

The intent of the Conceptual Plans and initial material specifications is to prescribe a guide and basis which the Contractor undertakes to do in full compliance with the Contract Documents.

The Contractor shall perform all items of work covered and stipulated in the Proposal, Specifications and on the Plan and do such special, additional, extra and incidental work as may be considered necessary without additional cost. The contractor shall furnish all equipment, labor, machinery, materials, tools, supplies, transportation and incidental expenses necessary to prosecute the work to completion, compliant to codes, complete with necessary permit and ready for use by the Employer, TESDA (Owner)

It is not intended that the conceptual plans/ drawings shall show every detail. All such items, whether mentioned or not in the Specifications, or shown or not in the Plans, shall be furnished and installed, if necessary, to complete the system, without extra cost to the End-User, in accordance with the best practice of the trade and especially as per manufacturer's instructions and specifications for installation.

Materials and Equipment deemed necessary to complete the works but not specifically mentioned in the Conceptual Plans, Initial Material Specifications or other Contract Documents shall be supplied and installed by the Contractor without extra cost to the

Materials and Equipment deemed necessary to complete the works but not specifically mentioned in the Conceptual Plans, Initial Material Specifications or other Contract Documents shall be supplied and installed by the Contractor without extra cost to the Owner. Such materials shall be of the highest quality available and installed or applied in a workmanlike manner at prescribed or appropriate locations.

1.4 Structural Design Concept

Structural design shall include foundation, columns and beams, roof framing, roof deck design, floor framing and slab, stairs and shear walls. Likewise, designer shall adopt conservative and economical design without compromising the safety factor and structural integrity. Conventional structural methodology shall be applied with the integration of contemporary approach for the conceptualization of structural design. Use at least 150mm and/or 200mm thick slabs to ensure the capacity for heavy live load and equipment load.

1.5 Electrical Design Concept

Electrical design shall include lighting design, power requirements, back-up power requirements, and power house/room. The use of power saving fixture is recommended. Also, electrical design should consider provisions for future expansions.

1.6 Mechanical Design Concept

Mechanical design shall include elevator/lift, fire protection and suppression system, pumps and motors, and air-conditioning. The use of power saving equipment is recommended. Elevator capacity should be considered and shall conform to the operations of the procuring unit. Elevator unit must be machine room less. Consider appropriate ventilation and temperature requirements especially for cold storage and processing/packaging rooms.

1.7 Information and Communication Technology (ICT) Design Concept

The proposed Innovation Center will be under TESDA that requires information and communications requirements. Information and communication technology design concept shall conform to the operations of the procuring unit and availability within the area/region.

1.8 Plumbing and Sanitary Design Concept

Plumbing and sanitary design concept shall include water and sanitary line, storm drainage system, septic tank design, sewage treatment plant (STP) system, rain water harvesting system and comfort room design. The use of low flow furniture and power saving equipment is recommended. Provisions for future expansion shall be considered.

Before proceeding with Architectural and Engineering conceptual/detailed design, the contractor should arrange a detailed kick-off meeting involving the employer, TESDA and its representatives or consultants in order to clarify and agree upon the design requirements and methodology keeping in mind the contract period, in coordination with other services and Architectural and Engineering design.

b. Design Life

Any new structure shall have a design life of at least fifty (50) years

V. GENERAL CODE AND STANDARDS

Install the work under this contract according to the requirements of the latest Philippine Codes, Laws and Ordinances. Nothing contained in these specifications or shown in the conceptual drawings shall be construed as to conflict with the national and local ordinances or laws governing the Installation of the Work. All such laws and ordinances are hereby made part of these Specifications. The Contractor is required to meet the requirements thereof.

The design, specifications, and methodology shall conform to, *but shall not be limited to the following standards* set by the:

- (i) National Building Code of the Philippines (NBCP), latest edition
- (ii) National Structural Code of the Philippines (NSCP), latest edition
 - With applicable US Standards:
 - American Institute of Steel Corporation (AISC), as applicable*
 - American Concrete Institute (ACI), as applicable*
 - American Iron and Steel Institute (AISI), as applicable*
 - American Welding Society (AWS), as applicable*
 - American Society for Testing and Materials (ASTM), as applicable*
- (iii) Fire Code of the Philippines (PD 1185), latest edition
- (iv) Philippine Electrical Code (RA 7920), latest edition
- (v) Philippine Mechanical Code, latest edition
- (vi) Revised National Plumbing Code of the Philippines (RA 1378), latest edition
- (vii) BP 344 or Accessibility Law and its Latest and Amended IRR
- (viii) Sanitation Code of the Philippines, latest edition
- (ix) Philippine Green Building Code, latest edition
- (x) Applicable National and Local Regulations and Ordinances,
- (xi) Republic Act 9184 and its Implementing Rules and Regulations
- (xii) R.A. No. 6716 about rainwater collection system.

VI. DETAILED DESIGN WORKS

1. General Conditions

The contractor is expected to provide all the necessary proposal to complete the design, ready for use, occupancy and complying with the latest Philippine Codes and Laws. The conceptual plans and initial site survey should act as a guide only for further site verification and detailing.

All Contractors submitting proposal for this project shall first examine the site, verify and investigate the existing conditions affecting the Work and submit proposed solutions of anticipated problems to the employer / TESDA (Owner) for approval at least one week ahead of the construction schedule.

No claim for extra compensation by the Contractor shall be entertained by the Employer, TESDA / Owner for negligence or inadvertence on the Contractor's part in obtaining all necessary and pertinent data from the site or from the Architect to supplement those on the Drawings.

The contractor must conduct site inspection to validate existing site conditions, environmental conditions, site survey, geotechnical conditions and other project data and information that is necessary for the project design definition and detailed design.

The contractor shall include the inspection and as-built for the design of the existing structures and buildings for rehabilitation and renovation.

The contractor must submit a Certification of Inspection duly signed by the employer and TESDA.

The contractor shall perform architectural design process based on the basic requirements provided by the procuring unit and gathered information based from the site survey and investigations.

The contractor has the responsibility in securing the construction permits such as building permit, excavation permit, fencing permit, occupancy permit, occupational construction safety and health permit and other permits including the fees necessary for the project.

The contractor shall comply with the local government and TESDA regulations with the regard to the project implementation.

The contractor is expected to provide all the necessary details and complete the design, ready for use, occupancy and complying with the latest Philippine Codes and Laws.

2. Site Investigation Reports, Surveys & Updated Schematic Design Phase

The Contractor shall submit to the employer /TESDA their Updated and Detailed Architectural Concept/s within **10 calendar days** upon receipt of Notice to Proceed but not necessarily limited to the following:

1. Site Reports - Surveys
2. Updated Site Development Plan
3. Rendered Exterior Perspectives (4 sides)
4. Updated Floor Plans (scaled, complete with dimensions)
5. Elevations
6. Rendered Cross and Longitudinal Sections
7. Rendered Interior Perspectives of the following:
 - a. Main Lobby of Main Building
 - b. Workshop Area
 - c. Incubation Rooms
 - d. Typical Meeting Rooms and Conference Rooms
 - e. Showcase/ Display Area
 - f. Typical Restroom
8. Aerial Perspective of Main Building
9. Tabulated Summary of Floor Area of the Proposed Project
10. Updated list of Materials, Door and Windows Schedule and Finishes
11. Outline Specifications for all trades
12. Design and Construction Methods
13. Value Engineering Analysis of Design and Construction Methods
14. Updated list of areas for rehabilitation/renovation of existing structures/building within TESDA complex, proposed scope of work
15. Initial Cost Estimate, Budgetary Estimate and Proposed Construction Schedule

3. Detailed Design

The contractor shall prepare and undertake the detailed architectural and engineering design within the government cost range and established preliminary design requirements.

The contractor must adhere to the applicable Design and Construction Codes of the Philippines, but not limited to the following:

- a. Architectural Design
- b. Floor Layout
- c. Civil and Engineering Design
- d. Structural Design
- e. Electrical Design
- f. Sanitary and Plumbing Design
- g. Geotechnical, Hydrological and Hydraulic Studies/Survey
- h. Mechanical Design
- i. Information Technology and Computer Network Cabling Design
- j. Fire Protection and Suppression Design
- k. Materials and Finishing Schedule

3.1 Architectural Design Works

The contractor shall have the responsibility to understand the operations and organizational structure of TESDA. Space allocations and arrangement shall conform to the operations and transaction flow of the TESDA.

Building façade design shall adopt modern contemporary design. Architectural design and finishes shall conform but not limited to the following:

- 1) Exterior wall and building envelop shall be a combination of concrete, pre-fabricated / pre-cast walls, masonry, glass, aluminum composite cladding and steel.
- 2) Partitions shall be preferably made of pre-fabrication / pre-cast concrete walls with acoustic and thermal insulation properties, as alternative to concrete hollow blocks (CHB), glass walls, dry-walls and acoustic engineered walls. Interior and exterior walls shall be auto-clave aerated concrete (AAC) panels.
- 3) Roof deck slab shall be plain concrete topping finish with specified waterproofing system. Torch membrane waterproofing is not recommended and allowed. For Two or Multiple Component Flexible, Cementitious waterproofing, provide concrete topping as additional layer. Direct and exposed is not recommended.
- 4) Use high pressure phenolic panels with hard plastic accessories and hardware for toilet and urinals with partitions.
- 5) Use acoustic ceiling panels for general office (meeting rooms) space area.
- 6) All furniture shall be modern and functional. Office furniture shall be design and installed based on the minimum requirements of the office space.
- 7) Acoustics and house lighting should be considered in studio rooms, meeting rooms and conference rooms.
- 8) Final Window and Door Locations to be determined after integration of Engineering design (column locations, utilities, etc.
- 9) Refer to proposed Material Specifications. (Section 6-ANNEX C)

- 9) Refer to proposed Material Specifications. (Section 6-ANNEX C)

3.2 Structural Design Works

The contractor shall perform structural design investigation and analyses and other structural design study for foundation, columns, beams, slabs, shear walls and other structural member of the project, in accordance with the National Structural Code of the Philippines and other prevailing codes. To consider the proposed number of occupants, equipment and use as prescribed in the space matrix and equipment list.

The contractor shall prepare structural design report and structural plans based from the design investigations and analyses. The following are the preliminary data to be used for the structural design analysis:

- ii. Preliminary Survey and Mapping
- iii. Soil Bearing Capacity
- iv. Utility Location
- v. Preliminary Noise Level Consideration Factors.

The prospective bidder shall perform necessary preliminary survey, investigations and analysis for the initial structural considerations, such as Soil Penetration Test (SPTT) and Analysis, Site Survey and Site Relocation Survey. These preliminary studies shall be the basis in the structural design for the project.

Construction methodology must ensure a monolithic structure for the stairwell walls which will entail a continuous and monolithic pour for all walls and slabs. Whenever possible, no construction joint shall be allowed on any part of the structure without the approval of the structural designer.

Time frame of construction shall be in an accelerated schedule for early occupancy. Admixtures shall be used to achieve high early strength of concrete and shall be subject to prior approval by designer, employer and TESDA. It shall be shown capable of maintaining essentially the same composition and performance throughout the work as the product used in establishing concrete proportions.

Concrete surface shall be free of defects and smooth finish ready for painting.

The prospective bidder has to investigate and analyze noise levels near the building (highway/neighborhood) in order to properly design insulation and acoustics for studios and production control rooms.

3.3 Mechanical Design Works

Mechanical design works shall include air-conditioning and ventilation system, fire protection and suppression system and machine room less elevator system.

3.3.1 Air-Conditioning and Ventilating System

The air-conditioning system requirement for the project shall be Variable Refrigerant Flow (VRF) direct-expansion inverter type system. ACU units shall be a combination of ceiling concealed type and wall type fan coil units. ACCU shall be located in an ACU ledge area or roof deck for maintenance.

Comfort rooms, pantries and active storage rooms, electrical, IT, mechanical and

of one outdoor unit with multiple indoor units. Indoor units can be controlled systematically and individually. Refrigerant capacity should be considered. All units are subject for testing and commissioning.

a. Fire Protection and Suppression System

Fire protection design shall include fire alarm system and smoke detection system. Fire suppression design includes automatic fire sprinkler system, fire hose cabinets, portable fire extinguisher, fire hydrant and fire department connection system. Fire protection and suppression system must be addressable type.

Fire protection and suppression system shall conform to the following standards. Whichever is more stringent and shall pass the local Bureau of Fire Protection plan review and inspection after construction and rehabilitation.

- a. ASHRAE Handbook
- b. NFPA 101 – Life Safety Code
- c. NFPA 10 – Portable Fire Extinguisher
- d. NFPA 14 – Standard for the Installation of Standpipe and Hose System
- e. Fire Code of the Philippines, latest edition.

Pump and motor system shall be incorporated in the design. It should accommodate the minimum requirements of the operation. All pumps, jockey and fire pumps should be UL listed and FM approved. Fire protection and suppression system is subject for testing and commissioning.

3.4 Sanitary and Plumbing Design Works

Sanitary and plumbing design shall conform to the following codes and standards. Whichever is more stringent and shall pass the plan review of the local Building Official / LGU.

- a. Revised National Plumbing Code of the Philippines
- b. Sanitation Code of the Philippines
- c. ASHRAE Handbook

The contractor shall design complete plumbing system including potable water line, sewer line, sanitary system, storm drain system including fixtures, piping system, fittings and appurtenances, equipment and machinery, facilities and other facility that is necessary for the project. The use of low-flow efficient fixtures and equipment is recommended. Technical drawings and specifications shall be clearly and properly defined.

Sanitary and plumbing design shall conform but not limited to the following:

- a. Sanitary waste shall be drained by gravity to the sewer line system
- b. All drainage and sewer line shall be concealed, unexposed and covered type system.
- c. Drainage plan shall be properly presented including flow, access hole distance, pipe and fitting sizes, invert elevations and other necessary information for the construction.
- d. Catch basin and culvert design shall be in accordance to the design requirements.
- e. Waste water from kitchen sink shall be provided with grease trap under the

- information for the construction.
- d. Catch basin and culvert design shall be in accordance to the design requirements.
- e. Waste water from kitchen sink shall be provided with grease trap under the sink.
- f. Septic vault shall be 3-chamber system.
- g. Storm drainage design shall be adequate.
- h. All fixtures shall be individually vented.
- i. Minimum slope for pipes shall be not lesser than 1 ½ %.
- j. All roof gutter drain shall be provided with strainer.
- k. Storm drainage system for floors above grade level shall be drained by gravity to the drainage line at ground level.
- l. Provide hose bib for site green areas, machine rooms, generator room, pump rooms, parking areas, and other utility rooms which requires water supply.
- m. Water tank / cistern shall be water proofed, subject for leak testing and disinfected.
- n. Booster pump and pressure tank, if any, shall be provided to meet the required minimum pressure.
- o. Operating pressure of fixtures shall be considered.
- p. Occupant water demand as per code requirement.
- q. Provide water pressure gauge per floor.
- r. Provide isolation gate valve per floor.
- s. Group fixtures shall be provided with isolation gate valve. The design shall be on the basis of the source and volume of water supply, water consumption, piping network, and conveyance in accordance with the applicable laws, rules and regulations governing health, safety and sanitation.
- t. Water storage tank and cistern shall be designed to accommodate fire and domestic uses where the number and size shall be supported with design computations.
- u. Issuance of water potability.

3.5 Electrical Design Works

The electrical design shall conform to the minimum requirements of the Philippine Electrical Code, Green Building Code and Fire Code of the Philippines. Whichever is more stringent and shall pass the plan review of the local Building Official. The contractor shall design lighting and power systems including but not limited to the following:

- a. General Lighting
- b. Convenience Outlet
- c. Grounding System
- d. Lightning Arrester
- e. Generator Set and enclosure
- f. Circuits and Breakers
- g. Power Supply System
- h. Back-up Power System
- i. Other facilities and equipment that are necessary for the project

The use of energy efficient and energy saving lights are mandatory (i.e., *Occupancy Sensors*), Power outlets strategically located for easy access and convenience based on the proposed furniture layout. Electrical load design should consider future expansion of the operation.

lighting for each room and corridors. Provide a lighted fire exit sign for stairs and fire exit doors.

3.6 Information and Communication Technology (IT) Design Works

IT design for this project shall conform to the minimum requirements of TESDA for its operations and performance. The design shall include IT communication system, internet/data system, Wi-Fi, CCTV and monitoring system, audio and video operation system and internal IT operations.

Basic IT requirements shall be incorporated to the design. The CCTV, Air- conditioning, fire protection and suppression, RFIDs or Security Access and smoke detection system shall be incorporated in the IT system.

The Contractor shall provide communication systems to meet the operation and maintenance needs of TESDA, including but not limited to the following subsystems:

- i. Communication Lines;
- ii. Transmission System;
- iii. Data Communication Network System;
- iv. Telephone switching System ;
- v. Mobile Communication System ;
- vi. Wired Dispatching Communication System;
- vii. Video Conferencing System;
- viii. Private Emergency Communication System;
- ix. Clock Synchronization and Time Synchronization System;
- x. Power Supply Equipment system;
- xi. Power Supply and Equipment Room Environment Monitoring;
- xii. Equipment Lightning Protection and Earthing;
- xiii. Integrated Network Management system.

The contractor shall take full responsibility for design, supply, factory testing, installation, testing and commissioning, training, defects and liabilities for the communication system.

The Contractor shall provide all necessary equipment, wiring and cabling as required to fit each sub-systems as part of the communication scope.

3.7 Employer's Responsibilities

The Employer will help the Bidder in:

- a) Facilitate in site for labor huts, temporary facility area for the contractor's labor,
- b) Facilitate in free access to materials and labor to the site of work,
- c) Facilitate in temporary utilities connection for execution of work. Payment of all charges which shall be the responsibility by the Contractor/Bidder.
- d) Assist on the application and permission from local offices etc. Contractor to facilitate, process and secure payment/ approval.

3.8 Environmental, Health and Safety Management Plan (EHSMP)

The Bidder shall follow guidelines related to the fight against COVID-19 issued by the Inter-Agency Task Force, DPWH, City/Municipal Government, and other offices, agencies, and departments of the Republic of the Philippines.

The Bidder shall address environmental and rehabilitation requirements and ensure that he is accountable for preventing or mitigating any environmental impacts. The Employer/ TESDA

departments of the Republic of the Philippines.

The Bidder shall address environmental and rehabilitation requirements and ensure that he is accountable for preventing or mitigating any environmental impacts. The Employer/ TESDA shall communicate the required measures from time to time through an **Environmental, Health and Safety Management Plan (EHSMP)** attached with the bid document.

Upon finalization of detailed design, a detailed EHSMP would be prepared prior to the commencement of civil works and suitable variation order would be issued to accommodate this. These plans would indicate the details as to how various measures are proposed to be taken, and the cost of such measures which shall be treated as an integral component of the project cost.

The following environmental aspects should be taken into account at various stages of the projects.

Liquid Effluents

- a) Effluents should be treated well to the standards as prescribed by the Central/State Water Pollution Control Boards.
- b) Soil permeability studies should be made prior to effluents being discharged and steps taken to prevent percolation and ground water contamination.
- c) Deep well burial of toxic effluents should not be resorted to as it can result in re-surfacing and ground water contamination. Conservation and re-use of water must be implemented.
- d) Effective management of storm water quantity and quality during construction to avoid erosion and contamination of water bodies.

Air Pollution

- a) The emission levels of pollutants should conform to the pollution control standards and adequate control equipment should be installed for minimizing emission.
- b) Dusty areas, building material stacks will be sprayed with water, particularly during hot, windy weather
- c) Combustion engine vehicles must have official valid emission certifications

Solid Wastes

- a) The site for waste disposal should be checked to verify permeability so that leachates do not percolate into the ground water or water bodies.
- b) Waste materials such as packaging etc shall be removed by truck (covered and/ or watered) to local official municipal disposal site

Noise and Vibration

- a) Adequate measures should be taken for control of noise and vibration so that it remains under permissible limit.

Occupational Safety and Health

- a) Proper precautionary measures for adopting occupational safety and health standards should be taken.
- b) Proper house-keeping and cleanliness should be maintained.
- c) Workers will be required to wear filter masks and eye protection, and earmuffs wherever necessary.

Transport Systems

- a) Proper parking places should be provided for the trucks and other vehicles by the industries to avoid any congestion or blocking of roads.
- b) Care has to be taken to avoid spillage of chemicals or substances on roads or inside the site. Proper road safety signs both inside and outside the plant should be displayed for avoiding road accident.

- b) Steep slopes will have minimal clearance of vegetation and replanted as a priority.

Disaster Planning

Disaster planning should be done to meet any emergency situation arising due to fire, explosion, sudden leakage of gas etc. Firefighting equipment and other safety appliances should be kept ready for use during such emergencies. The contractor must also have proper facility for first aid and should have tie-up with hospital in case of emergencies.

DECLARATION OF COMMITMENT TO EHSMP

I agree to ensure that:

- a) All site and environmental protection measures outlined within the Employer's approved EHSMP will be adhered to.
- b) All site rehabilitation and revegetation works will be undertaken in accordance with the approved EHSMP.
- c) Prior to construction personnel commencing work, I will ensure that Equipment/Plant will be serviced off-site and that all equipment will be cleaned and free of vegetation, soil and seed prior to being brought on to the site.
- d) Approval from the Project Manager will be obtained prior to any out-of-hours work occurring. Written notification will be provided to local residents when out-of-hours work is occurring.
- e) Provision of new service connections and upgrading of existing services will be undertaken in a timely manner with minimal on-site and off-site impacts and with prior approval of the services providers.

Signature of Bidder

3.9 Green Building Concepts

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This principle shall be applied during the design stage of buildings and sites. Sustainable development is simply the design of buildings and sites using sustainable materials and systems, which do not deplete the earth's natural resources, are renewable, usually recyclable, easily maintained and long-lasting or those that continue to capably function during the entire life-cycle of a building.

Energy Efficiency

The minimization of energy consumption shall be incorporated in the buildings' electrical design.

The following are methods that shall be incorporated in the design. Furthermore, the contractor is encouraged to introduce more alternative and creative ways to achieve energy efficiency.

Passive cooling techniques – Prevent heat gain of interior and exterior spaces to reduce mechanical cooling loads, by proper orientation of building, material specifications, use of sun shading devices (louvers), green roofs and others. Induce sufficient airflow to public areas and spaces that do not require mechanical cooling (lobbies, corridors, etc.)

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Daylighting techniques – Reliance on daylight to achieve ideal lighting conditions for spaces at daytime. Maximize window openings and minimize lighting fixtures. Provide proper switching layout and locations of fixtures to reduce electrical load. Specify lighting fixtures with energy-saving features.

Solar Panels – alternative power source, to be placed at roof decks. Solar energy will be harnessed by the building by installing panels on the roof. A maximum capacity of 25 kW can be generated, which will be used for lighting the building and perimeter. Adequate access from the second/third floor to the roof area will be provided to allow the maintenance of solar panels and the roofing system. Rainwater harvesting shall also be done through collection tanks, and after filtration shall be used for irrigation and flushing.

Water Conservation

The minimization of water consumption shall be incorporated in the buildings' mechanical design.

The following are methods that shall be incorporated in the design. Furthermore, the contractor is encouraged to introduce more alternative and creative ways to reduce water consumption.

Waste water recycling – Re-use wastewater from lavatories and kitchen sinks as gray water for flushing and watering of plants.

Efficient toilet fixtures – Specify toilet fixtures (water closets, urinals, faucets, shower fixtures, etc.) that consumes less water than conventional standards.

Rainwater collection – Encourage the collection of rainwater at cisterns for non-potable consumption of water such as flushing and watering of plants.

Resilient greenery – Specify hardy plants for the site development that requires minimal watering and maintenance.

Green Building Materials

As much as possible, green-building materials shall be specified in the design. Green-building materials are environmentally responsible materials whose minimal impacts are considered over the life of the product. Green building materials have the following desirable qualities.

- Containing recycled content
- Raw materials from natural, renewable and plentiful sources
- Recyclable and reusable including its packaging material
- Durable and does not require frequent replacement or reapplication
- Efficiently manufactured in terms of energy, water and by-products
- Non-toxic to its intended users and in its manufacturing and construction process
- Locally available or requires only a short distance for procurement

3.10

Materials & Equipment Approval

All materials, finishes and equipment to be installed shall be upon the approval of the employer, TESDA (Owner) and its representatives via **Request for Approval (RFA)**.

These shall conform to the latest standards. The contractor is hereby required to submit **2-3 actual samples, quotations with brands, specifications and brochures** attached to the RFA.

3.11 Permits, Clearance, Certificates and Fees

The contractor has the responsibility to process, apply, pay and secure necessary construction and operation permits and fees as required by the authorities for the preparation, implementation, completion and occupation of the project.

Permits and Fees to be processed and secured by the contractor, but are not limited to the following:

- a. Barangay Clearance
- b. Zoning, Locational Clearance, including necessary surveys
- c. Civil Aviation Authority of the Philippines (CAAP) Permit
- d. Building Permit Set, Fencing Permit, Signage Permit
- e. Fire Safety Evaluation Clearance & Inspection/s
- f. Excavation, Ground Preparation Permit
- g. Certificate of Final Electrical Inspection
- h. DENR Certificate of Non-Coverage (CNC) or Environmental Compliance Certificate (ECC); Tree Cutting Permit
- i. Occupancy Permit
- j. Contractor's Tax
- k. Fire Inspection
- l. Mechanical, including Elevator Permit
- m. Fire Inspection
- n. Green Building Certificate/s
- o. Temporary and Permanent Power Connection (Service Provider)
- p. Temporary and Permanent Water & Sewer Connection (Service Provider)
- q. Other necessary permits and fees, testing and commissioning

Minimum Required Construction Plans / Drawings

I. SURVEYS AND SITE INVESTIGATION (Site Verification)

A. Surveys and investigations of the site for the new Innovation Centers includes boundaries of the property, elevations, existing trees and vegetation, contours (at 0.50m interval) – Relocation / Lot Plan - signed and sealed for Building Permit

B. Soil tests, Geotechnical Report – Signed and Sealed for Building Permit

C. Actual Site Verification - Location, As-Built- dimension, floor elevations and other pertinent data on existing buildings and improvements (roads, parking areas, mature trees) and existing utility lines (e.g. water, power, telephone, internet, drainage, sewer, etc.).

II. UPDATED SCHEMATIC DESIGN PHASE

1. Updated Site Development Plan
2. Rendered Exterior Perspectives (4 sides)
3. Updated Floor Plans (scaled, complete with dimensions)
4. Elevations
5. Rendered Cross and Longitudinal Sections
6. Rendered Interior Perspectives of the following:
 - a. Main Lobby of Main Building
 - b. Workshop Area
 - c. Incubation Rooms
 - d. Typical Meeting Rooms and Conference Rooms
 - e. Showcase/ Display Area
 - f. Typical Restroom
7. Aerial Perspective of Main Building
8. Tabulated Summary of Floor Area of the Proposed Project
9. Updated list of Materials, Door and Windows Schedule and Finishes
10. Outline Specifications for all trades
11. Design and Construction Methods
12. Value Engineering Analysis of Design and Construction Methods
13. Updated list of select areas for rehabilitation/renovation of existing structures/building within TESDA complex, proposed scope of work
14. Initial Cost Estimate, Budgetary Estimate
15. Soft Copy (CAD 2013 version and Sketch Up File 2017 version),JPG/PNG file for perspectives
16. Hard Copy (A3 sheets)

III. BUILDING PERMIT PLANS (CONSTRUCTION DRAWINGS)

Scaled - 24" x 36" Signed and Sealed Plans (10 sets blueprint/white print)

Minimum 1:100 scale for Architectural plans

Other details/scale - follow standard scale for permit application

AutoCAD/ DWG files (scaled, minimum version 2013)

A. ARCHITECTURAL DESIGN

- 1 Front Page
- 2 Site Development Plan
- 3 Floor Plans
- 4 Roof Plan / Roof Deck Plan
- 5 Elevations
- 6 Sections
- 7 Bay Sections

- 9 Wall Elevations
- 10 Doors and Windows Schedule (Exterior)
- 11 Schedule of Finishes (Exterior)
- 12 Toilet Details
- 13 Stairs Details
- 14 Railing Details
- 15 Miscellaneous Details
- 16 Technical Specifications

B. ARCHITECTURAL INTERIORS / INTERIOR DESIGN

- 1 Proposed Furniture Layout or Floor Plan
- 2 Floor Pattern and Wall Finishes Plan
- 3 Reflected Ceiling Plan (Interior)
- 4 Wall Elevations
- 5 Section Details (For Accent Walls)
- 6 Built-in Furniture Details
- 7 Toilet Details
- 8 Miscellaneous Details
- 9 Doors and Windows Schedule (Interior)
- 10 Technical Specifications (Materials Digest)
- 11 Interior Perspectives

C. SITE DEVELOPEMNT PLAN

- 1 Reference Plan
- 2 Setting out Plan
- 3 Levels Plan
- 4 Materials Plan
- 5 Drainage Plan
- 6 Irrigation Plan
- 7 Lighting Plan
- 8 *Tree Planting Plan*
- 9 *Shrub Planting Plan*
- 10 *Softscape Details*
- 11 *Softscape Palette*
- 12 *Tile Setting Out Plan*

D. ENGINEERING DESIGN

- 1.0 **Structural (S - Complete Plan)**
- 1.1 Construction Notes
- 1.2 Foundation Plan
- 1.3 Floor framing Plans
- 1.4 Roof framing Plan
- 1.5 Sections
- 1.6 Typical Detail of Footings
- 1.7 Schedule of Footings
- 1.8 Typical Detail of Beams and Girders
- 1.9 Schedule of Beams/Girders
- 1.10 Schedule of Columns
- 1.11 Typical Detail/Elevation of Columns
- 1.12 Schedule of Steel Column, Beams & Girders
- 1.13 Cistern Tank
- 1.14 Septic Tank
- 1.15 Elevator/Escalator Pit
- 1.16 Miscellaneous Details
- 2.0 **Plumbing & Sanitary (P - Complete Plan)**
- 2.1 General Notes, Legend, Vicinity Map, Miscellaneous Details
- 2.2 Water Distribution Layout
- 2.3 Sanitary and Vent Layout
- 2.4 Storm Drainage Layout
- 2.5 Isometric Diagram for Water Distribution

- 2.5 Isometric Diagram for Water Distribution
- 2.6 Isometric Diagram for Sanitary and Vent
- 2.7 Isometric Diagram for Storm Drainage
- 2.8 Site Development Plan Water Distribution
- 2.9 Site Development Plan Storm Drainage

- 3.0 Mechanical (M - Complete Plan)**
 - 3.1 Mechanical
 - 3.2 General Notes, Legend
 - 3.3 Equipment Schedule
 - 3.4 A/C and Ventilation System Layout
 - 3.5 Miscellaneous Details
 - 3.6 Sections
 - 3.7 Generator Plan
 - 3.8 ACCU/FCU Schematic Riser Diagram
 - 3.9 Mounting Details

- 4.0 Fire Protection (FP – Complete Plans)**
 - 4.1 General Notes, Legend
 - 4.2 Equipment Schedule
 - 4.3 Fire Hose Cabinet & Fire Extinguisher
 - 4.4 Sprinkler Head Tabulation
 - 4.5 Fire Protection System Riser Diagram
 - 4.6 Fire Pump & Jockey Pump Location and Elevation
 - 4.7 Fire Protection System Layout
 - 4.9 Miscellaneous Details

- 5.0 Electrical (EE - Complete Plan)**
 - 5.1 General Notes, Specification
 - 5.2 Site Development Plan
 - 5.3 One Line Diagram
 - 5.4 Load Schedule
 - 5.5 Power Layout
 - 5.6 Lighting Layout
 - 5.7 Equipment Layout
 - 5.8 Design Analysis, Short Circuit Calculation, Voltage Drop Calculation
 - 5.9 Miscellaneous Details
 - 5.10 Permanent Power Application Requirements (local)

- 6.0 Electronics / Auxiliary (EA - Complete Plan)**
 - 6.1 Fire Detection and Alarm System
 - General Notes, Specification
 - Fire Detection and Alarm System Layout
 - Riser Diagram
 - Miscellaneous Details
 - 6.2 CCTV
 - General Notes, Specification
 - CCTV Layout
 - CCTV Riser Diagram
 - Miscellaneous Details
 - 6.3 Structured Cabling
 - General Notes, Specification
 - Structured Cabling Layout
 - Riser Diagram
 - 6.4 Public Address (PA)
 - General Notes, Specification
 - PA Layout
 - PA Riser Diagram
 - Miscellaneous Details

General Notes, Specification
Door Access Layout
Door Access Riser Diagram
Miscellaneous Details

IV. STANDARD ENGINEERING CALCULATIONS

STRUCTURAL

1. STRUCTURAL ANALYSIS

2. STRUCTURE

- a. Load Diagrams (SLD, Live Load, Line Load)
- b. Structural Framing showing frame sizes (Beam, columns, slabs & shear wall if any)

3. CONCRETE DESIGN

- c. Column Design (PMM ratio, Ties requirement)
- d. Beam Design (flexural requirement, Shear check & Deflection)
- e. Slab Design (flexural requirement, Deflection)
- f. Foundation Design (Punching check, flexural requirement)
- g. Shear wall (DC ratio, shear check)

4. SPECIFICATIONS & CALCULATION – Design Parameters (material specifications, loading, seismic parameters)

PLUMBING

- 1. Equipment Schedule – included in plan for Building Permit
- 2. Water Demand Calculation - For Utility Application
- 3. Elevated Tank sizing (internal reference)
- 4. Cistern Tank sizing (internal reference)
- 5. Pump Calculation (Internal Reference)
 - a. Transfer Pump (GPM, TDH and HP rating calculation)
 - b. Booster Pump (GPM, TDH and HP rating calculation)
 - c. Hot Water circulation Pump (GPM, TDH and HP rating calculation)
 - d. Sewage Pump (GPM, TDH and HP rating calculation)
- 6. Hot water storage tank sizing (internal reference)
- 7. Grease interceptor
- 8. Septic tank -

MECHANICAL

- 1. Cooling load calculation (as reference, for FCU sizing)
- 2. Ventilation/ airflow calculation (as reference, for sizing of supply/exhaust fans, pressurization blowers)
- 3. Generator design details, if any (required for bldg. permit application)

FIRE PROTECTION

- 1. Sprinkler system hydraulic calculation (as reference, used for sizing of pumps, fire tank, piping)
- 2. Fire pump sizing (GPM, TDH, HP calculation)
- 3. Fire tank sizing (volume)

ELECTRICAL

- 1. Load Schedule – included in the plans.
 - a. Riser Diagram (as reference for Load Schedule)
 - b. Protective Device sizing
 - c. Wire sizing
 - d. Conduit sizing
- 2. Short Circuit Calculation – for Building Permit
- 3. Voltage Drop Calculation – for Building Permit
- 4. Design Analysis – for Building Permit
- 5. Generator Sizing (kW/KVA) – Internal reference
- 6. Protection Coordination – Internal reference

6. Protection Coordination – Internal reference
7. Load Flow Analysis – Internal reference
8. Arc Flash Analysis – internal reference

**ELECTRONICS / AUXILIARY
FIRE DETECTION AND ALARM SYSTEM**

1. Battery and Voltage Drop calculation– Internal Reference (If necessary)
2. 24 hours of standby
3. 5 minutes general alarm
4. 15 minutes voice systems of partial initial notification
5. For a number of years, Table 14.4.3.2 in NFPA 72 stated that batteries had to be replaced within five years of the manufacture date. "Replace batteries in accordance with the recommendations of the alarm equipment manufacturer or when the recharged battery voltage or current falls below the manufacturer's recommendations."
6. Add all no alarm current draw (from the control unit, annunciators, Detectors, addressable control modules, etc.) x 24hours.
7. Add all alarm current (from the control unit, annunciators)

IV. BILL OF QUANTITIES, DETAILED UNIT PRICE ANALYSIS, UPDATED SPECIFICATIONS

Note:

1. All documents, plans, calculations shall be signed and sealed, with valid PRC ID and PTRs up to building permit application, applicable and renewed for Occupancy Permit.
2. Check with local Office of Building Official for minimum number of sets for Building Permit, Permanent Power and Occupancy Permit and other requirements such as Logbook, etc.
3. All Drawings, per design stage, Construction Drawings, Bill of Quantities, DUPA and Updated Specifications by the Contractor shall undergo the review and approval of the Owner

VII. CONSTRUCTION WORKS

The contractor shall perform the construction works based on the approved and signed plans by TESDA and Local Building Official, materials specifications and contract documents including the updated Construction Cost Estimate / Detailed Unit Price Analysis from the balancing of costs or due to design revisions and improvements. This should also reflect the updated plans from the as-built and rehabilitation of the existing structures/buildings within the TESDA complex.

A. Pre-Construction Phase:

1. Submission of DOLE Construction Safety and Health Plan, Updated Construction Methodology and Traffic Management.
2. Final submission of the following:
3. Final BOQ
4. Pert CPM
5. Unit Price Analysis
6. Manpower Schedule
7. Equipment Schedule
8. Cost Schedule
9. S-curve
10. Pre-Construction Meeting with Contractor, Contractor's Designers, Employer/ TESDA and its representatives, consultants, etc.

Construction works shall comply with the terms and conditions set forth governing quality, characteristics and properties of materials, methodology and testing.

Secure all necessary building permits, fees and clearances prior to construction.

B. Construction Phase:

General Requirements:

1. Permit to Construct
2. Environmental Clearance Certificate (ECC) or Certification of Non-Coverage (CNC), including the corresponding Tree Cutting Permit from the concerned government agencies, if necessary;
3. Approved Permits (Building Permit, Electrical Permit, Sanitary Permit, Mechanical Permit, Zoning Permit, Fire Safety Permit, Excavation, Signage, Tree Transfer & Cutting Permit etc.)
4. Bonds and Taxes
5. Project Billboard
6. Temporary Facilities and Facilities for the Consultant Team and the Construction Management Team
7. Mobilization
8. Health and Safety Requirements during Construction
9. Earthworks, Cutting, Filling and Grading
10. Transfer and Cutting of Trees as per DENR (with a permit from DENR)
11. Hauling and transportation of unused debris to areas outside the Project site premises.

The contractor shall perform the construction activities, but not limited to the following:

1. Mobilization / Demobilization
2. Site Clearing, Hauling of Debris
3. Construction of Temporary Facilities
4. Excavation and Backfilling
5. Foundation Works

6. Structural Works
7. Architectural Works
8. Electrical Works
9. Mechanical Works
10. Sanitary and Plumbing Works
11. Fire Protection and Suppression Works
12. IT Works
13. Interior Finishes
14. Built-In Furniture (Restroom and Pantry Counters, Reception Counters)
15. Specialty Works
16. Site Development and Landscaping
17. Rehabilitation/ Renovation of Existing Structures/ Buildings
18. Other works stipulated in the construction plans and contract documents

C. Materials & Equipment Approval

1. ALL materials, finishes and equipment to be installed shall be upon the approval of the employer, TESDA (Owner) and its representatives via Request for Approval (RFA).
2. These shall conform to the latest standards. The contractor is hereby required to submit 2-3 actual samples, quotations with brands, specifications and brochures attached to the RFA.
3. The contractor is also required to submit shop drawings and mock-ups of all finishes and specialty works before fabrication and installation
4. Unless otherwise specified, all materials shall be new and of the best grade. Apparent silence in the Specifications, as to any detail or description concerning any point shall be regarded as meaning that only the best general practice is to prevail and that only materials and workmanship of first class quality are to be used.

D. Design Revisions

1. All revisions and deviation from the approved plans, especially if it shall affect the overall cost of the project, shall be subject for approval via Request for Information (RFI) and Request for Approval (RFA) via email and letter using a prescribed and approved format. Queries and site instructions via text, online message (i.e. Viber, WhatsApp, Messenger) and verbal instructions shall not be entertained and considered official. This will be subject for balancing of costs within the contract amount or variation order upon confirmation and approval of owner and its representatives.
2. All queries and clarifications regarding the spaces, layout and use shall be submitted via Request for Information (RFI) via email and letter using a prescribed and approved format. Queries via text and online message (ex. Viber, WhatsApp, Messenger) shall not be entertained and considered official.
3. The contractor is expected to provide all the necessary proposal to complete the design, ready for use, occupancy and complying with the latest Philippine Codes and Laws. The conceptual plans and initial site survey should act as a guide only for further site verification and detailing.
4. All Contractors submitting proposal for this project shall first examine the site, verify and investigate the existing conditions affecting the Work and submit proposed solutions of anticipated problems to the Employer, TESDA (Owner) for approval at least one week ahead of the construction schedule.
5. No claim for extra compensation by the Contractor shall be entertained by the Employer, TESDA (Owner) for negligence or inadvertence on the Contractor's part in obtaining all necessary and pertinent data from the site or from the Architect to supplement those on the

Drawings.

6. The Contractor shall prepare **Daily Accomplishment Report**, supported with progress photographs and S-curves to monitor actual progress status of the project. The **daily accomplishment reports shall be consolidated weekly and submitted monthly to the Owner**. Such reports will form part of the requirements for progress payments.

7. The Project Manager and the Contractor shall individually maintain a **logbook** at all times reflecting time extensions, work suspensions, change/extra work orders and circumstances, affecting the progress of work.

8. The contractor shall adhere to the submitted and approved **Material Testing Plan**.

9. Hauling and fees of the unused materials (debris) outside of the TESDA site shall be the responsibility of the contractor, including payment/fees.

E. WARRANTY PERIOD

The Contractor shall guarantee the completed Works against structural defects and failure for its satisfactory performance vis-à-vis the prescribed minimum performance specifications during the structure's lifetime.

All design and build projects shall have a minimum Defects Liability Period of one (1) year after contract completion or as provided for in the contract documents. This is without prejudice, however, to the liabilities imposed upon the engineer/architect who drew up the plans and specification for a building sanctioned under Article 1723 of the New Civil Code of the Philippines

The Contractor shall provide a 1-year warranty *(or as specified in the drawing or specific item/material or supplier- example 5 years for waterproofing)* after turnover on the workmanship and installation of the product and shall replace and/or repair immediately part or all works that is deficient within the said warranty period. Contractor shall provide list of materials with certification for warranties on specific items.

For this purpose, the Contractor shall post warranty security in a form of a surety bond, callable on demand issued by a reputable institution, and based on the prescribed percentage of the contract price provided in the Bidding Documents

F. DEMOLISHED ITEMS

All demolished/removed materials that are still usable will not be allowed to be used and shall be properly stocked, inventoried and hauled with the supervision of the Employer/ TESDA's approval

VIII. POST CONSTRUCTION WORKS

A. Post construction works includes testing and commissioning of the following:

- 1) Electrical System including Stand-by Generator Set
- 2) Elevator
- 3) Pumps and Motors
- 4) Air-Conditioning System
- 5) Plumbing and Sanitation System
- 6) IT System
- 7) Signed and Sealed As-Built Plans
- 8) Operations and Maintenance Manuals
- 9) Occupancy Permit and Clearances from LGU (Building Official)
- 10) Permanent Utilities Connection / Energization (Power, Water, Sewer, Etc.)

B. The contractor shall submit testing and commissioning program and schedule. Likewise, the contractor shall submit the **operations and maintenance manuals** of all the equipment and machineries installed, incorporating the technical literature as designed and as actually installed, together with brochures, contact number of vendors, sub-contractors, suppliers and installers and warranty certificates.

C. Waterline and water tank cistern shall be leak tested. Disinfection shall follow after passing the hydrostatic and pressure leak test in accordance with the standards of the Philippine National Standard for Drinking Water (PNSDW).

D. The date by which "**as built**" drawings are required is two (2) weeks before the request for final payment. However, the Contractor shall supply to the Owner through its Project Manager the draft As-Built Drawings upon reaching ninety-five percent (95%) accomplishment to give ample time for review and checking. After which, the said As-Built drawings shall be finalized by the Contractor upon reaching 100 percent completion and shall be submitted to the Owner through its Project Manager for approval two weeks before the submission of the Contractor's request for final payment.

E. Demobilize, dismantle and remove all temporary facilities, including all workmen's houses, construction equipment, tools, personnel and debris out of the project site and/or TESDA premises. Restore all temporary utility connections.

IX. MINIMUM REQUIREMENTS FOR CONSTRUCTION OCCUPATIONAL SAFETY AND HEALTH (COSH) PROGRAM

The contractor shall have the responsibility to observe and implement the minimum requirements for COSH set by the Department of Labor and Employment (DOLE), but not limited to the following:

a. Construction Safety and Health

(a.1) Composition:

- (i) Construction-in-Charge or his representative as chairperson ex-officio
- (ii) General Construction Safety and Health Officer
- (iii) Construction Safety and Health Officers
- (iv) Safety Representative/Officer
- (v) Doctors, nurses and other health personnel pursuant to the requirements stated in Rule 1042 of the Occupational Safety and Health Services (OSHS)
- (vi) Workers' Representative

(a.2) Duties and Responsibilities:

- (i) The Construction-in-Charge or his representative shall act as the Chairperson of the committee.
- (ii) The committee shall conduct safety meetings at least once a month.
- (iii) The persons constituting the Safety and Health Committee shall, as far as practicable, be at the construction site whenever construction work is being undertaken.
- (iv) The committee shall continually plan and develop accident prevention programs.
- (v) The committee shall review reports of inspection, accident investigation and monitor implementation of the safety program.
- (vi) The committee shall provide necessary assistance to government authorities authorized to conduct inspection in the proper conduct of their activities.
- (vii) The committee shall initiate and supervise safety trainings for its employees.
- (viii) The committee shall conduct safety inspection at least once a month, and shall conduct investigations of work accidents and shall submit a regular report to the DOLE.
- (ix) The committee shall initiate and supervise the conduct of daily brief safety meetings or toolbox meetings
- (x) The committee shall prepare and submit to DOLE reports on said committee meetings
- (xi) The committee shall develop a disaster contingency plan and organize such emergency service units as may be necessary to handle disaster situations.

b. General Safety within Construction Premises

- (b.1) Provision for personal protective equipment, danger signs, barricades, and safety instructions for workers, employees, public, and visitors, such as, housekeeping, walkway surfaces, means of access, i.e. stairs, ramps, floor openings, elevated walkways, runways, platforms and light.
- (b.2) Personal Protective Equipment (PPE)
 - (i) The Contractor shall provide adequate and approved type of protective equipment (hard hats, safety glasses with side-shields, rubber boots). Workers within the construction project site shall be required to wear the necessary Personal Protective Equipment (PPE) at all times.
 - (ii) Specialty construction workers must be provided with special equipment, such as specialized goggles or respirators for welders and painters or paint applicators, and workers who worked in confined and enclosed spaces.
 - (iii) All other persons who are either authorized or allowed to be at the construction site shall wear appropriate PPE.
- (b.3) Safety Personnel
 - (i) The Contractor shall provide for a full time officer, who shall be assigned as the general construction safety and health officer to oversee full time the overall management of the Construction Safety and Health Program.
 - (ii) The general construction safety and health officer shall frequently monitor and inspect any health and safety aspect of the construction work being undertaken. He shall also assist government inspectors in the conduct of safety and health inspection at any time whenever work is being performed or during the conduct of accident investigation.
- (b.4) Emergency Occupational Health Personnel and Facilities
 - (i) The Contractor shall provide competent emergency health officer within the worksite duly complemented by adequate medical supplies, equipment and facilities. The services of a full-time registered nurse shall be required when the total number of workers exceeds 50 but not more than 200.
 - (ii) Where the Contractor provides only a treatment room, he shall provide for his workers in case of emergency, access to the nearest medical clinic or to a medical clinic located within 5 kilometer radius from the workplace and can be reached in 25 minutes of travel. Such access shall include the necessary transportation facilities. In such situation, there shall be a written contract with the medical clinic to attend to such workplace emergencies.
 - (iii) The engagement of an Emergency Health Provider for the

- (iii) The engagement of an Emergency Health Provider for the construction project site shall be considered as having complied with the requirement of accessibility to the nearest hospital facilities.
- (iv) The Contractor shall always have in the construction site the required minimum inventory of medicines, supplies and equipment.

(b.5) Construction Safety Signages and Barricades

- (i) Construction Safety Signages shall be provided as a precaution and advisory to workers and the general public of the hazards existing in the worksite.
- (ii) Signage Procedure – the signages shall be:
 - 1. Posted in prominent positions and at strategic locations.
 - 2. As far as practicable, be in the language understandable to most of the workers employed in the site.
 - 3. For non-raised floor areas, the attached yellow CAUTION sign shall be used when using yellow CAUTION tape.
 - 4. For non-raised floor areas, the attached red DANGER sign shall be used when using the red DANGER tape.
 - 5. Placed in designated areas at 1.2 meters from ground level, if there is no other more practicable height for placement.
 - 6. Regularly inspected and maintained in good condition to achieve its purpose.
 - 7. Signages that are damaged, illegible, those no longer apply as to purpose, site or language, shall be removed or be replaced by the safety officer when needed.
 - 8. Removed after the hazard is completely eliminated. If upon work completion the hazard is still present, the signage shall remain in place.
 - 9. Designed and constructed following the Overall Dimensions of Safety Signs Formula as required by the Occupational Safety and Health Services (OSHS).
 - 10. Specific with the type of hazard and should indicate the name of the contaminant/substance involved (for chemical hazards), and the type of PPE or respiratory equipment to be worn

- (iii) Posting of Signages shall
- (iv) Include, but not limited to the following places:
 - 1. Areas where there are risks of falling objects.
 - 2. Areas where there are risks of falling, slipping, tripping among workers and the public.
 - 3. Prior to entry in project sites, locations and its perimeter.
 - 4. Where there is mandatory requirement on the usage of PPEs.
 - 5. Areas where explosives and flammable substances are used or stored.
 - 6. Approaches to working areas where danger from toxic or irritant airborne contaminants/substances may exist.
 - 7. All places where contact with or proximity to electrical facility/equipment can cause danger.
 - 8. All places where workers may come in contact with dangerous parts of machinery or equipment.
 - 9. Locations of fire alarms and fire-fighting equipment.
 - 10. Locations for instructions on the proper usage of specific construction equipment, tools.
- (v) Barricading Procedures – the following shall apply:
 - 1. The contractor shall provide all necessary barricades, safety tapes, safety cones or safety lines as required in isolating or protecting an unsafe work area from other workers, pedestrians or vehicular traffic.
 - 2. Barricades shall completely enclose the hazardous area and effectively limit unintentional or casual entry.
 - 3. Barricades shall be three (3) feet vertical height from the ground, when no other more practical height specification is available or *see Building Code Requirements*
 - 4. Barricades shall be maintained in good condition to achieve its purpose.
 - 5. Barricades that are damaged, faded or that no longer apply as to purpose, site or meaning, shall be removed or shall be replaced by the safety officer.
 - 6. Barricade tape shall not be used on the floor as this presents a slipping hazard of its own.
 - 7. In addition to using the proper warning tape, the contractor shall use the appropriate safety signage when barricading an area.
 - 8. All barricades shall be removed after the hazard is completely eliminated.
 - 9. Upon work completion, if the hazard is still present, the barricade shall remain in place.

10. Installation of barricades shall include, but not limited to the following worksites conditions:
 - a. hazardous areas
 - b. trip hazard
 - c. robotic movement
 - d. energized electrical works
 - e. overhead suspended load test
 - f. critical high pressure test
 - g. chemical introduction
 - h. fall exposure
 - i. emergency response zone
 - j. unsafe condition zone
 - k. danger zone
 - l. confined and enclosed space

(vi) **Safety on Construction Heavy Equipment**

In relation to heavy equipment operation in all construction sites, the following are required in the different phases of the project.

a) Pre-Construction

The Contractor must ensure that appropriate certification is obtained from DOLE duly accredited organizations for the following:

1. All heavy equipment operators assigned at the project site must be tested and certified in accordance with a standard test prescribed by Technical Education and Skills Development Authority (TESDA) in coordination with its accredited organizations.
2. All heavy equipment must be tested and certified in accordance with the standards prepared by DOLE or its recognized organizations prior to commissioning of said equipment.

b) During Construction to Post Construction

The Contractor must ensure that the following conditions are met or complied with:

1. Load restriction of trailers carrying such heavy equipment, the height and width clearances as imposed by the Department of Public Works and Highways (DPWH) shall be observed.
2. Only duly certified operators are allowed to operate their designated heavy equipment and must wear personal protective equipment.

(b.7) Safety and Health Information

- (i) Workers shall be adequately and suitably:
 - 1. Informed of potential safety and health hazards to which they may be exposed at their workplace.
 - 2. Instructed and trained on the measures available for the prevention, control and protection against those hazards.
- (ii) Every worker shall receive instruction and training regarding general safety and health common to construction sites which shall include, but not limited to the following:
 - 1. The basic rights and duties of the workers at the construction site.
 - 2. The means of access and egress, both during normal work and in emergency situations.
 - 3. The measures for good housekeeping.
 - 4. The location and proper use of welfare and first-aid facilities.
 - 5. The proper care and use of the items or personal protective equipment and protective clothing provided the workers.
 - 6. The general measures for personal hygiene and health protection.
 - 7. The fire precautions to be taken.
 - 8. The action to be taken in case of any emergency.
 - 9. The requirements of relevant health and safety rules and regulations.
- (iii) The instruction, training and information materials provided shall be given in a language or dialect understood by the worker.
 - 1. Written, oral, visual and participative approaches shall be used to ensure that the worker has understood and assimilated the information.
 - 2. Each supervisor or any person e.g. Foreman, lead man, and other similar personnel shall conduct daily tool box or similar meetings prior to the start of the operations for the day to discuss with the workers and to anticipate safety and health problems related.
 - 3. No person shall be deployed in a construction site unless he has undergone a safety and health awareness seminar conducted by safety professionals or accredited organizations or other institutions recognized by DOLE.

(b.8) Construction Safety and Health Reports

(i) The Construction Safety and Health Report shall include:

1. Monthly summary of all safety and health committee meetings
2. Summary of all accident investigations /reports
3. Corrective/Preventive measures/action for each hazard
4. Periodic hazards assessment with corresponding remedial measures for new hazards
5. Safety promotions and trainings conducted/attended

(ii) Submission of Reports:

1. The Contractor shall be required to submit a monthly construction safety and health report to the Bureau of Working Conditions (BWC) copy furnished the DOLE Regional Office concerned.
2. In case of any dangerous occurrence or major accident resulting in death or permanent total disability, the concerned Contractor shall notify the appropriate DOLE Regional Office within twenty-four (24) hours from occurrence.
3. After the conduct of investigation by the concerned construction safety and health officer, the Contractor shall report all disabling injuries to the DOLE Regional Office on or before the 20th of the month following the date of occurrence of accident using the prescribed forms of the DOLE/BWC.

(b.9) Workers' Welfare Facilities

(i) Adequate supply of safe drinking water:

1. If the water is used in common drinking areas, it shall be stored in closed containers from which the water is dispensed through taps or cocks. Such containers shall be cleaned and disinfected at regular intervals but not exceeding fifteen (15) days.
2. Notices shall be posted conspicuously in locations where there is water supply that is not for drinking purposes.

(ii) Adequate sanitary and washing facilities

1. Adequate facilities for changing, storing and drying of work clothes.
2. Adequate accommodation for taking meals and shelter.
3. Separate sanitary, washing and sleeping facilities for men and women workers.
4. Violations and Penalties
5. Pursuant to the provisions of D.O. 13 and as circumstances may warrant, the DOLE shall refer to the Philippine Contractors Accreditation Board (PCAB) its findings, after due process, on any act or omission committed by construction contractors in violation of this rule, labor standards, safety rules and regulations and other pertinent policies. Any such violation committed by construction contractors, whether general contractors or sub-contractors, shall constitute as prima facie case of a construction malperformance of grave consequence due to negligence, incompetence or malpractice contemplated under RA 4566 (Constructors' Licensing Law), as amended, and its Implementing Rules and Regulations.
6. In cases of imminent danger situations, the DOLE Regional Director shall issue a stoppage order pursuant to the provisions of Rule 1012.02 of the Occupational Safety and Health Services (OSHS) and other pertinent issuances for stoppage of operation or for other appropriate action to abate danger.
7. Pending the issuance of the order, the Contractor shall take appropriate measures to protect his workers.
8. The stoppage order shall remain in effect until the danger is removed or corrected permanently.
9. Non-compliance with the order shall be penalized under existing provisions of labor laws.
10. All processes and/or procedures in the conduct of General Labor Standards inspection including General Occupational Safety and Health/Technical Safety Inspection shall be governed by the provisions of Department Order No.57-04 and its corresponding Manuals of Instruction.

XI. DESIGN AND CONSTRUCTION SCHEDULE

The project shall be implemented within the duration specified herein:

Surveys, Geotechnical Report, Site Inspections, Updated Schematic Design Phase	Within Sixty (60) to Ninety (90) Calendar Days
Detailed Design Phase	Within Thirty (30) to Forty-Five (45) Calendar Days
Application of Permits	Within Thirty (30) to Fifty (50) Calendar Days
Construction Phase New Construction (Innovation Center) & Rehabilitation	Within Three Hundred Thirty Calendar (330) Days
Post-Construction Phase	Within Thirty (30) Calendar Days
Proposed Project Duration	Within 480 to maximum 545 Calendar Days (16-18 months)

The term "Working Day" refers to working days in the government service. The term "Calendar Day" refers to the days in a week, *including Saturdays, Sundays and holidays*. Whenever the word "day" is used, it shall refer to calendar day.

The contractor shall submit final detailed design plans, updated and details materials specifications and finishes, and updated and details estimate (bill of quantities), derivation of unit price analysis, surveys, geotechnical reports, etc. within seventy (70) calendar days upon receipt of Notice to Proceed. Ready for Permit Application

Upon the approval and signing of the detailed design, the contractor shall secure the necessary permits for construction.

XI. MINIMUM REQUIREMENTS FOR DESIGN AND CONSTRUCTION PERSONNEL

No.	Position	Qualification	Minimum Experience	Experience In Similar Work	Period of deployment
			[years]	[years]	(months)
1	Construction cum Project Manager – One (1)	Civil Engineer; Valid PRC & PTR	12	3	Continuous
2	Site Engineers – One (1)	Civil Engineer; Valid PRC & PTR	7	3	Continuous
3	Architectural Design Manager – One (1)	Architect; Valid PRC, PTR & IAPOA	15	5	Intermittent, as and when required
4	Architect – One (1) (Architecture In-Charge of Construction)	Architect; Valid PRC, PTR & IAPOA	10	3	As required by work program
6	Structural Design Engineer – One (1)	Structural Engineer, Civil; Valid PRC & PTR	12	5	As required by work program
7	Electrical Design Engineer – One (1)	Professional Electrical Engineer; Valid PRC & PTR	10	3	As required by work program
8	Public Health Engineer – One (1)	Civil / Sanitary Engineer; Valid PRC & PTR	10	3	As required by work program
9	HVAC Engineer – One (1)	Professional Mechanical Engineer; Valid PRC & PTR	10	5	As required by work program
10	Draftsmen – Two (2)	Diploma in BS Architecture/ BS Civil Engineering	5	2	As required by work program
11	Quantity Surveyor – One (1)	Civil Engineer; Valid PRC & PTR	10	5	As required by work program and intermittent
12	QA QC (Quality Assurance and Quality Control Engineer- One (1)	Civil Engineer; Valid PRC & PTR	10	5	Continuous
13	HSE Officer- One (1)	Environmental, Health and Safety Officer. Bachelor of Science; Related Field (preferably in Construction) ;With diploma in safety management from Government institution; with COSH Certificate	5	2	Intermittent, as and when required.

XII. MINIMUM CONSTRUCTION EQUIPMENT

No.	Equipment Type and Characteristics	Minimum Number Required
1	Facility of automated CNC cold roll forming machine of reputed make having capacity of rolling material of thickness 0.75 mm to 1.80 mm and other parameters required for the fabrication of LGSF material	One (1)
2.	Facility (Workshop space) of Fabrication and machine welding	One (1)
3	Excavator with chiseling equipment	Two (2)
4	Tippers/Dumpers	Two (2)
5	Transit Concrete mix plant – weigh batch type	One (1)
6	Mechanical Concrete mixers	Two (2)
7	Material Hoists	Two (2)
8	Hydra	One (1)
9	Crane capable of handling required load of material up to required height and reach, with proper safety devices (can be hired) and should be able to help in erection of structure as per the approved work program.	One (1)
10	Bulldozer 1.50cu.m. Capacity	Two (2)
11	Concrete Vibrator, Flexible shaft type 2" head ϕ with 5 Amperes gasoline drive unit	Two (2)
12	Scaffolding / H-Frames and Accessories	Three (3)
13	Water Pump, 100mm Suction ϕ , 1800lpm	Three (3)
14	Generator Set, 301 – 350Kw,	Two (2)
15	Air Compressor with 2 jack Hammers	Two (2)
16	Chainsaw, 7' reach m 9" standard blade	Two (2)
17	Motorized Road Grader, G710A	Two (2)
18	Plate Compactor, 5HP	Two (2)
19	Welding Machine, Electric Driven, 500Amp	Two (2)
20	Minor Tools for steel works, Doors and Windows, Excavation, Embankment, Tile Works, Paintings, etc.	1 Lot

It is imperative for the contractor to provide a fully functional site laboratory with adequate equipment as per the approved list for testing of construction material. The laboratory should have qualified and approved staff for testing construction material.

Contractor is required to fill out the form as part of the bid submissions. This list is the minimum required, but may add other equipment/ tools needed to complete the project

XIII. SUBMITTALS AND DELIVERABLES

The prospective bidder / contractor shall submit **Schematic Architectural and Engineering Design based on Employer's Requirements & Estimates**, during the Opening of Bids. Failure to comply of this section shall be a ground for disqualification.

All submittals are subject for review and approval of the employer, TESDA, its representatives/ consultants. Shop drawings are required to submit if necessary for the construction. All shop drawings and supplemental plans are subject for review and approval.

These are the required submittals and deliverables after issuance of **Notice to Proceed (NTP)**:

1. Site Investigations, Surveys, Reports prior to Updated Schematic Design Stage

A. Surveys and investigations of the site for the new Innovation Centers includes boundaries of the property, elevations, existing trees and vegetation, contours (at 0.50m interval) – Relocation / Lot Plan - signed and sealed for Building Permit

B. Soil tests, Geotechnical Report) – Signed and Sealed for Building Permit

C. Actual Site Verification - Location, As-Built- dimension, floor elevations and other pertinent data on existing buildings and improvements (roads, parking areas, mature trees) and existing utility lines (e.g. water, power, telephone, internet, drainage, sewer, etc.).

2. Detailed Architectural Concept (Updated Schematic)

The Contractor shall submit to the employer /TESDA their Updated and Detailed Architectural Concept/s within **10 calendar days** upon receipt of Notice to Proceed but not necessarily limited to the following:

1. Updated Site Development Plan
2. Rendered Exterior Perspectives (4 sides)
3. Updated Floor Plans (scaled, complete with dimensions)
4. Elevations
5. Rendered Cross and Longitudinal Sections
6. Rendered Interior Perspectives of the following:
 - a. Main Lobby of Main Building
 - b. Workshop Area
 - c. Incubation Rooms
 - d. Typical Meeting Rooms and Conference Rooms
 - e. Showcase/ Display Area
 - f. Typical Restroom
7. Aerial Perspective of Main Building
8. Tabulated Summary of Floor Area of the Proposed Project
9. Outline Specifications for all trades
10. Design and Construction Methods
11. Value Engineering Analysis of Design and Construction Methods
12. Updated list and documentation of areas for rehabilitation/renovation of existing structures/building within TESDA complex, proposed scope of work
13. Initial Cost Estimate
14. Soft Copy (CAD 2013 version and Sketch Up File 2017 version),JPG/PNG file for perspectives
15. Hard Copy (A3 sheets)

3. Detailed Engineering Design and Construction Plans for the Construction of New Innovation Center and Rehabilitation of Existing Structures/Buildings within TESDA complex

The contractor shall submit the detailed engineering design and updated Architectural plans following the value engineering or updated from engineering layout upon the

2.1 ARCHITECTURAL PLANS

- 1) Site Development Plan
- 2) Floor Plans with Furniture Layout
- 3) Elevations of All Sides
- 4) Building Sections
- 5) End Bay Sections
- 6) Reflected Ceiling Plans
- 7) Schedule of Doors and Windows
- 8) Floor Covering Layout Plan
- 9) Elevator Elevation
- 10) Elevator Shaft Details
- 11) Stair Details
- 12) Roof Slab Plan and Roof Plan (select areas)
- 13) Canopy Details
- 14) Vehicle Driveway/Ramp Details
- 15) Pedestrian Ramp Details
- 16) Wall Façade Details
- 17) Main Building Electrical-Mechanical-Auxiliary Plan
- 18) Main Lobby Blow-up Plan including Ceiling Plan, Elevations and Sections
- 19) Board Room Blow-up Plan including Ceiling Plan, Elevations and Sections
- 20) Mini-Conference Room Blow-up Plan including Ceiling Plan, Elevations and Sections
- 21) Main Building Furniture Layout Plan with Schedule of Office Furniture
- 22) Comfort Room, Toilets and Pantry Blow-up detailed plans
- 23) Other Architectural Miscellaneous Details

2.2 STRUCTURAL AND CIVIL PLANS

- 1) Foundation Plan and Details
- 2) Slab on Grade plans and Details
- 3) Floor Framing Plans and Details
- 4) Roof Deck Framing Plans
- 5) Roof Framing Plans and Details
- 6) Footing, Columns, Slab, Beams and Girder Details
- 7) Shear Wall Details
- 8) Schedule of Reinforcement
- 9) Structural General Designs and General Notes
- 10) Other Structural Details

2.3 ELECTRICAL PLANS

- 1) Electrical General Notes and Specifications
- 2) Lighting Layout Plans
- 3) Power and Convenience Outlet Layout Plans
- 4) Grounding System Layout Plans
- 5) Schedule of Loads
- 6) Single Line Diagram
- 7) Power House Plans
- 8) Service Entrance Plans
- 9) Air-Condition System Power Layout Plans
- 10) Equipment and Machineries Power Layout Plans

- 8) Service Entrance Plans
- 9) Air-Condition System Power Layout Plans
- 10) Equipment and Machineries Power Layout Plans
- 11) Other Electrical Miscellaneous Details

2.4 MECHANICAL PLANS

- 1) Mechanical General Notes and Specifications
- 2) Elevator Plan, Sections and Elevations
- 3) Elevator Details
- 4) Pumps and Motors Layout Plans
- 5) Pump and Motor Details
- 6) Air-Condition System Layout Plans
- 7) Air-Condition System Details
- 8) Fire Sprinkler System Layout Plans
- 9) Fire Sprinkler System Details
- 10) Smoke Detection and Fire Alarm Layout Plans
- 11) Smoke Detection and Fire Alarm Details
- 12) Mechanical Room Plans and Details
- 13) Other Mechanical Miscellaneous Details

2.5 SANITARY AND PLUMBING PLANS

- 1) Sanitary and Plumbing General Notes and Specifications
- 2) Water Line Layout Plans
- 3) Sanitary and Plumbing Layout Plans
- 4) Plumbing System Isometric Diagram
- 5) Tank and Cistern Plans and Details
- 6) Toilet and Comfort Room Fixture Layout Plans
- 7) Other Sanitary and Plumbing Miscellaneous Details

2.6 INFORMATION AND COMMUNICATION TECHNOLOGY (IT) PLANS

- 1) IT General Notes and Specifications
- 2) Data (LAN) Layout Plans
- 3) CCTV Layout Plans
- 4) Public Address Layout Plans
- 5) Telephone System Layout Plans
- 6) Server Room Details
- 7) Audio and Video System for Conference /Training/Meeting Rooms
- 8) Other IT Miscellaneous Details

4. Detailed Reports

The contractor shall submit the following reports as part of the construction documents for the construction and rehabilitation.

- 3.1 Structural Design Report
- 3.2 Detailed Bill of Materials and Cost Estimates
- 3.3 Construction PERT-CPM and Bar Chart
- 3.4 Detailed Material Specifications and Finishes
- 3.5 Environmental Management Plan
- 3.6 Fire and Safety Compliance and Commissioning Report [FSCCR] and Fire Safety Maintenance Report [FSMR]
- 3.7 All other documents necessary in line with the construction as may be required by Employer/TESDA

submitted as well.

5. As-Built Plans

The contractor shall prepare and submit **signed and sealed** As-Built Plans based on the actual construction accomplishments and emplacement of materials, equipment, furnishings, utilities and other information that is necessary for the operations and maintenance of the buildings.

The contractor shall also submit operations and maintenance manuals of the emplaced equipment and machineries for the reference of the operations and maintenance personnel.

6. Details of Submittals and Deliverables (**Signed and Sealed**, Scaled for Plans) for New Construction and Rehabilitation

5.1 Updated Schematic Design Phase:

Number of Copies - 5 copies / sets

- i. Document Size - A3 Sheets
- ii. Soft Copy - CAD, SKP, PDF, PNG and PDF

5.2 Detailed Design and Construction Plans

- a) Number of Copies - 10 copies / sets
- b) Document Size - 24" x 36" White/Blue Print Copy
- c) Soft Copy - CAD 2013 minimum, SKP, PNG and PDF

5.3 Detailed Reports

5.3.1 Structural Design Report

- a) Number of Copies - 5 copies / sets
- b) Document Size - 8.5" x 14" Legal Size
- c) Specifications - Book Bound
- d) Soft Copy - Word, PDF

5.3.2 Detailed Bill of Materials and Cost Estimates

- a) Number of Copies - 5 copies / sets
- b) Document Size - 8.5" x 14" Legal Size
- c) Specifications - Book Bound
- d) Soft Copy - Excel and PDF

5.3.3 PERT-CPM and Bar Chart

- a) Number of Copies - 5 copies / sets
- b) Document Size - 24" x 36" White/Blue Print
- c) Soft Copy - Applicable Software/s

5.3.4 Detailed Estimates, DUA, Material Specifications and Finishes, Environmental

- a) Number of Copies - 5 copies / sets
- b) Document Size - 8.5" x 14" Legal Size
- c) Specifications - Book Bound
- d) Soft Copy - Excel, Word and PDF

5.3.5 Occupancy Permit (As-Built, Testing and Certifications)

- a) Number of Copies - 10 copies / sets
- b) Document Size - 24" x 36" White/Blue Print Copy
- c) Soft Copy - CAD 2013 minimum, PDF

ANNEXES

- A- Conceptual Perspectives and Building Massing (New Construction)
- B- Space Matrix (Minimum Space Requirements)
- C- Proposed Material Finishes and Branding
- D -Conceptual / Schematic Floor Plans with Equipment & Furniture Layout
- E- RTIC Focal Area Showcase Components and Innovation Makerspace Specifications
- F- General Scope of Work / Cost Estimate Guide
- G- Initial Environmental Examination
- H- Minimum Requirements for Rehabilitation / Renovation Works

ANNEX A

SCHEMATIC PERSPECTIVE

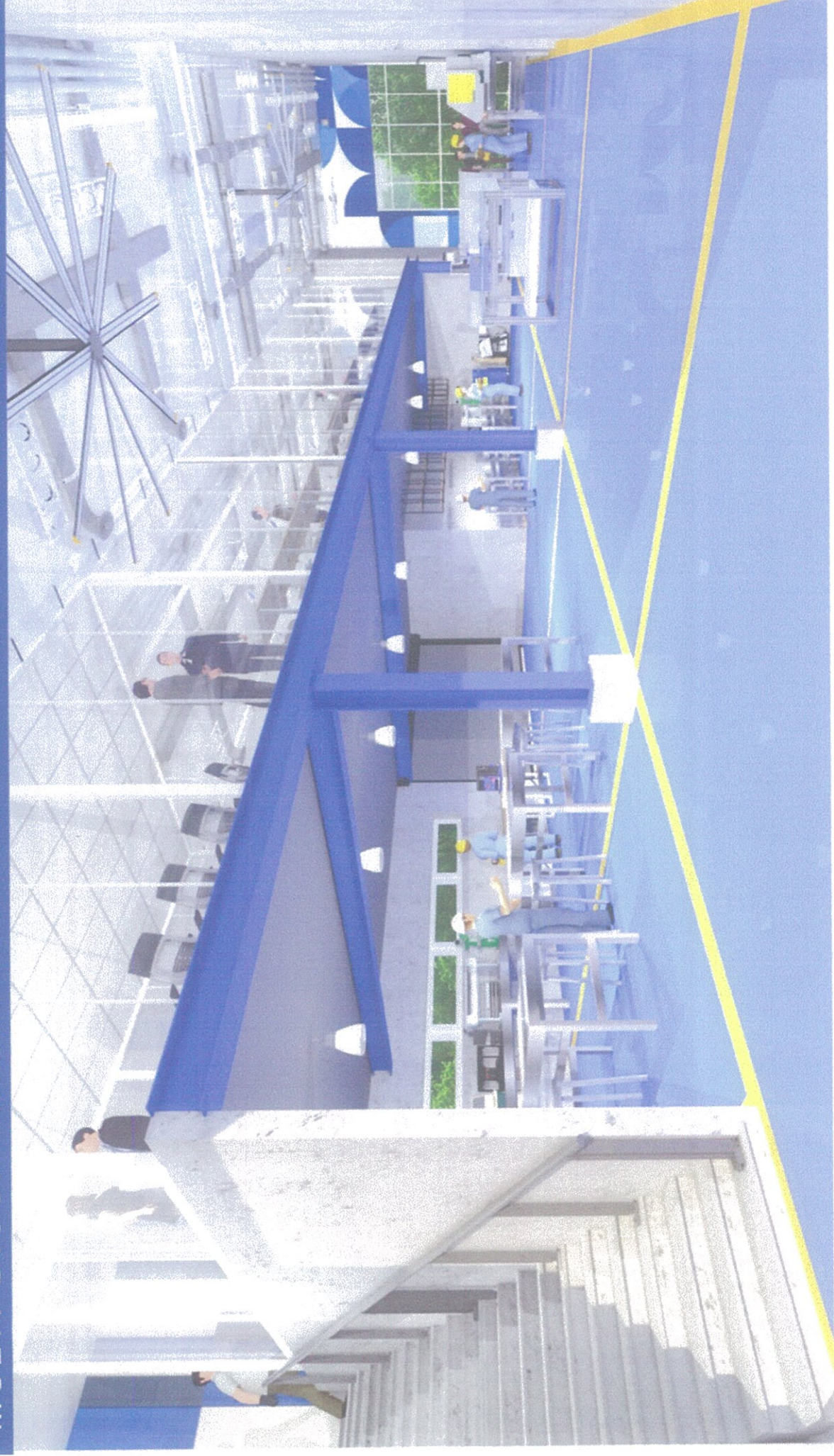
SCHEMATIC PERSPECTIVE

RTIC - TUGUEGARAO, CAGAYAN VALLEY REGION II



RTIC-TUGUEGARAO (REGION 2)

MULTI-DISCIPLINARY FABRICATION WORKSHOP – GROUND FLOOR



RTIC-TUGUEGARAO (REGION 2)

CAFÉ (SECOND FLOOR)



RTIC -TUGUEGARAO (REGION 2)

CO-WORKING SPACE / EVENTS SPACE & INCUBATION ROOMS



RTIC -TUGUEGARAO (REGION 2)

INCUBATION ROOMS



SITE PHOTO

RTIC- TUGUEGARAO (REGION 2)



SITE DEVELOPMENT PLAN

RTIC- TUGUEGARAO (REGION 2)

SITE: $\pm 1,320.20$ SQ.M



ANNEX B

SPACE MATRIX

SPACE MATRIX**RTIC- TUGUEGARAO, CAGAYAN VALLEY, REGION 2****APPROX. SITE AREA: ±1,320.29 SQ.M**

Excluding the road the the center of the site; Subject for detailed survey, site clearing / intervention, tree-cutting & relocation of flag pole

	SPACE	APPROX. AREA (±) SQ.M	PRIMARY USE	PROPOSED VERTICAL ROOM CLEARANCE / HEIGHT (Meters);	GENERAL CONSIDERATIONS
GROUND FLOOR (NORTH)					
1	COLD STORAGE FACILITY / IQF	96.70	Cold-Chain Facility	6.00	Convenience and Data Outlets, Wi-Fi, Minimum Requirements for Storage Facility or as set by TESDA
2	PROCESSING/ PACKAGING FACILITY OR TRAINING AREA	72.30	Working Tables, Processing and Packaging Equipment	6.00	Convenience and Data Outlets, Wi-Fi, Air-Conditioned, Exhaust, Plumbing Fixtures (Sink, Drainage) for foot bath, hand wash and lockers
3	UTILITIES/ STORAGE (Under Stairs)	12.76	Storage Area, Utility Room for Electrical/ Auxiliary, Plumbing	3.00	Electrical, Auxiliary, Mechanical and Plumbing
4	RESTROOMS	46.87	Male, Female, PWD / All-Gender Restroom	2.70	Waterclosets, Urinal, Lavatory, Grab bar for PWD, Dryer, Mirror, Stop sink
GROUND FLOOR (SOUTH)					
5	MULTI-DISCIPLINARY FABRICATION WORKSHOP	336.93	3D Printers, Work Benches, Staff Work Area, Laser Cutter, Lathe, CNC, Hand Tool and Work Bench, Brazing Area, Mezzanine Stairs, Delivery Area with Roller Shutters	6.00	Convenience and Data Outlets, Wi-Fi, Cold Chain Equipment, Exhaust, Emergency Eye Wash, See Equipment List, Large Fans, Heavy Floor Loading Capacity
6	STORAGE	32.00	Storage Area, Utility Room for Electrical/ Auxiliary, Plumbing	3.00	Electrical, Auxiliary, Mechanical and Plumbing
7	RESTROOM W/ SHOWER	6.00	All-Gender	2.70	Waterclosets, Urinal, Lavatory, Grab bar for PWD, Dryer, Shower, Glass Partition
MEZZANINE - Ground Floor					
8	ELECTRONICS, IOT AND ROBOTICS LAB	180.95	Work Tables, Chairs, Laser Cutter, Glass Boards, Phone Call and Meeting Booths	3.00	See Equipment List, Convenience and Data Outlets, Air-Conditioned, Convenience and Data Outlets, Wi-Fi
9	MEETING ROOM	27.30	8-10 pax	3.00	Convenience and Data Outlets, Wi-Fi, Mobile TV, Glass Boards, Air-Conditioned
SECOND FLOOR					
10	CO-WORKING SPACE	380.00	Shared pantry with collaboration spaces, movable furniture (modular working tables and chairs), small meeting/phone call booths	6.00	Convenience and Data Outlets, Wi-Fi, Mobile TV, Glass Boards, Air-Conditioned, Heavy Floor Load Capacity
11	SHOWCASE / DISPLAY AREA	154.00	Open space for kiosks, tables, lounge, wide corridor	6.00	Convenience and Data Outlets, Wi-Fi, Air-Conditioned
12	CAFÉ	100.00	Mini-Kitchen, Counters, Tables and Chairs	6.00	Convenience and Data Outlets, Wi-Fi, Mini-Kitchen, Air-Conditioned
13	MEETING ROOM	56.00	12-15 pax	6.00	Convenience and Data Outlets, Wi-Fi, Air-Conditioned, Mobile and Fixed TV/Smart Screen, Glass Boards
14	RESTROOMS	46.87	Male, Female, PWD / All-Gender Restroom	2.70	Waterclosets, Urinal, Lavatory, Grab bar for PWD, Dryer, Mirror, Stop sink, Waterproofing
15	STORAGE / UTILITIES	18.00	Storage Area, Utility Room for Electrical/ Auxiliary, Plumbing	6.00	Electrical, Auxiliary, Mechanical and Plumbing
MEZZANINE - Second Floor					
16	INCUBATION ROOMS	260.00	7-small incubation rooms; 1- Large incubation room; hallways and mezzanine stairs	3.00	Convenience and Data Outlets, Wi-Fi, Mobile TV, Glass Boards, Air-Conditioned
CIRCULATION SPACES, MISC					
17	STAIRS, ELEVATOR/LIFT, ELEVATOR LOBBY, FIRE EXITS, WALLS, HALLWAYS	385.32		-	Machine Room-less Elevator for lift, see material specifications
ROOF					
18	DECK	Varies	Space for Utilities, Waterproofing (check general specifications); Other Areas shall be with roof (with insulation)	-	Solar Panels, Additional Utility Rooms, Area for ACU Outdoor Units / Condenser Units, for Gondola Lift
APPROX. TOTAL (±)		2,212.00			

Note: To follow Standard Philippine Codes on Design, Construction, Accessibility, Fire Protection & Utilities

Spaces shall be ready for use and occupancy of employees. To SDG. Refer to Equipment List for further information.

ANNEX C



BRANDING

Section 6 - ANNEX C

BRANDING

EXTERIOR AND INTERIOR

GENERAL NOTE: The images provided serve solely for reference purposes, and it is essential to clarify that there is no intention to claim ownership or authorship of the design depicted in these visuals. Their inclusion is solely for informative or illustrative purposes, aiming to provide additional context, elucidate concepts, or offer visual examples to enhance comprehension. This disclaimer is crucial to prevent any misunderstanding regarding the original or proprietary rights associated with the showcased design elements. Furthermore, the use of these images is strictly for reference, and no claim is made regarding their design or intellectual property.

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
TESDA logo	<p>To be placed at the façade, main lobby and elevator lobbies</p>   	Variations / Creative incorporation of TESDA logo. For Approval of TESDA
Graphic Walls	<p>Interior lobby. Science and Technology Theme. Abstract or Silhouttes</p> 	Combination of Blue, White, Gray
Carpet Tiles		Combination of Blue, White, Gray
Typography, Signages / Wayfindnig	  	Example of Fonts: Helvetica, Arial or minimalist. Accent colors on walls and floors thru heavy duty paint. Directional signs and room labels on glass frostings.

Contractor to submit samples and shop drawings for approval

GENERAL MATERIAL SPECIFICATIONS

EXTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Cladding / Façade Treatment	Aluminum Composite Cladding 	Structural performance: provide exterior/interior wall cladding assemblies capable of withstanding the effects of load and stresses from dead loads, wind loads, and normal thermal movement without evidence of permanent defects and stains of assemblies or components. Sealed joints shall allow free and silent movement of panels during expansion and contraction while preventing uncontrolled penetration of moisture. Submit shop drawings and samples for approval.
Walls (Interior and Exterior)	Combination of Cement finish with masonry coating/sealer and Acrylic Solvent-based paint on colored areas. 	Walls shall be made of pre-cast / pre-fabricated walls. Lightweight, higher compressive strength, sound insulation, fire, water and moisture resistant. Finishes shall be a combination of limewash and wall paint (acrylic solvent-based coating). Accent walls should be combination of colors blue and wood veneers. Employer/ TESDA approved color for other areas.
Waterproofing for roof decks and canopies	Two or multiple component, flexible cementitious waterproofing membrane. Proved concrete topping as additional layer Torch-membrane application is not recommended and allowed	Contractor to conduct a demo before actual application and/or approval. Minimum warranty of five (5) years.
Curtain Walls, Windows and Glass	As per manufacturer/suppliers' recommended specifications given the height Use of 12mm thk. Clear, Tempered Glass for glass doors. Powder-coated aluminum framing; Employer-approved color / shade. For areas facing South and West, apply Clear Glass Coating with 0.61 Solar Heat Gain Coefficient and an 86% Ultraviolet (UV) Deflection. 76% visible light transmission and 47% glare reduction. 	Contractor to submit shop drawings and samples for approval of employer / TESDA
Roofing (for selected areas)	Ga. 24 Pre-Painted Rib-type/corrugated roofing with double sided roof insulation (polyethylene foam): Gauge of Sheetting Spacing of Laths 26 450 mm – 600 mm 25 600 mm – 750 mm 24 600 for nails, 900 mm for screws	Can withstand Signal 4-5 typhoons.
Exterior Flooring	Non-Skid Cement tiles (80cmx80cm or larger) and pavers 	Contractor to submit samples for approval. 2.0mm max grouting width should and match the color of the tiles..
PWD Ramp	Refer to BP 344	Stainless Steel Railing, Tactile Blocks
Canopies (Glass)	High Impact, wind load resistant and translucent glass canopies with structural framing. Complete with structural framing and sealants	Toughened, laminated glass, shatter proof and has a high tensile strength to protect against cracking and breaking.
Louvers (Sun-Shading)	Aluminum Louvers 	Can withstand Signal 4-5 typhoons. Complete with framing and accessories. Check angle and position with the building orientation

Contractor to submit samples and shop drawings for approval

Section 6 - ANNEX C

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: Lobby, Lounge, Hallway / Corridors, Stairs (General Circulation)
Location: Ground Floor; Upper Floors





PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	Refer to schematic floor plan / tabulation	
Flooring	Polished Concrete 	5- 7 steps process. Employer/ TESDA to approved final color, size of aggregates. Check final floor elevation. Avoid topping less than standard height (50mm or above); Satin Finish / Sheen, Non Slip
Ceiling	Exposed Structural members and utilities with drop ceiling made of acoustic panels, 12mm thk.gypsum board (white) 	White color for all utilities. Provide proper tagging / marking for utilities (ex. Fire protection).
Walls	Light-colored limewash and combination of white 	Use of pre-fabricated or modular walls/blocks. Combination of limewash and wall paint (acrylic solvent-based coating). Accent walls should be combination of colors blue and wood veneers.
Lighting	-Fixture type -Color temperature(Kelvins) *cool/natural white: 4000-4500K *warm white for accent lighting (if applicable): 3000-3500K LED lighting,(Power-saving) Combination of drop light and recessed	Employer/ TESDA to approve design and colors of casing
Curtain Walls, Windows and Glass	As per manufacturer/suppliers' recommended specifications given the height Use of 12mm thk. Clear, Tempered Glass for glass doors. Powder-coated aluminum framing; Employer-approved color / shade. For areas facing South and West, apply Clear Glass Coating with 0.61 Solar Heat Gain Coefficient and an 86% Ultraviolet (UV) Deflection. 76% visible light transmission and 47% glare reduction. 	Contractor to submit shop drawings and samples for approval of employer / TESDA
Handrails	Wood (preferred to be locally sourced) with stain/color on steel framing/accessories 	Employer/ TESDA to approve design and colors of casing

Contractor to submit samples and shop drawings for approval

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: **Workshop Area; Multi-Disciplinary Fabrication Area; Maker Space;**
 Location: **All Floors; Mostly for Ground Floor**

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	Refer to schematic floor plan / tabulation	
Flooring	Epoxy Flooring (2-coat, heavy traffic, heavy duty) 	Excellent Chemical Resistant.,Self Leveling, Anti-slip, Antiskid, Antistatic, Fire Resistant, Oil, Stain & water resistant, Require little or no major maintenance). Heavy Loading Requirement for Equipment
Ceiling	Exposed structural members and utilities with drop ceiling made of acoustic panels, gypsum board (white) flat latex paint finish 	White color for all utilities. Provide proper tagging / marking for utilities (ex. Fire protection). Acoustic Ceiling Clouds colors will be subject for approval of employer/TESDA. Preferably shades of blue
Walls	Light-colored limewash and combination of white 	Use of pre-fabricated or modular walls/blocks. Combination of limewash and wall paint . Paint finishes: Use low VOC, semi-gloss or satin sheen latex/water-based paint finish. Minimum of 2 coats of paint color. Apply proper surface preparation and primer prior to application of paint color.
Lighting	1500-2000 Lux LED lighting,(Power-saving) Combination of drop light, recessed and task lighting	Employer/ TESDA to approve design and colors of casing. -Fixture type -Color temperature(Kelvins) *cool/natural white: 4000-4500K *warm white for accent lighting (if applicable): 3000-3500K
Curtain Walls, Windows and Glass Doors	As per manufacturer/suppliers' recommended specifications given the height Use of 12mm thk. Clear, Tempered Glass for glass doors. Powder-coated aluminum framing; Employer-approved color / shade. For areas facing South and West, apply Clear Glass Coating with 0.61 Solar Heat Gain Coefficient and an 86% Ultraviolet (UV) Deflection. 76% visible light transmittance and 47% glare reduction. 	Contractor to submit shop drawings and samples for approval of employer / TESDA
Window Treatment (Roller Blinds)	Single-colored (cream or light gray), PVC sunscreen-type roller blinds with 5% openness factor	Employer/ TESDA to approved-color





Contractor to submit samples and shop drawings for approval

Section 6 - ANNEX C

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: Co-Working Spaces, Showcase Area, Cafe, Pantry (Open Plan)
Location: Upper Floors

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	Refer to schematic floor plan / tabulation	
Flooring	Polished Concrete 	5- 7 steps process. Employer/ TESDA to approved final color, size of aggregates. Check final floor elevation. Avoid topping less than standard height (50mm or above); Satin Finish / Sheen, Non Slip
Ceiling	Exposed Structural members and (cloud ceiling) made of acoustic panels, gypsum board (white) 	White color for all utilities. Provide proper tagging / marking for utilities (ex. Fire protection).
Walls	Light-colored limewash and combination of white 	Use of pre-fabricated or modular walls/blocks. Combination of limewash and wall paint (acrylic solvent-based coating). For Accent Walls (Veneer): Use skin-type 0.5-0.6mm thickness veneer sheet. On concrete and on drywall applications: provide 1/2" thk plywood substrate. Ensure substrate is smoothened and free from dust and moisture prior to application. Adhesive must be polyvinyl acetate(PVA) glue or contact cement, or as per manufacturer/supplier's standard. Apply sheets with wood grains oriented vertically and in random match pattern. Heat press veneer sheet following application.
Lighting	500-1000 Lux LED lighting.(Power-saving) Combination of drop light and recessed	Employer/ TESDA to approve design and colors of casing. -Fixture type -Color temperature(Kelvins) *cool/natural white: 4000-4500K *warm white for accent lighting (if applicable): 3000-3500K
Curtain Walls, Windows and Glass Doors	As per manufacturer/suppliers' recommended specifications given the height Use of 12mm thk. Clear, Tempered Glass for glass doors. Powder-coated aluminum framing; Employer-approved color / shade. For areas facing South and West, apply Clear Glass Coating with 0.61 Solar Heat Gain Coefficient and an 86% Ultraviolet (UV) Deflection. 76% visible light transmission and 47% glare reduction. 	Contractor to submit shop drawings and samples for approval of employer / TESDA
Window Treamtent (Roller Blinds)	Single-colored (cream or light gray), PVC sunscreen-type roller blinds with 5% openness factor	Employer/ TESDA to approved-color






Contractor to submit samples and shop drawings for approval

Section 6 - ANNEX C

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: **Meeting Room / Conference Room**
Location: **Upper Floor**





PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	Refer to schematic floor plan / tabulation	
Flooring	Carpet Tiles 	At least 6mm thick, 50x50cm or 60x60cm (preferred); Employer/TESDA-approved colors and pattern. Preferably Blue and Gray combination
Ceiling	Acoustic Ceiling Panels / Tiles 	NRC - 1.00; Concealed Edges/Runners; White, 60cm x 60cm or 120cm x 60cm
Walls	Tempered Glass Walls and Doors. 	12mm thick Clear Tempered Glass Walls with frosting decal; Walls (Masonry) Pre-fabricated; Pre-Cast Wall with acoustic and insulation partitions between other rooms; One side should be installed with smart TV and finished with accent wall (colored or wood veneer). Veneer accent wall: Use skin-type 0.5-0.6mm thickness veneer sheet. On concrete and on drywall applications: provide 1/2" thk plywood substrate. Ensure substrate is smoothened and free from dust and moisture prior to application. Adhesive must be polyvinyl acetate(PVA) glue or contact cement, or as per manufacturer/supplier's standard. Apply sheets with wood grains oriented vertically and in random match pattern. Heat press veneer sheet following application.
Lighting	400-750 Lux LED lighting, (Power-saving) Combination of drop light, recessed and task lighting	Employer/ TESDA to approve design and colors of casing. -Fixture type -Color temperature(Kelvins) *cool/natural white: 4000-4500K *warm white for accent lighting (if applicable): 3000-3500K
Curtain Walls, Windows and Glass Doors	As per manufacturer/suppliers' recommended specifications given the height Use of 12mm thk. Clear, Tempered Glass for glass doors. For areas facing South and West, apply Clear Glass Coating with 0.61 Solar Heat Gain Coefficient and an 86% Ultraviolet (UV) Deflection. 76% visible light transmission and 47% glare reduction. Powder-coated aluminum framing; Employer-approved color / shade. 	Contractor to submit shop drawings and samples for approval of employer / TESDA
Glass Writing Board	Frameless, magnetic, "write-on" and project screen glass board. 	Locate on on side of meeting room/ conference area

Contractor to submit samples and shop drawings for approval

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: **Incubation Rooms**
 Location: **Upper Floors**

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	Refer to schematic floor plan / tabulation	
Flooring	Polished Concrete 	5- 7 steps process. Employer/ TESDA to approved final color, size of aggregates. Check final floor elevation. Avoid topping less than standard height (50mm or above); Satin Finish / Sheen, Non Slip
Ceiling	Acoustic Ceiling Panels / Tiles 	NRC - 1.00; Concealed Edges/Runners; White, 60cm x 60cm or 120cm x 60cm
Walls	Tempered Glass Walls and Doors and Operable wall 	1. Fronting Co-Working Space: Tempered Glass Walls with Frosting Decal (Cuts and Design for approval) 2. Between rooms: Movable or Operable Partition with Acoustic properties
Lighting	400-750 Lux LED lighting, (Power-saving) Recessed Lighting	Employer/ TESDA to approve design and colors of casing
Curtain Walls, Windows and Glass Doors	As per manufacturer/suppliers' recommended specifications given the height Use of 12mm thk. Clear, Tempered Glass for glass doors. For areas facing South and West, apply Clear Glass Coating with 0.61 Solar Heat Gain Coefficient and an 86% Ultraviolet (UV) Deflection. 76% visible light transmission and 47% glare reduction. Powder-coated aluminum framing; Employer-approved color / shade. 	Contractor to submit shop drawings and samples for approval of employer / TESDA
Window Treamtent (Roller Blinds)	Single-colored (cream or light gray), PVC sunscreen-type roller blinds with 5% openness factor	Employer/ TESDA to approved-color

Contractor to submit samples and shop drawings for approval

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: **Packaging, Processing Facility; Cold Storage Facility**
 Location: **All Floors**







PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	Refer to schematic floor plan / tabulation	
Flooring	Polyurethane Flooring 	4-component polyurethane self-levelling system. Slip-resistant mortar system; mixture of high-grade polyurethane resin base with hardener and fillers; 6mm-25mm total thickness application Cures to a sturdy flooring system with a smooth matte-colored finish. For Cold Storage facility /storage; High-Impact, Chemical- and Water Resistant, Anti-Slip, Anti-bacterial;
Ceiling and Walls	Option 1: Insulated Metal Panels or PVC Panels  Option 2: Expanded polystyrene (EPS) wall panels Lightweight, non-load bearing precast wall panel; Compressive strength of 400-700 PSI; with fireproof rating of 4hrs against 1000 deg. C; 100-150mm thickness; water and moisture resistant; Painting- Water based paint (acrylic or latex); non-solvent type; apply as per EPS wall manufacturer's standard	Contractor to submit samples for approval of employer / TESDA. Food Grade, Moisture Resistant. Anti-Bacterial
Lighting	500-1000 Lux LED lighting, (Power-saving) Combination of drop light, recessed and task lighting	Employer/ TESDA to approve design and colors of casing. -Fixture type -Color temperature(Kelvins) *cool/natural white: 4000-4500K *warm white for accent lighting (if applicable): 3000-3500K
Doors and Windows	Steel/ Aluminum (Food Grade); Air Seal, View Panel, Self and Quick Closing, PWD-Friendly, Kick-Plates 	Contractor to submit shop drawings and samples for approval of employer / TESDA; RFID/ Security Access
Ventilation, Exhaust and Air-Conditioning	Verify with Standards for Cold Storage and Processing Facilities	

Contractor to submit samples and shop drawings for approval

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: **Restrooms; PWD CR/ All-Gender Toilet**
 Location: **All Floors**

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	<i>Refer to schematic floor plan / tabulation</i>	
Flooring	60x60cm Homogenous, Non-Slip Tiles 	Homogenous Rectified Non-Slip Tiles. Employer/TESDA-approved colors. 2.0mm max grouting width should and match the color of the tiles. Provide waterproofing for upper floors.
Ceiling	12mm thk. Moisture-Resistant Gypsum Boards 	Ceiling Height at Ground Floor: 2.70 meters, for Upper Floors: 2.50 meters. White Color, provide shadow gap, cornice and accent colors.
Walls	30x60cm Homogenous Tiles and Phenolic Board Partition 	Homogenous Rectified, 2.0mm max grouting width. Phenolic Board Partitions should have stainless steel hardware. Employer / TESDA to approved colors.
Lighting	100-300 Lux (Warm White); LED lighting, (Power-saving) Recessed Lighting (General), Strip Lights and Sconce at Mirror/Lavatory	Employer/ TESDA to approve design and colors of casing
Windows	Aluminum Powder Coated Frame, Awning.	Refer to Exterior/ Co-Working Area Specifications
Urinal	Water-less type / water-saving 	At least 300mm wide and the lip of the collection area shall project from the wall at least 300mm. Should not be set closer than 450mm from its center to any side wall partition. A ledge or should be installed in the cubicles for putting personal items.
Water Closet	Flush valves, single flush; water-saving 	Concealed Sensor Toilet Flush Valve with Manual Override. Preferably be wall hung, without leg support, so as to facilitate cleaning. A ledge should be installed in the cubicles for putting personal items.
Lavatory and Counters	Semi-Counter Type Lavatory on Quartz Countertop 	Hands-free / touch less faucet; Countertop color for approval of employer/TESDA
PWD-Fixtures	Refer to BP 344 standards for handrail and heights	Stainless steel
Accessories	Hand dryer and automatic paper towel dispenser Infant changing table	

Contractor to submit samples and shop drawings for approval

Section 6 - ANNEX C

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD/ MINIMUM REQUIREMENTS

Space / Function: **Storage / Utilities, Fire Exit Access, Special Equipment**
 Location: **All Floors**

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Size / Floor Area	<i>Refer to schematic floor plan / tabulation</i>	
Flooring	Polished Concrete 	5- 7 steps process. Employer/ TESDA to approved final color, size of aggregates. Check final floor elevation. Avoid topping less than standard height (50mm or above); Satin Finish / Sheen, Non Slip
Ceiling	Exposed Structural members and utilities. Soffit Painted White 	Provide proper tagging / marking for utilities (ex. Fire protection).
Walls	White, Semi Gloss Latex 	Use of pre-fabricated or modular walls/blocks. Semi Gloss Latex (White)
Lighting	500-1000 Lux LED lighting,(Power-saving) Combination of drop light and recessed	Employer/ TESDA to approve design and colors of casing. -Fixture type -Color temperature(Kelvins) *cool/natural white: 4000-4500K *warm white for accent lighting (if applicable): 3000-3500K
Large Ceiling Fans	Industrial Ceiling Fans 	For Workshop Areas and Optional for Co-Working Spaces / Events Space
Gondola Lift	Provide suspended lift at roof decks for gondola access   	For maintenance and transport of materials

Contractor to submit samples and shop drawings for approval

GENERAL MATERIAL SPECIFICATIONS

INTERIOR FINISHES STANDARD MINIMUM REQUIREMENTS

Space / Function:
Location:

Doors, Windows and Railings
All Floors

PARAMETER	REQUIREMENTS / PREFERRED	REMARKS
Curtain Walls, Windows and Glass Doors	<p>As per manufacturer/suppliers' recommended specifications given the height</p> <p>Use of 12mm thk. Clear, Tempered Glass for glass doors. Powder-coated aluminum framing; Employer-approved color / shade.</p> <p>For areas facing South and West, apply Clear Glass Coating with 0.61 Solar Heat Gain Coefficient and an 86% Ultraviolet (UV) Deflection. 76% visible light transmission and 47% glare reduction.</p> 	Contractor to submit shop drawings and samples for approval of employer / TESDA
Doors (Glass) Room locations: Meeting Rooms, Mezzanine Floors, Incubation Rooms.	<p>12mm thk. Tempered Glass, Frameless Panel with glass frosting</p> 	At least 2.4 meters in high, 0.80m wide for single door, 1.60m wide for double doors. Complete with hardware, locks and accessories. Ready to received RFID/Security Access. Whole door/s can be framed with Aluminum (Powder Coated) but panels should be frameless. Install decorative frosting (typography/room labels). Contractor to submit samples and shop drawings
Doors (Steel) Room locations: Workshop Areas, Maker Space, Co-Working Spaces, Fire Exits	<p>Double Leaf Swing Door, Double Action</p> 	At least 2.40meters high and 1.50m width (Clear Opening; Fire Rated. View Glass panel should be made of tempered glass. With Aluminum Kickplates, Complete with hardware and accessories. Owner Approved Color/s. Fire Exit Signs (Illuminated)
Doors (Steel) Single Door Fire Exits		Fire Rated. View Glass panel should be made of tempered glass. With Aluminum Kickplates, Complete with hardware and accessories. Fire Exit Signs (Illuminated)
Roller Shutter	<p>For Workshop Area. Automatic/Remote Controlled with Manual Override. At least 4.50m high</p> 	with wicket door or personnel (pedestrian access) at least 1.0 meter width for the door
Restroom Doors	<p>Self-closing. Solid Wood, with heavy duty, aluminum fittings.</p> 	With labels and typography. Self-closing. At least 2.4m high. Finish can be stained or high pressure laminate with aluminum kick-plates.
Railings	<p>Combination of Steel and Glass (Clear, Tempered) Railings</p> 	Preferably Black or Gray

Contractor to submit samples and shop drawings for approval

ANNEX D

SCHEMATIC FLOOR PLANS

ADMIN. BUILDING

ANNEX D- SCHEMATIC FLOOR PLANS RTIC -TUGUEGARAO COLD-CHAIN

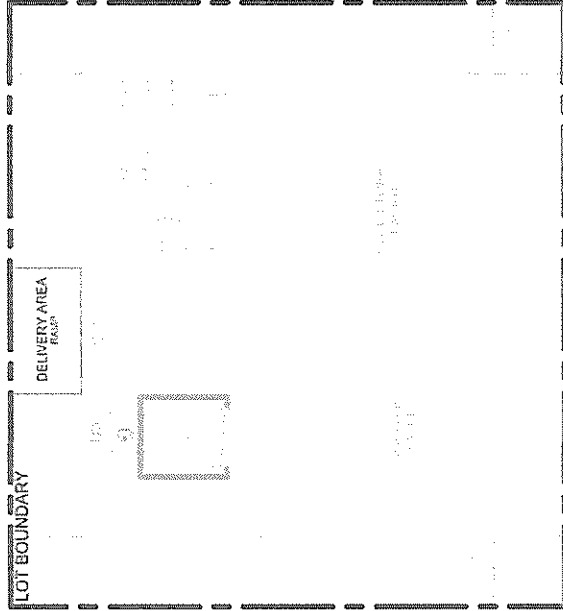


±25.50

±3.90

±38.70

EXISTING ROAD / A/C TO OVERHEAD BRIDGE

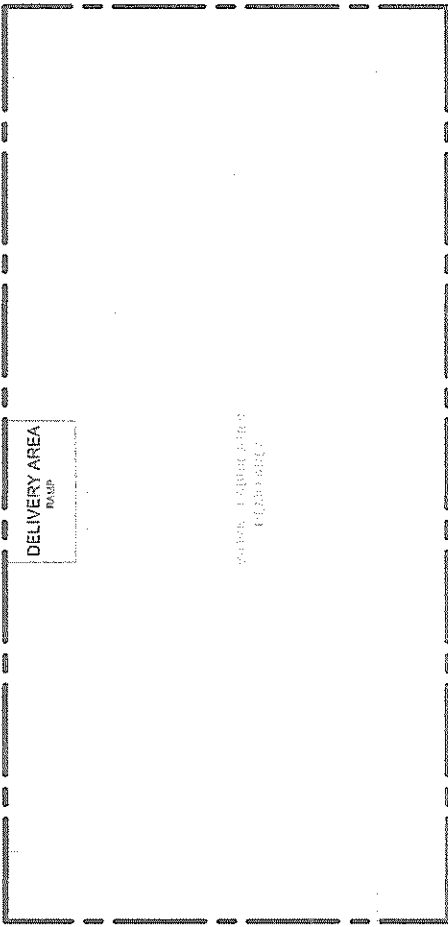


LOT BOUNDARY

EXISTING TEMA ROAD

EXISTING ROAD / A/C TO OVERHEAD BRIDGE

LOT BOUNDARY



LOT BOUNDARY

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SCHEMATIC / CONCEPTUAL SITE DEVELOPMENT PLAN



THE
MAZDAHARA
RIVER

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**SCHEMATIC / CONCEPTUAL
SECOND FLOOR PLAN**

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THE NEW YORK PUBLIC LIBRARY

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SCHEMATIC / CONCEPTUAL

MEZZANINE - SECOND FLOOR PLAN

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2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138	140	142	144	146	148	150	152	154	156	158	160	162	164	166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198	200
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90	93	96	99	102	105	108	111	114	117	120	123	126	129	132	135	138	141	144	147	150	153	156	159	162	165	168	171	174	177	180	183	186	189	192	195	198	201	204	207	210	213	216	219	222	225	228	231	234	237	240	243	246	249	252	255	258	261	264	267	270	273	276	279	282	285	288	291	294	297	300
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116	120	124	128	132	136	140	144	148	152	156	160	164	168	172	176	180	184	188	192	196	200	204	208	212	216	220	224	228	232	236	240	244	248	252	256	260	264	268	272	276	280	284	288	292	296	300	304	308	312	316	320	324	328	332	336	340	344	348	352	356	360	364	368	372	376	380	384	388	392	396	400
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230																																																						

ANNEX E

RTIC FOCAL AREA SHOWCASE

ANNEX E:

RTIC Focal Area Showcase Components and Innovation Makerspace Specifications

Components of the Intelligent Cold Chain Showcase @ RTIC TUGUEGARAO

- **Automated Storage and Retrieval Systems (AS/RS):** Systems can automatically store and retrieve goods in a temperature-controlled warehouse.
- **Intelligent Refrigeration Units:** These are storage units that automatically adjust their temperature based on the type of products stored and outside environmental conditions.
- **IoT-enabled Temperature and Humidity Sensors:** Sensors collect real-time data about the conditions inside storage and transportation units and alert on failure of chiller units.
- **AI-powered Cold Chain Management Software:** Software can analyze real-time data from IoT devices, predict potential issues, and provide actionable insights for improving cold chain operations.
- **Energy-Efficient Equipment:** Energy-efficient refrigeration units, vehicles, and other equipment to reduce the environmental impact of the cold chain.
- **Automated Guided Vehicles (AGVs) and Autonomous Mobile Robots (AMRs):** Vehicles can transport goods within a warehouse without human intervention.
- **Intelligent Transport Systems:** Monitor and control the conditions inside a vehicle during transportation, and reroute the vehicle based on weather conditions and traffic.
- **Cloud Computing Solutions:** For storing and analyzing large amounts of data from IoT devices and other sources.
- **RFID and NFC Technology:** Radio-Frequency Identification (RFID) and Near Field Communication (NFC) tags can provide real-time tracking of goods in the cold chain.
- **GPS Tracking and Geofencing Tools:** Tools that provide real-time location tracking of goods in transit and alert managers if a vehicle moves out of a predefined geographical area.
- **Smart Packaging Solutions:** Packaging with built-in sensors that can monitor the condition of the product and transmit this data to a centralized system.
- **Drones with Temperature-Controlled Compartments:** For last-mile delivery of temperature-sensitive goods.
- **Augmented Reality (AR) Devices:** AR can help with maintenance of equipment, navigation within warehouses, and training of staff.
- **Blockchain Technology:** Blockchain can be used for secure and transparent data sharing across the cold chain.
- **Machine Learning and Predictive Analytics Tools:** These can analyze historical data to predict future demand, optimize inventory levels, and improve route planning.



General Specification for Makerspace @ RTICs

Parameter	Norm	Remarks
Electrical Loading Requirement	3-phase power supply for conventional mill, turn, grinder Each mill, turn, grind 15 KVA and each machine assembly project station 2 KVA 16A electrical socket outlet should be provided for general use in the workshop All electrical installation should comply with local regulations	
Floor Requirement	Project work and storage area: 12 KN 300 mm concrete 2 coats epoxy industrial paint Raised floor at least 350 kg/m ² Vinyl composition to reduce dust and improve electrical insulation	
Lighting Requirement (Lumen)	Standard ceiling flourescent lightings at 25 W/m ² Emergency lights	
Building Safety Code Requirement	Comply with national safety code requirements	
Door Width	At least 1.5 m wide	

A = ampere, D = dimensional, kg/m² = kilogram per square meter, KN = kilonewton, kVA = kilo volt ampere, m = meter, mm = millimeter, W/m² = watt per square meter.

TUGUEGARAO RTIC



Equipment, Furniture and Electricals Recommendations for Cold Storage Focus

1. Multi-Disciplinary Heavy Fabrication Workshop – Level 1

Equipment Category	Detailed Equipment	Equipment Description	Quantity
1. CNC Equipment	CNC Milling Machine	Computer controlled milling machine for precise cutting and shaping	1
2. Lathes	Metal/Wood Lathe	Machine for shaping metal	1
3. Mill/Router	Metal/Wood Mill/Router	Used for hollowing out an area in a piece of wood	1
4. Brazing Equipment	<ul style="list-style-type: none"> Brazing Torch Kit Brazing Rods Flux Fire-Resistant Mat/Blanket Safety Gear Vice/Clamps Acetylene and Oxygen Tanks Cylinder Cart Refrigeration Tubing Tube Cutter Tube Bender Tube Brushes/Tube Cleaning Kit 	Comprehensive Brazing station	1
5. Hand Tools	<ul style="list-style-type: none"> Screwdrivers Set Variety of sizes and types (Phillips, flathead, etc.) Pliers Set Variety of types (needle-nose, slip-joint, etc.) Wire Cutters For cutting and stripping wire Precision Knife For fine cutting and trimming tasks Hammers Various types for different tasks (claw hammer, ball-peen hammer, etc.) Saws 	Basic set of hand tools for various tasks	1
6. Drilling Tools	Bench Drill Press	Stationary drill for precise hole placement	1
	Band Saw	For cutting wood or metal	1
	Circular Saw	Portable saw for cutting wood	1
	Jigsaw	Portable saw for cutting curves	1

	Metal Shear	For cutting sheet metal	1
7. Bending Tools	Metal Bender	For bending metal rods and bars	1
	Sheet Metal Brake	For bending sheet metal	1
8. Measurement Tools	<ul style="list-style-type: none"> • Callipers • Micrometer • Ruler • Square • Protractor • Tape Measure 	Comprehensive measurement tools set	2
9. Safety Equipment	<ul style="list-style-type: none"> • Eye Protection • Ear Protection • Dust Masks • Fire Extinguisher 	Safety equipment for various tasks	10 sets
10. Other Tools	Sanding Machine	For smoothing and finishing wood and metal	1
	Bench Grinder	For sharpening tools and grinding metal	1
	Belt Sander	For smoothing and finishing large surfaces	1
	Clamping Tools Set (C-clamps, Bar Clamps, Bench Vice)	For securely holding workpieces	1
11. Compressor/Vacuum	Industrial Air Compressor	An air compressor capable of providing the needed air pressure and flow for a CNC machine.	
	Industrial Vacuum System	A vacuum system designed for use with a CNC machine.	
12. Consumables	CNC Milling Bits	For use with the CNC machine	10
	Lathe Cutting Tools	For use with the lathes	10
	Router Bits	For use with the router	10
	Drill Bits	For use with the drill press	20
	Band saw Blades	For use with the band saw	5
	Circular Saw Blades	For use with the circular saw	5
	Jigsaw Blades	For use with the jigsaw	10
	Sandpaper	For use with the sanding machine and belt sander	50
	Grinding Wheels	For use with the bench grinder	5
	Screws, Nails, Fasteners	Assorted sizes and types for various projects	100

Furniture

Category	Detailed Equipment	Equipment Description	Quantity
Furniture	Workbenches	Heavy-duty tables for performing work	3
	Storage Cabinets	For securely storing tools and materials	2
	Chairs	For sitting while working	20
	Tool Chests	For organizing and storing small tools	2
	Shelving (3D Printers)	For 3D Printers	2

Electrical Outlet Points

Equipment Category	Detailed Equipment	Equipment Description	Quantity
Electrical Outlets	240V Single Phase Outlet	Standard wall outlets for various tools and machines	16
Electrical Outlets	415V Three Phase Outlet	High-capacity outlets for heavy machinery like the CNC machine and welder	5
Electrical Outlets	240V GFCI Single Phase Outlet	Ground fault circuit interrupter outlets for safety for CNC, Milling, Lathe and Router	4
Total Outlets			24

2. Work Fabrication Area – Level 1

Equipment Category	Equipment Description	Quantity
13. 3D Printers	High-Resolution 3D Printers (For prototyping and model creation)	5
14. Filament	PLA Filament (standard for most general-purpose printing)	10
	PLA Filament (standard for most general-purpose printing)	10
	Specialty Filament (flexible, wood-infused, metal-infused, etc.)	10
15. Printer Maintenance	Print Bed Surface	2
	Replacement Nozzles	5
	Cleaning and Scraping Tools	2
16. Design Software	CAD Software License (like Tinkercad, Fusion 360)	
17. Computers	Computers (For 3D modelling, research, etc.)	2
18. Post-processing	Deburring Tools	2 sets
	Sandpaper Assortment	2 sets
19. Laser Cutter	High Resolution Laser Cutter	1

20. Safety Equipment	Fire Extinguisher	1
	Fume Extractor (particularly for ABS or other noxious materials)	1
21. Measurement Tools	Callipers (For precise measurements)	5
	Level (For ensuring proper alignment)	5
22. Safety Equipment	Safety Glasses (Eye protection)	20
	First Aid Kits (Emergency treatment)	2
23. Workshop Furniture	Workbenches (Workstation for users)	3
	Drafting Chairs (Adjustable seating for users)	18
	Computer Desks (Workstation for staff)	2
	Office Chairs (Seating for staff)	2
	3D Printer Stands/Cabinets (Dedicated housing for 3D printers)	5
24. Storage	Filament Storage Boxes	5
	Tool Storage Box	1

3. Cold Storage and Packaging Area – Level 1

Equipment/Item	Description	Quantity
25. Walk-in Freezer Unit	This will be the main freezing unit for the facility. The price will vary widely based on the specific model, size, and type of freezer.	1
26. Insulation Panels (Walls)	To ensure proper insulation of the facility, which is critical for maintaining low temperatures.	1
27. Pallet Racking	For organizing and storing products within the freezer.	4
28. Floor Sealer	A high-quality floor sealer to resist the cold temperature and moisture.	1
29. Refrigeration System	An industrial refrigeration system to keep the facility cold.	1
30. Industrial Dehumidifier	To control moisture and prevent ice build-up inside the facility.	1
31. Lighting	Cold-resistant LED lighting suitable for cold storage facilities.	4
32. Pallet Jacks	Equipment for moving products around within the facility.	2
33. Insulated Doors	Special doors designed to withstand cold temperatures and maintain insulation.	1
34. Emergency Exit	Safety installation for emergencies, including proper signage and lighting.	1
35. Temperature Monitoring System	A system for monitoring the temperature and ensuring it remains at the appropriate level.	1
36. Intelligent Energy Management System	A system for managing and optimizing energy usage in the facility.	1

Category	Equipment Description	Quantity
37. Measurement Tools	Digital Kitchen Scales (Accurate measurements)	4
	Thermometers (Infrared and Probe) (Temperature monitoring)	4
	pH Meters (Acidity monitoring)	2
38. Safety Equipment	Fire Extinguishers (Fire safety)	2
	First Aid Kits (Emergency treatment)	1
39. Packaging Equipment	Vacuum Packaging Machine (Airtight food packaging)	1

4. Equipment for Electronics, Robotics and IOT Workshop (Level 1 Mezzanine)

Equipment Category	Equipment Description	Quantity	Details
43. Microcontrollers	Arduino Uno	8	Open-source electronic prototyping platform enabling users to create interactive electronic objects.
44. Microcontrollers	Raspberry Pi 4	8	Compact computer board used for a variety of applications and projects.
45. Microcontrollers	ESP32	8	A series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth.
46. Microcontrollers	ESP8266	8	A low-cost Wi-Fi chip with full TCP/IP stack and MCU capability.
47. Sensors	Various Sensors	8 (sets)	<p>Sensor kits for a variety of IoT projects or equivalent:</p> <ul style="list-style-type: none"> • DHT22 (Temperature & Humidity Sensor) • PIR Motion Sensor • HC-SR04 (Ultrasonic Distance Sensor) • Photocell (Light Sensor) • MPU6050 (Gyroscope & Accelerometer) • Reed Switch (Magnetic Sensor) • Soil Moisture Sensor • MQ-2 Gas Sensor • Load Cell & HX711 Amplifier (Weight Sensor) • Sound Sensor (Microphone Module) • Infrared Obstacle Avoidance Sensor • LDR (Light Dependent Resistor) • Hall Effect Sensor (Magnetic Field) • Pulse Rate Sensor
48. Actuators	Various Actuators (Servo Motors, DC Motors, LEDs)	8 (sets)	<p>Actuator kits for robotics and IoT projects or equivalent:</p> <ul style="list-style-type: none"> • Servo Motor (SG90) • DC Motors • Stepper Motor (28BYJ-48 with ULN2003 Driver) • Brushless DC Motor • Solenoid • Piezoelectric Actuator • Linear Actuator • Relay Module • LED Light Strip • Speaker/Buzzer

49. IoT Modules	Various IoT Modules	8 (sets)	IoT module kits for various connectivity options or equivalent: <ul style="list-style-type: none"> • ESP8266 WiFi Module • HC-05 Bluetooth Module • SIM800L GSM Module • NEO-6M GPS Module • RAKWireless LoRa Module • XBee Pro S2C • RFID reader and tags
50. Circuit Components	Basic Electronics Components Kit (Resistors, Capacitors, Diodes, Transistors, ICs, Breadboards, Jumper wires, Power supplies)	8	Basic electronics kits for building and testing circuits. <ul style="list-style-type: none"> • Resistors (Assorted) • Capacitors (Assorted) • Diodes • Transistors (Assorted) • Integrated Circuits (Assorted) • Breadboards • Jumper Wires (Assorted) • DC Power Supply • LED (Assorted) • Switches (Assorted) • Relays • Stepper Motors • Motor Driver ICs • FPGA Development Boards • Function Generator
51. Displays	Various Displays	8 (sets)	Variety of display types for different project needs. <ul style="list-style-type: none"> • 7" TFT LCD Display • OLED Display Module • 32x8 LED Matrix Panel
52. Computers	Laptop Computers	6	Following specification or aboe: <ul style="list-style-type: none"> • i5 or Ryzen 5 • 16 GB RAM • 500GB SSD • FHD screen • USB and HDMI ports • Battery life of more than 5 hours
53. Robotic Arms	ABB's GoFa or UFactory 850 collaborative robot	2	High-speed, high-precision collaborative industrial robotic arm.
54. Soldering Tools	Soldering Tools Set	8	Essential tools for assembling electronic components. <ul style="list-style-type: none"> • High-Precision Soldering Station • Lead-Free Solder Wire • Desoldering Pump

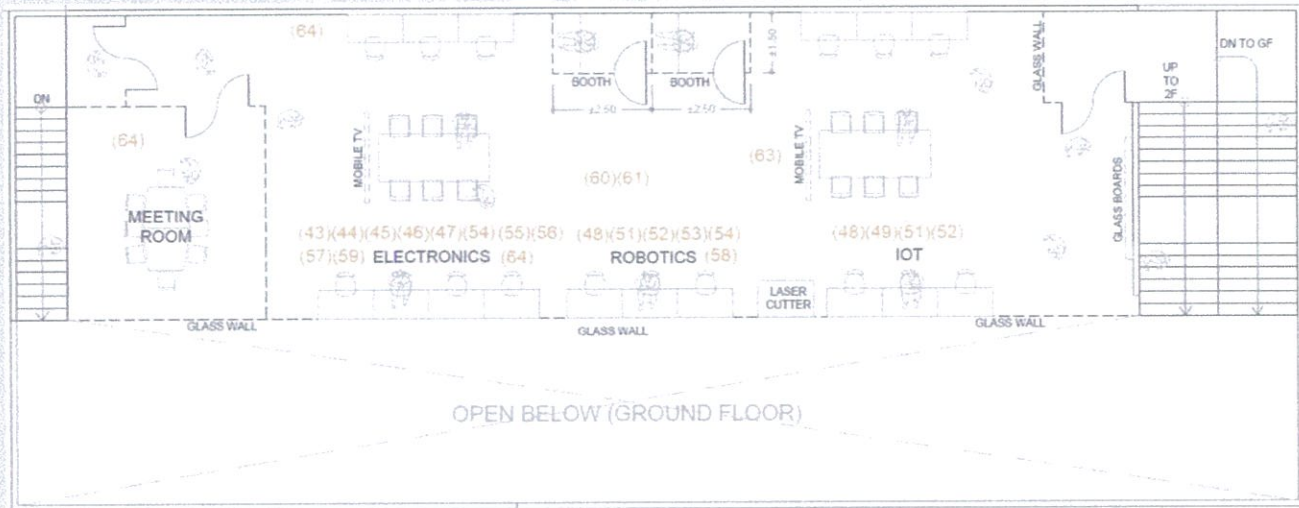
			<ul style="list-style-type: none"> • Soldering Tips (Variety pack) • Solder Wick • Flux Pen • Tip Tinner • Helping Hands with Magnifying Glass • Safety Glasses • Soldering Mat
55. Measurement Tools	Multimeter	8	Instrument for testing electrical connections and activity.
	Oscilloscope	2	Instrument for observing varying signal voltages.
56. Hand Tools	Hand Tools Set (Screwdrivers, Pliers, Wire Cutters, Precision knife)	8	<p>Essential tools for manual work on projects.</p> <ul style="list-style-type: none"> • Set of pliers • Set of screw drivers • Set of wire markers • Wire strippers • Digital multi-meter • Wire crimpers • Clamp ammeter • Mobile tool trolley • Plastic cable tray 1 m × 1.5" × 1.5"
57. Other Tools	Other Tools Set	8	<p>Additional tools for constructing and securing electronic projects.</p> <ul style="list-style-type: none"> • Heat shrink tubing • Adhesive tapes • Heat gun • PCBs • PCB Etching solution • Heat shrink tubing (assorted sizes) • PCBs and PCB Etching solution • Precision Knife Set
58. 3D Printing Tools	3D Printer	2	For fabricating custom parts and components.
59. (Safety Equipment)	Safety Equipment Set	8	<p>Safety equipment to ensure user safety during hands-on work.</p> <ul style="list-style-type: none"> • Safety Glasses • Fume Extractor for Soldering • Antistatic Mat • Antistatic Wrist Strap • Ear Plugs • First Aid Kit • Fire Extinguisher (special for electrical fires) • Safety Gloves (for handling hot or sharp objects)

			<ul style="list-style-type: none"> • Ear Protection (if using noisy tools) • Emergency Exit Signage •
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Furniture

Category	Furniture	Quantity	Description
60. Workstations	Workbenches/Tables	10	Sturdy workbenches for hands-on work.
	Comfortable Chairs	8	Comfortable chairs for extended work periods.
	Computer Desks	6	Desks for computers and electronics work.
	Computers for Design/Coding	6	Computers for design and coding tasks.
61. Storage	Storage Cabinets for Tools	2	Cabinets for storing tools and equipment.
	Storage Cabinets for Components	2	Cabinets for storing electronic components.
	Shelves for Projects/Robots	2	Shelves for displaying projects and robots.
	Rolling Tool Chests	2	Mobile tool chests for flexible workspace.
	Filing Cabinet for Documentation	1	Cabinet for storing documentation and records.
62. Safety & Cleanup	Soldering/Hot Work Station	1	Dedicated station for soldering and hot work.
	Safety Equipment Storage	1	Storage for safety equipment like goggles and gloves.
	Trash/Recycling Bins	2	Bins for waste management.
	First Aid Kit	1	First aid kit for minor injuries.
	Fire Extinguisher	1	Fire extinguisher for safety.
63. Teaching & Presentation	Large Whiteboards	4	Whiteboards for teaching and brainstorming.
	Large Screen TVs	2	TV for presentations and media display.
64. Meeting Room	Conference Table	1	Large conference room table
	Large Screen TV	1	TV for presentations and media display
	Conference Room Chairs	12	Comfortable chairs for the conference table

Indicative Layout (Level 1 Mezzanine)



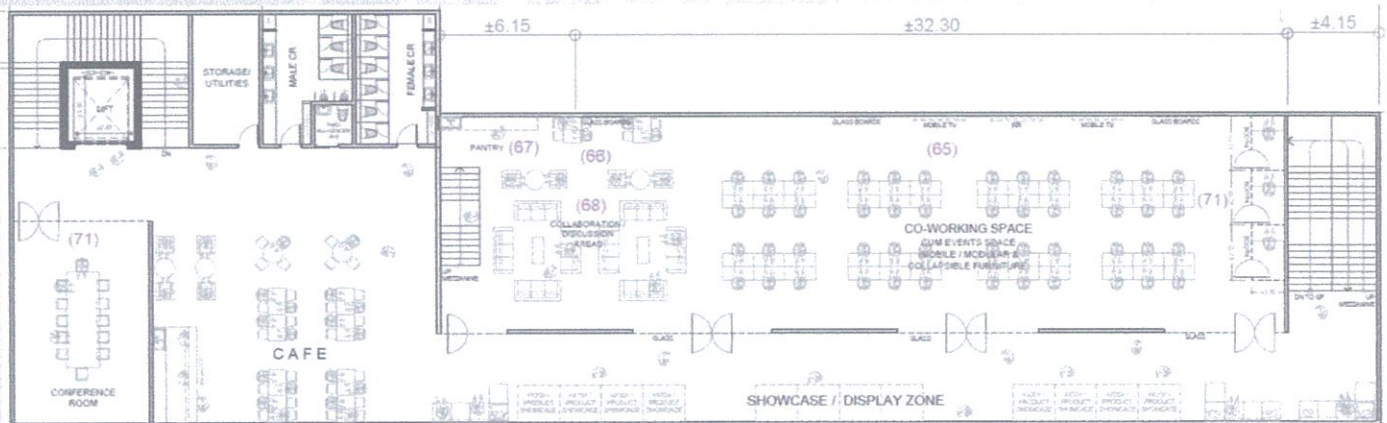
Electrical Outlet Points (240V – Single Phase)

Electrical Outlet to Support Equipment/Furniture	Quantity	Electrical Points per Unit	Total Electrical Points
Desks (Workbenches/Tables + Computer Desks)	16	4	64
3D Printers	2	2	4
Computers for Design/Coding	6	2	12
Large Screen TVs	3	2	6
Meeting Room Conference Table	6	2	12
Total Electrical Outlets			98

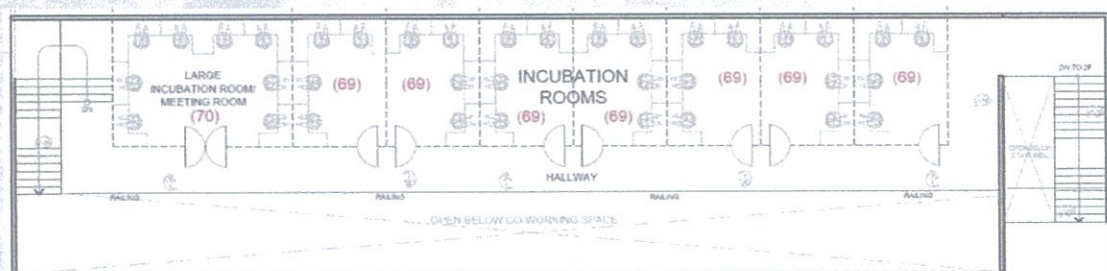
5. Incubation, Co-Working and Event Space (Level 2 & 2M)

Category	Item	Quantity
65. Co-working Space	Office chairs on rollers	48
	Foldable tables on rollers	48
66. Dining Area	Dining tables	2
	Dining chairs	8
67. Pantry	Refrigerator	1
	Microwave Oven	1
	Electric Kettle	1
	Coffee Maker	1
	Water Dispenser	1
	Dish Rack	1
	Storage Cabinets	As needed
	Cutlery & Crockery	As needed
68. Sofa Area	3-Seater Sofas	8
	Coffee tables	2
69. Small Incubation Rooms (6x)	Mobile tables on rollers	6
	Office chairs	28
	Whiteboards	7
	Notice boards	7
70. Large Incubation Room (1x)	Mobile tables on rollers	8
	Office chairs	8
	Large whiteboard	2
	Notice board	1
71. Conference Room	Conference Table	1
	Conference Room Chairs	12
	Large TV Display	1
72. Telephone Booths	Single-person desk	3
	Office chairs	3

Indicative Layout – Level 2



Layout – Level 2 Mezzanine



Electrical Outlet Points

Category	Item	Outlet Points Needed	Voltage
Co-working Space	Foldable tables on rollers	48	240V 1P
Incubation Rooms	Desk points	36	240V 1P
Dining Area	Dining tables	2	240V 1P
	Dining chairs	8	240V 1P
Pantry	Refrigerator	1	240V 1P
	Microwave Oven	1	240V 1P
	Electric Kettle	1	240V 1P
	Coffee Maker	1	240V 1P
	Water Dispenser	1	240V 1P
Sofa Area	Coffee tables	4	240V 1P
	Total Outlet Points	103	

ANNEX F

COST ESTIMATE GUIDE GENERAL SCOPE OF WORK

Section 6 - ANNEX F

GENERAL SCOPE OF WORK COST ESTIMATE GUIDE

CODE	DESCRIPTION
0.00	PROFESSIONAL FEES
1.00	Detailed A&E Design / Professional Fee
2.00	As-Built of Existing Structures/Building for Rehabilitation / Renovation
	SURVEY AND TESTING
3.00	Geodetic Survey
4.00	Geotechnical Investigation/ Soil Test
5.00	Location and Orientation of Facilities
6.00	Hydrology (if applicable)
7.00	Hydraulic (if applicable)
8.00	Seismic
9.00	Existing Environmental Conditions
10.00	Others
DIV 01	GENERAL REQUIREMENTS
1.00	Permits and Fees
2.00	Overhead
3.00	Temporary Facilities and Controls
4.00	Equipment
5.00	Insurance
6.00	Bonds
7.00	Field Engineerings
8.00	Structural Test and Special Field Tests
9.00	Management and Coordination
10.00	Construction Progress Documents
11.00	Temporary Construction Facilities and Controls
12.00	Utilities
13.00	Room Integrity Testing
14.00	Construction Waste Management
15.00	Product Requirements
16.00	Warranties and Bonds
17.00	Closeout Procedures
18.00	Operation and Maintenance Data
19.00	Functional Performance Testing (FPT) Coordination
20.00	Demonstration and Training
21.00	Environmental Management Plan
22.00	Shop Drawings for Approval, As-Built Plans for Occupancy Permit, Project Manual
23.00	HEALTH AND SAFETY
	Environmental, Health and Safety Management
24.00	Others
DIV 02	SITE WORK
1.00	Site Preparation
2.00	Selective Demolition & Clearing
3.00	Earthworks & Retaining Structures
4.00	Site Drainage + Dewatering
5.00	Concrete Curbs, Gutters and Paved Walks
6.00	Roads and Parking (pavement)
7.00	Site Electrical and Transformers
8.00	Site Water Supply & Service Entrance
9.00	Integrated Pest Management
10.00	Hardscaping
11.00	Soft Landscaping
12.00	Demobilization & Clearing
13.00	Building Layout
14.00	Top Soil Stripping and Re-use
15.00	Excavation

16.00	Fill/Backfill Compacted
17.00	Termite Treatment
18.00	Others
DIV 03 CONCRETE	
1.00	Forms, Scaffoldings & Accessories
2.00	Footings
3.00	Grade Beams / Footing Tie Beam
4.00	Columns, Beams and Girders
5.00	Shear/ Lower Ground Walls
6.00	Suspended Slabs
7.00	Lower Ground Floor Slabs & Slabs on Fill
8.00	Stairs
9.00	Cisterns (Potable an& Rainwater)
10.00	Concrete Gutters, Parapets and Ledges
11.00	Equipment Pads
12.00	RC Testing
13.00	Others
DIV 04 MASONRY	
1.00	CHB & Other Masonry Walls
2.00	Pre-fabricated / Pre-cast Walls
3.00	Cast Stone Sills, Thresholds and Walls
4.00	Masonry Accessories
5.00	Others
DIV 05 METALS	
1.00	Structural Steel
2.00	Miscellaneous Structural Steel
3.00	Welding and Fasteners
4.00	Stainless Steel Hand and Grab Rails
5.00	Metal Stairs and Railings
6.00	Factory-Applied Metal Coatings
7.00	Aluminum Tube Railings
8.00	Aluminum Equipment Screen
9.00	Fiberglass Gratings
10.00	Architectural Joint Systems
11.00	Gondola Lift (installed at roof deck)
12.00	Others
DIV 06 WOOD & PLASTIC	
1.00	Miscellaneous Rough Lumber
2.00	Interior Woodwork, Baseboards & Miscellaneous
3.00	Wood Veneers
4.00	Reception and Security Desks
5.00	Others
DIV 07 THERMAL & MOISTURE PROTECTION	
1.00	Slab, Deck and Gutter Waterproofing
2.00	Wall Waterproofing
3.00	Cistern Epoxy Waterproofing
4.00	Roofing Insulation, Double Sided
5.00	Roofing Materials and Accessories
6.00	Translucent Roofing - Glass
7.00	Sheet Metal Flashing and Trim
8.00	Sheet Metal Roofing
9.00	Exterior Metal Wall System
10.00	Sprayed-Fire Resistive Materials
11.00	Through-Penetration Firestop systems

12.00	Fire-Resistive Joint Systems
13.00	Joint Sealants
14.00	Expansion Joint Covers
DIV 08	DOORS & WINDOWS
1.00	Metal Doors and Windows
2.00	Metal Door and Window Frames
3.00	Roller Shutters with Pedestrian Access. See Material Specs for Packing/Cold Facilities
4.00	Stainless Steel Frames
5.00	Custom Steel Doors and Frames
6.00	Interior Aluminum Frames
7.00	Frameless Glass Doors Tempered with Frosting
8.00	Flush Wood Doors
9.00	Access Doors and Frames
10.00	Overhead Colling Doors
11.00	Aluminum Framed Entrances
12.00	Aluminum Windows
13.00	Hardware
14.00	Door Hardware
15.00	Finish Hardware
16.00	Automatic Door Operators
17.00	Glazing
18.00	Glazed Alumuinum Curtain Walls
19.00	Windows & Doors Testing
20.00	Clear Coating - Anti-Heat Gain, UV Protection
21.00	Others
DIV 09	FINISHES
1.00	Plaster/Plaster Walls
2.00	Off the Form Smooth Rubbed Ceiling Finish
3.00	Fiber Cement Ceiling on Light Gauge Metal Frame
4.00	Acoustic Ceilign Panels
5.00	Gypsum Wall Boards and FCS on Light Gauge Metal
6.00	Aluminum Composite Panels complete with Framing
7.00	Epoxy Flooring
8.00	Homogenous Granite Floor Tiles
9.00	Homogenous Granite Wall Tiles
10.00	Vapor Transmission Testing for Concrete
11.00	Concrete Floor Treament (Polished Concrete)
12.00	Concrete Densifier and Sealer
13.00	Carpet Floor Tiles - at least 6mm thk.
14.00	Exterior Painting
15.00	Interior Painting, Varnishing & Accessories
16.00	Others
DIV 10	SPECIALTIES
1.00	Louvers and Vents
2.00	Impact Resistant Wall and Door Protection Warnings, Occupational and Biosafety Signage, Fire Exit Routs
3.00	Interior Signages
4.00	Metal Lockers
5.00	Fire Extinguisher Cabinets
6.00	Fire Extinguishers
7.00	Operable Panel Partitions
8.00	Toilet and Bath Accessories
9.00	Signages, Wayfinding
10.00	Others
DIV 11	EQUIPMENT

1.00	Loading Dock Equipment
2.00	Contractor Furnished & Installed Laboratory Equipment
3.00	Fume Hoods and Exhaust Devices
4.00	Biological Safety Cabinets
5.00	Room Air Visual Indicator
6.00	Pumps and Accessories
7.00	Others
DIV 12	FURNISHINGS
1.00	Window Treatment (Roller Blinds)
2.00	Restroom and Pantry Countertop (Quartz/Solid Surface)
3.00	Furniture Systems / Built-Ins / Counters
DIV 13	SPECIAL CONSTRUCTION
1.00	Seismic Protection For Equipment
DIV 14	CONVEYING EQUIPMENT
1.00	Elevator/Lift
DIV 15	MECHANICAL / PLUMBING
1.00	SANITARY & STORM WATER SYSTEM
2.00	Plumbing pipes and fittings
3.00	Sanitary & Storm Drain Accessories
4.00	Plumbing Fixtures
5.00	Septic Tank / STP
6.00	Plumbing Pipe Testing
	DOMESTIC WATER SUPPLY
1.00	Pipes, Fittings & Individual Meters
2.00	Water Supply Accessories
3.00	Potable Water Supply Tanks
4.00	Rain Water Supply Tanks
5.00	Water Pipe Testing
6.00	Plumbing Fixtures and Trims
7.00	Drinking Fountain and Water Coolers
8.00	Others
	FIRE PROTECTION SYSTEM
1.00	Complete Fire Standpipe System
2.00	Fire Water Supply Tanks
3.00	Fire Sprinklers
4.00	Fire Detection and Alarm System
5.00	Fire Pipe Testing
6.00	Others
	VENTILATION SYSTEM
1.00	Ventilation System
2.00	Airconditioning System
3.00	Metal Ducts and Duct Accessories
4.00	Testing, Adjusting and Balancing
5.00	Other
DIV 16	ELECTRICAL & AUXILIARY
1.00	Electrical Service Entrance
2.00	Overcurrent Protective Device Coordination
3.00	Grounding and Bonding
4.00	Lightning Protection

5.00	Electrical Testing
6.00	Hangers and Supports for Electrical Systems
7.00	Electrical Identification
8.00	Conductors and Cables
9.00	Raceways
10.00	Cable Trays
11.00	Lighting Control Devices
12.00	Generator (Emergency Power Supply) Silent Type, including housing/enclosure complete with exhaust and padding.
13.00	Variable Frequency Controllers
14.00	Transient Voltage Suppression
15.00	Enclosed Switches and Circuit Breakers
16.00	Transfer Switches
17.00	Electrical Distribution System
18.00	Switchboards
19.00	Panelboards
20.00	Enclosed Bus Assemblies
21.00	Low Voltage Transformers
22.00	Fuses
23.00	Interior LED Lighting Fixtures & Accessories
24.00	Exterior LED Lighting Fixtures & Accessories
25.00	Voice and Data Communications
26.00	Security Systems / RFID
27.00	Fire Alarm
28.00	Public Address System
29.00	Telephone MTTC, Wiring & Devices
30.00	WIFI Wiring, Hub and Router
31.00	Data Rack/s
32.00	Lighting Protection System
33.00	Miscellaneous & Electrical Auxiliaries Testing
34.00	Energization
35.00	Others
	OTHER ITEMS NEEDED TO COMPLETE THE PROJECT / COMPLETE THE SYSTEM -(Ready for use, Occupancy, Code-Compliant)
1.00	
2.00	
3.00	
Note: (1) Contractor/Bidder can add and amend items needed to complete the project, ready for use, occupancy and to be code-compliant.	
(2) This general scope of work will serve as a guide only for the <u>NEW CONSTRUCTION and REHABILITATION / RENOVATION</u>	
(3) Contractor/ Bidder to submit DETAILED COST ESTIMATE, Derivation of UNIT COST/ UNIT COST PRICE ANALYSIS based on the updated/proposed design	
(4) By submitting and signing this estimate, we have certified that we have visited the site and conducted the necessary inspection/s.	

ANNEX G

INITIAL ENVIRONMENT EXAMINATION

SECTION 6 -ANNEX G

Initial Environmental Examination (2021)

Philippines: Supporting Innovation in the Philippine Technical and Vocational Education and Training System Project

Prepared by Technical Education and Skills Development Authority, Government of the Philippines for the Asian Development Bank.

This initial environmental examination 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. Your attention is directed to the "terms of use" section on ADB's website.

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EXECUTIVE SUMMARY

Introduction

The Philippine Government has requested a loan from Asian Development Bank (ADB) in the amount of \$ 100 million to finance the proposed Supporting Innovation in the Philippine Technical and Vocational Education and Training Project (the Project) which will support the Philippine Development Plan (2017–2022) to improve the quality of technical and vocational education and training (TVET) training programs, integrate 21st century competencies, strengthen certification, encourage research and innovation, and forge stronger links between TVET institutes and industry to increase employability of Filipino youth. The Project aims to strengthen the global competitiveness and readiness of Filipino mid-level workforce and to effectively use TVET as an instrument for social equity for workforce inclusion and poverty reduction. The Executing Agency is the Technical Education and Skills Development Authority (TESDA).

Project Rationale

This Initial Environmental Examination (IEE) was prepared in relation to the upgrading and modernization of 17 TESDA technology institutions (TTIs), one per region, into industry-responsive innovation centers. To support the implementation of innovations within TESDA, Regional TVET Innovation Centers (RTICs) will be established in 16 regions and TTI facilities will be rehabilitated in 17 regions. Except for RTIC-Cebu, which has its own innovation center already, new RTICs will also be established within 16 TTIs. Each innovation center will have different areas of specialization supportive to the region's economic drivers.

Each innovation center will provide the infrastructure to operationalize the strategy for social innovation and the processing of “shared context” for quality assurance, upskilling of workforce, entrepreneurship, applied research and development, problem-solving to create social value, collaborative arrangements and institutional partnerships (international and domestic). It will serve as information hub and connector between the local industry and the government agencies (national and local), firms (domestic and international), training institutions, colleges, universities and research institutions.

Aside from the physical facility, the TTIs with RTICs will also be capacitated to include in their current curricular offering higher-level TVET programs (Philippine Qualifications Framework levels III to V) and joint skills development programs with industry, focusing on 21st century skills and new, advanced and emerging technologies. Complementary to the skills development programs of the TTIs, the RTICs will offer research, innovation, entrepreneurship and startup training programs. Likewise, the RTICs will be capacitated to implement “spoke and hub model” and provide technology demonstration services, research and development services, and incubation and business start-up services to its learners, industry partners and public and private technical vocational Institutions (TVIs) within the region.

The Project will support 4 outputs:

- Output 1: The Philippines's skills development ecosystem modernized
- Output 2: TVET training made more demand-driven and industry-led
- Output 3: Selected TESDA TTIs upgraded and modernized into industry-responsive innovation centers
- Output 4: TESDA's management capacity and resilience strengthened.

Purpose and Methodology of Environmental Assessment

This environmental assessment focuses on the upgrading and modernization of TTIs into industry-responsive innovation centers. These TTIs will have improved training facilities and equipment that will benefit students. Climate-smart designs and climate-proofing measures will be adopted while upgrading the TTIs and establishing select RTICs.

Environment Classification and Assessments

The Project is classified as environment category B based on ADB's Rapid Environment Assessment (REA) Checklist and Safeguards Policy Statement (SPS) 2009, requiring the preparation of an IEE and Environmental Management Plan (EMP). The IEE and EMP covers the civil works proposed under Output 3 of the Project, which covers the rehabilitation of existing TTIs and construction of new RTICs. The proposed civil works will be undertaken entirely within the existing campuses of TESDA, which are all owned by TESDA and / or the government of the Philippines. The proposed sites are located within built-up areas. There are no protected areas, wetlands, mangroves, estuaries, cultural heritage site or historical monuments that will be directly affected by the Project.

For new project where the total construction area is less than 1 hectare, it is not covered by the Philippine Environmental Impact Statement System (PEISS), based on the Department of Environment and Natural Resources–Environmental Management Bureau's (DENR-EMB) Memorandum Circular (MC) 005, series of 2014. The expansion, modification and/or rehabilitation of existing buildings with issued environmental compliance certificate (ECC), on the other hand, requires amending the ECC through the submission of an Environmental Performance Report and Management Plan to the DENR–EMB regional office where the project is located. A Building Permit must be secured from the local government unit where the facility will be constructed, in compliance with Presidential Decree No. 1096 (National Building Code of the Philippines) before any type of building construction or repair work can start. No significant non-compliance of existing facilities with government environment requirements has been observed during various consultations with TTIs, and basic environmental and utility services (water supply, wastewater treatment, and drainage) will be improved as part of upgrading of TTI facilities. The project will ensure that all the requisite clearances and permits will be secured prior to construction.

The detailed design of the TTIs and RTICs will conform with the National Building Code of the Philippines and international standards. Applicable local government clearances such as building, sanitary and electrical permits will be secured prior to construction. Other permits to be secured include Fire Safety Evaluation Clearance, Height Clearance Permit (for sites near airports) and Tree Cutting Permit. This IEE will be updated to include the detailed design of the Project.

Environmental Conditions at Project Sites

All of the identified TTIs have sufficient land for the proposed rehabilitation of existing buildings and construction of new buildings. All of the identified TTIs are connected with existing national, provincial, or local roads and can be accessed through public transportation. All TTIs have available land for the proposed innovation centers. The proof of occupancy includes Usufruct, Presidential Proclamation and Republic Act, Deed of Donations, Tax Declaration and Land Title.

In terms of topography, only the Regional Training Center - Baguio is located upland, with an elevation of 1,338 meters above sea level (masl), while the other 16 TTIs are located lowland, with an elevation that ranges from 3 to 43 masl.

The provinces that are at most risk to earthquakes include Benguet, Pangasinan, Davao Oriental, Leyte, Agusan del Norte and South Cotabato. Pangasinan is prone to earthquake, specifically the deep-focused ones, because of the Manila Trench, while Davao Oriental, Leyte, Agusan del Norte and General Santos have earthquake hazards due to the Philippine Fault Zone. Frequency of shallow and left-lateral strike-slip earthquakes in Eastern Pangasinan and Benguet can be attributed to its location along the Philippine Fault Zone. Benguet, Oriental Mindoro, Davao Oriental, South Cotabato and Misamis Oriental are susceptible to landslide hazards.

In terms of tsunami hazard, the TTIs that are most at risk from tsunami include Pangasinan Technological Institute, Regional Training Center Cavite, Laguna, Rizal, Quezon (RTC CALABARZON), Provincial Training Center Oriental (PTC) Mindoro – San Teodoro, RTC Iloilo, RTC Cebu, and RTC Zamboanga Peninsula (high potential); RTC Tacloban, RTC Tagoloan, and Davao Oriental Polytechnic Institute (local generators); and General Santos National School of Arts and Trades (local and foreign generators).

Active volcanoes that are within 100 km from proposed TTIs include Mt. Pinatubo, which is 65.13 km from RTC Central Luzon- Guiguinto; Taal Volcano, which is 55.34 km and 29.06 km from RTC NCR and RTC CALABARZON, respectively; Mt. Isarog and Mt. Iriga, which is 13.86 km and 24.87 km, respectively, from RTC Pili; Davao Oriental Polytechnic Institute, which is 52 km from Leonard Range Volcano (or Leonard Kniazeff); and Mt. Parker, which is 30.72 km from General Santos National School of Arts and Trade.

In terms of frequency of tropical cyclones (TCs), Region II was the most affected, with 81-106 TCs from 1953-2010, while Regions I, CAR, V and VII received about 61-80 TCs for the same period. Regions XI, XII and BARMM received the lowest number, with 1-2 TCs for the same period.

TTIs most at risk for flooding include Pangasinan Technological Institute, RTC Tuguegarao, RTC - NCR, RTC – Pili, RTC Zamboanga Peninsula, RTC Tagoloan, and Davao Oriental Polytechnic Institute, where flooding may reach up to 1.5 meters during a 5-year return period. RTC Central Luzon – Guiguinto is also at risk for a 1.5 m flood with a return period of 25 years. TTIs with medium to high (>0.5 m to >1.5 m) 100-year return period flood hazard, include RTC – Baguio and Regional Manpower Development Center, while TTIs with low probability or no flooding, even a 100-year return period, include RTC – CALABARZON, PTC Oriental Mindoro – San Teodoro, RTC – Iloilo, RTC – Cebu, RTC – Tacloban, General Santos National School of Arts and Trades, and Northern Mindanao School of Fisheries.

Areas highly at risk to El Niño – induced drought include Davao Oriental, South Cotabato, Sultan Kudarat, Misamis Oriental and Cebu. Provinces included in the Project that are most at risk to projected rainfall changes are Batangas, Pangasinan, Metro Manila, Bulacan, Camarines Sur, Cebu, Leyte, Misamis Oriental and Sultan Kudarat.

In terms of locations of protected areas and key biodiversity areas, RTC Baguio and Regional Manpower Development Center are 1 km within buffer zone of Lower Agno Watershed Forest Reserve and Marcos Highway Watershed Forest Reserve; and Liguasan Marsh, respectively. General Santos National School of Arts and Trades is 5 km within buffer zone of Sarangani Bay Protected Landscape; PTC Oriental Mindoro– San Teodoro, also 5 km within buffer zone of Puerto Galera; and RTC Zamboanga Peninsula, also 5 km within buffer zone from Pasonanca watershed.

RTC Tuguegarao, RTC Pili, RTC Cebu and RTC Tacloban, are all 10 km within buffer zone of nearest protected areas.

Environmental Impacts and Mitigation Measures

A comprehensive environment and social safeguards questionnaire was prepared and used during the site surveys of TTIs. Assessments were done through video conferencing with TESDA regional safeguards focals to verify the initial assessments identified in the environment and social safeguards questionnaires sent to regional offices in November 2020. The National Institute for Technical Education and Skills Development (NITESD)-TESDA central office assisted in completing the questionnaires and provided lacking information.

The project is expected to have positive impact on the quality of (TVET in the Philippines. Students who intend to pursue TVET will directly benefit from upgraded curriculum geared towards the fourth industrial revolution (4IR), and better facilities in innovation centers.

During the pre-construction phase, major risks and potential negative impacts include geological and natural hazards, flooding risks and climate change impacts; and minor impacts on vegetation (loss of trees).

During construction, major potential impacts include disturbance of land and soil condition and generation of wastes from rehabilitated TTIs and construction of innovation centers, and impact on air quality and noise level; and medium impacts on the following: surface water quality, loss of vegetation, reduced water supply from ground water, temporary disturbance of access, increased level of use of water, increased level of vehicle traffic, and health and safety of workers and the community. There is a risk that asbestos or asbestos containing materials could be present in some of buildings to be demolished or rehabilitated. The Project will refer to DENR Administrative Order (DAO) No. 2000 – 02 (Chemical Control Order for Asbestos), particularly Section IX, Specific Requirements and Standards, item 6 – Renovation, Removal and Demolition Requirements. Based on the DAO, the duly authorized owner or operator, in this case the TTI, through the Design and Construction Supervision Consulting (DSC) Firm, shall thoroughly inspect and assess the facility to verify the presence of any friable asbestos containing materials, or non-friable asbestos containing materials that have become friable prior to the commencement of any demolition and/or rehabilitation activity. In addition, and based on the findings of the risk assessment, the DSC Firm will also develop a risk management plan to be refined and implemented by works contractors during the construction phase, using qualified and experienced experts.

During operation, major risks and impacts include climate change risks, while medium for generation of solid wastes from TVET activities, potential deterioration of water quality, additional strain to existing water resource, traffic generation, increase in level of particulate matter, and risks of students and workers from handling equipment.

Based on the assessment of adverse impacts of the Project, mitigating measures were proposed to address these potential impacts.

Information Disclosure, Consultation and Participation

Public consultations were conducted with different stakeholders via Microsoft Teams and Zoom videoconferencing due to travel restrictions brought by the COVID-19 pandemic. Concerns and recommendations of the stakeholders were incorporated in the environmental management plan

(EMP). A grievance redress mechanism (GRM) was also established at the national and regional levels to address concerns and complaints arising from the Project construction.

In line with ADB's Access to Information Policy (2018), the IEE Report for the project will be made available in a timely manner, in an accessible place, and in a form and language that will be understood by affected people and other stakeholders. The purpose is for affected people, including the general public, to provide meaningful inputs during project implementation. As this version of the IEE is based on the conceptual design, updated IEE reflecting detailed engineering design, which incorporates further inputs and feedbacks of all concerned stakeholders, will also be made available to the public.

Grievance Redress Mechanism

The Project Management Unit (PMU) will establish and maintain a grievance redress mechanism to register, assess, and address project-related complaints. The TTIs will assign GRM focals prior to commencement of works to address the issues raised by affected people on the project. Contact number of the contractor, the TTI safeguards focals, the PMU and the design and construction supervision consultant (DSC) including names, positions, and telephone numbers shall be disclosed at the project site. Persons or groups with project related issues may file their complaints with the GRM focals through the grievance intake form or through email or complaints box that will be made available in each TTI. The TESDA GRM focal at the regional office will be responsible for the registration of grievances and communication with aggrieved party.

Environmental Management Plan

The EMP for the project includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates and performance indicators. The Contractor must adhere to the mitigating measures and other requirements in the EMP to ensure that construction will not adversely affect the environment, the community and workers. In addition, the Contractor will prepare the following detailed Contractor's EMP (CEMP): workers' accommodation plan, occupational health and safety plan, emergency response plan, traffic management plan, waste disposal management plan, and demobilization plan. The contractor will also implement an asbestos risk management plan, as applicable.

I. INTRODUCTION

A. Project Concept and Rationale

1. The proposed Supporting Innovation in the Philippine Technical and Vocational Education and Training System Project (the Project) aims to strengthen the institutional capacity of Technical Education and Skills Development Authority (TESDA) as a public institution with the mandate to develop strategies and regulate the technical and vocational education and training (TVET) ecosystem, as well as become key actor in enabling policy and social innovations towards inclusive sustainable development.
2. The Philippine Development Plan, 2017–2022 emphasizes the need to improve the quality of TVET training programs, integrate 21st century competencies, strengthen certification, improve research and innovation, and forge stronger links between TVET institutes and industry to increase employability of Filipino workforce, including women and the youth.
3. The National Technical Education and Skills Development Plan 2018–2022 (NTESDP) identified priority industries and employment generators of TVET subsector, namely: (i) tourism; (ii) construction; (iii) information and communication technology and business process management; (iv) transport, communication and storage; (v) agriculture, fisheries, and forestry (including agro-processing); (vi) manufacturing including food manufacturing and electronics; and (vii) health, wellness, and other social services. The NTESDP 2018–2022 highlights the need to address social inequity through “greater collaboration between TESDA and other agencies that serve the basic sectors including agriculture, agrarian reform, environment and natural resources and social welfare and development. Moreover, recent social development policies likewise affirm the role of TVET and TESDA in human capital development, and convergence with other social programs such as universal access to health care, education, and social protection.

B. Methodology for Environmental Assessment

4. The project has been screened and categorized as “B” for environment since the proposed impacts of civil works are site-specific and confined within TESDA campuses, most are reversible, and can be managed using mitigation hierarchy and implementation of environmental management plan. This Initial Environmental Examination (IEE) and Environmental Management Plan (EMP) have been prepared based on ADB’s Safeguard Policy Statement (SPS, 2009).
5. The preparation of this IEE and EMP was guided by the following: ADB SPS (2009), ADB Operational Manual Section OM/F1, Access to Information Policy (2018), World Bank Group Environment, Health and Safety (EHS) Guidelines, the Philippine Environmental Impact Statement System (PEISS) and relevant Philippine environmental laws and regulations.
6. This IEE presents the findings from the assessment of 17 TESDA regional training centers and schools that represent each region in the Philippines. The assessments were done in two parts: the first, conducted in the 4th quarter of 2020, used environmental and social safeguards questionnaires to get information about TESDA facilities and the baseline environmental and social conditions in each site. The second, which was done in February 2021, involved consultations online with designated safeguards focal for each region, together with staff from the NITESD-TESDA. These consultations consisted of capacity building of safeguards focals on ADB’s SPS, particularly Safeguards Requirements 1: Environment; discussion on proposed Innovation Center site or alternative sites; discussion and clarification on the environmental and social safeguards questionnaires; and discussion on safeguards focals’ responsibilities during

project implementation, creation of Grievance Redress Committee for each TESDA site, and safeguards focal's role in monitoring and submission of reports to TESDA Central Office and ADB.

7. Following the survey and consultations, secondary data were gathered from different sources such as TESDA technology institutions (TTIs) proximity to protected areas or areas with high biodiversity, climate change and geological hazards, and socio-economic conditions in the area, where TESDA facilities will be constructed or rehabilitated. For each phase of the project, activities were identified as well as the environmental implications of each activity. Mitigation measures were proposed to address adverse environmental impacts. Responsibilities and budget for mitigation measures, frequency and parameters for environmental monitoring and reporting, institutional arrangements, and capacity building activities, were likewise indicated in the proposed Environmental Management Plan.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB's Environment Safeguard Policy

8. The environment safeguards requirements of ADB are presented in the following guidelines:

- (i) Safeguard Policy Statement (SPS) (2009),
- (ii) Operational Manual Section F1/BP², and
- (iii) Access to Information Policy (2018)

9. ADB's Strategy 2030³ emphasizes the pursuit of environmentally sustainable and inclusive economic growth for developing member countries (DMCs) and requires mitigation to address environmental and social impacts of projects. The ADB's Safeguards Policy Statement (SPS, 2009) governs the environmental and social safeguards of ADB's operations. When a project has been identified for ADB financing, it is screened and categorized to determine the following:

- (i) Significance of potential impacts or risks of the project to the environment
- (ii) Level of assessment and institutional resources required to address the safeguard issues; and
- (iii) Information disclosure and consultation requirements.

10. The Environmental Safeguard Requirements 1 (SR1) of the SPS (2009) outlines the requirements that borrowers/clients have to meet. These requirements include assessing impacts, planning and managing impact mitigations, preparing environmental assessment reports, disclosing information and undertaking stakeholder consultations, establishing a grievance redress mechanism, and monitoring and reporting. It also includes specific environmental safeguard requirements pertaining to biodiversity conservation and sustainable management of natural resources, pollution prevention and abatement, occupational and community health and safety, and conservation of physical cultural resources.

11. For environmental safeguards, projects are classified into the following categories:

- i) **Category A.** The proposed project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented; impacts may affect an area larger than the sites or facilities subject to physical works. A full-scale environmental impact assessment (EIA) including an EMP, is required.

- ii) **Category B.** The proposed project's potential environmental impacts are less adverse and fewer in number than those of category A projects; impacts are site-specific, few if any of them are irreversible, and impacts can be readily addressed through mitigation measures. An IEE, including an EMP, is required.
- iii) **Category C.** The proposed project is likely to have minimal or no adverse environmental impacts. No EIA or IEE is required although environmental implications need to be reviewed.
- iv) **Category FI.** The proposed project involves the investment of ADB funds to, or through, a financial intermediary.

12. Project categorization has been done using REA checklist following the guidance provided above and the project is categorized as B. As per SPS 2009, **Category B** projects warrants preparation of an IEE.

13. The SPS (2009) includes 11 policy principles on environment safeguards on screening, conduct of environmental assessment, alternative analysis, mitigation hierarchy, need for meaningful consultation, public disclosure, environmental management planning, biodiversity protection and conservation, pollution prevention, occupational health and safety, and conservation of physical cultural resources. The requirements of the 11 policy principles are detailed in Table 1.

Table 1: Environmental Safeguard Policy Principles of ADB Safeguard Policy Statement (2009)

Environment Policy Principle	Requirement
1. Screening and categorization	Use of a screening process for each proposed project to determine the extent and type of environmental assessment commensurate with the significance or potential impacts and risks.
2. Environmental assessment	Conduct of an environmental assessment for each proposed project to identify potential impacts and risks to environment and people.
3. Examination of alternatives	Examine alternatives to project's location, design, technology, and components and their potential environmental and social impacts. Also consider the "no project" alternative.
4. Environmental mitigation and monitoring plans	Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.
5. Consultation and grievance redress mechanism	Carry out meaningful consultation with affected people and facilitate their informed participation early in the project preparation process and ensure that their views and concerns are taken into account. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns regarding the project's environmental performance.
6. Public disclosure	Disclose the environmental assessment including the EMP in a form and language understandable to affected people and other stakeholders.
7. EMP implementation and monitoring	Implement the EMP and monitor its effectiveness. Document the monitoring results, including corrective actions and disclose the monitoring reports.
8. Protection of critical habitats	Do not implement project activities in areas of critical habitats unless (i) there are no measurable adverse impacts on the critical habitat, (ii) there is no reduction in the population of any recognized endangered or critically endangered species and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, additional programs to promote and enhance the conservation aims of the protected area will be implemented.

Environment Policy Principle	Requirement
9. Pollution prevention and control technologies	Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank's Environmental, Health, and Safety (EHS) Guidelines.
10. Occupational health and safety	Provide workers with safe and healthy working conditions and prevent accidents, injuries and diseases in the workplace. Minimize adverse impacts and risks to the health and safety of local communities.
11. Preservation of physical cultural resources	Conserve physical cultural resources and provide a "chance find" procedure and conservation approach for materials that may be discovered during project implementation.

EHS = Environmental, Health, and Safety, EMP = environmental management plan.

14. Aside from ADB SPS (2009), the ADB also prescribes the Access to Information Policy (2018) which requires consultations, participation and disclosure of information to enhance stakeholders' trust in and ability to engage with ADB. The policy promotes transparency, accountability, and participatory development. It establishes the disclosure requirements for documents produced or to be produced through ADB assistance. The IEE, EMP and the environmental monitoring reports of the project are to be disclosed at the ADB website in accordance with the Access to Information Policy (2018).

15. For a category B project, the draft IEE report should be available to interested stakeholders before project approval and posted on the ADB's website upon Board approval of the project.

B. Philippines' Legal Framework and Regulatory Requirements

16. Presidential Decree (PD) 1151, enacted on June 6, 1977, established the Philippine Environment Policy to address the need to formulate an integrated program to protect the environment. The policy mandates the government, in cooperation of concerned private organizations and entities to use all practicable means to promote the general welfare of the people through safe, decent, helpful, productive and aesthetic environment. All agencies and instrumentalities of the national government, including all government owned and controlled corporations, as well as private companies and entities with projects or undertakings that can significantly affect the quality of the environment, are required to prepare a detailed statement on the environmental impact of the proposed action, project or undertaking.

17. Presidential Decree 1586, which became effective on June 11, 1978, established the Philippine Environmental Impact Statement System. Section 4 of the decree empowers the President or his duly authorized representative to grant or deny the issuance of environmental compliance certificates (ECCs) for environmentally critical projects (ECPs) and projects within environmentally critical areas (ECAs).

18. Presidential Proclamation No. 2146 (Proclaiming Certain Areas and Types of Projects as Environmentally Critical and Within the Scope of the Environmental Impact Statement System Established under Presidential Decree No. 1586), proclaim certain areas and types of projects as environmentally critical, and hence within the scope of the PEISS system.

19. ECPs include the following:

- (i) Heavy industries
 - a. Non-ferrous metal industries
 - b. Iron and steel mills
 - c. Petroleum and petrochemical industries including oil and gas
 - d. Smelting plants

- (ii) Resource extractive industries
 - a. Major mining and quarrying projects
 - b. Forestry projects
 - 1. Logging
 - 2. Major wood processing projects
 - 3. Introduction of fauna (exotic animals) in public / private forests
 - 4. Forest occupancy
 - 5. Extraction of mangrove products
 - 6. Grazing
 - c. Fishery Projects
 - 1. Dikes for/and fishpond development projects
- (iii) Infrastructure Projects
 - a. Major dams
 - b. Major power plants (fossil-fueled, nuclear fueled, hydroelectric or geothermal)
 - c. Major reclamation projects
 - d. Major roads and bridges

20. ECAs include the following:

- (i) All areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries;
- (ii) Areas set aside as aesthetic potential tourist spots;
- (iii) Areas which constitute the habitat for any endangered or threatened species of indigenous Philippine wildlife (flora and fauna);
- (iv) Areas of unique historic, archaeological, or scientific interests;
- (v) Areas which are traditionally occupied by cultural communities or tribes;
- (vi) Areas frequently visited and/or hard-hit by natural calamities geologic hazards, floods, typhoons, volcanic activity, etc.
- (vii) Areas with critical slopes;
- (viii) Areas classified as prime agricultural lands;
- (ix) Recharged areas of aquifers;
- (x) Water bodies characterized by one or any combination of the following conditions:
 - a. tapped for domestic purposes;
 - b. within the controlled and/or protected areas declared by appropriate authorities;
 - c. which support wildlife and fishery activities.
- (xi) Mangrove areas characterized by one or any combination or the following conditions:
 - a. with primary pristine and dense young growth;
 - b. near or adjacent to traditional productive fry or fishing grounds;
 - c. which act as natural buffers against shore erosion, strong winds and storm floods;
 - d. on which people are dependent for their livelihood.
- (xii) Coral reef characterized by one or any combination of the following conditions:
 - a. with 50% and above live coralline cover;
 - b. Spawning and nursery grounds for fish;
 - c. Which act as natural breakwater of coastlines.

21. Administrative Order No. 300 (Further Strengthening the Philippine Environmental Impact Statement System and Clarifying the Authority to Grant or Deny the Issuance of ECC), signed in 1996, confirm the power of the Secretary of the Department of Environment and Natural Resources and the DENR Regional Executive Directors to grant or deny the issuance of ECCs.

22. Section 3 of PD 1586 mandates the National Environmental Protection Council to review and evaluate the environmental impact statements on declared ECPs and ECAs. The National Environmental Protection Council and National Pollution Control Commission were merged in June 1987, and by virtue of Executive Order 192, became the Environmental Management Bureau (EMB). The EMB became a line bureau of the DENR pursuant to Republic Act 8749 (Philippine Clean Air Act) in 1999. The DENR is tasked to administer the EIS System through the EMB and its regional offices (ROs). The DENR-EMB central office reviews and processes ECPs while the DENR-EMB ROs review and approve projects considered to be located in ECAs, as well as projects outside the purview of the EIS system.

23. DENR Administrative Order No. 30, series of 2003 categorized single projects into three major groups:

- Group I: ECPs in either ECAs or Non-ECAs
 - (i) Golf course
 - (ii) Heavy industries
 - (iii) Fishery
 - (iv) Logging
 - (v) Grazing projects
 - (vi) All projects introducing exotic fauna in public and private forests
 - (vii) Major wood processing
 - (viii) Major mining and quarrying projects
 - (ix) Major listed infrastructure projects
- Group II: Non-ECPs in ECAs;
 - (i) Agriculture industry
 - (ii) Buildings, storage facilities and other structures
 - a. Chemical industries
 - b. Cottage industries
 - c. Demonstration and pilot projects
 - d. Environmental enhancement and mitigation projects
 - e. Food and related industries
 - f. Packaging materials and miscellaneous products industries
 - g. Pipeline projects
 - h. Textile, wood and rubber industries
 - i. Tourism industry
 - j. Transport terminal facilities
 - k. Waste management projects
 - l. Water supply, irrigation or flood control projects
 - m. Treasure hunting in National Integrated Protected Areas System (NIPAS)
 - n. Wildlife farming or any related projects as defined by PAWB
- Group III: Non-ECPs in Non-ECAs – All Group II project types outside ECAs

24. Environmentally critical projects require the completion of an EIA and the submission of an EIS report (Group I) while projects in ECAs (Group II) require the preparation of an IEE Report. DENR determines if a project is an ECP or if a project will be implemented in an ECA. If either or both of these conditions apply, the proposal is required to secure an ECC. Otherwise, DENR – EMB or the regional offices can issue a Certificate of Non-Coverage (CNC) certifying that the project will not significantly affect the environment (Group III).

25. **Procedural requirements and responsibilities.** The project subscribes to ADB's Safeguards Policy Statement (SPS) 2009 and all applicable national environment related laws, regulations and administrative orders. Based on the Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB) Memorandum Circular (MC) 005, series of 2014 (Revised Guidelines for Coverage Screening and Standardized Requirements under the PEISS), **construction of new buildings such as schools, including storage facilities with no hazardous or toxic materials, with total/gross floor area that includes parking, open space and other areas of less than 1 hectare, is not covered by the PEISS.** The expansion, modification and/or rehabilitation of existing buildings requires securing or amending the ECC through the submission of an Environmental Performance Report and Management Plan to the DENR-EMB regional office where the project is located. A Building Permit must be secured from the local government unit where the facility will be constructed in compliance with Presidential Decree No. 1096 (National Building Code of the Philippines) before any type of building construction or repair work can start. All the Certificates of Non-coverage that have been secured are presented in **APPENDIX**. The project will ensure that all the remaining ECCs / CNCs that have not been secured yet will be secured prior to construction.

Table 2: Philippine Environmental Impact Assessment Requirements

Environmental Compliance Certificate Amendment	For existing facilities with issued ECC built since 1982 that will be rehabilitated, secure the ECC amendment by filing Environmental Performance Report and Management Plan (EPRMP) with DENR-EMB regional offices
Certificate of Non-coverage (CNC)	For existing facilities (with no ECC from DENR-EMB) built since 1982 that will be rehabilitated, secure CNC through the DENR-EMB online system by filing Project Description. For existing facilities built before 1982 that will be rehabilitated, secure CNC through DENR-EMB online system by filing Project Description and Proof of Project Implementation prior to 1982 without expansion / alteration / modification. For new facilities, secure CNC through the DENR-EMB online system by filing Project Description.

DENR-EMB = Department of Environment and Natural Resources – Environmental Management Bureau

C. Environmental Standards

26. The national environmental standards in the Philippines are based on Presidential Decree No. 1152 or the Philippine Environment Code, which orders the establishment of ambient air quality standards, national emission standards for new and existing stationary and mobile sources of pollution, community noise levels, standard for noise-producing equipment, classification standards for receiving bodies of water, effluent standards, guidelines for waste management, and liquid waste disposal.¹ Table below shows the National Ambient Air Quality Guideline Values as compared to World Health Organization (WHO) Ambient Air Quality Guideline Values.

¹ Presidential Decree No. 1152. Philippine Environment Code. 6 June 1977.

Table 3: National and WHO Ambient Air Quality Guideline Values

Pollutants	Short Term (24 hours averaging time), $\mu\text{g}/\text{m}^3$		Long Term (1 year averaging time, $\mu\text{g}/\text{m}^3$	
	Philippines	WHO	Philippines	WHO
TSP	230	-	90	-
PM ₁₀	150	50	60	20
PM _{2.5}	50 ²	25	25	10

27. Section 74 to 79 of the issued rules and regulations of Presidential Decree (PD) 984 of the then National Pollution Control Commission in 1978 specified the noise control regulations and defined the environmental quality standards for noise in general areas. Table below shows the national environmental quality standards for noise in general areas. Subsequent table shows WHO Guidelines for Community Noise.

Table 4: National Environmental Quality Standards for Noise in General Areas

Category of Area	Maximum allowable noise by time period, dB		
	Daytime (9 AM–6 PM)	Morning and Evening (5–9 AM & 6–10 PM)	Nighttime (10 PM–5 AM)
AA – section or area which requires quietness, such as an area within 100 m from school sites, nursery schools, hospitals and special homes for the aged	50	45	40
A – residential purposes	55	50	45
B – commercial area	65	60	55
C – light industrial area	70	65	60
D – reserved as a heavy industrial area	75	70	65

Table 5: WHO Guidelines for Community Noise

Receptor	One Hour L _{Aeq} (dBA)	
	Daytime 07:00 – 22:00	Nighttime 22:00 – 7:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

28. Based on DENR Administrative Order No. 08, series of 2016 (Water Quality Guidelines and General Effluent Standards of 2016), the significant effluent quality parameters³ applicable for the Project includes BOD, Fecal Coliform, Ammonia, Nitrate, Phosphate, Oil and Grease, and all significant parameters depending on the nature of their activity.

Table 6: Effluent Standards

Parameter	Unit	AA	A	B	C	D	SA	SB	SC	SD	WB-IFC EHS
BOD	mg/L	NDA	20	30	50	120	NDA	30	100	150	30
Ammonia – as NH ₃ -N	mg/L	NDA	0.5	0.5	0.5	7.5	NDA	0.5	0.5	7.5	-
Fecal coliform	MPN/ 100 mL	NDA	4	200	400	800	NDA				-
Total coliform	MPN/ 100 mL	NDA	3,000	3,000	10,000	15,000	NDA	3,000	10,000	15,000	400

² DENR Administrative order No 20123-13. [Establishing the Provisional National Ambient Air Quality Guideline Values for Particulate Matter 2.5](#). 7 March 2013.

³ Education (Public and private education, including support services).

Parameter	Unit	AA	A	B	C	D	SA	SB	SC	SD	WB-IFC EHS
Nitrate as NO ₃ -N	mg/L	NDA	14	14	14	30	NDA	20	20	30	10 ⁴
Phosphate	mg/L	NDA	1	1	1	10	NDA	200	400	800	2 ⁵
Oil and grease	mg/L	<1	1	1	2	5	1	2	3	5	10
Total suspended solids	mg/L	NDA	70	85	100	150	NDA	70	100	150	50

Note: NDA = no discharge allowed; MPN=— most probable number

Table 7: Water Body Classification and Usage of Freshwater

Classification	Intended Beneficial Use
Class AA	Public Water Supply Class I – Intended primarily for waters having watershed, which are uninhabited and / or otherwise declared as protected areas, and which require only approved disinfection to meet the latest Philippine National Standards for Drinking Water
Class A	Public Water Supply Class II – Intended as sources of water supply requiring conventional treatment (coagulation, sedimentation, filtration and disinfection) to meet the latest PNSDW
Class B	Recreational Water Class I – Intended for primary contact recreation (bathing, swimming, etc.)
Class C	1. Fishery Water for the propagation and growth of fish and other aquatic resources 2. Recreational Water Class II – For boating, fishing, or similar activities 3. For agriculture, irrigation and livestock watering
Class D	Navigable waters

Note: For unclassified water bodies, classification shall be based on the beneficial use as determined by the Environmental Management Bureau (EMB)

Table 8: Water Body Classification and Usage of Marine Waters

Classification	Intended Beneficial Use
Class SA	1. Protected Waters – Waters designated as national or local marine parks, reserves, sanctuaries, and other areas established by law (Presidential Proclamation 1801 and other existing laws), and/or declared as such by appropriate government agency, LGUs, etc. 2. Fishery Water Class I – Suitable for shellfish harvesting for direct human consumption
Class SB	1. Fishery Water Class II – Water suitable for commercial propagation of shellfish and intended as spawning areas for milkfish (<i>Chanos chanos</i>) and similar species 2. Tourists Zone – For ecotourism and recreational activities 3. Recreational Water Class I – Intended for primary contact recreation (bathing, swimming, skin diving, etc.)
Class SC	1. Fishery Water Class III – For the propagation and growth of fish and other aquatic resources and intended for commercial and sustenance fishing 2. Recreational Water Class II – For boating, fishing, or similar activities 3. Marshy and/or mangrove areas declared as fish and wildlife sanctuaries
Class SD	Navigable waters

29. **Solid Waste.** Republic Act 9003 or the Ecological Solid Waste Management Act of 2000 governs the solid waste management in the Philippines. The policy promotes the utilization of environmentally-sound methods that maximize the utilization of valuable resources; sets guidelines and targets for solid waste avoidance and volume reduction through source reduction and waste minimization measures⁶; ensure the proper segregation, collection, transport, storage, treatment and disposal of solid waste through the formulation and adoption of the best environmental facilities; and ensure the integration of ecological solid waste management and

⁴ Total nitrogen.

⁵ Total phosphorus.

⁶ These include composting, recycling, reuse, recovery, and others, prior to collection, treatment and disposal.

resource conservation and recovery topics into the academic curricula of formal and non-formal education to promote environmental awareness and action among citizenry.

30. **Hazardous Wastes.** Republic Act 6969, otherwise known as the Toxic Substances and Hazardous and Nuclear Wastes Control Act mandates the control and management of import, manufacture, process, distribution, use, transport, treatment and disposal of toxic substances and hazardous and nuclear wastes in the country. DENR Administrative Order No. 2000-02 or Chemical Control Order for Asbestos governs the regulations for the importation, manufacture and use of asbestos and the storage, transport and disposal of their wastes.

31. Table below contains the summary of environmental legislations applicable to the Project.

Table 9: Summary of Environmental Legislations Applicable to the Proposed Project

No.	Legislation Number	Legislation Title	Relevance to the Project	Responsible Institution
1	Presidential Decree 1151 (1977)	Philippine Environmental Policy	Project proponent is not required to prepare an environmental impact statement or initial environmental examination of proposed action, project or undertaking.	Ministry of Natural Resources (1974-1987)
2	Presidential Decree 1586 (1978)	Philippine Environmental Impact Statement System	Establishment of Philippine environmental impact statement (EIS) system based on Section 4 of Presidential Decree 1151	Ministry of Natural Resources (1974-1987)
3	Presidential Proclamation 2146 (1981)	Proclaiming Certain Areas and Types of Projects as Environmentally Critical and Within the Scope of EIS Established under PD 1586	Proclamation of areas and types of projects as environmentally critical and within the scope of Philippine EIS system	Ministry of Natural Resources (1974-1987)
4	Presidential Decree 1121 (1977)	Creating the National Environmental Protection Council	Creation of the National Environmental Protection Council as a central authority that will oversee, unify and integrate the planning, management, and implementation of the government's environment program	National Environmental Protection Council (1977 – 1987)
5	Executive Order No. 192 (1987)	Reorganization Act of the Department of Environment and Natural Resources	Providing for the reorganization of the Department of Environment, Energy and Natural Resources, renaming it as the Department of Environment and Natural Resources and for other Purposes	Department of Environment and Natural Resources (1987 – present)
6	DENR Administrative Order No. 2002-17	Defining the Organizational Structure and Major Responsibilities of the Environmental Management Bureau as a line Bureau by virtue of Section 34 of the Philippine Clean Air Act of 1999 (RA 8749)	Strengthening the enforcement and implementation of major environmental laws such as Presidential Decree 984 – Pollution Control Law; Presidential Decree 1586 – The Environmental Impact Assessment Law; Republic Act 6969 – Toxic Substances and Hazardous and Nuclear Wastes Control Act; Republic Act 8749 – Philippine Clean Air Act of 1999; and Republic Act 9003 – Ecological Solid Wastes Management Act, among others	DENR and EMB
7	DENR Administrative	Implementing Rules and Regulations for the	Incorporation of environmental considerations into the Environmental	DENR and EMB

No.	Legislation Number	Legislation Title	Relevance to the Project	Responsible Institution
	Order No. 30, (2003)	Philippine Environmental Impact Statement System	Impact Assessment (EIA) process at an early stage to streamline the current procedure in the conduct of the EIA process to improve the effectiveness as a planning, regulatory and management tool, and enhance maximum public participation	
8	Republic Act 6969 (1990)	Toxic Substances and Hazardous and Nuclear Wastes Control Act	Control and management of import, manufacture, process, distribution, use, transport, treatment and disposal of toxic substances and hazardous and nuclear wastes in the country	DENR and EMB
9	Republic Act 8749 (1999)	Philippine Clean Air Act of 1999	Comprehensive air quality management policy and program with the objective of achieving and maintaining healthy air for all Philippine citizens	DENR and EMB
10	Republic Act 9003 (2000)	Ecological Solid Wastes Management Act	Provides guidelines for ecological solid waste management program and creating the necessary institutional mechanisms and incentives as well as prohibitions and penalties	National Solid Waste Management Commission (NSWMC) and EMB
11	Republic Act 9275 (2004)	Philippine Clean Water Act of 2004	Applies to water quality management in all water bodies. Primarily applies to abatement and control of pollution from land-based sources	DENR and EMB
12	Republic Act 7586 (1992)	National Integrated Protected Areas System Act	Establishment of a comprehensive system of integrated protected areas within the classification of national park to secure the present and future generations the perpetual existence of all native plants and animals	DENR
13	DAO 08, series of 2016	Water Quality Guidelines and General Effluent Standards of 2016	Amended DAO 34 and 35 series of 1990.	DENR and EMB
14	Republic Act 10066 (2009)	National Cultural Heritage Act of 2009	Provides for the protection and conservation of the national cultural heritage, strengthening the National Commission for Culture and the Arts (NCCA) and its affiliated cultural agencies	National Commission for Culture and the Arts (NCCA)
15	Presidential Decree 953 (1976)	Requiring the planting of trees in certain places and penalizing unauthorized cutting, destruction and injuring on certain trees, plants and vegetations destruction, damaging and injuring of certain trees, plants and vegetation	Guidelines on planting of trees and penalty for cutting and damaging of trees	Bureau of Forest Development (BFD)
16	Republic Act 11058 (2018)	An Act Strengthening Compliance with Occupational Safety and Health Standards and	Aims to ensure a safe and healthful workplace for all workers by affording them full protection against all hazards in their work environment. Rules apply to contractors and	Department of Labor and Employment (DOLE)

No.	Legislation Number	Legislation Title	Relevance to the Project	Responsible Institution
		Providing Penalties for Violations thereof	subcontractors including projects in the public sector	
17	Republic Act 9729 (2009)	Climate Change Act of 2009	Mainstreaming climate change into government policy and establishing framework strategy and program for its implementation	Climate Change Commission (CCC)
18	Executive Order 174 (2014)	Institutionalizing Philippine Greenhouse Gas Inventory Management and Reporting System	Institutionalization of GHG inventory management and reporting system in relevant government agencies to ensure transition towards a climate-resilient pathway for sustainable development.	Climate Change Commission (CCC)
19	DENR Administrative Order 2013-24	Chemical Control Order (CCO)	Set a 90 ppm total lead content limit in paint. The CCO provided for a three-year phase out period from 2013 to 2016 for lead-containing paints used for architectural, decorative and household applications.	Department of Environment and Natural Resources
20	DENR Administrative Order 2000 - 02	Chemical Control Order for Asbestos	Requirements and procedures related to the importation, manufacture and use of asbestos and the storage, transport and disposal of their wastes.	Department of Environment and Natural Resources

D. Permitting Requirements

32. Table below details the procedural requirements for the expansion, modification, and/or rehabilitation of TTIs and construction of RTICs, as well as the responsibilities of TESDA, the National Project Management Unit, Regional Project Management Unit, the Project Management Consulting (PMC) Firm, the DSC Firm, and Contractors. No significant non-compliance of existing facilities with government environment requirements has been observed during various consultations with TTIs. Basic environmental and utility services (water supply, wastewater treatment, and drainage) will be improved as part of upgrading of TTI facilities. The project will ensure that all the requisite clearances and permits will be secured prior to construction, and that necessary clearances (including fire safety inspection certificate and occupancy permits are secured prior to facility operation.

Table 10: Procedural Requirements for Environmental Compliance, Construction Permits and License to Operate

Item	Procedural Requirement	Responsible Entity	Approval Entity
Pre-construction			
Facility design, permit to construct	Upgrade TESDA technology institutions and design the new regional training innovation centers following the National Building Code of the Philippines, other relevant national regulations, and international standards. Prepare the Architectural and Engineering Design and documentation (signed and sealed by architect and engineers) and other requirements to secure building permits and licenses prior to construction.	Contractor, PMC Firm, DSC Firm	TESDA, City or Municipal Engineering Office of local government units
ECC Amendment	For existing facilities with issued ECC built since 1982 that will be rehabilitated, secure the ECC amendment by filing Environmental Performance Report and	RPMU	DENR-EMB regional offices

Item	Procedural Requirement	Responsible Entity	Approval Entity
	Management Plan (EPRMP) with DENR-EMB regional offices		
CNC	For existing facilities (with no ECC from DENR-EMB) built since 1982 that will be rehabilitated, secure CNC through the DENR-EMB online system by filing Project Description. For existing facilities built before 1982 that will be rehabilitated, secure CNC through DENR-EMB online system by filing Project Description and Proof of Project Implementation prior to 1982 without expansion / alteration / modification. For new facilities, secure CNC through the DENR – EMB online system by filing Project Description.	RPMU	DENR-EMB regional offices
Local permits	Secure the Building Permit, Sanitary Permit, Electrical Permit, and other permits from the local government prior to construction.	Contractor, RPMU	LGU
Fire Safety Evaluation Clearance	Submit building plan, pertinent documents and Fire and Life Safety Assessment Report (FALAR) to the city/municipal Fire Marshal to secure the Fire Safety Evaluation Clearance prior to construction.	Contractor, RPMU	City / Municipal fire marshal
Height Clearance Permit	Submit elevation plan of proposed structure and Certification of Geodetic Engineer – i) Geodetic Coordinates (WGS-84 Datum) and True Ground Elevation in meters above mean sea level / Orthometric Height of the site; ii) Location Plan with Vicinity Map; and iii) Copy of the original field notes, traverse computations and GPS processing notes including raw data (total station data should be in ASCI format and RINEX format in GPS), signed and sealed by a Geodetic Engineer. Complete requirements can be found here - https://caap.gov.ph/height-clearance-permit-and-limitation-form/	Contractor, RPMU	Civil Aviation Authority of the Philippines (CAAP)
Tree Cutting Permit	Submit letter of application and LGU Endorsement/ Certification of No Objection from the Municipality/City and Barangay. Submit as well copy of Land Title (OCT/TCT) and photographs of trees to be removed. Please include Site Development Plan and Environmental Compliance Certificate	Contractor, RPMU	Community Environment and Natural Resources Office (CENRO) - DENR
Construction			
EMP monitoring	Monitor the implementation of the EMP by the Contractor	NPMU, PMC, RPMU	TESDA, ADB
Progress reporting	Submit quarterly progress reports on the status of construction and EMP implementation to the TESDA and PMU	NPMU, PMC, RPMU, Contractor	TESDA, ADB
Post-construction			
Fire Safety Inspection Certificate	Secure a Fire Safety Inspection Certificate from the city/municipal Fire Marshal.	Contractor, RPMU	Municipal fire marshal
Occupancy Permit	Secure an Occupancy Permit from the local government	Contractor	LGU
Completion Report	Submit a completion report with as-built drawings to TESDA during turn-over.	Contractor, RPMU	NPMU, TESDA

ADB = Asian Development Bank, CAAP = Civil Aviation Authority of the Philippines, CENRO = Community Environment and Natural Resources Office, CNC = Certificate of Non-Coverage, COCP = Code of Construction Practice, DB =

design-build, DENR = Department of Environment and Natural Resources, DSC = Design and Supervision Consulting Firm, ECC = environment compliance certificate, EMB = Environmental Management Bureau, LGU = local government unit, NPMU = National Project Management Unit, PMC = Project Management Consulting Firm, RA = Republic Act, RPMU = Regional Project Management Unit, TESDA = Technical Education and Skills Development Authority.
Source: Asian Development Bank.

E. International Conventions

33. This section reviews all the relevant international agreements and commitments, existing institutions and legislations, both at the national and local levels. The Philippines is a member of various international agreements, conventions and treaties for conservation of the environment at global level. Some of the international agreements where the Philippines is a party and applicable to the proposed Project are discussed in the following sections.

34. **United Nations Convention on Sustainable Development (UNCSD).** Also known as Rio+20 or Earth Summit 2012, the UNCSD is the third conference on Sustainable Development. It followed the 1992 Earth Summit/United Nations Conference on Environment and Development. UNCSD is the key forum for the consideration of issues related to the integration of the three dimensions of sustainable development: economic development, social inclusion and environmental protection. As such, its mandate is not limited to environmental issues.

35. **Stockholm Convention, 2004.** The Stockholm Convention is a global treaty to protect human health and the environment from the adverse effects of persistent organic pollutants (POPs). Adopted in 2001 and entered into force in 2004, the convention requires its parties to take measures to eliminate or reduce the release of POPs into the environment.

36. **United Nations Framework Convention on Climate Change, 2003.** The United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty focusing on what countries could do to limit average global temperature increases and the resulting climate change. The ultimate objective of the convention is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. In 2013, both non-Annex (including the Philippines) and Annex I members to the UNFCCC were requested to prepare their Intended Nationally Determined Contributions. Activities/Goals set under the Intended Nationally Determined Contributions, regardless of the legal nature of the contributions, will serve as the first Nationally Determined Contribution of the respective parties for the period beyond the Doha Amendment, upon ratification of the Paris Agreement.

37. **Kyoto Protocol, 2003.** The Kyoto Protocol is an international treaty under the UNFCCC. Adopted in 1997, the protocol commits 43 Annex I countries to limit their greenhouse gas emissions for the period 2008-2012 below or equal to the level of their emissions in 1990. By 2012, the Doha Amendment to the protocol was proposed to extend the protocol to a second commitment period for 2013-2020. However, only 37 countries have committed to binding targets. Binding targets for Kyoto Protocol are applicable only to Annex I (developed countries), and will end in 2020.

38. **Vienna Convention for Protection of the Ozone Layer, 1991 and Montreal Protocol on Substances Depleting the Ozone Layer, 1991:** The Vienna Convention outlines states' responsibilities for protecting human health and the environment against the adverse effects of ozone depletion, and established the framework under which the Montreal Protocol was negotiated. The Montreal Protocol stipulates that the production and consumption of compounds that deplete ozone in the stratosphere - chlorofluorocarbons, halons, carbon tetrachloride, and

methyl chloroform), are to be phased out by 2010. The project does not envisage production and consumption of ODS.

F. Regulatory Framework for Construction and Rehabilitation of Technical Education Facilities

39. The Philippine Development Plan, 2017–2022 emphasizes the need to improve the quality of TVET training programs, integrate 21st century competencies, strengthen certification, improve research and innovation, and forge stronger links between TVET institutes and industry to increase employability of Filipino workforce, including women and the youth. The National Technical Education and Skills Development Plan 2018–2022 (NTESDP) identified priority industries and employment generators of TVET subsector, namely: (i) tourism; (ii) construction; (iii) information and communication technology and business process management; (iv) transport, communication and storage; (v) agriculture, fisheries, and forestry (including processing); (vi) manufacturing including food manufacturing and electronics; and (vii) health, wellness, and other social services.

40. Republic Act 11293 or the Philippine Innovation Act of 2019 adopts a state policy fostering “innovation” as a vital component of the country’s development policies to drive inclusive development. The law broadly defines innovation as the creation of new ideas resulting in development of new or improved policies, products, services which are then spread or transferred across the market. It intends to harness innovation efforts to help the poor and the marginalized and enable national competitiveness of micro, small and medium enterprises in both domestic and global supply chains. Further, it identifies education institutions, private organizations, government agencies and local government units as key drivers of programs that stimulate innovation literacy and skills development for the Filipino workforce and entrepreneurs, including women and the youth.

41. TESDA has embodied in the NTESDP 2018–2022 the strategic direction for global competitiveness and workforce readiness with the objective of preparing the Philippine workforce to meet the requirements of the 4IR (TESDA Circular 060, series of 2020).

III. DESCRIPTION OF THE PROJECT

A. Project Background

42. To support the project’s outcome of employability of TVET graduates and improvement in equitable access to quality TVET, one of the outputs –. The selection was based on demand and supply side considerations. The TTIs and their regional innovation centers will prioritize the economic needs of the particular province, the government’s flagship “Build, Build, Build” program, and the priority sectors indicated in the National Technical Education and Skills Development Plan (NTESDP) 2018 – 2022. The project will link the TTIs and RTICs in a hub-and-spoke model with nearby higher education institutions and community-based training providers. The project will also adopt climate-smart, gender-responsive, and accessible designs while upgrading the TTIs and establishing the RTICs.

The site development plans of the 1TTIs are detailed in **APPENDIX 1**.

Figure 1: Location Map of the Proposed Regional TVET Innovation Centers

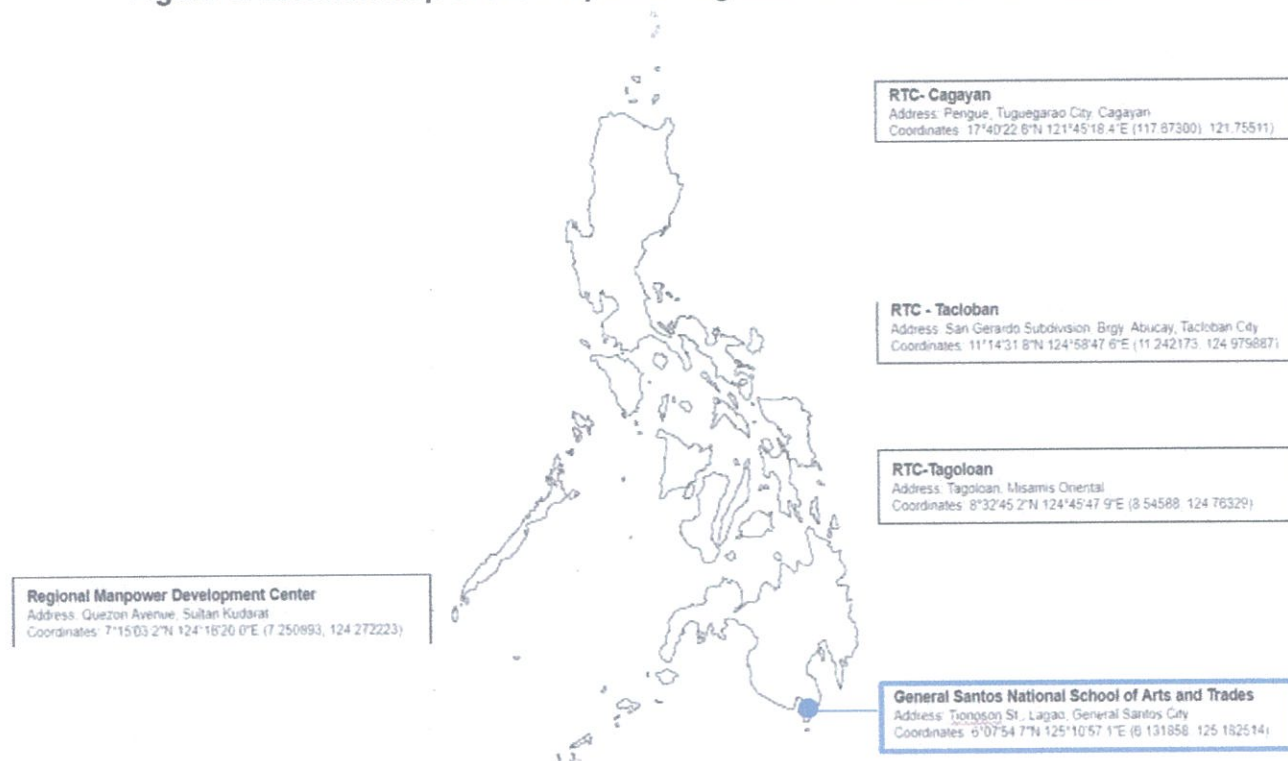


Table 11: List of First 5 TESDA Training Institutions

Region	TTI	Address	Sector and Focus Area of Innovation
II	Regional Training Center - Tuguegarao	TESDA Building, Consuelo Village, Pengue, Tuguegarao City, Cagayan	Cold Chain
VIII	Regional Training Center - Tacloban	Barangay Abucay, Tacloban City	Farm Mechanization & Automation
X	Regional Training Center - Tagoloan	Sta. Cruz, Tagoloan, Misamis Oriental	Manufacturing sector: Mechatronics, Industrial Automation and Control technology
XII	General Santos National School of Arts and Trades	Tionoson St., Lagao, General Santos City	Warehousing & Logistics Management
BARMM	Regional Manpower Development Center	RMDC Barangay Rebuken, Municipality of Sultan Kudarat, Maguindanao	Farm Mechanization & Automation

B. Design Features of TTIs and RTICs

43. The repair works of TESDA Technology Institutions (TTIs) cover improvement of dilapidated architectural members, major structural retrofitting or general rehabilitation works, upgrading of existing water supply system, drainage and sewerage system to meet environmental, electrical and safety requirements.

44. The design of the RTICs, on the other hand, draws from the expertise of international TVET practitioners to ensure compliance with industry specifications and at par with international standards. The size of the proposed innovation center will be determined by the maximum construction cost for construction and limits of the selected project site within the TESDA RTC compound or complex. The indicative cost per square meter is employed to estimate the ballpark cost only. The site location, availability of materials, and mark-up costs will also play a factor in the final construction cost. The detailed architectural and engineering plans will guide the PMU and the ADB determine the bill of materials

45. The design and construction of new building will adhere to the Philippines' national building code and integrate climate change resilience and green building features, e.g., type of construction and materials, building orientation, elevation, drainage, roofing system and windows. It will also take into consideration climate factors such as the amount of rainfall, frequency and intensity of typhoon as well as wind and solar direction. In order to ensure sufficient natural light and ventilation to the building adequate setbacks on all sides will be met; owing to the necessity of providing vehicular access for material delivery the setbacks will be in excess of those required by the building by laws.

46. The proposed RTIC building will be designed to ensure efficient use of functional areas and allocation of adequate spaces for the trainees and trainers. Related functions will be planned in proximity with each other within each floor level and between floor levels of the building. Floor to ceiling height will take into account the requirements of the training equipment to be installed and allow their effective usage. The width of the corridor will be set to allow movement of required training equipment, i.e., installation, use and subsequent maintenance and/or replacement. It will be more than the prescribed corridor width of the National Building Code; and not less than 1.8 meters.

47. **Structural design.** The structural design will be in accordance with the Philippines National Structural Code. It will take into account soil characteristics, the loads and movement of training equipment for each facility, topography of the site, and environmental conditions. The main structure will be built using concrete and suitable materials per the specification of walls and windows. Measures will be integrated in the design to avoid termite infestation, such as use of steel for the roofing system and fiber cement board with metal furring for the ceiling.

48. **Sustainable architecture.** Solar energy will be harnessed by the building by installing panels on the roof. A maximum capacity of 25 kW can be generated, which will be used for lighting the building and perimeter. Adequate access from the second/third floor to the roof area will be provided to allow the maintenance of solar panels and the roofing system. Rainwater harvesting shall also be done through collection tanks, and after filtration shall be used for irrigation and flushing.

IV. DESCRIPTION OF THE ENVIRONMENT

49. This chapter describes the environmental condition at the proposed TTI sites where rehabilitation and upgrading of select TTIs and new construction of selected 16 RTICs will be done. The REA Checklist summary is in **APPENDIX 2** while detailed baseline condition in each of these TTIs is detailed in **APPENDIX 3**.

A. Existing Conditions at Selected TTI Sites

50. **Land availability.** All of the identified TTIs have sufficient land for the proposed rehabilitation of existing buildings and construction of new buildings.

51. **Transportation Access.** All of the identified TTIs are connected with existing national, provincial, or local roads and can be accessed through public transportation.

Table 12: Information on Location, Elevation, Road Access, and Nearest Body of Water and Proof of Occupancy of select TTIs

Region	Name of TTI	Location		Elevation, m	Classification of Road Access	Receiving Body of Water	Distance to Body of Water, m
		Latitude	Longitude				
II	Regional Training Center-Tuguegarao	17° 40' 23" N	121° 45' 19" E	24	National Primary road	Cagayan River	2,400
VIII	Regional Training Center - Tacloban	11° 14' 32.83" N	124° 58' 47.99" E	10	Provincial road	Coalargo Bay	140
XII	General Santos National School of Arts and Trades	6° 07' 57" N	125° 10' 55" E	30	City road	Sarangani Bay	2,700
BARMM	Regional Manpower Development Center	7° 15' 04" N	124° 16' 16" E	12	Barangay road	Rio Grande de Mindanao	1,500

B. Existing Conditions of Proposed Regional Training Innovation Centers Sites

52. **Availability of Land and Proof of Occupancy.** All of the identified TTI sites have available land for the proposed innovation centers. The proof of occupancy includes deed of usufruct, presidential proclamation and republic act, deed of donation, tax declaration and land title.

C. Topography and Natural Hazards

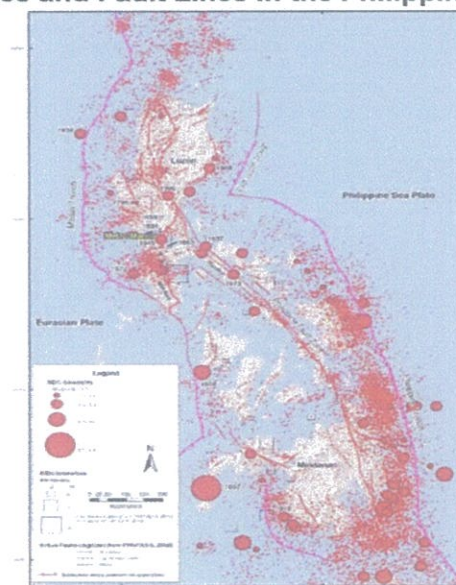
53. The Manila Observatory has developed risk maps of the Philippines' vulnerability to environmental hazards using data from the Philippine Institute of Volcanology and Seismology (PHIVOLCS) and the Earthquake and Natural Resource Atlas of the Philippines of 1998. Based on the geophysical hazards profiling, sites that are prone to earthquakes, earthquake-induced landslides, tsunamis and volcanic eruptions were identified.

54. **Earthquake.** Based on the Seismicity Map and the Earthquake Prone Areas of the Philippines, almost all regions have recorded earthquake events with moment magnitude greater than Mw 4.1, based on 25,100 historical and instrumentally recorded earthquake events from 1608 to 2016. The provinces that are at most risk to earthquakes include Leyte and South Cotabato. Leyte and General Santos have earthquake hazards due to the Philippine Fault Zone. Leyte and General Santos City will be evaluated further during detailed design to ensure that the innovation centers will be able to withstand strong earthquakes. The same will be done for other sites, since they are also prone to earthquakes, although of lesser occurrences and magnitude.

55. In terms of earthquake hazard, the Philippines was classified as High, or more than 20% chance of potentially damaging earthquake in the next 50 years, based on **ThinkHazard**, a web-based tool to consider the impacts of disasters on new development projects developed by the Global Facility for Disaster Reduction and Recovery (GFDRR, 2020)⁷. Regions II, VIII, X, XII, and BARMM are all classified as High.

56.

Figure 5: Earthquakes and Fault Lines in the Philippines (Wong et al., 2014)

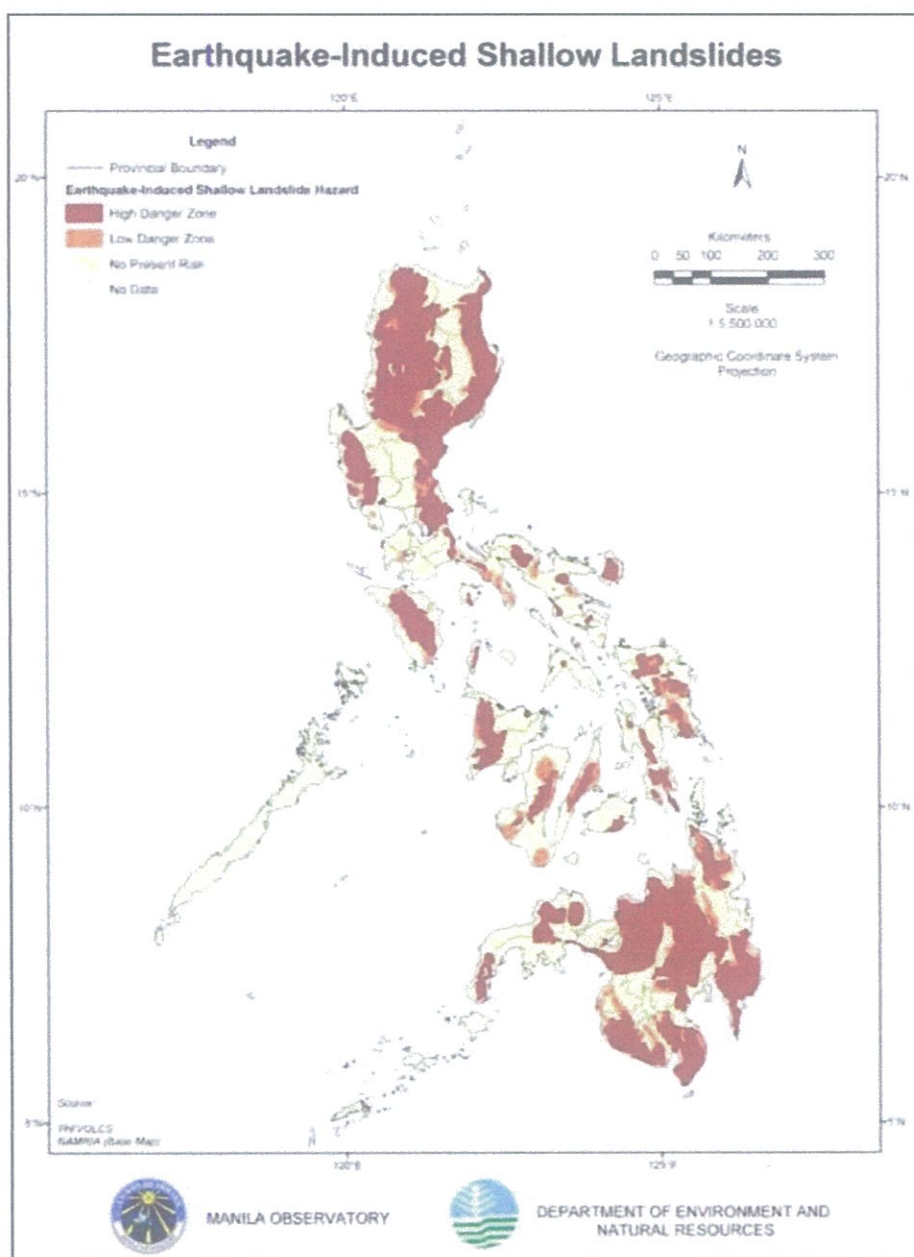


⁷ Thinkhazard.org. [ThinkHazard! Identify natural hazards in your project area and understand how to reduce their impact: Philippines.](https://thinkhazard.org/)

57. **Earthquake-Induced Landslides.** Most of the provinces are susceptible to landslide hazards. Among the provinces selected for the project, Misamis Oriental are susceptible to landslide hazards. The susceptibility of TTI sites will be further evaluated during detailed design.

58. **Earthquake-Induced Landslides.** Most of the provinces are susceptible to landslide hazards. Among the provinces selected for the project, Misamis Oriental are susceptible to landslide hazards. The susceptibility of TTI sites will be further evaluated during detailed design.

Figure 6: Earthquake-Induced Shallow Landslides in the Philippines

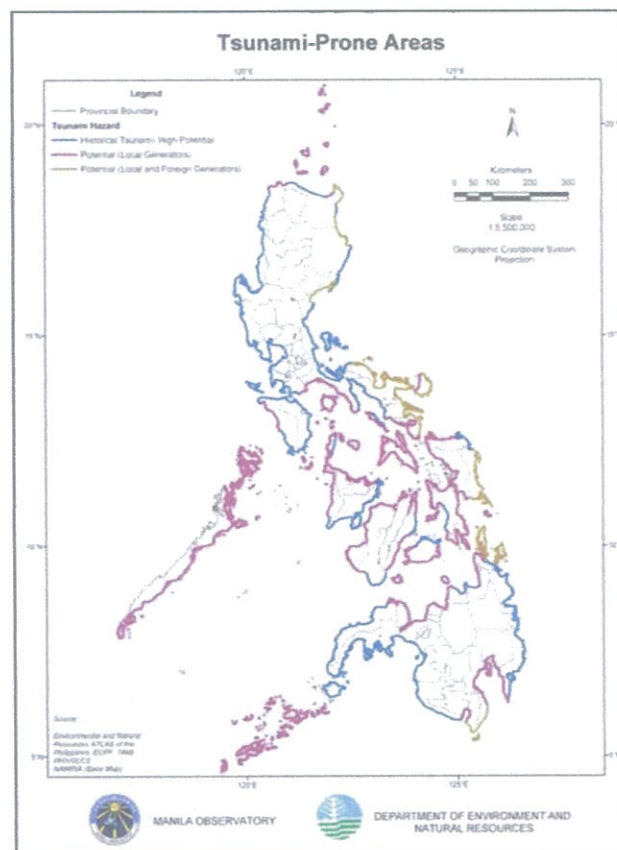


59. **Tsunamis.** Regional Training Center – Tacloban (140 m from Coalargo Bay), Regional Training Center – Tagoloan (367 m), General Santos National School of Arts and Trades (2.7 km from Sarangani Bay)), In terms of tsunami hazard, the TTIs that are most at risk from tsunami include the following:

- (i) Potential (Local Generators): RTC Tacloban, RTC Tagoloan, and Davao Oriental Polytechnic Institute;
- (ii) Potential (Local and Foreign Generators): General Santos National School of Arts and Trades⁸

60. The detailed design will consider the siting and design of building structures to minimize tsunami damages.

Figure 7: Tsunami-Prone Areas in the Philippines



⁸ Philippine Institute of Volcanology. [Tsunami-Prone Areas in the Philippines.](#)

61. **Volcanic Eruptions.** PHIVOLCS classifies volcanoes according to its eruptive history. Active volcanoes are those that erupted within the last 600 years, and those that have written accounts of eruption within the last 10,000 years based on the analyses of materials from young volcanic deposits. Potentially active volcanoes, on the other hand, are those that are morphologically young-looking but with no historical or analytical records of eruption. Active volcanoes that are within 100 km from proposed TTIs include Mt. Parker, which is 30.72 km from General Santos National School of Arts and Trade.

Figure 8: Distribution of Volcanoes in the Philippines

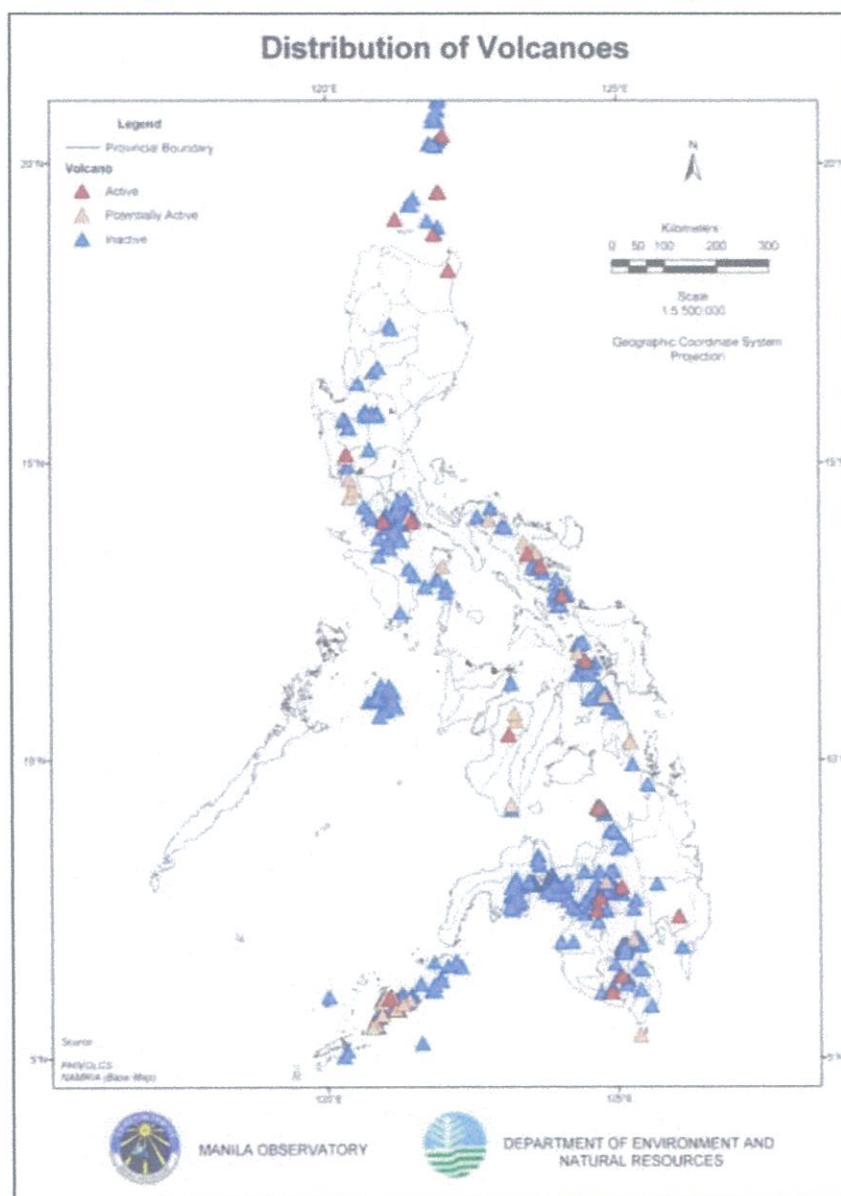
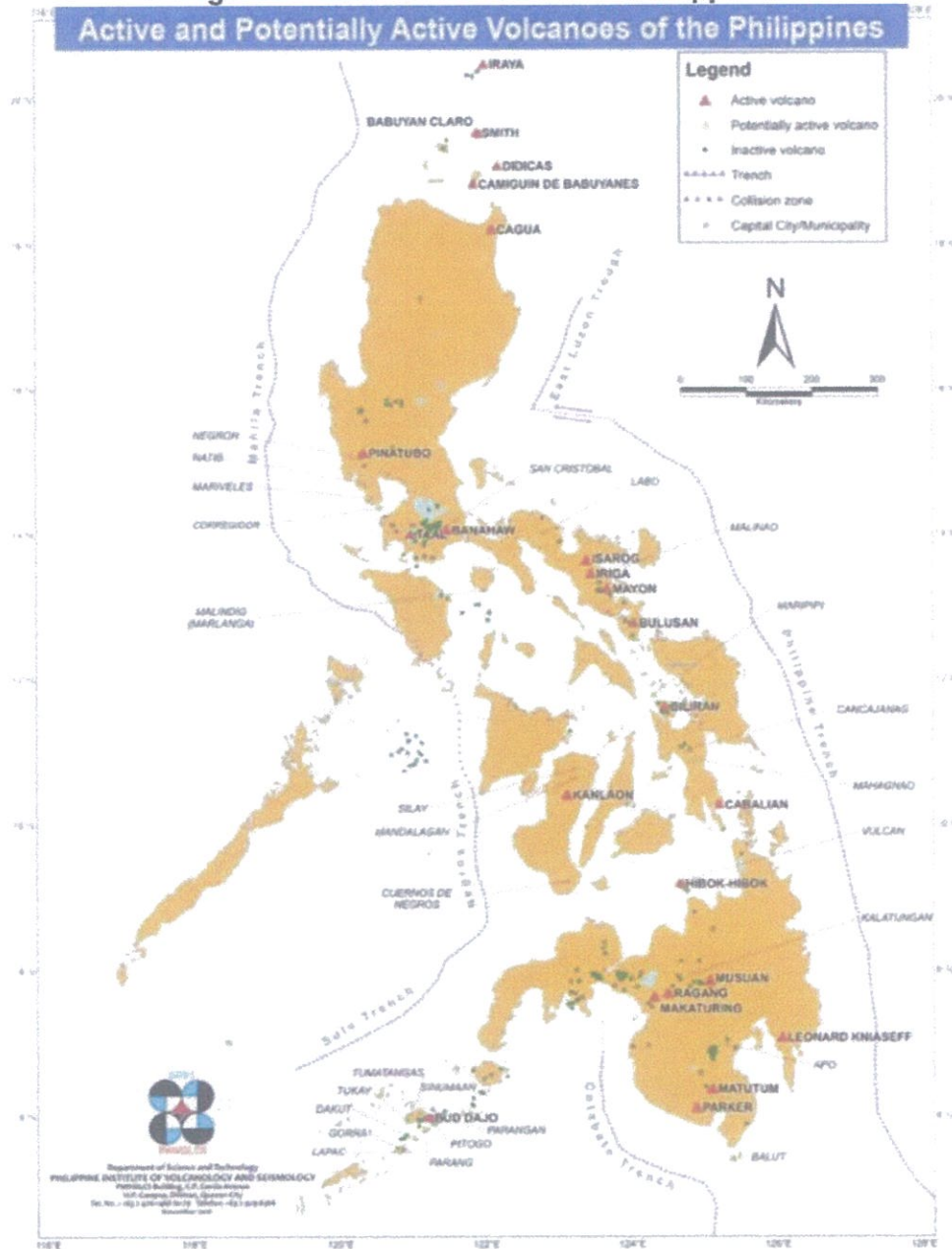
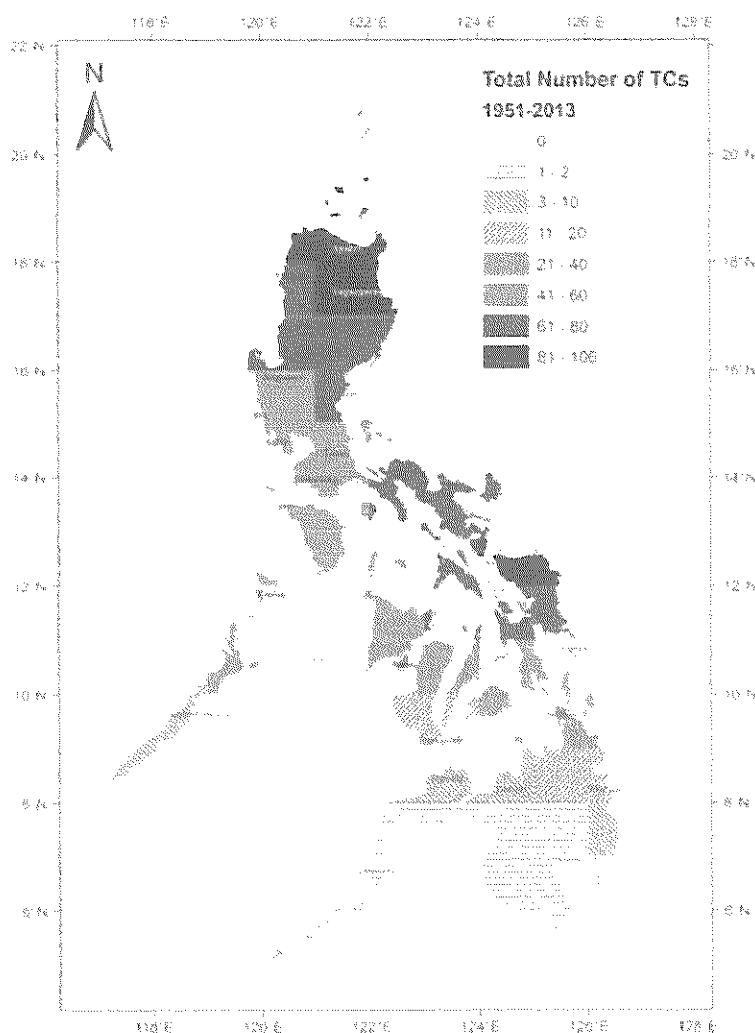


Figure 9: Active Volcanoes in the Philippines



62. **Tropical Cyclone (TC).** Approximately 19-20 tropical cyclones (TCs) enter the Philippine Area of Responsibility, with about 8 or 9 of them crossing the Philippines (PAGASA, 2021), which is equivalent to 25% of global occurrence (Huigen and Jens, 2006). In terms of frequency of tropical cyclones, Region II was the most affected, with 81-106 TCs from 1953-2010, Regions XII and BARMM received the lowest number, with 1-2 TCs for the same period. The technical team will evaluate further the design of innovation centers to mitigate the impact from typhoon.

Figure 10: Frequency of Tropical Cyclones in the Philippines (1951-2013)



63. **Flooding.** Data on predicted flooding were sourced from Project NOAH or the Nationwide Operational Assessment of Hazard, the Philippines' primary disaster risk reduction and management program, which was initially managed by the Department of Science and Technology (DOST) from 2012 to 2017, but is now under the management of the University of the Philippines.

64. Based on the flooding hazard assessment of NOAH, details of Flood Hazard Maps of which are indicated in **APPENDIX 3**, the TTIs most at risk for flooding include RTC Tuguegarao and RTC Tagoloan, where flooding may reach up to 1.5 meters during a 5-year return period. TTIs with low probability or no flooding, even a 100-year return period, include

Tacloban and General Santos National School of Arts and Trades, and Northern Mindanao School of Fisheries. The risks of flooding will be evaluated further by the technical team during detailed design.

Table 13: Flood Hazards and Return Period of select TTIs

Region	Name of TTI	Flood Hazard	Flood Depth	Return Period, years
II	Regional Training Center - Tuguegarao	Low to medium	<0.5 m to 1.5m	5
VIII	Regional Training Center - Tacloban	Low	up to 0.5 m	100
X	Regional Training Center - Tagoloan	High	>1.5 m	5
XII	General Santos National School of Arts and Trades	Low	up to 0.5 m	100
BARMM	Regional Manpower Development Center	Medium to high	>0.5 m to >1.5 m	100

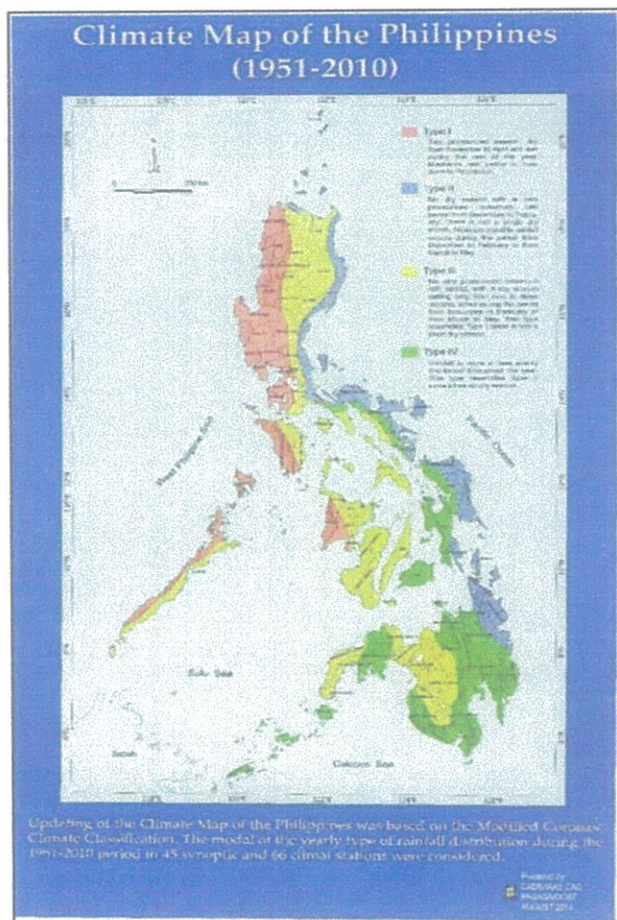
Note: Flood hazard – Low (≤ 0.5 m); Medium ($>0.5 - 1.5$ m); High (>1.5 m)

65. **El Niño – Induced Drought.** Areas highly at risk to El Niño – induced drought include Sultan Kudarat, Misamis Oriental and Cebu. The technical team will assess the sustainability of water supply for proposed infrastructure during detailed design.

66. **Rainfall Change.** The risk to projected rainfall change incorporates both decrease during the dry season and increase during the wet season. Provinces included in the Project that are most at risk to projected rainfall changes are Leyte, Misamis Oriental and Sultan Kudarat. The design team will further evaluate the impact of rainfall change in the design of innovation centers.

71. **Type IV:** Rainfall is more or less evenly distributed throughout the year. This climate type resembles the second type more closely since it has no dry season. Provinces included in the project with this type of climate include Leyte.

Figure 12: Modified Coronas Classification of Climate in the Philippines



E. Air Quality and Noise

72. There are no major industrial sources of air pollution in the vicinity of the TTIs, except from vehicle sources. Sources of noise come from residential, commercial and institutional sources within the vicinity of TTIs.

F. Biological Resources

73. To determine if any TTI is located in any restricted zones of protected area or biodiversity conservation areas, Integrated Biodiversity Assessment Tool (IBAT) was used⁹. IBAT, which is a multi-institutional program of work involving BirdLife International, Conservation International,

⁹ IBAT Proximity Report. Generated under licence 2099-16526 from the Integrated Biodiversity Assessment Tool on 16-18 March 2021; 21 and 24 May 2021 (GMT). www.ibat-alliance.org.

International Union for Conservation of Nature (IUCN), and UN Environment Programme World Conservation Monitoring Centre (UNEP WCMC). The tool intends to provide a basic risk screening on biodiversity. Adjacent protected areas and key biodiversity areas within 10 km of TTI, using the IBAT tool are detailed in **APPENDIX 4**.

74. **Protected Areas.** The following TTIs are within 10 km of buffer zones of protected areas: RTC Tuguegarao (10 km), RTC Tacloban (10 km), General Santos National School of Arts and Trades (5 km).

75. **Key Biodiversity Areas.** Buffer zones of key biodiversity areas that are within 10 km from TTIs include: RTC Tuguegarao (10 km)

Table 14. Protected and Key Biodiversity Areas Near TTIs

No.	Region	Name of TTI	Protected Area	Key Biodiversity Area
3	II	Regional Training Center - Tuguegarao	Peñablanca Protected Landscape and Seascape (within 10 km of buffer zone)	Peñablanca Protected Landscape and Seascape (within 10 km of buffer zone)
11	VIII	Regional Training Center - Tacloban	MacArthur Landing National Park (Imelda Park) (within 10 km of buffer zone)	No key biodiversity area within buffer distance
13	X	Regional Training Center - Tagoloan	No protected area within buffer distance	No key biodiversity area within buffer distance

No.	Region	Name of TTI	Protected Area	Key Biodiversity Area
15	XII	General Santos National School of Arts and Trades	Sarangani Bay Protected Landscape (within 5 km of buffer zone)	No key biodiversity area within buffer distance
17	BARMM	Regional Manpower Development Center	No protected area within buffer distance	Liguasan Marsh (1 km)

G. Power, Water and Telecommunications Infrastructure

76. All TTIs are connected with the electric grid provided by electric utility companies or cooperatives. Some TTIs source their water from the community water supply, while others have back-up deep well and overhead water tanks. Internet connections vary from 5 Mbps (copper cable) in RTC - Iloilo, up to 1 Gbps (fiber optics) in RTC - Tuguegarao.

Table 15. Power, Water and Telecommunication Infrastructure

No.	Region	Name of TTI	Power	Water	Telecommunication
1	CAR	Regional Training Center - Baguio	220VAC Three-phase electrical connection	Community water supply	Fiber Optic: 100 Mbps
2	I	Pangasinan Technological Institute	220VAC Single Phase (220VAC-Neutral/Ground) electrical connection	Community water supply Deep-well (operated and maintained by the TTI) 2 Overhead tanks: 500L and 1000L	Copper Cable: 60 Mbps Fiber Optics: 200 Mbps
3	II	Regional Training Center - Tuguegarao	220VAC, 3phase 220VAC, Single phase	Deep-well (operated and maintained by the TTI) Gravity type concrete water tank (2 units)	Fiber Optic: 50 Mbps 1 Gbps
4	III	Regional Training Center Central Luzon - Guiguinto	220VAC Three-phase electrical connection	Deep-well (operated and maintained by the TTI)	Fiber Optics: 30 Mbps
5	NCR	Regional Training Center - NCR	220VAC Three-phase electrical connection	Community water supply Overhead water tank and Firefighting water backup tank	Fiber Optics: 100 Mbps
6	IV-A	Regional Training Center - CALABARZON	240VAC One-phase electrical connection 240VAC Three-phase electrical connection	Community water supply	Copper Cable 10 Mbps Fiber Optics: 100 Mbps
7	IV-B	Provincial Training Center Oriental Mindoro – San Teodoro	220VAC, 3 phase / 220VAC, 1 phase	No data	Copper cable: 10 Mbps
8	V	Regional Training Center - Pili	220VAC Three-phase electrical connection	Community water supply	Fiber Optics: 50 Mbps

No.	Region	Name of TTI	Power	Water	Telecommunication
				Deep-well (operated and maintained by the TTI) Overhead Bolted Steel Tank/ 1M Gallon	
9	VI	Regional Training Center - Iloilo	300 kVA 3-phase open delta	Water is delivered (with water shortage)	Copper cable: 5 Mbps
10	VII	Regional Training Center - Cebu	220VAC Three-phase electrical connection	Deep-well (operated and maintained by the TTI) Overhead Tank, Concrete, 3 m x 3 m x 3 m	Copper Cable: 15 Mbps
11	VIII	Regional Training Center - Tacloban	220VAC Three-phase electrical connection	Community water supply	Fiber Optics: 50 Mbps
12	IX	Regional Training Center – Zamboanga Peninsula	220VAC Single Phase electrical connection 220VAC Three-phase electrical connection	No data	DSL: 10 Mbps Broadband: 20 Mbps
13	X	Regional Training Center - Tagoloan	220VAC Three-phase electrical connection	Deep-well (operated and maintained by the TTI) Overhead Tank, Concrete, 40 m ³	Wireless: 50 Mbps Fiber Optics: 10 Mbps Broadband: 10 Mbps
14	XI	Davao Oriental Polytechnic Institute	220VAC 60 Amp, 1 phase	Deep-well (operated and maintained by the TTI)	8 Buildings with 20mbps and 1 Building with 50mbps
15	XII	General Santos National School of Arts and Trades	220VAC Single Phase (220VAC-line to line) electrical connection 220VAC Three-phase electrical connection	Community water supply Deep-well (operated and maintained by the TTI) Overhead Concrete Tank, 12.5 m ³ powered by 1.5 Hp electric motor pump	Fiber Optics: 300 Mbps
16	CARAGA	Northern Mindanao School of Fisheries	220VAC One-phase electrical connection	Community water supply	Fiber Optics: 10 Mbps; 100 Mbps; 500 Mbps
17	BARMM	Regional Manpower Development Center	220VAC Three Phase (220VAC-line to line) electrical connection	Deep-well (operated and maintained by the TTI) Pressurized and Overhead tank	Airfiber: 20 Mbps

H. Climate Risk Vulnerability Assessment

1. Background

78. The Philippines is highly vulnerable to climate change impacts, which includes increased frequency of extreme weather events, sea level rise, rising temperatures, and extreme rainfall (USAID, 2017).¹⁰ This is because of the country's high exposure to natural hazards such as typhoons, landslides, floods and droughts), dependence on natural resources which are sensitive to climate change, and the long coastlines where all major cities and bulk of the population reside. There are about 19-20 typhoons in the Philippines each year, of which about 7-9 make landfall. Sea levels are also rising faster than the global average, increasing storm surges and inundation hazard.

79. As a party to the United Nations Framework Convention on Climate Change, the country adopts its objective of stabilizing greenhouse gas concentrations in the atmosphere, to ensure that food production is not threatened and to ensure economic development to proceed in a sustainable manner. As one of the parties to the Hyogo Framework for Action, the country also adopts the strategic goals to build national and local resilience to climate change-related disasters. The Philippines has adopted Republic Act 9729 or the Climate Change Act of 2009 to provide the policy framework to systematically address the growing threats on community life and its impact on the environment.

80. The National Framework Strategy on Climate Change was adopted in April 2010 following the passage of Republic Act 9729 in 2009 (amended in 2012). The framework has been translated into a National Climate Change Action Plan for 2011–2028, which prioritizes food security, water sufficiency, ecological and environmental stability, human security, climate-smart industries and services, sustainable energy, and knowledge and capacity development. The Philippines ratified the Paris Agreement on March 23, 2017, with the objective of limiting global warming to well below 2, preferably to 1.5 °C compared to pre-industrial levels. The Philippines' Nationally Determined Contribution is to reduce GHG (CO₂ equivalent) emissions by 70% by 2030 compared to the business-as-usual scenario of 2000-2030. Reduction of CO₂ equivalent emissions will come from energy, transport, waste, forestry and industrial sectors.

2. Climate Baseline Conditions

81. The Philippines has exhibited increasing temperatures of 0.64 °C or an average of 0.01 °C per year-increase from 1951–2010. Maximum (daytime) and minimum (nighttime) temperatures are also seen to have increased by 0.36 °C and 0.1 °C, respectively in the last 59 years. There has also been a slight increase in the number of typhoons in the Visayas during the 30-year observation period from 1971-2000 compared with the 1951-1980 and 1960-1990 periods (PAGASA, 2011).

3. Future Climate Scenarios

82. According to Observed Climate and Projected Climate Change in the Philippines (Department of Science and Technology – PAGASA, 2018), observed temperature in the country is warming at an average rate of 0.1 °C every decade. Assuming the moderate emission scenario

¹⁰ Climatelinks – A Global Knowledge Portal for Climate and Development Practitioners. [Climate Risk Profile: Philippines](#). USAID Factsheet (accessed 20 April 2021).

(RCP4.5), it is projected that the country-averaged mean temperature could increase by 0.9 C to 1.9 C, and 1.2 C to 2.3 C (considering the high emission scenario or RCP8.5) in mid-21st century.

83. Rainfall, on the other hand, is projected to be within the natural rainfall variations, except for the projected rainfall reduction over central sections of Mindanao. The projection is based on multi-model central estimate of projected changes in rainfall (Observed Climate and Projected Climate Change in the Philippines, DOST- PAGASA, 2018). It was likewise projected, based on the same study, that the high year-to-year variations in the frequency of occurrence and intensity of tropical cyclones will remain.

84. It was also projected by DOST-PAGASA that the sea level in the country will increase by approximately 20 cm by the end of the 21st century under RCP8.5 scenario. The projected increase in sea level is expected to worsen storm surge hazards in coastal communities.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

A. Impact Assessment

85. This section will identify the impacts of the proposed construction of innovation centers and other facilities on the physical, biological, and socio-economic environment of proposed TTIs. The identification of impacts was based on the project design, location, proposed activities during construction and operation, secondary information from national government agencies and online resources, and information gathered from consultations with safeguards focals of the select TTIs conducted from 8 – 22 February 2021, and with safeguards focals of 6 new TTIs on 26-28 May 2021.

86. Prior to the impact assessment process, two broad requirements are needed:

- a. What is in the receiving environment that may be affected by the project activities?
- b. What are the project activities that may affect the receiving environment?

87. The first requirement determines the elements of the environment that are considered important. This is called Valued Environmental Receptors (VERs). The second requirement will be listed, based on similar projects funded by ADB, and the proposed program of works (POW).

B. Valued Environmental Receptors

88. Valued Environmental Receptors (VERs), which include the elements of the receiving environment which are considered to be important, were identified, based on review of available information and consultations with stakeholders. VERs are defined as fundamental elements of the physical, biological or socio-economic environment, including the air, water, soil, terrain, vegetation, fauna and land use that may be affected by a proposed project.

Table 16: Valued Environmental Receptors

Environment	Valued Environmental Receptors	Rationale and Relationship to the Project
Physical	Project location	Earthquake hazards. Regions II, VIII, X, XI, XII and BARMM are all classified as High (Global Facility for Disaster Reduction and Recovery, 2020). Regions IV-A, V, IX and NCR are considered medium.

Environment	Valued Environmental Receptors	Rationale and Relationship to the Project
		<p>Earthquake-induced landslides. Misamis Oriental are susceptible to landslide hazards.</p> <p>Volcanic eruptions. Active volcanoes that are within 100 km from proposed TTIs include Mt. Parker, which is 30.72 km from General Santos National School of Arts and Trade.</p> <p>Tropical cyclones. Region II was the most affected, with 81-106 TCs from 1953-2010. BARMM received the lowest number, with 1-2 TCs for the same period. Region VIII also experienced Haiyan in 2013.</p> <p>Tsunami. Potential tsunami generators in RTC Tacloban, RTC Tagoloan, Davao Oriental Polytechnic Institute, and General Santos National School of Arts and Trades.</p>
	Land and soil condition	Construction timing is important though as rainy and windy season impacts the soil condition.
	Topography and elevation	Flooding. The TTIs most at risk for flooding include RTC Tuguegarao, RTC Tagoloan, where flooding may reach up to 1.5 meters during a 5-year return period. TTIs with low probability or no flooding, even a 100-year return period, include RTC – Tacloban, General Santos National School of Arts and Trades.
	Receiving body of water	Effluent from gray water will contribute to water quality of nearby receiving bodies of water. Quality of effluent must be ensured prior to release to receiving water.
	Ground water	Regions II, X, XI, XII and BARMM depend on deep well for domestic water supply. Both quantity and quality of water must be ensured.
	Climate change	<p>Climate change impacts include increased frequency of extreme weather events, sea level rise, rising temperatures, and extreme rainfall.</p> <p>El Niño – induced drought. Areas highly at risk to El Niño – induced drought include, Sultan Kudarat and Misamis Oriental.</p> <p>Rainfall change. Provinces included in the Project that are most at risk to projected rainfall changes are Leyte, Misamis Oriental and Sultan Kudarat. The design team will further evaluate the impact of rainfall change in the design of innovation centers.</p>

Environment	Valued Environmental Receptors	Rationale and Relationship to the Project
Biological	Protected areas and key biodiversity areas	Protected areas. The following TTIs are within 10 km of buffer zones of protected areas: RTC Tuguegarao (10 km), RTC Tacloban (10 km), General Santos National School of Arts and Trades (5 km). Key biodiversity areas. Buffer zones of key biodiversity areas (KBAs) that are within 10 km from TTIs include: RTC Tuguegarao (10 km)
	Flora and Fauna	Trees will be cut in Regions II, VIII, and BARMM
	Fauna	The Regional Manpower Development Center in BARMM, on the other hand, is covered by the IBA of Liguasan Marsh.
Socio-economic	Access to technical and vocational education	The rehabilitation and construction of TTIs and RTICs will provide access to quality technical and vocational education in the selected regions.
	Infrastructure and access	All of the identified TTIs are connected with existing national, provincial, or local roads and can be accessed through public transportation.
		Existing TTI buildings will be demolished in Region II.
	Water supply	All selected TTIs have dependable water supply. Sources include community water supply and/or deep well. Some TTIs have overhead tank for water storage.
	Vehicle traffic	The proposed construction of innovation centers and other facilities will entail the transportation of construction materials which may obstruct the flow of traffic where the construction vehicles will pass through.
	Acoustic environment	Construction of innovation centers and other facilities will generate noise that may impact both workers, students and faculty of TTIs, and surrounding community.
	Community and occupational health and safety	During construction of innovation centers and other facilities, there are risks on the health and safety of workers and the community, which may lead to injury and/or death. TTI buildings to be rehabilitated may potentially contain asbestos or asbestos-containing materials that could put workers at risk.

89. **Project Activities.** The following project components and activities per phase that will have substantial interaction with the environment were identified:

- (i) Preconstruction stage:
 - a. Location and design of RTIC and other facilities
 - b. Consultation and securing of clearances from government agencies
 - c. Land survey
 - d. Survey of vegetation and tree cutting
 - e. Survey of TTI facilities that will be rehabilitated / replaced, including buildings to be demolished
 - f. Traffic planning
 - g. Capacity building on safeguards implementation and grievance redress

- (ii) Construction Phase
 - a. Site mobilization and construction of temporary facilities - establishment of storage areas for construction materials, mobilization of construction equipment and perimeter fencing
 - b. Management of wastes from demolished and/or repaired buildings
 - c. Construction of RTICs
 - d. Construction of dormitories and operation of other associated and related facilities
 - e. Management of construction activities- worker camps, stockpiles, solid wastes and wastewater
- (iii) Post-Construction Phase
 - a. Demobilization
 - b. Operation of RTICs and other facilities
 - c. Management of wastes from TVET activities
 - d. Monitoring

90. The assessment of impacts, both quantitatively and qualitatively, are based on the REA checklist (**APPENDIX 2**), and infrastructure and environmental questionnaires. Due to COVID-19 travel restrictions, consultations with safeguard focal of TTIs were conducted online from 8–22 February 2021, and 26–28 May 2021 with 6 new TTIs. Review of literature and environmental studies were also done.

91. These impacts can be classified as major, moderate, minor and negligible. Some of the impacts associated with the construction of RTICs include impacts on land, vegetation, receiving body of water, occupational health and safety during demolition or repair of old buildings (including potential exposure to asbestos or asbestos-containing materials), air quality impacts. Prevalent impacts during operation phase includes the management of solid waste and wastewater, sustainability of building and facilities, and climate change.

C. Evaluation of Impacts

1. Beneficial Impacts

92. The project is expected to have positive impact on the quality of TVET in the Philippines. Students who intend to pursue TVET will directly benefit from upgraded curriculum geared towards 4IR, and better facilities in innovation centers.

2. Adverse Impacts

93. The identification of potential negative impacts requires the identification of the components of physical, biological and socio-economic environment that are at risk from the proposed construction of innovation centers and other facilities such as dormitories. A modified Leopold matrix, involving interactions between valued environmental receptors and project activities are proposed.

94. Negative impacts can be mitigated through good construction management practices while positive impacts will be further enhanced. Impacts from the proposed projects are classified into intensity, duration and scope. Intensity refers to the level of disruption, duration pertains to the time dimension of impact, while scope refers to the spatial impact. These can be further classified into different levels, as shown in the next table.

Table 17: Intensity, Duration and Scope Classification of Impacts

Intensity: Level of impacts	Duration: Time dimension of impacts	Scope: Spatial dimension of the effect
Low: Little change in the characteristics of the component. Difficult to quantify	Short-lived: Effect dissipates easily	Regional: Action affects areas outside TTIs
Average: Change in certain characteristics of the components. Change may be quantified	Temporary: Effect does not last. Effect is felt during one project activity or throughout project implementation	Local: Action affects areas within TTIs
High: Change in all or in the main characteristics of the component. Change is quantifiable	Permanent: Effect leaves lasting impact for the life of the infrastructure	Limited: Action affects only the innovation center footprint of the project

95. The three parameters – intensity, duration and scope are incorporated to form multicriteria matrix that can be categorized into the following: Major – effect is permanent that substantially alters the environment quality; Medium – signifies temporary and perceptible effect that has little effect on the environmental component and can be reversed, the effect is only limited and short-lived; and Minor – effect does not affect the environmental component in qualitative or quantitative terms, that is, the effect is short-lived and very limited in scope.

Table 18: Multi-criteria Analysis to Determine the Potential Environmental Impacts

Intensity	Duration Scope	Short-lived	Temporary	Permanent
Low	Limited	MIN	MIN	MED
	Local	MIN	MIN	MED
	Regional	MIN	MED	MED
Medium	Limited	MIN	MED	MED
	Local	MED	MED	MAJ
	Regional	MED	MAJ	MAJ
High	Limited	MED	MAJ	MAJ
	Local	MED	MAJ	MAJ
	Regional	MAJ	MAJ	MAJ

Table 19: Matrix Showing the Relationship Between VERs and Project Components and Activities for the Construction of Innovation Centers

Activities for the construction of innovation centers																
Valued Environmental Receptors	Project Phases															
	Pre-construction						Construction						Operation			
	Location and design of RTIC and other facilities	Consultation and securing of clearances from government agencies	Land survey	Survey of vegetation and tree cutting	Survey of old facilities that will be rehabilitated / replaced, including buildings to be demolished	Traffic planning	Capacity building on safeguards implementation and grievance redress	Site mobilization and construction of temporary facilities - establishment of storage areas for construction materials	Mobilization of construction equipment and perimeter fencing	Management of wastes from demolished buildings	Construction of RTICs	Construction of dormitories and other associated and related facilities	Management of construction activities- worker camps, stockpiles	Demobilization	Operation of RTICs and other facilities	Monitoring
Physical Environment																
Project location	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Land and soil condition	✓		✓		✓			✓	✓	✓	✓	✓		✓		
Topography and elevation	✓		✓				✓				✓	✓				
Receiving body of water	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ground water	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Air quality and noise level	✓				✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Climate	✓										✓	✓			✓	
Biological Environment																
Protected areas and key biodiversity areas	✓		✓	✓							✓	✓	✓			
Flora	✓		✓	✓			✓	✓		✓	✓	✓			✓	✓
Fauna	✓										✓	✓	✓		✓	✓
Socio-economic Environment																
Access to technical and vocational education		✓			✓	✓				✓					✓	✓
Infrastructure and access	✓	✓	✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
Water supply	✓				✓			✓	✓		✓	✓	✓	✓	✓	✓
Vehicle traffic	✓	✓				✓		✓	✓		✓		✓	✓	✓	✓
Acoustic environment	✓	✓			✓	✓		✓	✓		✓	✓		✓	✓	✓

Table 20: Analysis of Environmental Impacts

Project Components	Environmental Components	Description of Environmental Effects	Intensity	Duration	Scope	Assessment of Potential Negative Impacts
Preconstruction Phase						
Location and design	Project location	Geological and natural hazards	High	Permanent	Regional	Major
	Topography and elevation	Flooding risks	High	Permanent	Regional	Major
	Climate	Climate change impacts	High	Permanent	Regional	Major
	Protected areas	Potential impacts on biodiversity	Medium	Permanent	Regional	Medium
	Vegetation	Loss of trees	Medium	Permanent	Limited	Medium
	Fauna	Loss of fauna	Low	Temporary	Limited	Minor
	Hazardous wastes, including asbestos	Impacts on land, air, water, flora and fauna and health and safety of workers and the community	High	Permanent	Regional	Major
Construction Phase						
Mobilization of construction equipment and construction of temporary facilities; Demolition of existing buildings; Construction of innovation centers and dormitories	Land and soil condition	Disturbance of land and soil condition	High	Temporary	Limited	Major
	Land and soil condition	Generation of wastes, including hazardous wastes from buildings to be demolished	High	Temporary	Limited	Major
	Surface water quality	Deterioration of water quality	Medium	Temporary	Local	Medium
	Air quality and noise	Increase in particulate matter and noise level	High	Temporary	Local	Major
	Vegetation	Loss of trees	Medium	Temporary	Local	Medium
	Ground water	Reduced water supply from groundwater	Medium	Temporary	Local	Medium
	Fauna	Loss of fauna	Low	Temporary	Limited	Minor
	Public infrastructure and access	Temporary disturbance of access	Medium	Temporary	Local	Medium
	Water supply	Increased level of use of water	Medium	Temporary	Local	Medium
	Vehicle traffic	Increased level of traffic	Medium	Temporary	Local	Medium
	Occupational health and safety	Impact on health and safety of workers	High	Short-lived	Local	Medium
	Community health and safety	Impact on health and safety of community	High	Short-lived	Local	Medium
Operation Phase						
Demobilization	Land and soil condition	Compaction of soil	Low	Temporary	Limited	Minor
	Surface water quality	Increase in level of pollutants	Low	Temporary	Limited	Minor
	Air quality	Increase level of particulate matter	Low	Temporary	Limited	Minor
	Ambient noise	Increased level of noise	Low	Temporary	Limited	Minor
	Vehicle traffic	Increased level of traffic	Low	Temporary	Limited	Minor
	Community health and safety	Impact on the community	Low	Temporary	Limited	Minor
Operation of innovation centers and dormitories	Climate	Climate change impacts	High	Permanent	Regional	Major
	Land	Generation of solid wastes from TVET activities	Medium	Temporary	Local	Medium
	Surface water quality	Potential deterioration of water quality	High	Temporary	Regional	Medium

Project Components	Environmental Components	Description of Environmental Effects	Intensity	Duration	Scope	Assessment of Potential Negative Impacts
	Water supply	Additional strain to existing water resource	Medium	Temporary	Local	Medium
	Vehicle traffic	Traffic generation	Medium	Temporary	Local	Medium
	Air quality	Increase in level of particulate matter	High	Temporary	Local	Medium
	Receiving body of water	Deterioration of water quality	Low	Temporary	Local	Minor
	Ground water	Reduced water supply from groundwater	Medium	Temporary	Local	Medium
	Occupational health and safety	Risks from handling of equipment	Medium	Permanent	Regional	Medium

96. The analysis of impacts shown in the preceding table revealed the following:
- (i) During the pre-construction phase, major risk and potential negative impact include geological, natural and physical hazards, flooding risks and climate change impacts; and medium impacts on biodiversity and loss of trees.
 - (ii) During construction, major potential impacts include disturbance of land and soil condition and generation of wastes, including hazardous wastes from buildings to be demolished, and from rehabilitated TTIs and construction of innovation centers, and impact on air quality and noise level; and medium impacts on the following: surface water quality, loss of vegetation, reduced water supply from ground water, temporary disturbance of access, increased level of use of water, increased level of vehicle traffic, and health and safety of workers and the community.
 - (iii) During operation, major impacts include climate change while medium for generation of solid wastes from TVET activities, potential deterioration of water quality, additional strain to existing water resource, traffic generation, increase in level of particulate matter, deterioration of water quality, reduced water supply from groundwater, and risks of students and workers from handling equipment.

D. Negative Impacts and Mitigation

1. Pre-construction Phase

97. The construction of innovation centers and rehabilitation of TTIs will be done exclusively at the selected TTI sites. Impacts due to project location include geological hazards such as earthquake and volcanoes, vulnerability to tropical cyclones and flooding, and proximity to areas with high biodiversity, and loss of trees. As some buildings will be demolished in NCR, CAR, Region I, Region II and Region III, and some TTIs will be rehabilitated or expanded, there is a potential that hazardous wastes including asbestos or asbestos-containing materials (ACM) are present in buildings affected. The design of buildings, facilities and other associated infrastructure necessary for the construction and operation of RTICs and other facilities will be evaluated further during detailed design stage.

98. The following are the major environmental issues associated with project location.

a. Geological Hazards

99. **Earthquake Hazards.** In terms of earthquake hazards, Regions II, VIII, X, XI, XII, and BARMM are all classified as High (Global Facility for Disaster

Reduction and Recovery, 2020). The project will conduct geotechnical survey during detailed design to further evaluate the hazards from active faults close to the TTIs that may trigger earthquakes. The project will also be in compliance with the National Structural Code of the Philippines and other applicable codes, standards and regulations.

100. **Volcanoes.** Mt. Parker, which is 30.72 km from General Santos National School of Arts and Trade. Volcano hazards associated with eruption include lava flow, ash fall, pyroclastic flow, lateral blast and volcanic gas. The project will utilize the Volcano Information Materials from PHIVOLCS to educate the TTI stakeholders on the needed actions to prepare for volcanic eruptions.

b. Natural Hazards

101. **Tropical Cyclones.** Region II was the most affected, with 81-106 TCs from 1953-2010, while VIII received about 61-80 TCs for the same period. The design of innovation centers will take into consideration the impacts of severe tropical cyclones.

102. **Flooding.** The TTIs most at risk for flooding include RTC Tuguegarao and RTC Tagoloan where flooding may reach up to 1.5 meters during a 5-year return period. The design of innovation centers and other facilities will consider flooding risks and incorporating mitigating measures such as raising the floor height of buildings and increasing capacity of drainage.

103. **Vulnerability to climate change.** Increased temperature in the TTIs may lead to decreased ground water supply for innovation centers, increased need for ventilation and additional energy for air conditioning. The projected rainfall reduction over central sections of Mindanao, will likewise impact on TTI's water supply. The high variability in the frequency of occurrence and intensity of tropical cyclones will impact on the integrity of the buildings, specifically in Region II, and VIII. The projected sea level rise of 20 cm by the end of the 21st century will likewise impact TTIs located near coastal areas, as this will worsen storm surge hazards in these areas.

104. **Impacts on biodiversity.** The construction of innovation centers and other facilities will not lead to loss of biodiversity or critical habitat since all activities will only be confined within TESDA sites. To coordinate with the Department of Environment and Natural Resources and Ministry of Environment, Natural Resources and Energy (MENRE) regional office to ensure compliance with local environmental requirements.

105. **Loss of trees.** Based on the initial survey from selected sites, trees will be affected in the following regions, arising from the construction of RTICs: II, VIII, XII, CAR and BARMM.

TTIs will coordinate with the Community Environment and Natural Resources Office (CENRO) with jurisdiction over the TTI, on requirements and mitigating measures (including replacement of cut trees) to lessen impacts of cut vegetation.

c. Physical Hazard

106. **Hazardous wastes from buildings to be demolished or rehabilitated.** There is a potential that hazardous wastes, including asbestos, are present in buildings affected. To ensure compliance with relevant regulations, the Project will refer to DENR Administrative Order (DAO) No. 2000 – 02 (Chemical Control Order for Asbestos), particularly Section IX, Specific Requirements and Standards, item 6 – Renovation, Removal and Demolition Requirements. Based on the DAO, the duly authorized owner or operator, in this case the TTI, through the Design and Construction Supervision Consulting (DSC) Firm, shall thoroughly inspect and assess the facility to verify the presence of any friable asbestos containing materials, or non-friable asbestos containing materials that have become friable prior to the commencement of any demolition activity.¹¹ In addition, and based on the findings of the risk assessment, the DSC Firm will also develop a risk management plan to be refined and implemented by works contractors during the construction phase.

2. Construction Phase

107. **Disturbance of land and soil condition.** The construction of innovation centers will only be done in the land allocated by TTIs. There will be no land acquisition and resettlement as these lots are owned by TTIs.

108. Construction phase activities include mobilization of construction equipment, construction of temporary facilities, and construction of innovation centers and other facilities. Prior to the construction of innovation centers, contractors will transport construction materials and equipment that will disturb soil condition within the project area. The impact will be permanent since the area traversed will be used for internal road, parking and buildings. Impacts will be limited to the building footprint area and areas devoted for roads and parking. At the minimum, about 1,900 to 2,500 m² of land will be altered permanently since these are the areas required for the building.

109. To mitigate the impacts on disturbance of land and soil condition, best management practices include limiting the amount of erosion and sediment by disturbing only the areas necessary for construction, phasing of construction activity, lessening the grade of steep slopes, and covering of exposed soils until time of revegetation or building of facilities. Soil loss can also be lessened by scheduling construction activities during fair weather to prevent soil erosion, use of appropriate sedimentation and soil erosion and control devices (sediment traps or silt fences). Stockpiles of soil removed during construction should be covered. Storage of construction materials should be limited to paved parking lots or inactive areas within existing building or temporary shed. Construction machineries should be parked in paved areas. Drivers should also be instructed to observe speed limit to reduce soil disturbance.

¹¹ Friable asbestos material" means any material containing more than one percent (1%) asbestos, as determined using standard polarized light microscopy techniques, which when dry can be crumbled, pulverized, or reduced to powder by hand pressure thereby, releasing airborne fibers. "Non-friable asbestos containing material", on the other hand, means any material containing more than one percent (1%) asbestos, as determined by using standard polarized light microscopy techniques, which when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure (DENR Administrative Order 2000 – 02).

110. **Generation of wastes.** The rehabilitation of TTIs and construction of innovation centers will generate wastes from cut trees, spoil, demolition and construction wastes that can negatively impact the environment, workers, students and faculty of TTIs, and people close to TTIs. Prior to construction of innovation centers, vegetation will be cut and land will be cleared. These will generate wastes from cut trunks, leaves and roots that may contaminate receiving body of water. Permit to cut trees will be coordinated with DENR CENRO while the disposal of organic materials will be coordinated with the local government.

111. Rehabilitation of TTIs will also generate demolition wastes that may include general wastes and hazardous wastes. The works contractor must implement a waste management plan as part of CEMP, and in case asbestos is identified as being present in those areas of buildings to be demolished or rehabilitated (to be identified during detailed engineering design), the contractor must implement the risk management plan developed by DSC Firm. The contractor must ensure to set-up waste collection area for construction, non-hazardous and domestic solid wastes. Solid wastes must be segregated into biodegradable, recyclable, residual and hazardous wastes. Construction wastes, consisting of concrete and rubble, steel rods, damaged formworks and paper that can be recycled must be separated. Hazardous wastes such as paint, used oil and fuel, and batteries, must be disposed temporarily in designated hazardous waste temporary storage, prior to collection by DENR accredited hazardous waste management provider, for proper treatment, storage and disposal. The contractor will ensure compliance with national regulations, international commitments where Philippines is a party, and WB - IFC EHS Guidelines (2007) on hazardous waste storage, transportation and treatment and disposal. Hazardous wastes generated during construction, which include fuel and chemicals, among others, should be stored to prevent or control accidental releases to air, soil and water resources. Stored waste should have physical separation or containment curbs, and should be stored in closed containers away from direct sunlight, wind and rain. There should be adequate ventilation where volatile wastes are stored.

112. **Impact on air quality and noise level.** There will also be impacts on air quality and increased level of noise arising from movement of construction vehicles, demolition of buildings in some TTIs, and the construction activities itself. The quality of receiving body of water will also be affected, as disturbed land will generate runoff during rainfall events.

113. The movement of vehicles carrying construction materials may generate dust that may affect the air quality in surrounding areas and may also impact the health of the people. The contractor must require covering trucks carrying construction materials to prevent dispersion of dust during transport. Piles of aggregates must also be covered during high wind condition to prevent dust from scattering in TTI vicinity. Washing of tires of construction vehicles will also be imposed after delivery of construction materials. Speed limit and watering of roads will also be implemented to prevent dust.

114. Workers exposed to high noise levels (i.e., 90 dBA) may suffer from physical and psychological stress, reduced productivity, interference with communication and concentration, and may contribute to workplace accidents and injuries due to difficulty in hearing warning signals.¹² Workers who are exposed to repeated exposures to high levels of vibration may suffer from hand-arm and whole-body vibration. Hand-arm vibration exposure, is a known contributing

¹² United States Department of Labor. [Occupational Noise Exposure](#) (accessed 13 May 2020).

factor to carpal tunnel syndrome and other ergonomic-related injuries. It also causes direct injury to the fingers and hand that affect feeling, dexterity and grip.¹³

115. To mitigate excessive noise, no worker should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C). The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Impact of vibration can be lessened through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure. Electric hazard from exposed or faulty electrical device can be mitigated by such measure as marking all energized electrical devices and lines with warning signs and protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas.

116. **Impact on surface water quality.** The contractor will ensure that the wheels of vehicles transporting aggregates and other construction materials are thoroughly washed to prevent sediment runoff that will impact the quality of receiving body of water. Portable toilets will be provided to manage the wastewater coming from the workers. Contractor through third party service provider, will be responsible for the operation, maintenance and disposal and treatment of collected wastes from portable toilets. Potential impacts on receiving body of water will be addressed through minimization of exposed soil from erosion, construction of silt traps, interceptor drains and sedimentation pits around work areas and camp site.

117. Construction of innovation centers will generate construction wastewater as well as domestic wastewater from workers who will temporarily stay inside workers' camp. It was estimated that around half of workers will stay inside the construction camp. It was estimated that water consumption for each worker is 80 liters/day or a total of 1.92 m³/day. Sources of water consumption will come from toilets, housing, dining area, laundry and kitchen. It was also estimated that 80%, or 1.5 m³/day will drain into receiving body of water of each TTI. This volume of wastewater will have high level of BOD₅, nutrients, bacteria and pathogen. This will further contribute to local water pollution if not treated. The impacts on waterways can be mitigated through appropriate collection and treatment.

118. **Impact on vegetation.** As there are trees in some TTIs where innovation centers will be constructed, there will be medium impact on trees as these need to be cut or transplanted in available land within the TTI. A permit to cut will be secured from the CENRO prior to cutting or transplanting of trees. The contractor will schedule the cutting of trees progressively so as not to expose soil for long period. Contractor will be responsible for transport and disposal of biomass wastes from cut trees. Contractor also need to strip the topsoil from any areas to be covered by pavement, structures or where utilities will be located, to be used later for revegetation. Stripping of topsoil shall be at a depth to the bottom of the grassroots zones. Grass shall be stripped together with topsoil.

119. **Impact on water supply.** Since construction will involve the use of water, there will be medium impact on the water supply of TTIs, which is sourced from the community water supply and groundwater supply of TTIs. Water supply will be used for construction activities and for workers' use in construction camp.

¹³ R. Brauch. 2015. [Vibration Hazards in the Workplace: The Basics of Risk Assessment](#). *Occupational Health and Safety*.

120. **Impact on vehicle traffic.** There will be increased vehicle movements during construction phase, which may affect localized traffic. There may also be restriction of access in other buildings resulting from the construction of TTI facilities. The contractor will prepare and implement traffic management plan as part of the Contractor's EMP, in coordination with the Traffic Management Office of the city or municipality covering the TTI, to manage the traffic in the area. The plan will include driving policy, roles and responsibilities of drivers, workers and management, traffic management procedures, site layout and traffic flow pattern and schedule, road safety rules, training and vehicle inspection registries, road safety records and incident reports, and performance reports. The contractor must set speed limit for all construction vehicles and install traffic warning signs within the project site. The contractor must also conduct regular orientation and capacity building on safe driving for drivers and workers. Contractor must also be responsible for regular vehicle maintenance. Warning and informatory signs will also be put up along the roads leading to the construction site. There will be prior consultation and coordination with the local governments and affected stakeholders prior to start of construction.

121. **Impact on health and safety.** To minimize the short-term construction impacts on health and safety of workers, students, TESDA personnel, and the community, good construction management practices will be implemented in the select TTIs. The Environmental Management Plan (EMP) for the project, includes mitigation measures to prevent or minimize above construction impacts. The Contractor will also prepare and implement occupational health and safety plan as part of the CEMP, format of which is based from Section 2.0 of World Bank – IFC EHS Guidelines on Occupational Health and Safety.¹⁴ The contractor will implement as well the asbestos risk management plan developed by DSC Firm, as applicable. The project will adhere to the relevant provisions of the Environmental, Health and Safety General Guidelines of the World Bank Group (2007) and the relevant environmental regulations of the Philippines. The EMP includes mitigation measures on environment (air emissions and ambient air quality, wastewater and ambient water quality, water conservation, hazardous materials management, waste management and noise); occupational health and safety; community health and safety; and construction and decommissioning. The bidding documents and contracts for civil works will include the EMP.

122. Contractor shall require workers with high exposure to hazards to wear personal protective equipment (PPE) such as face and eye protection device with side shields, welder goggles for welding and hot works, gloves, facemasks with appropriate filters for dust removal, plastic helmets with top and side protection, body suits, and safety shoes and boots. Contractor must also implement fall prevention and protection measures for workers exposed to falling hazard. These include installation of guard rails, proper use of ladders and scaffolds, and use of fall prevention devices such as safety belt. The Contractor should also provide first aid attendant for the project as well as medical kit to treat workers' injuries and illnesses prior to transportation to hospital.

123. The contractor must also restrict the access of students and other personnel of TTIs, and the general public to the site as the construction poses health and safety hazards. These include accidents associated with building structure failure, injuries from falls, open excavation or contact with heavy equipment, respiratory problems from dust and fumes, elevated noise from construction equipment, and exposure to hazardous materials. To lessen the impact of the project on the community's health and safety, the contractor must fence the perimeter of the construction site, install signages, assign guards at entrance and exit, and inform the public through regular

¹⁴ International finance Corporation. [Environmental, Health, and Safety \(EHS\) Guidelines—General EHS Guidelines: Occupational Health and Safety.](#)

consultation. The contractor must also ensure that there are no hazardous conditions inside the project site such as open excavation and unstable piles.

3. Operation Phase

124. **Impact of climate change.** Based on the analysis of climate baseline conditions and future climate change scenario, the project will be affected by El Niño-induced drought and rainfall change.

Table 21: Potential Climate Change Impacts and Proposed Adaptation Measures

Climate Change Indicator	Affected Provinces	Potential Climate Change Impacts	Proposed Adaptation Measures
Niño – induced drought	Sultan Kudarat, Misamis Oriental	Decrease in both community and groundwater supply, affecting the operation of TTIs	Rainwater harvesting measures to supplement existing water supply, specifically in TTIs that depend on ground water supply
		Increase in demand for power supply for air conditioning	Utilize solar PV panels to complement the power supply from the grid. Design incorporating natural ventilation or use of fans instead of air conditioners in some sections of RTICs and rehabilitated TTIs. Possible use of skylight roofing to utilize natural light, and to lessen localized temperature.
		Impact on long-term viability of agri-fisheries related programs of TTIs	Introducing drought tolerant variety of crops, use of water-smart technologies such as drip irrigation and wastewater reuse, and adopting conservation agriculture technologies
Rainfall change	Leyte, Misamis Oriental and Sultan Kudarat, Cagayan	Flooding	Increase in elevation of building above High Flood Level Increase in capacity of drainage Provision of permeable pavement for parking spaces to recharge groundwater supply
Sea level rise	Leyte, Zamboanga del Sur	Flooding, saltwater intrusion, increased level of storm surge	Increase in elevation of building above High Flood Level Developing additional water supply in view of salt water intrusion on groundwater supply Design to minimize impact caused by storm surge

125. **Generation of wastes.** The operation of TTIs and RTICs will generate wastes from students and faculty. The National Solid Waste Management Commission of the DENR estimated that the per capita waste generation for the Philippines is 0.4 kg/day. These include biodegradable from food consumed and papers, recyclables such as bottled water and soft drinks, and wastes generated from TESDA programs (e.g., wastes from metal works, used oil and fuel, batteries, etc.).

126. The Project will abide by the guidelines of Ecological Solid Waste Management Act of 2000 (Republic Act 9003) and the Toxic Substances and Hazardous and Nuclear Wastes Control

Act of 1990 (Republic Act 6969). The former regulates general wastes, while the latter regulates toxic and hazardous wastes.

127. To manage general, non-hazardous wastes, the management must install 3 types of solid waste containers in designated areas with the following labels: biodegradable or organic (food waste, kitchen waste, paper), recyclable (plastics, glasses and metals), and residuals. All domestic wastes must be collected, segregated, and transported to common solid waste management facility of each TTI. The collected wastes will be transported through the municipal or city solid wastes management services or through a service provider that will transport the collected solid wastes to materials recovery facility and at the disposal facility of the municipality or city. Hazardous waste management, such as those coming from laboratories, vocational courses related activities, and maintenance activities, will be governed by relevant provisions of RA 6969.

128. Within the project site, each TTI must designate a specific storage zone for hazardous waste. The facility should be lined, with enclosed walls and roofs to store hazardous waste containers. The management should actively promote waste segregation to avoid hazardous waste mixing with general wastes. The management must also initiate regular training on safe practices to handle hazardous wastes. These hazardous wastes include used oil, battery, electric and electronic wastes, pesticides, and paints and other chemicals. Appropriate PPEs will also be required for the workers.

129. **Potential deterioration of water quality.** Wastewater from cleaning of equipment, used oil from vehicles and equipment, kitchen wastes, and other sources may contaminate the receiving body of water of the TTI. To mitigate the potential deterioration of water quality of receiving body of water, each innovation center will install a wastewater treatment system that will meet the effluent standard for water following the Philippine Clean Water Act of 2004 and WB-IFC EHS Guidelines.

130. **Additional strain to existing water resource.** The operation of innovation center and rehabilitated TTIs will increase additional demand to existing water resource of TTIs. In addition, there will be additional power arising from the usage of additional facilities and equipment. Each TTI will explore options to utilize solar power to complement power from the grid. Each TTI will explore rainwater harvesting for plant irrigation and for general use, except for drinking. Each TTI will also explore the potential of reusing the effluent for flushing toilets, design of which will be finalized in detailed engineering design phase.

E. Analysis of Alternatives

131. Alternative locations for innovation centers were discussed during the February consultations with safeguards focals of each TTI. ADB consultant also consulted with each TTI to discuss the area allocation and the most suitable site for the TTI. The Site Development Plans (APPENDIX 1) for the select TTIs are the most suitable locations for each TTI, based on the preliminary evaluation and consultations with the TTI.

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Information Disclosure

132. In line with the Access to Information Policy of ADB (2018), the IEE report for the project will be made available in a timely manner, in an accessible place, and in a form and language

that will be understood by affected people and other stakeholders. The purpose is for affected people, including the general public, to provide meaningful inputs into project design and implementation. As this version of the IEE is based on the conceptual design, updated IEE reflecting detailed engineering design, which incorporates further inputs and feedbacks of all concerned stakeholders, will also be made available to the public.

133. ADB will disclose the following safeguard documents on its website: final or updated initial environmental examination upon receipt; and environmental monitoring reports submitted by TESDA during project implementation upon receipt.

B. Key Stakeholder Consultation and Participation to Date

134. ADB's SPS (2009) requires project proponents to carry out meaningful public consultation that begins early and is carried out throughout the project cycle and to provide timely disclosure of relevant information that affected people can understand and can be easily accessed. Moreover, SPS also requires that consultations be free from coercion, be gender inclusive and caters to the needs of disadvantaged and vulnerable people, and that all relevant views of affected people are considered.

135. The consultations aimed to familiarize and build capacity of safeguards focals on ADB's SPS (2009) and the Philippine environmental impact assessment requirements for the TTIs. These consultations also allowed safeguards focals to present the baseline conditions of proposed sites for innovation centers and other facilities. The infrastructure survey and safeguards information that were previously submitted by the TTIs were also discussed to confirm the information indicated in the forms. Lastly, responsibilities on environmental monitoring, establishment of grievance redress mechanism within TTI, and securing of various permits and clearances at each stage of the project from relevant government agencies were also discussed. Below is the program for the consultation.

C. Future Public Consultation and Information Disclosure

136. All key stakeholders should be informed about the project and their inputs solicited. Activities for information disclosure, public consultation and public participation are part of the overall planning design process and construction of the proposed TTIs. Information of planned project activities prior to construction works will be done through stakeholder consultations and publications through mass media and posters. Stakeholder consultations will be done through:

137. **Discussions with stakeholders.** It aim to explain the construction activities of TTIs, including the environmental and social impacts associated with the activities and the management plan to address potential impacts. Stakeholders, which include students, staff of TTIs, and the communities that will be affected by the project, may express their opinions verbally during these discussions.

138. **Survey.** Stakeholders that will be affected by the project will fill out their responses in the questionnaire prepared by TESDA / TTIs. The stakeholders will also provide written opinions and suggestions on the project in the prepared questionnaire as well as their suggestions on managing potential environmental and social impacts of the project.

VII. GRIEVANCE REDRESS MECHANISM

A. Grievance Redress Mechanism

139. ADB's SPS (2009) requires the borrower to establish a GRM to receive and facilitate the resolution of environment-related issues and concerns affecting the project. A project-specific grievance redress mechanism will be established in each TTI, to receive, evaluate and facilitate the complaints / grievances of affected persons on the environmental performance of the established facilities.

140. The PMU will establish and maintain a grievance redress mechanism to register, assess, and address project-related complaints. The selected TTIs will assign GRM focals prior to commencement of works to address the issues raised by affected people on the project. Contact number of the contactor, the TTI safeguards focals, the PMU and the DSC including names, positions, and telephone numbers shall be disclosed at the project site.

141. Persons or groups with project related issues may file their complaints with the GRM focals through the grievance intake form or through email or complaints box that will be made available in each TTI. The TESDA GRM focal at the regional office will be responsible for the registration of grievances and communication with aggrieved party.

142. The steps to be followed in filing complaints and the procedures for redress during construction phase are the following:

- (i) Complainant will provide the background and file the complaint verbally or in writing to TTI. The GRM focal will assist the complainant in filling-up the grievance intake form;
- (ii) Within 2 working days, TTI, the contractor's representative, and the complainant will discuss if the complaint can be resolved without calling for a meeting;
- (iii) Within 3 days of lodging the complaint, TTI will provide the complainant a written feedback on the process, steps and timeframe for resolving the complaint.
- (iv) If the complaint cannot be resolved, a meeting with the complainant will be called within 5 working days;
- (v) The TTI will have 15 working days to resolve the complaint;
- (vi) The complainant will receive feedback from TTI within 5 working days after the various steps of the GRM are completed; and
- (vii) If the complainant is not satisfied with the feedback from the TTI, the complainant will elevate the complaint to TESDA Central Office following the above process. If the complainant is still not satisfied with the outcome, he or she or the group has the option to access the Government's judicial, administrative remedies or through concerned government agencies.

143. The steps to be followed during operation will be the same, except that the contractor's representative will no longer be involved.

144. The GRM focal will receive, follow-up and prepare monthly reports regarding all complaints, disputes or questions received about the Project and corresponding actions taken to resolve the issues. These reports will be included in the semi-annual environmental monitoring reports to be submitted by TESDA to ADB.

B. ADB's Accountability Mechanism

145. In case issues are not resolved through the GRM, affected persons may elevate their complaint to Philippine ADB Resident Mission. The complainant can elevate the case further through the ADB's accountability mechanism in case issues are not resolved through the GRM and ADB Resident Mission. The accountability mechanism provides opportunities for people that are adversely affected by ADB-financed projects to express their grievances, seek solutions, and report alleged violations of ADB's operational policies and procedures, including safeguard policies. ADB's accountability mechanism comprises of (i) consultation led by ADB's special project facilitator to assist people adversely affected by ADB-assisted projects in finding solutions to their concerns and (ii) providing a process through which those affected by projects can file requests for compliance review by ADB's Compliance Review Panel.

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Overview

146. The EMP has been prepared to provide the mitigating and management measures that will be undertaken for identified impacts at different phases of the project. Information includes: (i) Mitigating measures to be implemented (ii) required monitoring associated with the mitigating measures and (iii) implementation arrangement. Institutional set-up is presented in the implementation arrangement and discusses the monitoring and supervisory roles of responsible parties.

147. The EMP contains a number of components crucial to effective environmental management within the Project. These include:

- (i) Evaluate the performance of mitigation measures proposed in IEE;
- (ii) Provide information which could be used to verify predicted impacts and thus validate impact prediction techniques;
- (iii) Suggest improvement in environmental mitigation measures as required; and
- (iv) Provide information on unanticipated adverse impacts or sudden change in impact trends.

148. The EMP has been developed based on discussions with NITESD-TESDA and the online consultations with safeguards focals of the selected TTIs. The EMP will be included in the bid and contract documents to ensure that contractors are aware of their obligations during construction phase. The plan will also guide TESDA in the supervision and monitoring of contractors' safeguards performance during construction.

B. Mitigation Plan

149. Environmental mitigation measures of the project have been formulated and summarized in Table 27. It presents summary information on: (i) project activity causing impacts by project's phase; (ii) Anticipated impacts associated with project activity; (iii) proposed mitigation measures for each environmental impact, (iv) responsible party for carrying out mitigation measures, and (v) associated cost (tentative). Details of mitigating measures are already discussed in Chapter V where the need for mitigation of each impact was determined in the screening process. The table also presents the information on Impact Monitoring including: (i) parameters to be monitored; (ii) frequency and means of verification; (iii) party responsible for monitoring.

150. During the pre-construction phase the cost of preparing tender documents with provisions for the required environmental measures are part of the design consultant's contract. During construction, all costs of environmental mitigation measures shall be the responsibility of contractors and are considered part of their contracts as specified in the technical specifications. During the operation phase, all costs of mitigation measures are part of the operation and maintenance costs of TTIs.

151. The EMP costs shall not be taken as separate environmental costs since they are already part of specific items such as the design consultant's contract, contractors' contracts and TTI's operation and maintenance costs.

C. Reporting

152. Throughout the construction period, each contractor will submit monthly works progress and CEMP implementation reports to the DSC. The quarterly project progress reports prepared by the PMU for ADB should include a short summary of EMP implementation progress and any grievances raised/resolved in the reporting period. The PMC will support the PMU in preparing and submit semi-annual environmental monitoring reports (SAEMRs) to TVET and ADB.¹⁵ The SAEMR will include progress of construction, results of site inspections and environmental monitoring, progress made in EMP implementation, status of compliance with domestic environmental regulatory requirements and other clearances, record of community complaints, unforeseen environmental impacts, and suggested corrective actions for the next monitoring period. The SAEMRs submitted to ADB until the Project Completion Report is prepared. The SAEMR shall be based on the semi-annual environment monitoring reports to be prepared by the TTIs (on behalf of the PIUs). Table below presents the environment safeguards reporting plan for the project.

Table 24: Environmental Safeguards Reporting Plan

Type of Report	Basic Content	Prepared by	Submitted to	Frequency
Construction Phase				
Construction Progress Report	Progress of construction, CEMP implementation (checklists)	Contractors	TTIs, DSC, PMC	Weekly and Monthly
TTI Environment Progress Report	Environment progress reports, including environment supervision results, accidents and	TTIs, DSC	PMU, PMC	Semi-annual

¹⁵ Report template is annexed to the IEE.

Type of Report	Basic Content	Prepared by	Submitted to	Frequency
	incidents, and any complaints received			
Project Progress report	Project status Including a summary section on EMP implementation, accidents and incidents, and any complaints received	PMU, PMC	ADB	Quarterly
Environmental Monitoring Report	EMP implementation, environmental monitoring, compliance with GOI environmental requirements, accidents/incidents, complaints received, and actions undertaken	PMU, PMC	ADB, TVET	Semi-annual
Operational Phase				
Report to ADB	Subproject progress report, including section on EMP implementation and monitoring	PMU, PMC	ADB	Semi-annual until PCR

ADB = Asian Development Bank; CEMP = contractor environmental management plan; EMP = environmental management plan; PCR = project completion report; PIU = project implementation unit; PMC = project management consultant; DSC = design and construction supervision consultant; PMU = project management unit.

D. Institutional Arrangement

153. The Department of Finance is the Executing Agency (EA) and TESDA is the Implementing Agency (IA) for the project. The DOF, who will sign the Loan Agreement on behalf of the Philippine government, will be responsible for overall oversight, strategic and policy direction of the project. TESDA, as the implementing agency, will be responsible for implementing the project. It will be accountable for the use of the ADB loan proceeds and for preparing project financial reports. TESDA will also ensure that the project complies with the ADB SPS, the IEE and EMP, and the PEIS System. The Project Management Unit (PMU) to be established for the project will include safeguard specialists who will be supported by a Project Management Consultant (PMC) and Design and Construction Supervision Consultant (DSC), each with safeguards consultants. Each TTI will assign one safeguards focal for EMP implementation supervision. The PMC, on behalf of the TESDA and the PMU, will update the IEE and EMP during detailed engineering design stage. The tendering process shall advocate environmentally responsible procurement by ensuring the inclusion of EMP provisions in the bidding documents and construction contracts. TTIs are tasked to (i) secure required government environmental approvals such as CNC or ECC prior to project implementation; (ii) establish and operationalize the grievance receipt and administration mechanisms at the TTI level, in line with the overall project level grievance redress mechanism; (iii) conduct consultations with internal and external stakeholders; and (iv) provide inputs to DSC on TTI's compliance to ADB's and Philippine's safeguards requirements for submission to PMU, which, through the PMC, will be responsible for consolidating all the reports from TTIs into one consolidated semi-annual safeguards monitoring report.

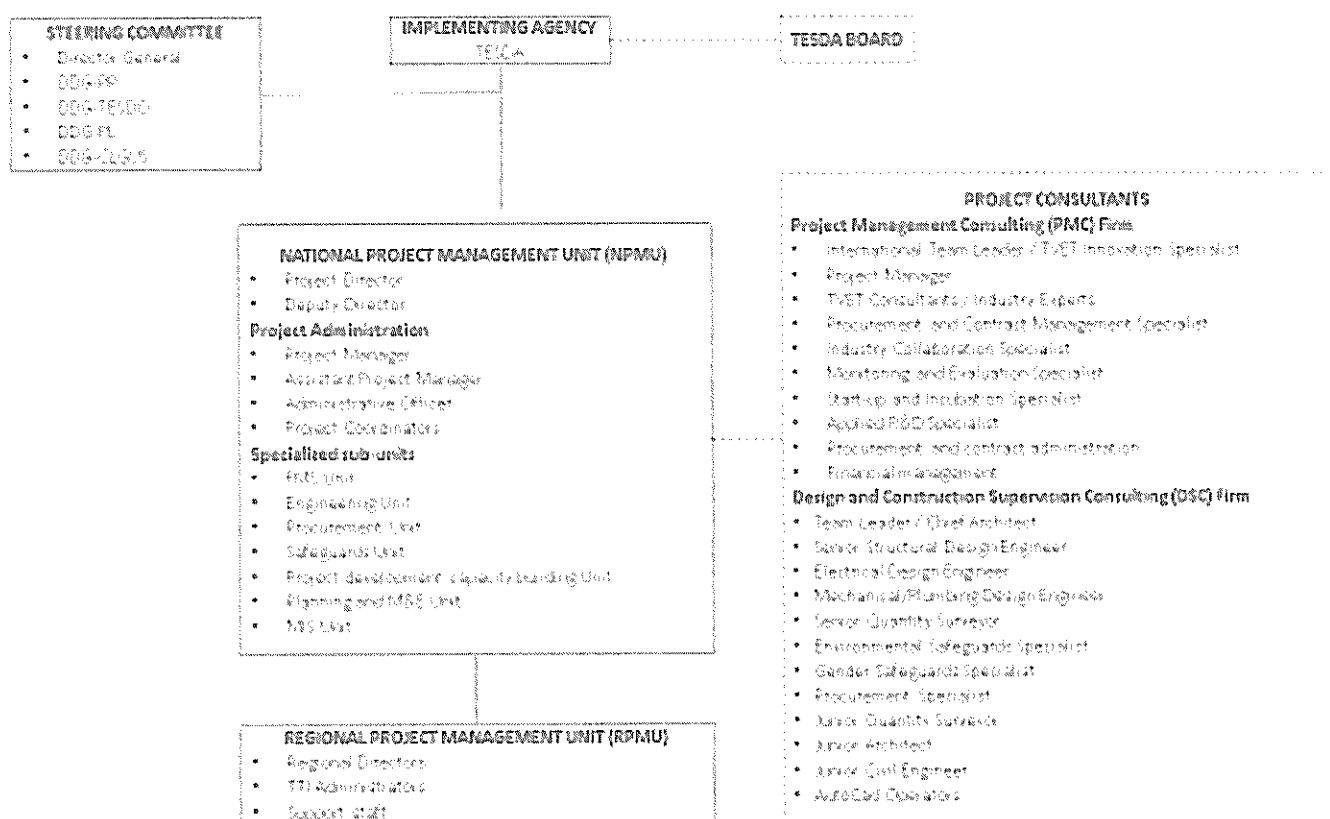
154. Works contractors will assign qualified EHS staff at each construction site to supervise and monitor the EMP and ensure compliance with safeguards requirements of ADB and the

Government of the Philippines. Contractors will be required to prepare and submit their CEMP prior to commencement of works, to be cleared by the DSC.¹⁶

155. Training and/or workshops on environmental management and monitoring requirements shall be programmed by the PMC for PMU, safeguard focals at TTIs, Contractors and other relevant parties. Monitoring of occupational and community health and safety requirements, including COVID-19 risk management, will be prioritized during construction to reduce risks to workers and the community. PMU and safeguard focals at TTIs shall continue the process of public consultation and information disclosure in accordance with the requirements of the SPS and the government rules and regulations during detailed engineering design and construction phases.

156. The Contractor must adhere to the mitigating measures and other requirements in the EMP to ensure that construction will not adversely affect the environment, the community and workers. During operation phase, each regional TTI will be responsible for implementing environmental management measures specified in the EMP. These include management of wastes from activities arising from the courses to be offered and innovations to be introduced in rehabilitated TTI facilities and innovation centers, respectively. These also include other management measures, as detailed in the EMP of the IEE.

Figure 13: Project Management Organization



¹⁶ The CEMP shall include but not necessarily be limited to the following sub-plans: workers' accommodation plan, occupational health and safety plan, emergency response plan, traffic management plan, waste disposal management plan, and demobilization plan.

Table 25: Institutional Arrangement

Responsible Unit	Roles and Responsibilities
ADB	<ul style="list-style-type: none"> • Provide financing, monitor implementation and undertake review missions • Approve procurement activities • Review project implementation twice a year • Disburse grant proceeds to the consultants and the contractors for the project
TESDA Board	<ul style="list-style-type: none"> • Advises the PMO on general policy directions for the project, including ensuring synergy of programs across TVET stakeholder agencies
Steering Committee	<ul style="list-style-type: none"> • Provides overall direction and oversight function to the PMU; and • Makes decisions on matters critical to the implementation of the project
Project Management Unit (NPMU)	<ul style="list-style-type: none"> • Responsible for the overall day-to-day operations of the PMO • Liaise with ADB and relevant NGAs and LGUs to ensure compliance with processes and requirements needed in the implementation of the project • Coordinate with relevant NGAs (DTI, DOST, etc.) to ensure project components and outputs are in sync with Philippine development priorities and action plans; • Coordinate with different project stakeholders; • Coordinate / call on other TESDA offices or organizes technical working groups (TWG) to provide or produce administrative, logistical, technical, financial, and other relevant information and data needed for the project; • Ensure compliance with all applicable laws in the implementation of the project; • Provide guidance and ensure seamless communication and coordination between and among the PMU and the Project Consultants; • Undertake project procurement activities (goods, works and consultancy services) in accordance with the Loan Agreement and ADB Procedures; • Handle project financial managements activities in accordance with ADB Procedures; • Facilitate quarterly, special administrative and midterm reviews of the project; • Prepare and submit regular project implementation reports; • Manage contract administration and negotiations requirement; • Provide regular updates to the Oversight Committee and TESDA Board, as needed; • Elevate critical decision points regarding the project to the Oversight Committee
Project Management Consulting (PMC) Firm	The Firm will ensure that the project management, monitoring and support requirements for the project and the delivery of project outputs will be implemented in compliance with the ADB's Policies and Regulations, Loan Agreement, Project Agreement, project administration manual (PAM), procurement plan, and the GOP's national laws.
Design and Construction Supervision Consulting (DSC) Firm	The Firm will work closely with and assist the PMU in the finalization and approvals of all design work needed for the new construction of selected 16 RTICs and the repair and upgrading of selected TTIs. The Firm will be responsible for the timely completion of the detailed architectural and engineering designs (architectural, structural, electrical, mechanical, plumbing designs) for new construction and repair. The Firm will also conduct asbestos risk assessment for the buildings (or parts thereof) to be rehabilitated or demolished, and to develop an asbestos risk management plan should asbestos be identified.
Contractor	Each Contractor will be required to hold a valid Philippine Contractors Accreditation Board license and will appoint a qualified Environment, Health and Safety (EHS) officer to supervise construction works in compliance with the EMP and the Philippine regulatory and policy framework for EHS.

E. Environmental Management Plan

157. The EMP for the project includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates and performance indicators. The Contractor must adhere to the mitigating measures and other requirements in the EMP to ensure that construction will not adversely affect the environment, the community and workers. In addition, the Contractor will prepare the following detailed CEMP:

workers' accommodation plan, occupational health and safety plan, emergency response plan, traffic management plan, waste disposal management plan, and demobilization plan. Key responsibilities for EMP implementation and details of the EMP are detailed below.

Table 26: Key Responsibilities for EMP Implementation

Entity	Key Responsibilities
TESDA	<ul style="list-style-type: none"> • Ensure that staff of TESDA are aware of and comply with the Government regulations and requirements on environmental management, permits, reporting, and monitoring. • Liaise with DENR to facilitate the securing of ECCs / CNCs. • Comply with the safeguard related provisions with the project Loan Agreement, Project Administration Manual, and Initial Environmental Examination and Environmental Management Plan
Project Management Unit	<ul style="list-style-type: none"> • Ensure compliance with loan covenants and ADB SPS (2009) • Coordinate with TTI regional offices in the review and approval of the design and contract awards • Ensure that the project design conforms with international standards for TVET • Ensure that the EMP is included in the bid and contract documents with the Contractor • Liaise with the Regional Office to monitor implementation of the EMP by the Contractor • Prepare semi-annual environment monitoring reports on EMP implementation to ADB. • Coordinate the securing of licenses and permits and ensure that Contractors will implement the environmental management plan (EMP) of the project • Provide relevant information on the operation and environmental performance of the existing TTI facilities that includes DENR permits (ECC or CNC and other applicable permits) monitoring reports, and facility layout. • For TTIs that will be rehabilitated, Safeguards Focal of each TTI to complete the Environmental Performance Report and Management Plan (EPRMP) as required in securing the Environmental Compliance Certificate (ECC) amendment from the Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB) regional office • For TTIs not covered by the Philippine EIS System, Safeguards Focal of each TTI to secure Certificate of Non-coverage (CNC) from the DENR-EMB regional office • Ensure the implementation of EMP and reporting of its compliance is being followed by the Contractor • Establish and disseminate the GRM to TESDA regional office and local government, including contact details of authorized person to receive complaints • Address environment-related concerns through the Grievance Redress Mechanism (GRM) set-up for the project
Project Management Consulting Firm	<ul style="list-style-type: none"> • Support PMU in the project implementation. • Ensure compliance with loan covenants and ADB SPS (2009) • The environment safeguards specialist under the PMC to develop a capacity building program in environmental assessment and management to train and provide capacity support to TESDA, PMU, and Contractors
Design and Construction Supervision Consulting (DSC) Firm	<ul style="list-style-type: none"> • The Firm will be responsible for the incorporation of the climate resilient design in architectural and engineering designs (architectural, structural, electrical, mechanical, plumbing designs) for new construction and repair • Screening of asbestos risks of facilities to be demolished and rehabilitated and develop asbestos risk management plan • Assign an environment, health and safety officer who will supervise the work of the Contractor in completing the EPRMP / PD as required in securing the ECC amendment / CNC from the DENR-EMB regional office • Ensure compliance with loan covenants and ADB SPS (2009). • Ensure the construction of facilities conforms with the approved building design • Ensure the implementation of EMP and reporting of its compliance is being followed by the Contractor • Review the environment monitoring reports submitted by the Contractor prior to submission to PMU of TESDA
Contractors	<ul style="list-style-type: none"> • Ensure compliance with relevant design standards for TVET facilities based on the National Building Code, international standards and other related TESDA administrative orders, circulars, and guidelines.

Entity	Key Responsibilities
	<ul style="list-style-type: none"> • Secure the ECC (or ECC Addendum) or CNC from the concerned DENR-EMB regional office in coordination with the RPMU. • Secure the Building Permit, Sanitary Permit, Electrical Permit, and other clearances from the local government prior to start of construction works. • Implement the asbestos risk management plan developed by DSC Firm • Secure the Fire Safety Evaluation Clearance from the city/municipal Fire Marshal prior to start of construction. • Conduct air, water, and noise monitoring during construction phase. • Prepare the requirements for the requisite permits in close coordination with the TTI. • Assign qualified EHS staff at the construction site to supervise and monitor the EMP • Secure a Fire Safety Inspection Certificate from the city/municipal Fire Marshal. • Secure an Occupancy Permit from the local government • Submit a completion report with as-built drawings to TESDA regional office during turn-over.

ADB = Asian Development Bank, CNC = Certificate of Non-coverage, DENR = Department of Environment and Natural Resources, ECC = environment compliance certificate, EHS = environment, health and safety, EMB = Environmental Management Bureau, EMP = environmental management plan, EPRMP = Environmental Performance Report and Management Plan, GRM = Grievance Redress Mechanism, NPMU = National Project Management Unit, PCO = Pollution Control Officer, PTC = Permit to Construct, RPMU = Regional Project Management Unit, SPS = Safeguard Policy Statement, TESDA = Technical Education and Skills Development Authority, TTI = TESDA technology institutions, TVET = Technical and Vocational Education and Training.

Source: Asian Development Bank.

Table 27: Environmental Management Plan

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
Pre-construction Phase					
Preparation of plans and requirements to secure licenses and permits	Impact on commencement of construction activities	<ul style="list-style-type: none">Obtain all clearances, licenses or permits required for the proposed innovation centers and rehabilitation of TTIs prior to commencing construction in accordance with relevant Philippine government regulations on building structures, environment clearances, and local permits, respectivelyEnsure all designs conform with the National Building Code of the PhilippinesEnsure all licenses and permits have been secured prior to construction workPrepare the following Contractor's Environmental Management Plan (CEMP):<ul style="list-style-type: none">Workers' accommodation planOccupational health and safety planEmergency response planTraffic management planWaste disposal management planDemobilization plan	DSC Firm / TTI / Contractor	TESDA / City or Municipal Engineering Offices of LGUs	Operational budget of TESDA
Social Preparation	Community Impact	<ul style="list-style-type: none">Establish Grievance Redress MechanismConduct Traffic Impact AssessmentCapacity building of Safeguards Focal on SPS 2009 and environmental management plan and grievance redress mechanism implementationConsult with stakeholders	Safeguards Focal of TTI / PMU	TESDA	Operational budget of TESDA
Detailed Design	Impact of climate change and natural hazards on location of innovation center, resources and people	<ul style="list-style-type: none">Incorporation of natural hazard and climate resilient design (e.g., increasing building elevation, increasing drainage capacity, building rainwater harvesting facilities) to minimize impact of natural hazards and climate changeIncorporation of environment-friendly design such as use of natural light, water conservation, solid waste recycling, and energy conservation through use of solar powerIncorporate design that will facilitate easy access for differently abled people in compliance with applicable government regulations	DSC Firm / Contractor	PMC Firm / PMU TESDA	Part of detailed design cost
	Conformity of the project to land use plan	<ul style="list-style-type: none">The innovation centers are within the compound of the TTIs			

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
Flora and fauna survey	Impacts of hazardous wastes from buildings to be demolished	<ul style="list-style-type: none"> DSC Firm to thoroughly inspect and assess existing facilities to be demolished or rehabilitated to verify the presence of any friable asbestos containing materials, or non-friable asbestos containing materials that have become friable prior to commencement of any demolition activity. DSC Firm to prepare asbestos risk management plan, as required. Ensure that the design of the RTIC buildings prone to geologic hazards incorporate resiliency against earthquake, earthquake-induced landslides, and volcanic eruptions 			
	Geologic hazards				
	Loss of flora and fauna species	<ul style="list-style-type: none"> Coordinate with the nearest Community, Environment and Natural Resources Office (CENRO) for RTIC that will be constructed near protected areas and key biodiversity areas to determine appropriate mitigating measures Secure tree cutting permit from CENRO and implement management measures in the issued Permit to Cut Trees Schedule cutting of trees progressively so as not to expose soil for long period. Contractor will be responsible for transport and disposal of biomass wastes from cut trees Catching of animals will be prohibited Strip the topsoil at a depth to the bottom of the grassroots zones from any areas to be covered by pavement, structures or where utilities will be located, to be used later for revegetation Grass shall be stripped together with topsoil, which will be used later for revegetation of RTIC building compound 	Safeguards Focal of TTI / Contractor	PMU / TESDA	Operational budget of TESDA
Geologic hazards and climate change assessment	Vulnerability to natural hazards and climate change impacts	<ul style="list-style-type: none"> Detailed design will consider hazards from earthquake, tsunami, volcano and flooding Design properly the drainage system for the project to prevent flooding 	DSC / Contractor	PMC Firm / PMU / TESDA	Operational budget of TESDA
Construction Phase					
Mobilization of construction materials and heavy equipment	Disturbance of land and soil condition	<ul style="list-style-type: none"> Limit the amount of erosion and sediment by disturbing only the areas necessary for construction, phasing of construction activity Lessen the grade of steep slopes 	Contractor	DSC Firm / PMU / TESDA	Incorporated in environmental mitigations allocation of construction

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
		<ul style="list-style-type: none"> • Cover exposed soils until time of revegetation or building of innovation centers • Schedule construction activities during fair weather to prevent soil erosion • Use of appropriate sedimentation and soil erosion and control devices (sediment traps or silt fences). • Cover stockpiles of soil removed during construction • Limit storage of construction materials to paved parking lots or inactive areas within existing building or temporary shed • Park construction machineries in paved areas • Drivers to observe speed limit to reduce soil disturbance 			contract of (contract civil works)
	Impact on surface water quality	<ul style="list-style-type: none"> • Ensure that the wheels of vehicles transporting aggregates and other materials are thoroughly washed to prevent sediment runoff going to nearest body of water • Provide portable toilets to manage wastewater from workers who stays in construction camp • Contractor through third party service provider or through coordination with local government unit, will be responsible for the operation, maintenance and disposal and treatment of collected wastes from portable toilets • Segregate and pre-treat oil and grease containing effluent using grease trap prior to discharge • Minimize erosion from exposed soil, construct silt traps, interceptor drains and sedimentation pits around work areas and camp site • Clean construction vehicles within paved surfaces to lessen contamination of soil and groundwater • The contractor will be responsible for compliance with DENR's Clean Water Act and WB – IFC EHS Guidelines on wastewater discharge standard. 	Contractor	DSC Firm / PMU / TESDA	Incorporated in environmental mitigation allocation of construction contract (contract of civil works)
	Impact from generation of solid and hazardous wastes.	<p>General non-hazardous wastes:</p> <ul style="list-style-type: none"> • Contractor must implement a waste management plan as part of Contractor's Environmental Management Plan (CEMP) • Ensure to put up waste collection points for construction, hazardous, non-hazardous and domestic solid wastes • Install garbage receptacles at worker camp and construction area 	Contractor / Approved service provider	DSC Firm / PMU / TESDA	Incorporated in environmental mitigation allocation of construction contract (contract of civil works)

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
		<ul style="list-style-type: none"> • Coordinate with local government unit or private contractor for the collection, treatment and disposal of wastes • Coordinate with local government units where TTIs are located for the management of wastes • Segregate solid wastes into biodegradable, recyclable, residual and hazardous wastes • Separate construction wastes (consisting of concrete and rubble, steel rods, damaged formworks, paper) that can be recycled • The contractor will be responsible for compliance with the Ecological Solid Waste Management Act of 2000 and WB – IFC EHS Guidelines on waste management <p>Hazardous wastes</p> <ul style="list-style-type: none"> • Ensure compliance with Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 and WB - IFC Environment, Health and Safety Guidelines (2007) on hazardous waste storage, transportation and treatment and disposal • For asbestos, works contractor to implement asbestos risk management plan developed by DSC Firm. These shall be implemented by qualified experts only. • Store hazardous wastes generated during construction of innovation centers and rehabilitation of TTIs, which include fuel and chemicals, among others, to prevent or control accidental releases to air, soil and water resources • Physical separation or use closed containers for hazardous wastes, away from direct sunlight, wind and rain. • Provide adequate ventilation where volatile wastes are stored • Conduct on-site and off-site transportation of waste to prevent or minimize spills, releases, and exposures to workers and the public • In case of third-party hazardous waste transporter, employees involved in the transportation of hazardous materials should be trained regarding proper shipping procedures and emergency procedures 			

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
	Increase in the level of air pollutants and noise	<ul style="list-style-type: none"> • Ensure that the wheels of vehicles transporting aggregates and other materials are thoroughly washed • Cover material piles during high wind condition • Impose speed limit within the TTI compound to lessen disturbance of soil • Ensure that contractors' vehicles meet the regulatory requirement on air quality • Water exposed soil to prevent suspension of particulate matter • Cover construction materials to prevent erosion and dispersion of materials • Apply water to minimize dust from vehicle movements • Train drivers on good driving practices, including driving within safe speed limits and measured acceleration to prevent to lessen dust • Ensure that all air emission licenses and permits of construction machineries and equipment are updated • Implement a regular vehicle maintenance and repair program. The Contractor will ensure to comply with Philippine Clean Air Act or WB – IFC EHS Guidelines 2007 on air quality standards, whichever is stricter • Comply with the Environmental Quality Standards for Noise in General Areas (National Pollution Control Commission, 1980) or WB – IFC EHS Guideline on Noise. • Monitor air quality standards and noise, together with other parameters, quarterly, to ensure compliance • Contain the pollutants by fencing off the construction site • Require exposed workers to wear appropriate personal protective equipment (PPE) such as masks and goggles • For workers exposed to excessive noise, wear hearing protection and for a limited exposure time only • Implement timing of operation that avoids sensitive hours, shielding of noise sources, and proper maintenance and operation of equipment • Restrict work between 8:00 AM and 5:00 PM • Schedule classes and activities in TTI buildings not directly affected by the construction activities in the innovation centers • Prohibit workers from open burning of wastes. 	Contractor / Approved service provider	DSC Firm / PMU / TESDA	Incorporated in environmental mitigation allocation of construction contract (contract of civil works)

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
	Impacts from transportation of construction materials and wastes	<ul style="list-style-type: none"> • Prepare and implement traffic management plan as part of the Contractor's EMP, in coordination with the Traffic Management Office of the local government unit where TTI is located, to manage the traffic in the area • Traffic management plan to include driving policy, roles and responsibilities of drivers, workers and management, traffic management procedures, site layout and traffic flow pattern and schedule, road safety rules, training and vehicle inspection registries, road safety records and incident reports, and performance reports • Set speed limit for all construction vehicles and install traffic warning signs within the project site • Conduct regular orientation and capacity building on safe driving for drivers and workers • Regular vehicle maintenance and use of genuine parts to prevent malfunction that may lead to accident • Put up warning and informatory signs along the routes of construction vehicles • Prior coordination with the affected stakeholders, specifically with barangays where construction vehicles will pass through, prior to commencement of construction. 	Contractor	DSC Firm / PMU / TESDA	Incorporated in environmental mitigations allocation of construction contract (contract of civil works)
Hiring and mobilization of workers	Occupational health and safety of workers	<ul style="list-style-type: none"> • Prepare and implement occupational health and safety plan as part of the CEMP. Such plan shall also include a COVID-19 risk management protocol to address COVID-19 risks to workers and nearby community. • Avoid forced labor and child labor (Contractor, subcontractors, and supply chain) as per ADB's SPS, 2009 and Philippine law • Inform workers regarding access to Grievances Redress Mechanisms (GRM) • No worker should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection • No unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C) • Lessen impact of vibration through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure. • Require workers with high exposure to hazards to wear personal protective equipment (PPE) such as face and eye protection device with side shields, welder goggles for 	Contractor	DSC Firm / PMU / TESDA	Incorporated in environmental mitigations allocation of construction contract (contract of civil works)

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
		<p>welding and hot works, gloves, facemasks with appropriate filters for dust removal, plastic helmets with top and side protection, body suits, and safety shoes and boots</p> <ul style="list-style-type: none"> • Implement fall prevention and protection measures for workers exposed to falling hazard • Install guard rails, proper use of ladders and scaffolds, and use of fall prevention devices such as safety belt • Provide first aid attendant for the project as well as medical kit to treat workers' injuries and illnesses prior to transportation to hospital. • Train workers in the use of MSDS of chemicals used in the construction site, safe work practices, and appropriate use of PPE to mitigate exposure from chemical hazards • Implement the asbestos risk management plan developed by DSC Firm. Only workers with necessary qualifications and experience shall implement the plan. • Store flammables away from entry and exit points of buildings, and storage area should have natural floor and ceiling level ventilation • Install fire extinguishers in workers' camp and in construction site • Ensure and enforce hygiene among workers and to allow sick workers not to continue working in the construction site • Observe COVID 19 health protocols as mandated by the Inter-agency Task Force on COVID 19 and the Department of Health • Breeding grounds of vectors such as mosquitoes should be kept free from stagnant water • Ensure cleanliness to keep away pests • Provide emergency and health services on site to address worker's injury and illness, including access to ambulance and medical services from nearby hospitals 			
	Community and safety	<ul style="list-style-type: none"> • Fence the perimeter of the construction site, install signages, assign guards at entrance and exit, and inform the stakeholders (internal and external) through regular consultations • Ensure that there are no hazardous conditions inside the project site such as open excavation and unstable piles. • Prioritize and promote traffic safety during construction phase when project equipment and machineries were utilized that may impact the safety and health of the public 	Contractor	DSC Firm / PMU / TESDA	Incorporated in environmental mitigation allocation of construction contract (contract of civil works)

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
Operation of innovation center		<ul style="list-style-type: none"> Hire professional licensed drivers and train them on safe driving Limit the duration of trips to avoid overtiredness Maintain vehicles regularly Cover trucks carrying construction materials to prevent dispersion of dust during transport Prepare and implement emergency response plan health as part of the CEMP to primarily assist staff and emergency response teams during real life emergency that may also affect the community 			
	Operation Phase				
	Management of solid wastes,	<ul style="list-style-type: none"> Engage solid waste management service to manage the cleaning of facilities, and collection of wastes All domestic wastes must be collected, segregated, and transported to common solid waste management facility Transport collected wastes will by a licensed collection / treatment company to materials recovery facility and finally, at the disposal facility 	TTI	TESDA	Yearly maintenance cost of building including fire protection and waste management is estimated 2% of the total building cost. The budgeted to be included in operations and maintenance budget of the TTI
	Management of wastewater	<ul style="list-style-type: none"> Install a wastewater treatment system that will meet the effluent standard of Clean Water Act and WB-IFC EHS Guidelines Monitor effluent standard for water following Clean Water Act and WB-IFC EHS Guidelines 	TTI	TESDA	
	Traffic Management	<ul style="list-style-type: none"> Coordinate with the Traffic Management Office of the local government unit where TTI is located, to manage the traffic within the vicinity of TTI Orient drivers on driving policy and road safety rules Install traffic management signs inside TTI such as speed limit, pedestrian crossing and parking spaces 	TTI	TESDA	
	Occupational health and safety	<ul style="list-style-type: none"> Prepare and implement occupational health and safety plan for innovation center Adopt COVID-19 protocols as provided by the Department of Health and Inter-agency Task Force for the Management of Emerging Infectious Diseases Inform workers regarding access to Grievances Redress Mechanisms (GRM) Require students who are exposed to hazardous course-related activities to wear appropriate PPE such as face and eye protection device with side shields, welder goggles for 	TTI	TESDA	

Project Activities	Environmental Impacts	Mitigation Measures	Responsibility		Budget Source
			Implementation	Monitoring	
		welding and hot works, gloves, and facemasks with appropriate filters for dust removal • Provide first aid kit to treat minor injuries and illnesses • Install fire extinguishers in designated sites			

Table 28. Environmental Monitoring Plan

Environmental Indicators	Parameters	Location	Methodology	Frequency	Standard	Responsibility		Budget Source
						Implementation	Monitoring	
General impact	Licenses and permits, social preparation, detailed engineering design	TTI in 17 regions	Fieldwork, community consultation, prepare detailed engineering design, coordination with utility companies	Once, prior to construction phase		DSC Firm / TTI / Contractor	PMU	Operational budget of TESDA
Flora and fauna	Species, volume of yard wastes generated	TTI in 17 regions	Survey and marking of affected trees	Once, prior to construction phase		TTI	PMU / CENRO	Operational budget of TESDA
Air quality	SO ₂ (1 hour) CO (1 hour) NO ₂ (1 hour) PM _{2.5} (24 hours) TSP (24 hours) Average dB(A)	TTI in 17 regions	Field works with analysis approved by DENR	Semi-annual during construction	Philippine Clean Air Act of 1999	DSC	PMU / EMB - DENR	DSC budget
Noise level		TTI in 17 regions	Field works with analysis approved by DENR	Semi-annual during construction	World Bank – IFC EHS Guidelines	DSC	RPMU / EMB - DENR	DSC budget
Surface water quality	pH, temperature, color, BOD ₅ , DO, oil and grease, TSS, nitrate, phosphate, ammonia, surfactant (MBAS), fecal coliform, total coliform	Receiving body of water of TTI in 17 regions	Field works with analysis approved by DENR	Semi-annual during construction	Philippine Clean Water Act of 2004 / DENR Administrative Order No. 08, series of 2016 (Water Quality Guidelines and General Effluent	DSC	RPMU / EMB - DENR	DSC budget

Environmental Indicators	Parameters	Location	Methodology	Frequency	Standard	Responsibility		Budget Source
						Implementation	Monitoring	
					Standards of 2016)			
Wastewater quality	pH, temperature, color, BODs, DO, oil and grease, TSS, nitrate, phosphate, ammonia, surfactant (MBAS), fecal coliform, total coliform	Construction site and workers camp	Field works with analysis approved by DENR	Semi-annual during construction	Philippine Clean Water Act of 2004 / DENR Administrative Order No. 08, series of 2016 (Water Quality Guidelines and General Effluent Standards of 2016)	DSC	RPMU / EMB - DENR	DSC budget
Solid waste	Domestic waste segregated, collected and disposed in disposal site; Hazardous waste collected, transported and treated in accredited facility	Location of demolished buildings; Construction site and workers camp	Screening for hazardous wastes and asbestos; Visual observation	Prior to construction phase for hazardous wastes; Monthly	Republic Act 6969; DENR Administrative Order 2000 – 02 for asbestos; Ecological Solid Waste Management Act of 2000	Contractor	DSC	DSC Budget
Occupational health and safety	Space allocated per person, supply of safe water, adequate sewage and garbage disposal system, accommodation, sanitary and washing facilities, ventilation, provision for cooking, and storage facilities	Workers' camp	Observation	Daily	Republic Act 11058 (Occupational Safety and Health Standards)	Contractor	DSC	DSC Budget
	Near misses, incidents, or accidents resulting in injuries and emergency response	Workers' camp	Observation	Daily	Republic Act 11058 (Occupational Safety and Health Standards)	Contractor	DSC	DSC Budget

Environmental Indicators	Parameters	Location	Methodology	Frequency	Standard	Responsibility		Budget Source
						Implementation	Monitoring	
	Dust mitigation, noise and vibration levels, stagnant water	Workers' camp	Observation	Daily	Republic Act 11058 (Occupational Safety and Health Standards)	Contractor	DSC	DSC Budget
Community health and safety	Access to the site and dangerous conditions - fencing the perimeter of the construction site, installation of signages, assigning guards at entrance and exit, and informing public through consultation No hazardous conditions - open excavation and unstable piles Traffic incidents and accidents	Construction site	Observation	Daily	World Bank – IFC EHS Guidelines	Contractor	DSC	DSC Budget
Operation Phase								
Solid waste	Domestic waste segregated, collected and disposed in disposal site; Hazardous waste, including infectious wastes collected, transported and treated in accredited facility	TTI in 17 regions	Observation	Annual	Republic Act 6969; Ecological Solid Waste Management Act of 2000	TTI	EMB - DENR	TESDA budget
Wastewater quality	pH, temperature, color, BODs, DO, oil and grease, TSS, nitrate, phosphate, ammonia, surfactant	TTI in 17 regions	Field works with analysis approved by DENR	Annual	Philippine Clean Water Act of 2004 / DENR Administrative Order No. 08,	TTI	EMB - DENR	TESDA budget

Environmental Indicators	Parameters	Location	Methodology	Frequency	Standard	Responsibility		Budget Source
						Implementation	Monitoring	
	(MBAS), fecal coliform, total coliform				series of 2016 (Water Quality Guidelines and General Effluent Standards of 2016)			
Traffic	Traffic incidents and accidents	TTI in 17 regions	Observation	Annual	Republic Act 4136 (Land Transportation and Traffic Code)	TTI	DOTR / Local Government Unit	LGU budget
Occupational health and safety	Space allocated per person, supply of safe water, adequate sewage and garbage disposal system, sanitary facilities, lighting and ventilation	TTI in 17 regions	Observation	Annual	Republic Act 11058 (Occupational Safety and Health Standards)	TTI	TESDA	TESDA budget

VIII. CONCLUSION AND RECOMMENDATION

158. The results of the initial evaluation for the rehabilitation of TTIs and construction of innovation centers in the 17 regions, show that based on the preliminary design, location and environmental conditions, the anticipated environmental impacts will be primarily related to geologic hazards, natural hazards, flooding risks, climate change impacts and impacts on biodiversity and loss of trees. Construction phase impacts are considered typical for similar buildings, and mainly involved disturbance of land and soil condition, generation of wastes from rehabilitated TTIs and construction of innovation centers, and impact on air quality and noise level, surface water quality, loss of vegetation, reduced water supply from ground water, temporary disturbance of access, increased level of use of water, increased level of vehicle traffic, and health and safety of workers and the community. During operation, major impacts include climate change while medium for generation of solid wastes from TVET activities, potential deterioration of water quality, additional strain to existing water resource, traffic generation, increase in level of particulate matter, deterioration of water quality, reduced water supply from groundwater, and risks of students and workers from handling equipment.

159. Mitigating measures were proposed and incorporated in the environmental management plan to lessen the identified risks. Stakeholders from TESDA were favorable of the project since the expected benefits far outweighed the anticipated impacts. Overall, the project is expected to bring beneficial impacts to TTIs in the 17 regions on a wider scale in terms of enhancing the quality of vocational education in the Philippines.

Region II – Cagayan



APPENDIX 3: FLOOD HAZARDS

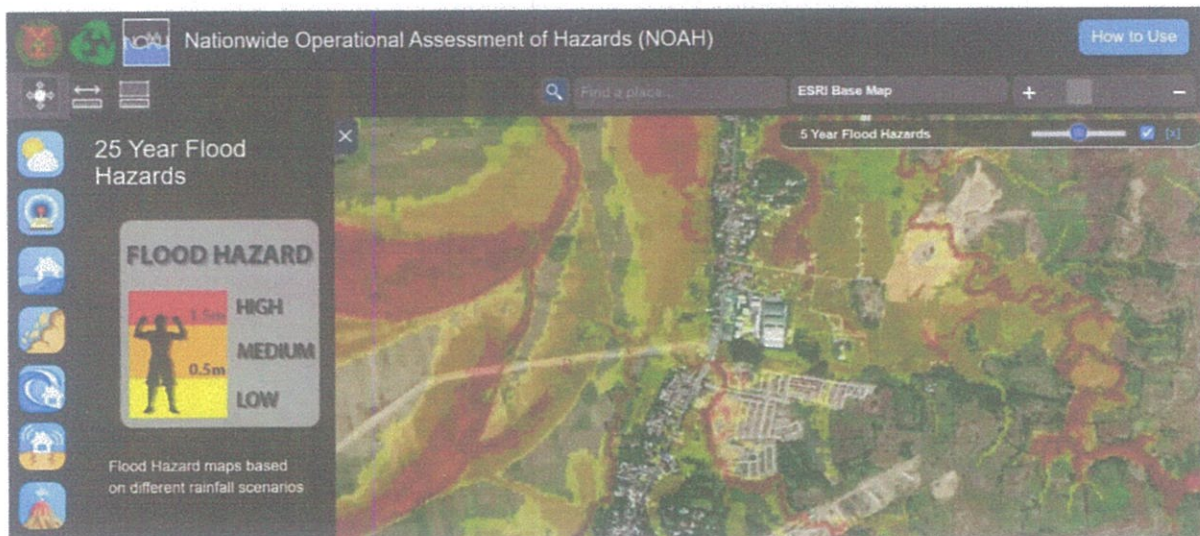


Figure 3. Regional Training Center Tuguegarao - 5-year flood hazards (low to medium, <0.5 m to 1.5m)

**APPENDIX 4: PROTECTED AREAS AND KEY BIODIVERSITY AREAS NEAR THE
SELECT TTIs USING INTEGRATED BIODIVERSITY ASSESSMENT TOOL (IBAT)**

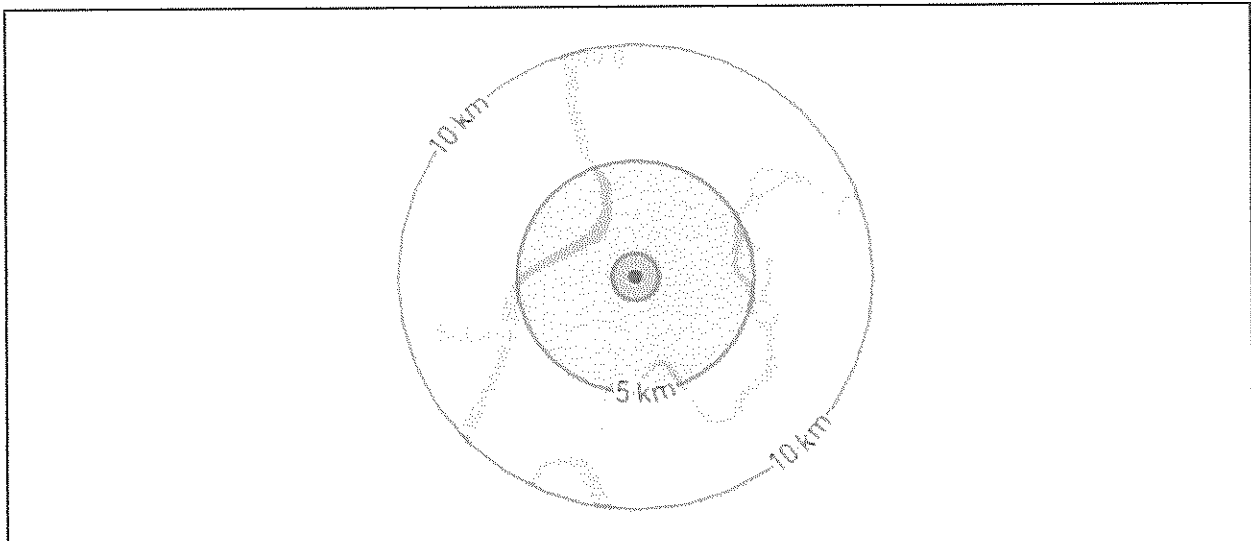


Figure 2. Regional Training Center – Tuguegarao

ANNEX H

MINIMUM REQUIREMENTS FOR REHABILITATION /RENOVATION WORKS

Section 6: Employers Requirements

ANNEX H - Minimum Requirements for Rehabilitation / Renovation Works

Design and Build of SIPTVETS-RTIC with Rehabilitation Works in RTC-Tuguegarao, Cagayan

Location: Existing Buildings, Structures and Select Rooms *within RTC-Tuguegarao, Cagayan*

The contractor shall also inspect the existing structures/building around the TESDA site, provide the as-built plans, design and rehabilitate in accordance with the latest building codes and provisions to ensure the safety and comfort of the users.

The repair works of TESDA Technology Institutions (TTIs) cover improvement of dilapidated architectural members, major structural retrofitting or general rehabilitation works. Some TTIs include upgrading of existing water supply system, drainage and sewerage system to meet environmental, electrical and safety requirements.

The contractor is expected to provide all the necessary proposal to complete the design, ready for use, occupancy and complying with the latest Philippine Codes and Laws.

GENERAL ITEMS TO CONSIDER
Inspection, Site Verification, As-Built
Structural Integrity (Major and Minor Repairs)
Rehabilitation of Plumbing & Drainage
Rehabilitation and Improvement of Electrical and Wirings
Improvement / Rehabilitation of Airconditioning/Ventilation
Improvement / Replacement of Fire Suppression / Protection
Rehabilitation / Replacement of Roofing, Insulation / Thermal Protection
Re-Painting Works
Refurbishment / Replacement of Dilapidated Doors & Windows
Improvement of Access Roads / Pavement & Walkways

NOTE:

Contractor/Bidder can add and amend items needed to complete the project, ready for use, occupancy and to be code-compliant.

Contractor/ Bidder to submit DETAILED COST ESTIMATE, Derivation of UNIT COST/ UNIT COST PRICE ANALYSIS.